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User's Manual

# CKT3530 Series

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Insulation Resistance Meter

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## Introduction

Thank you for purchasing CKT3530 series insulation resistance meter. To obtain maximum performance from this product, please read this manual first before operation, and keep it handy for future reference

### **Registered trademarks**

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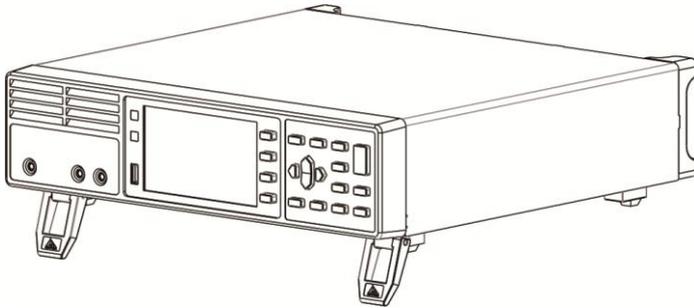
## Checking Packing Contents

When receiving instrument, please check carefully to ensure that the instrument is not damaged during transit. In addition, special inspections of accessories, panel switches and connectors are required. If the instrument is found to be damaged or it fails to operate as described in the user manual, please contact us.

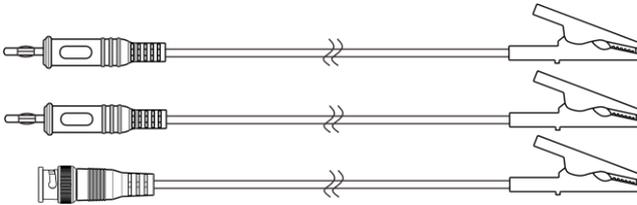
To transport this instrument, use the original packaging and wrap it in a double carton. Damage during transit is not covered by the warranty.

**Check packing list:**

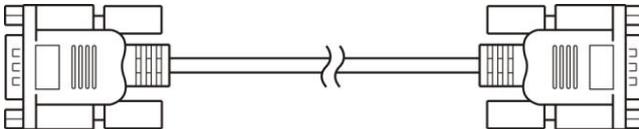
	Item	Qty
1	CKT3530/CKT3530A Insulation Resistance Meter	1
2	Test Leads	1
3	RS232 Communication Cable	1
4	AC Power Cord	1



3530 Insulation Resistance Meter



Test Leads



9800 RS232 Communication Cable

## Safety Notes

The instrument is designed to comply with the IEC 61010 safety standard and has been thoroughly tested for safety prior to shipment. However, if it is used improperly, it may cause injury or death and damage the instrument. Be sure to read through this manual and its precautions before use. Our company does not assume any responsibility for accidents and injuries caused by defects in the instrument itself.

## Safety Signs

This manual marks the relevant signs for safe operation of the instrument. In order to ensure the safety of the instrument and its users, please read the following safety signs and operating precautions carefully before use.

	The sign in this manual is particularly important and should be read carefully before using the machine. This sign means that users must check corresponding theme in the manual before using the corresponding function.
	Stands for DC (Direct Current).
	Stands for fuse
	Stands for ground terminal

The following symbols in the manual indicate important notes and warnings.

	Indicates improper operation, extremely dangerous, can cause serious injury or death to users.
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	Indicates improper operation, very dangerous, can cause serious injury or death to users.
	Indicates improper operation may cause user injury or damage to the instrument
Notes	Indicates recommendations related to instrument performance or normal operating methods

## Accuracy

We use f.s. (full range), rdg. (reading) and dgt. (resolution) values to define the measurement tolerances, which have the following meanings:  
f.s. (Maximum display value or measurement range)

This is usually the maximum display value. In the instrument, this indicates the currently used range.

rdg. (Reading or displayed value)

The value currently being measured and the value indicated on the measuring instrument.

dgt. (Resolution)

The smallest displayable unit on a digital measuring instrument, i.e., the input value that causes the digital display to show "1" .

## Usage Notes

### Installation Environment

- Operating temperature and humidity:  
0 to 40 ° C, below 80% RH (no condensation)
- Temperature and humidity range that can ensure accuracy:  
23 ± 5°C, below 80%RH (no condensation)
- To avoid malfunction or damage to the instrument, do not place the tester in the following situations:
- Places where the sun is shining directly at high temperatures
- It will splash to the place where the liquid temperature is high and condensation occurs.
- Exposed to dusty places
- Locations where corrosive or explosive gases are flooded
- Locations with strong electromagnetic fields and electromagnetic radiation
- Places where mechanical vibration is frequent

## Checking before Use

Before using this instrument, verify that the operation is normal and that there is no damage during storage or transportation. If find any damage, please contact us.

 <b>WARNING</b>	Before using the instrument, make sure that the AC power cord and test leads are well insulated and whether there are conductors are exposed. If a similar situation occurs, there is a danger of electric shock when using this instrument. Please contact us.
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 <b>DANGER</b>	There are high pressure and high temperature parts inside the instrument during operation, in order to avoid electric shock, do not disassemble instrument electronic enclosure.
 <b>CAUTION</b>	To avoid damage to the instrument, physical shock should prevented when handling and operating the instrument. Special care should be taken to prevent the instrument from falling.
 <b>NOTE</b>	Be sure to turn the power off after using it.

## Measurement Considerations

 <b>DANGER</b>	To avoid electric shock and short circuit, the following procedures must be followed: Do not wet the instrument or use wet hands for operating it, otherwise, an electric shock may result. Do not modify, disassemble or repair it yourself, otherwise, it may cause fire, electric shock or injury.
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- Do not place device on an unstable pedestal or tilted place. Failure to do so may cause injury or malfunction of the device due to falling or overturning.
- To prevent damage to the instrument, avoid vibration and collision during moving and use. Pay particular attention to collisions caused by falling.
- To avoid damage to the instrument, do not connect the measurement terminal to the REMOTE. I/O terminal and communication terminal.

## Handling Leads and Cables

 <b>DANGER</b>	In order to prevent electric shock accidents, please do not short-circuit the top of the test leads and voltage-bearing lines.
 <b>CAUTION</b>	<ul style="list-style-type: none"><li>• When testing, for your safety, please use the instrument's own test leads option.</li><li>• To avoid damaging test leads, do not bend or stretch the test leads.</li><li>• To avoid damage to the test leads, do not take the cables while you are plugging or unplugging the test leads, hold the connectors.</li></ul>

# Chapter 1 Overview

## 1.1 Introduction

CKT3530 series is insulation resistance tester controlled by high-performance microprocessor. 7 ranges test, output voltage is continuously adjustable, resistance of  $500\Omega \sim 9.9 \times 10^9 \Omega$  can be tested, the maximum display is 99999, the test speed can reach 5 times/second.

The instrument has a professional sorting function, with 10 sets of stored data, a variety of sorting beep settings, equipped with a Handler interface, used in automatic sorting system to complete fully automatic pipeline testing. Built-in RS232 interface and LAN interface for remote control and data collection and analysis.

Computer remote control commands are compatible with SCPI (Standard Command for Programmable Instrument standard command set), which can efficiently complete remote control and data collection functions.

CKT3530 series can measure the insulation resistance and leakage current of various electronic components, equipment, dielectric materials, wires and cables, etc.; the matching electrode box can test the surface resistance and volume resistivity of the material.

## 1.2 Characteristics

### Exterior

- 4.3-inch high-resolution TFT LCD display, easy to operate
- Compact and powerful

### Excellent test performance

- Readback voltage accuracy  $0.5\% \pm 1V$
- Insulation resistance maximum accuracy 1%

#### Quick Measurement

- The minimum test period is only 200ms

### Constant pressure test

- Adopt constant voltage test method to quickly measure insulation resistance

#### Rich interface

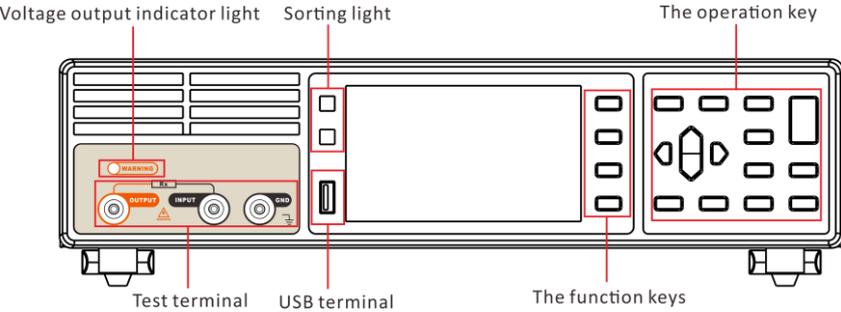
- Handler Interface
- RS-232 interface
- Ethernet interface
- U-disk interface

#### Powered by

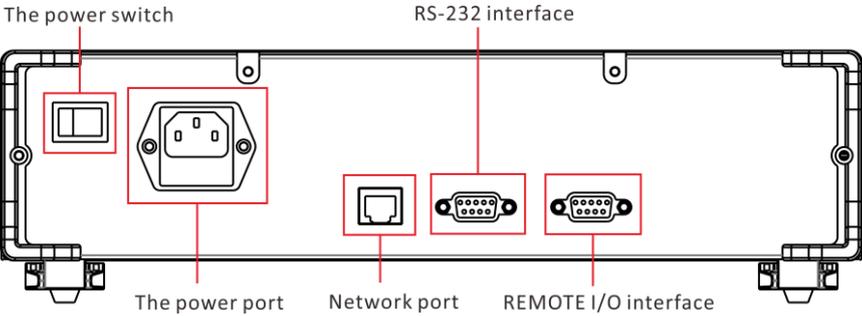
- 198~240V power supply
- Power frequency 47Hz~63Hz
- Maximum power consumption 50W

# 1.3 Component Names and Operation Overview

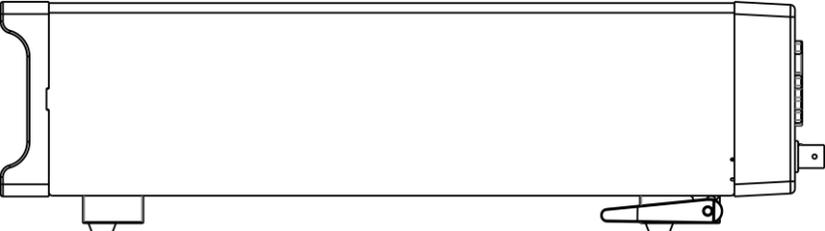
## Front Panel



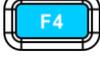
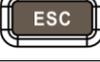
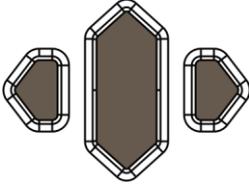
## Rear Panel



## Side View

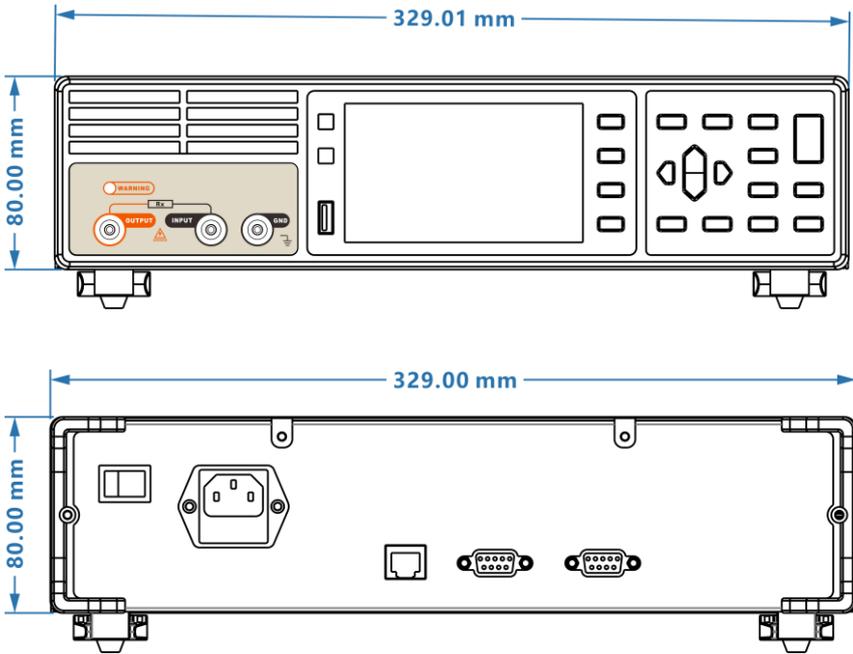


Keys	Description
------	-------------

	<b>Function key F1</b>
	<b>Function key F2</b>
	<b>Function key F3</b>
	<b>Function key F4</b>
	<b>Function key Escape</b>
	<b>Function key Enter</b>
	<b>[Direction] key, used to select menu items or set values</b>
	<b>[Page switch key] Switch [Test page] &lt;-&gt; [Setup page] &lt;-&gt; [Save page] &lt;-&gt; [Communication page] &lt;-&gt; [System page]</b>
	<b>[0.ADJ] Key, used to perform clear zero</b>
	<b>Voltage setup key</b>
	<b>Test mode resistance/ current switch key</b>

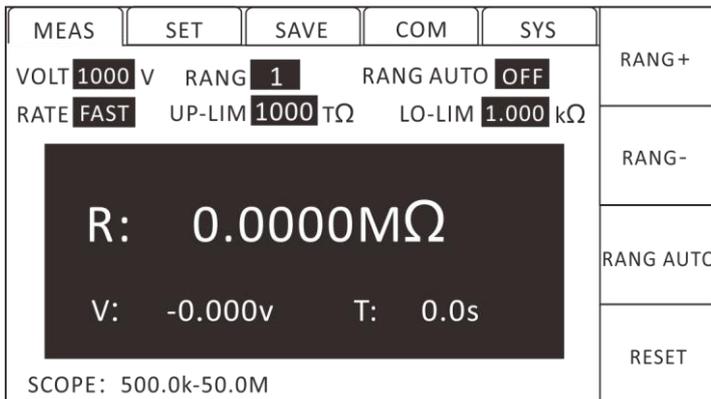
 <p>ON — OFF</p>	<p><b>[Trigger] key, start and stop the test</b></p>
 <p>RATE</p>	<p><b>[Speed] key, set test rate</b></p>
 <p>LOCK</p>	<p><b>[Keylock] key, long press [LOCK] key, page is locked, other keys are invalid, long press can release the lock</b></p>
 <p>UP-LIM</p>	<p><b>[Upper limit setup] key, used to set upper limit value</b></p>
 <p>LO-LIM</p>	<p><b>[Lower limit setup] key, used to set lower limit value</b></p>

## 1.4 Dimension

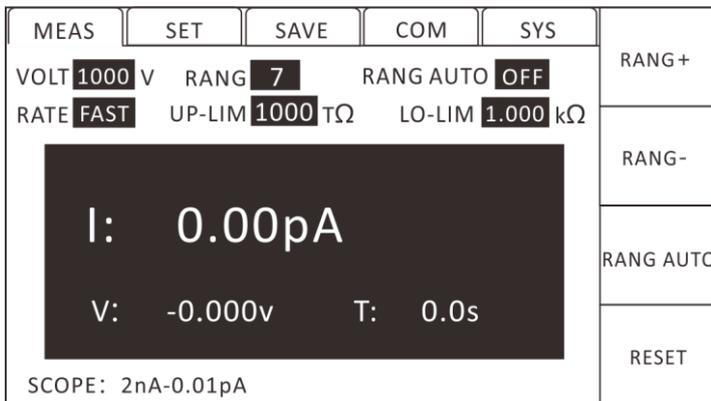


## 1.5 Screen Composition

### R Measuring Display



### I Measuring Display



## Setup Display

MEAS	SET	SAVE	COM	SYS	
MEAS TIME	<b>OFF</b>				OFF
CHG TIME	OFF				ON
DISC TIME	OFF				
RS	OFF				
RV	OFF				
DIGIT	5				
BEEP MODE	PASS				

## Save Display

MEAS	SET	SAVE	COM	SYS																								
<table border="1"> <thead> <tr> <th>No.</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>PANEL_01</td> </tr> <tr> <td>02</td> <td>-----</td> </tr> <tr> <td>03</td> <td>-----</td> </tr> <tr> <td>04</td> <td>-----</td> </tr> <tr> <td>05</td> <td>-----</td> </tr> <tr> <td>06</td> <td>-----</td> </tr> <tr> <td>07</td> <td>-----</td> </tr> <tr> <td>08</td> <td>-----</td> </tr> <tr> <td>09</td> <td>-----</td> </tr> <tr> <td>10</td> <td>-----</td> </tr> </tbody> </table>					No.	Name	01	PANEL_01	02	-----	03	-----	04	-----	05	-----	06	-----	07	-----	08	-----	09	-----	10	-----		SAVE
No.	Name																											
01	PANEL_01																											
02	-----																											
03	-----																											
04	-----																											
05	-----																											
06	-----																											
07	-----																											
08	-----																											
09	-----																											
10	-----																											
VOLT            0050 RANG            6 MEAS TIME    OFF CHARG TIME   OFF UP-LIM        ----Ω LO-LIM        ----Ω BEEP MODE    PASS						LOAD																						
						CLEAR																						
						RENAME																						

## Communication Display

MEAS	SET	SAVE	COM	SYS	
COM MODE	RS232				RS232
RADIO	OFF				TCP
BAUDRATE	9600				

## System Display

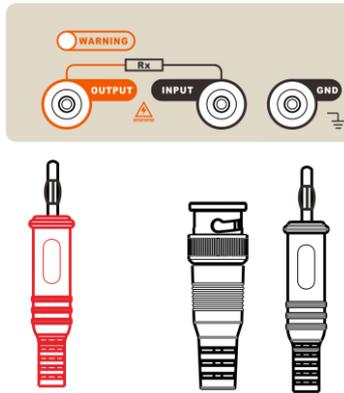
MEAS	SET	SAVE	COM	SYS	
LANG	EN				CN
VERSION	V1.0.0				EN

# Chapter 2 Preparing for Measurement

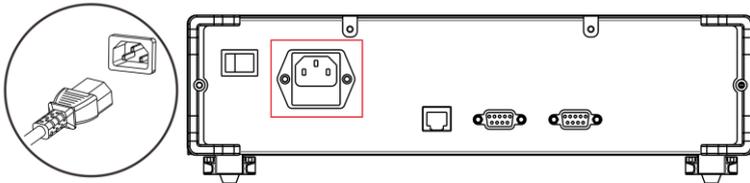
## 2.1 Measurement Process Overview

The instrument is kept power off, the following steps are taken to prepare for testing.

1. Turn off the instrument and connect the test leads.

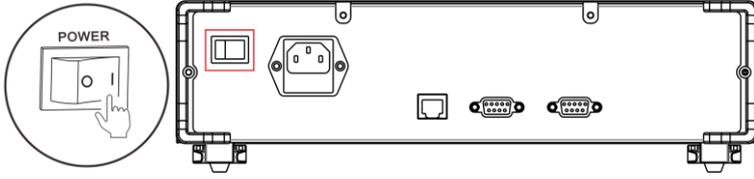


2. Plug AC power cord into the mains outlet



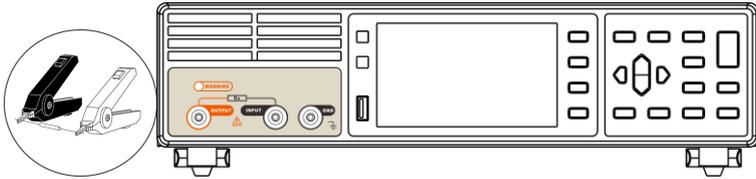
Ensure that the power cord is well grounded, which is conducive to the stability of the test.

3. Turn on the power at back of instrument.

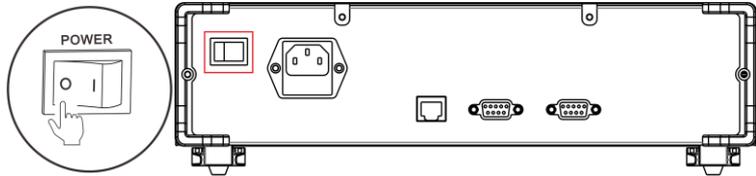


4. Setting test parameters (Refer to the following chapter for details)

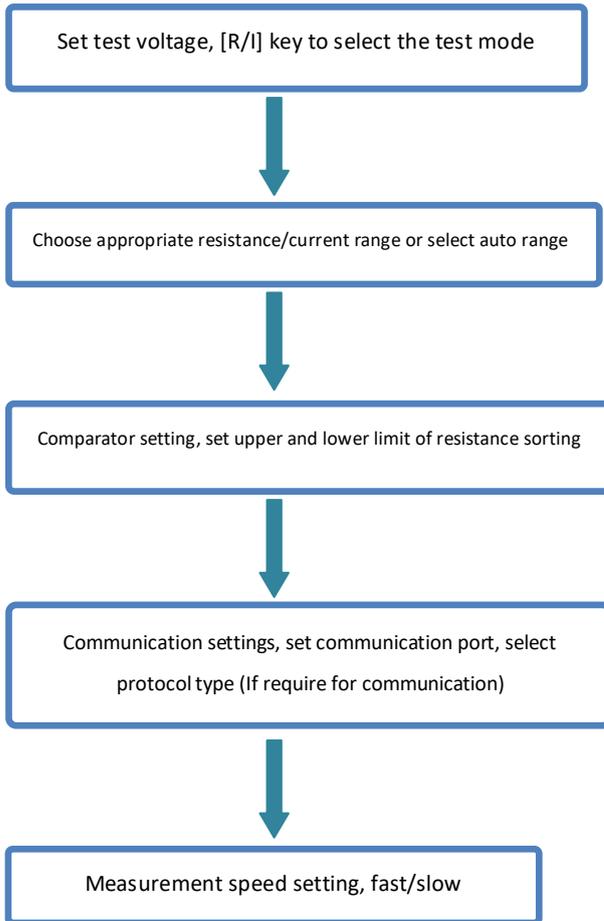
5. Start to test



6. Complete test, turn off the power



## 2.2 Basic Parameter Setting Process



## 2.3 Pre-measurement Inspection

Before using the instrument, inspect it to verify that no damage has occurred during storage or transportation and it operates normally. If finding any damage, contact us.

### Instrument and peripheral checking

Inspection item	Action
Is there any damage or a crack in the instrument? Are the internal circuits exposed?	If any damage is found, do not use it. Return it for repair.
Is there any dust or contamination, such as pieces of metal, on any terminals?	If dust or contamination is adhered to a terminal, clean the terminal with a swab.
Is the test lead coating broken or is the metal exposed?	If the coating of a test lead is broken, the measured value may become unstable or have an error. It is recommended to replace the intact wire.

### Power-on checking

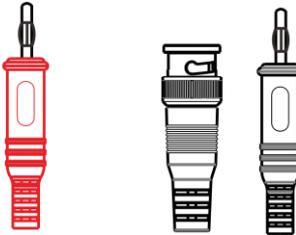
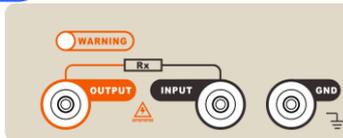
Inspection item	Action
Are all screens lit when the power is turned on, and is the measurement screen displayed normally?	When the display is different, there may be a malfunction inside the instrument, please send it for repair.

## 2.3 Test Leads Connection Method



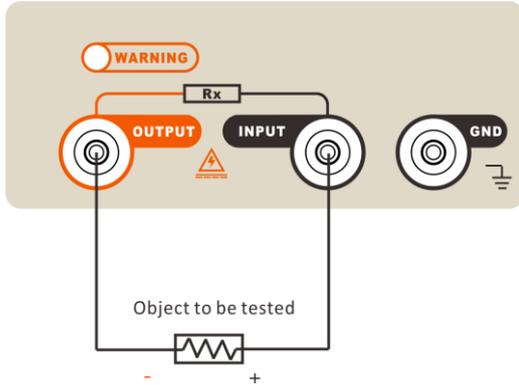
- The test leads port is sharp, taking care not to be scratched.
- For safety reasons, test leads supplied with the instrument should be used.
- To avoid electric shock, make sure the test leads are properly connected

### Front panel connection



### Test leads connection

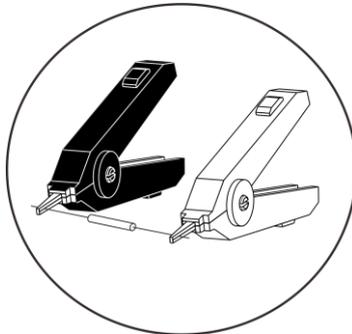
1. When connecting a DUT with polarity, such as a capacitor, the positive and negative poles must be distinguished, test according to the following wiring methods:



Output terminal outputs a negative voltage, connect to the negative terminal of the device under test. The Input terminal is connected to the positive terminal of the device under test.

	<p>Connect polar devices (electrolytic capacitors, etc.) according to positive and negative poles, otherwise it will threat to personal safety.</p>
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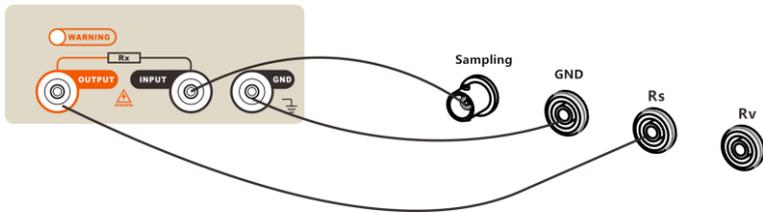
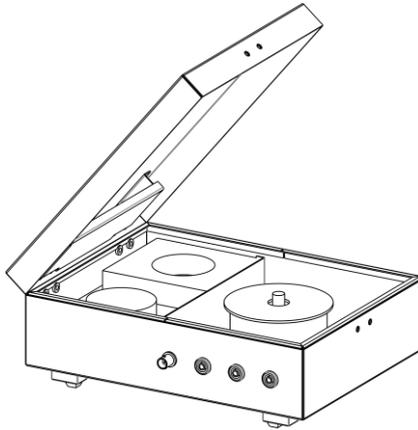
- There is no special requirement for connecting DUT without polarity, such as wire and cable, rubber materials, etc., test according to the following wiring method:



3. When measuring high resistance, users need to ground GND to shield external interference.

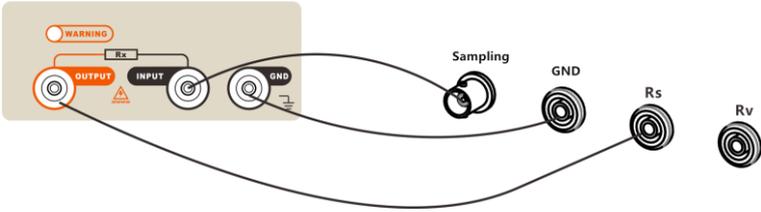
## 2.4 Connection Method of Electrode Box

CKT3530 series electrode box can test the surface resistance and volume resistivity of the material. 0305 electrode box is an optional accessory, customers can customize it according to their needs.



When testing the surface resistivity, connect as shown above, the OUTPUT terminal of the test instrument is connected to the  $R_s$  terminal of the electrode box;

When testing the volume resistivity, the OUTPUT terminal of the test instrument is connected to the  $R_v$  terminal of the electrode box, the wiring is as shown in the figure below.



Input current sampling terminal of the instrument is connected to Sample current sampling terminal of the electrode box for sampling current.

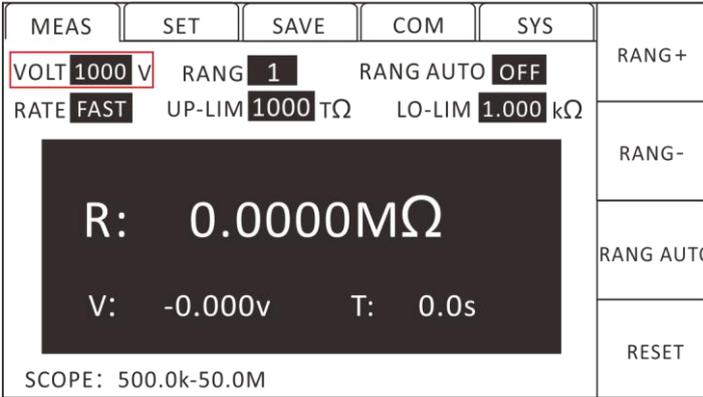
The GND ground terminal of the instrument is connected to the GND ground terminal of the electrode box for shielding.

Output voltage output terminal of the instrument is connected to the high voltage terminal of the electrode box Rs or Rv to apply voltage to the measured object.

## Chapter 3 Basic Settings

### 3.1 Set Test Voltage

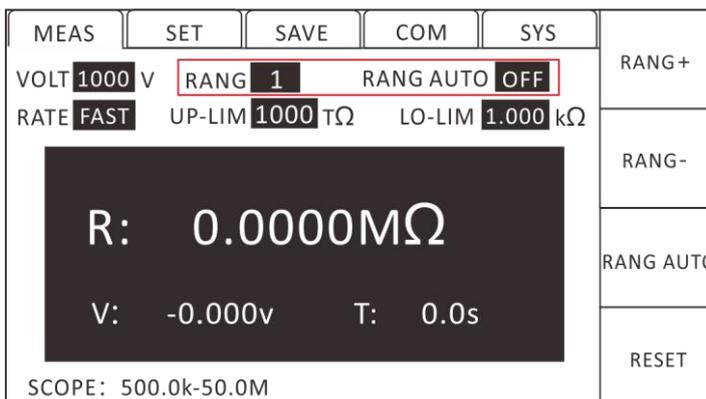
CKT3530 voltage setting range is from -1000V to 0V. On the test page, press [V-SET] key on the instrument, then use the direction keys to set voltage value, press [ENTER] to confirm, [ESC] to cancel.



### 3.2 Setting Test Range

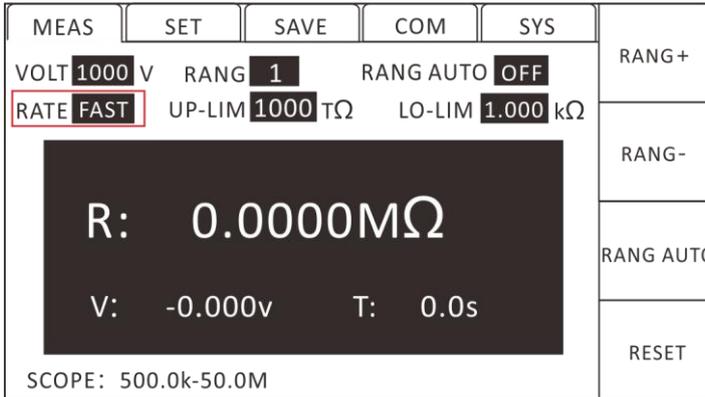
On the test page, press [F3] to select "Range Auto" option, users can turn on or off auto range function. When it is switched to range auto state, the screen displays "range auto: ON", users can press [F1] [F2] to manually select the test range.

CKT3530 series have a total of 7 test ranges. The test range can be changed under both auto range and manual range. Auto range will be closed when the range number is changed under auto range.



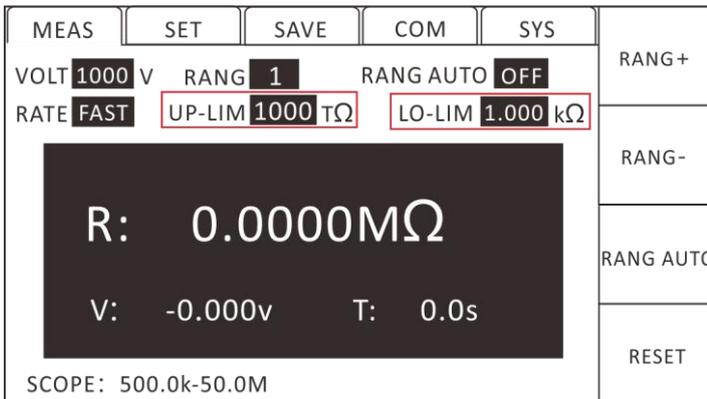
### 3.3 Setting Measurement Speed

The completion of a sampling is from test generation-analog-to-digital conversion-operation to display the measurement results and sorting results. This period of time is called the sampling time. Sampling rate refers to the number of samples that can be completed per second. CKT3530 series provide 2 speed settings for users to choose, fast (5 times/second) and slow speed (1 times/second), directly press the [RATE] key on the instrument panel to switch the test speed.



### 3.4 Comparator Function

Press [UP-LIM] to select upper limit of comparator, press [F1] to turn on/off the upper limit comparator function, use direction keys to set the upper limit value after turn on, use [F2] and [F3] to switch the value unit magnification;



Press [LO-LIM] to select lower limit of comparator, press [F1] to turn on/off the upper limit comparator function, use direction keys to set the lower limit value after turn of, use [F2] and [F3] to switch the value unit magnification;

After the upper and lower limits of the comparator are turned off, the instrument sorting system will no longer work, and the

signals related to the comparator output in the Handler interface are also turned off.

### 3.5 Beep Pattern of Sorting Result

On the test page, press [PAGE] to switch to setting page, use the direction keys to select beep mode.

MEAS	SET	SAVE	COM	SYS	
MEAS TIME	<input type="text" value="OFF"/>				OFF
CHG TIME	<input type="text" value="OFF"/>				PASS
DISC TIME	<input type="text" value="OFF"/>				
RS	<input type="text" value="OFF"/>				FAIL
RV	<input type="text" value="OFF"/>				
DIGIT	<input type="text" value="5"/>				
BEEP MODE	<input type="text" value="PASS"/>				

CKT3530 series have 3 beep modes: OFF, PASS, and FAIL. Press [F1], [F2], [F3] to select the corresponding beep mode, press [ESC] to exit the setting page.

OFF: turn off beep;

PASS: The beep sounds when the sorting is qualified;

FAIL: Beep sounds when the sorting fails.

### 3.6 Surface Resistivity

Press [PAGE] on the test page to switch to setting page, use direction keys to select surface resistance.

MEAS	SET	SAVE	COM	SYS				
MEAS TIME	<input type="checkbox"/>				OFF			
CHG TIME	<input type="checkbox"/>				ON			
DISC TIME	<input type="checkbox"/>							
RS	<input checked="" type="checkbox"/>	LENG	<input type="text" value="34.56"/>	cm	GAP	<input type="text" value="01.00"/>	cm	PRESET
RV	<input type="checkbox"/>							
DIGIT	<input type="text" value="5"/>							
BEEP MODE	<input type="text" value="PASS"/>							

Press [F1] to turn off surface resistance, press [F2] to turn on surface resistance, press [F3] to preset circumference and distance, or use direction keys to manually set circumference and distance of the object to be measured; press [ESC] to exit and return to the surface resistivity Rs measurement page.

MEAS	SET	SAVE	COM	SYS					
VOLT	<input type="text" value="0010"/>	V	RANG	<input type="text" value="2"/>	RANG AUTO	<input checked="" type="checkbox"/>	RANG+		
RATE	<input checked="" type="checkbox"/>	FAST	UP-LIM	<input type="text" value="1000"/>	TΩ	LO-LIM	<input type="text" value="1.000"/>	kΩ	RANG-
<div style="background-color: black; color: white; padding: 10px;"> <p><b>Rs: 3.0000MΩ</b></p> <p>V: -0.000v      T: 3.0s</p> </div>								RANG AUTO	
SCOPE: 50.0k-500.0M								RESET	

### Surface Resistivity

Surface resistivity is the resistance value per unit area. Surface resistance formula:

$$\rho_s = R_s \cdot (\text{Perimeter}/\text{Gap})$$

Among them:  $\rho_s$  surface resistivity (Ω)

Perimeter effective circumference (cm)

Gap is Distance between primary electrode and secondary electrode (cm)

Rs measured surface resistance ( $\Omega$ )

Perimeter calculation formula:

$$\text{Perimeter} = \pi \times (D2+D1)/ 2$$

Gap calculation formula:

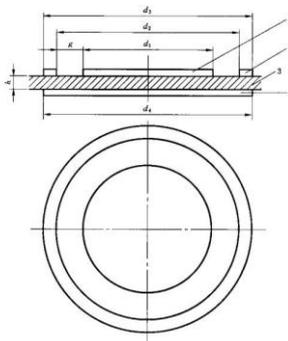
$$\text{Gap} = (D2-D1)/2$$

Among them: D1 main electrode diameter (cm)

D2 Diameter of secondary electrode (cm)

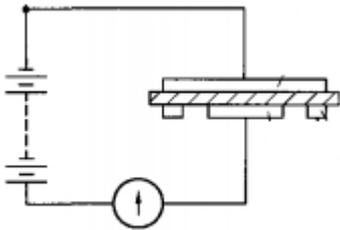
### Insulation resistance electrode box parameter description

Parameter	Description	Valid value
D1	Main electrode diameter	5.0cm
D2	Secondary electrode diameter	6.0cm
B	Effective area factor	$0 \leq B \leq 1$ The default is 0
AREA	Effective area	$0 \text{ cm}^2 \leq \text{AREA} \leq 9999.9 \text{ cm}^2$ The default is 19.635 $\text{cm}^2$
Perimeter	Effective circumference	$0 \text{ cm} \leq \text{Perimeter} \leq 999.99 \text{ cm}$ The default is 17.278cm
Gap	Distance between main electrode and auxiliary electrode	$0.001 \text{ cm} \leq \text{Gap} \leq 99.99 \text{ cm}$ The default is 0.5cm

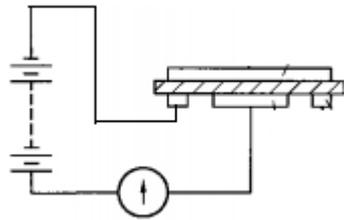


Basic circuit for measuring volume resistivity and surface resistivity of electrodes

Among them: 1-Protected electrode;  
 2-Protective electrode;  
 3-Sample;  
 4-The electrode is not protected;  
 d1-Diameter of the protected electrode;  
 d2-Inner diameter of protective electrode  
 d3-Outer diameter of protective electrode  
 d4-Electrode diameter not protected  
 g-Electrode gap  
 h – Specimen thickness



a) Measuring volume resistivity circuit



b) Measuring surface resistivity circuit

### 3.7 Volume Resistivity

Press [PAGE] on the test page to switch to setting page, use direction keys to select volume resistance.

MEAS	SET	SAVE	COM	SYS	
MEAS TIME	<input type="text" value="OFF"/>				OFF
CHG TIME	<input type="text" value="OFF"/>				ON
DISC TIME	<input type="text" value="OFF"/>				
RS	<input type="text" value="OFF"/>				PRESET
RV	<input checked="" type="checkbox"/>	THICK	<input type="text" value="00.30"/> cm	AREA	<input type="text" value="19.635"/> cm <sup>2</sup>
DIGIT	<input type="text" value="5"/>				
BEEP MODE	<input type="text" value="PASS"/>				

Press [F1] to turn off the volume resistance, press [F2] to turn on volume resistance, press [F3] to preset thickness and area, or use direction keys to manually set thickness and area of the object to be measured; press [ESC] to exit, return to the volume resistivity Rv measurement page .

MEAS	SET	SAVE	COM	SYS		
VOLT	<input type="text" value="0010"/> V	RANG	<input type="text" value="2"/>	RANG AUTO	<input checked="" type="checkbox"/>	RANG+
RATE	<input checked="" type="checkbox"/> FAST	UP-LIM	<input type="text" value="1000"/> TΩ	LO-LIM	<input type="text" value="1.000"/> kΩ	RANG-
<div style="background-color: black; color: white; padding: 10px; border: 1px solid black;"> <p style="font-size: 2em; margin: 0;">Rv: 6.0000MΩ</p> <p style="margin: 0;">V: -0.000v      T: 6.0s</p> </div>					RANG AUTO	
SCOPE: 50.0k-500.0M					RESET	

### Volume Resistivity

Volume resistivity is the resistance value per unit volume. In general, the formula for volume resistivity is:

$$\rho_v = \text{Area}/t \times R_v$$

Among them:  $\rho_v$  volume resistivity ( $\Omega\text{-cm}$ )

Area Effective area ( $\text{cm}^2$ )

t Sample thickness ( $\text{cm}$ )

Rv measured volume resistance ( $\Omega$ )

The effective area can be set according to the following formula:

$$\text{Area} = \frac{\pi \times \left( D_1 + \frac{B(D_2 - D_1)}{2} \right)^2}{4}$$

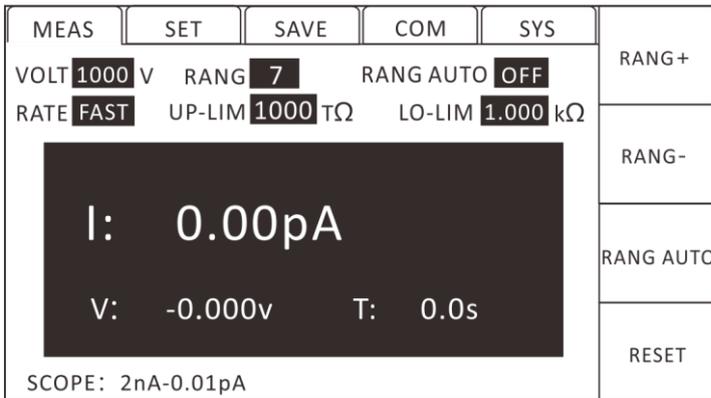
Among them: D1 main electrode diameter (cm)

D2 Diameter of secondary electrode (cm)

B Effective area factor

### 3.8 Leakage Current Measurement

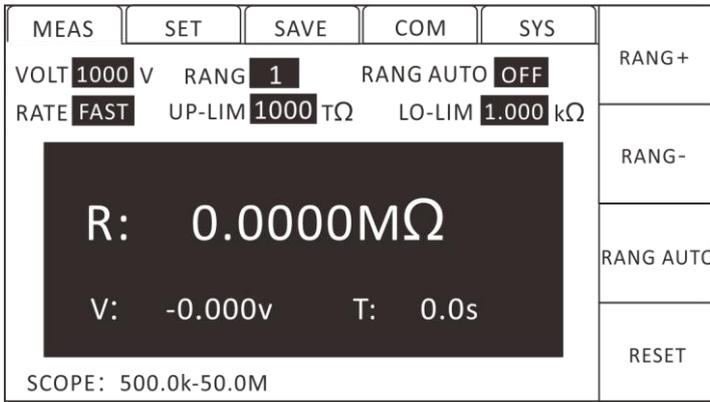
On the resistance measurement page, press [R/I] to switch between resistance measurement and leakage current measurement.



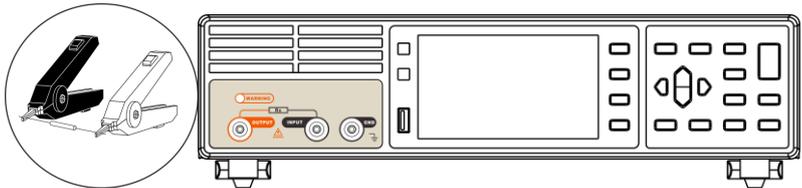
# Chapter 4 Measurement

## 4.1 Start Test

1. Set the relevant parameters (see Chapter 3 for details).



2. Connect the test leads correctly (see Chapter 2 for details).



3. Press  to start test.

## 4.2 Measuring Range

7 test ranges are available for CKT3530 series. On the test page, press [F3] to select "Range Auto" option to turn on auto range function. When it is switched to the range automatic state, "range automatic: ON" is displayed on the screen. CKT3530 series will automatically select the most suitable range for measurement through the table below.

Range number, current range and range change process

Range No.	Current Range	Beep	Rise Range	Descend Range
1	2mA	>2mA beep R: range over lower		
2	200uA	>200uA Not beep R: range over lower	2.2mA	180uA ↓
3	20uA	>20uA Not beep R: range over lower	↑ 220uA	18uA ↓
4	2uA	>2uA Not beep R: range over lower	↑ 22uA	1.8uA ↓
5	200nA	>200nA Not beep R: range over lower	↑ 2.2uA	180nA ↓
6	20nA	>20nA Not beep R: range over lower	↑ 220nA	18nA ↓
7	2nA	>2nA Not beep R: range over lower	↑ 22nA	1.8nA ↓

## 4.3 Setting Test Parameters

Press [PAGE] on the test page to switch to setting page, use direction keys to select the parameter to be set.

MEAS	SET	SAVE	COM	SYS	
MEAS TIME	OFF				OFF
CHG TIME	OFF				ON
DISC TIME	OFF				
RS	OFF				
RV	OFF				
DIGIT	5				
BEEP MODE	PASS				

Measurement timing: 000.0S Set continuous test time, range is 000.1-999.9S.

Charging delay: 000.0S Set charging time, delay range is 000.1-999.9S, in single or continuous test mode will be delayed according to the charging time.

Discharge delay: 000.0S Set the discharge time, the delay range is 000.1-999.9S, in single or continuous test mode, the delay will be based on the discharge time.

Surface resistance: Set the surface resistivity parameter.

Volume resistance: Set volume resistivity parameters.

Display digits: The display digits of resistance display can be set to 4 or 5.

Beep mode: Set beep mode.

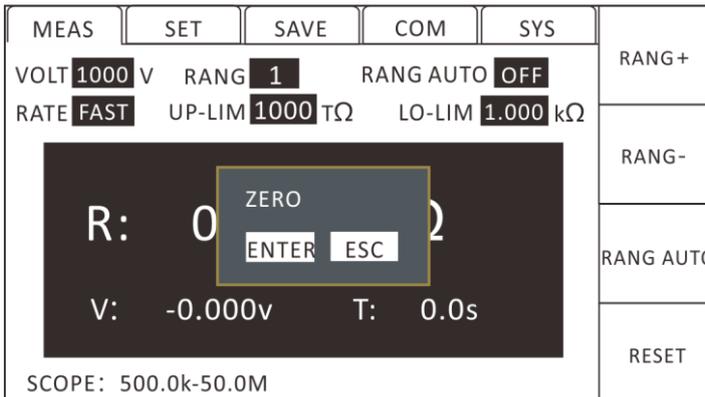
## 4.4 Open-circuit Clear Zero

1. Press the [0.ADJ] key to enter the page for preparing to clear zero. Before starting to clear, please remove the input terminal and the voltage output terminal test clip or leave it unconnected.
2. Press [ENTER] key to confirm and start to clear, and [ESC] to return to the measurement page. The instrument is cleared zero, under auto range, it clears all ranges. In manual mode, the instrument only clears the current range. If the reset is successful, the reset data will be saved in non-volatile memory.
3. The instrument will automatically return to the test state after the clear zero is completed.



### CAUTION

The test leads at the input terminal and the voltage output terminal must be open and suspended, and do not touch any objects.



## Chapter 5 Measurement Panel Save

Press [PAGE] key twice on the measurement page to switch to the save page, press [ESC] to return to the measurement page.

MEAS	SET	SAVE	COM	SYS	
					SAVE
No.	Name	VOLT	0050		
01	PANEL_01	RANG	6		
02	-----	MEAS TIME	OFF	LOAD	
03	-----	CHARG TIME	OFF		
04	-----	UP-LIM	----Ω		
05	-----	LO-LIM	----Ω	CLEAR	
06	-----	BEEP MODE	PASS		
07	-----				RENAME
08	-----				
09	-----				
10	-----				

### 5.1 Save Panel Setting

- 1、 Press [F1] on the save page to save the current measurement parameters.

MEAS	SET	SAVE	COM	SYS	
					0-9
No.	Name	VOLT	0050		
01	PANEL_01	RANG	6		
02	-----	MEAS TIME	OFF	A-Z	
03	-----	NAME PANEL_01			
04	-----				
05	-----	UP-LIM	----Ω	a-z	
06	-----	LO-LIM	----Ω		
07	-----	BEEP MODE	PASS		
08	-----				DEL
09	-----				
10	-----				

- 2、 Use direction keys and [F1-F4] function keys to enter the name, press [ENTER] to confirm, press [ESC] to cancel;

## 5.2 Retrieve Measurement Settings

1、 Use up and down direction keys to select the file name to be loaded on the save page.

MEAS	SET	SAVE	COM	SYS	
No.	Name	VOLT	0050		SAVE
01	PANEL_01	RANG	6		LOAD
02	-----	MEAS TIME	OFF		
03	-----	CHARG TIME	OFF		CLEAR
04	-----	UP-LIM	----Ω		
05	-----	LO-LIM	----Ω		RENAME
06	-----	BEEP MODE	PASS		
07	-----				
08	-----				
09	-----				
10	-----				

2、 Press [F2] on the save page to load the selected file, press [ENTER] to confirm, press [ESC] to cancel.

MEAS	SET	SAVE	COM	SYS	
No.	Name	VOLT	0050		
01	PANEL_01	RANG	6		
02	-----	MEAS TIME	OFF		
03	-----				
04	-----				
05	-----				
06	-----				
07	-----	BEEP MODE	PASS		
08	-----				
09	-----				
10	-----				

PRESS ENTER TO LOAD

## 5.3 Delete Measurement Settings

1、 Use up and down direction keys on the save page to select the file name to be cleared.

MEAS		SET		SAVE	COM	SYS	
				VOLT		0050	SAVE
				RANG		6	LOAD
				MEAS TIME		OFF	
				CHARG TIME		OFF	CLEAR
				UP-LIM		----Ω	
				LO-LIM		----Ω	RENAME
				BEEP MODE		PASS	

2、 Press [F3] to delete on the save page, press [ENTER] to confirm, press [ESC] to cancel.

MEAS		SET		SAVE	COM	SYS	
				VOLT		0050	
				RANG		6	
				MEAS TIME		OFF	
				PRESS ENTER TO CLEAR			
						Ω	
						Ω	
				BEEP MODE		PASS	

## 5.4 Rename Measurement Settings

1、 Use up and down direction keys to select the file name to be renamed on the save page.

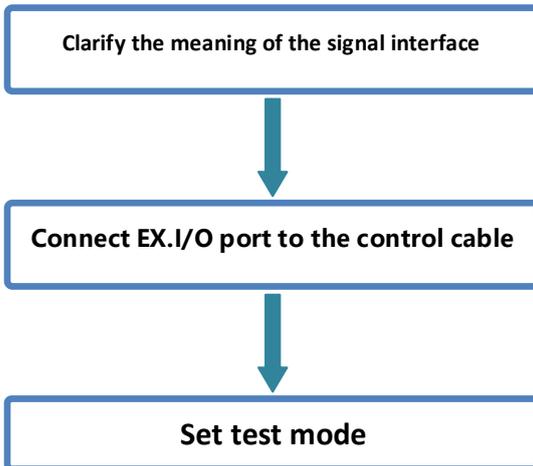
MEAS	SET	SAVE	COM	SYS																								
<table border="1"> <thead> <tr> <th>No.</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>PANEL_01</td> </tr> <tr> <td>02</td> <td>-----</td> </tr> <tr> <td>03</td> <td>-----</td> </tr> <tr> <td>04</td> <td>-----</td> </tr> <tr> <td>05</td> <td>-----</td> </tr> <tr> <td>06</td> <td>-----</td> </tr> <tr> <td>07</td> <td>-----</td> </tr> <tr> <td>08</td> <td>-----</td> </tr> <tr> <td>09</td> <td>-----</td> </tr> <tr> <td>10</td> <td>-----</td> </tr> </tbody> </table>					No.	Name	01	PANEL_01	02	-----	03	-----	04	-----	05	-----	06	-----	07	-----	08	-----	09	-----	10	-----	VOLT      0050 RANG      6 MEAS TIME OFF CHARG TIME OFF UP-LIM    ----Ω LO-LIM    ----Ω BEEP MODE PASS	SAVE
No.	Name																											
01	PANEL_01																											
02	-----																											
03	-----																											
04	-----																											
05	-----																											
06	-----																											
07	-----																											
08	-----																											
09	-----																											
10	-----																											
					LOAD																							
					CLEAR																							
					RENAME																							

2、 On the save page, press [F4] to rename, use direction keys and [F1-F4] function keys to enter the name, press [ENTER] to confirm, press [ESC] to cancel.

MEAS	SET	SAVE	COM	SYS																								
<table border="1"> <thead> <tr> <th>No.</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>PANEL_01</td> </tr> <tr> <td>02</td> <td>-----</td> </tr> <tr> <td>03</td> <td>-----</td> </tr> <tr> <td>04</td> <td>-----</td> </tr> <tr> <td>05</td> <td>-----</td> </tr> <tr> <td>06</td> <td>-----</td> </tr> <tr> <td>07</td> <td>-----</td> </tr> <tr> <td>08</td> <td>-----</td> </tr> <tr> <td>09</td> <td>-----</td> </tr> <tr> <td>10</td> <td>-----</td> </tr> </tbody> </table>					No.	Name	01	PANEL_01	02	-----	03	-----	04	-----	05	-----	06	-----	07	-----	08	-----	09	-----	10	-----	VOLT      0050 RANG      6 MEAS TIME OFF CHARG TIME OFF UP-LIM    ----Ω LO-LIM    ----Ω BEEP MODE PASS	0-9
No.	Name																											
01	PANEL_01																											
02	-----																											
03	-----																											
04	-----																											
05	-----																											
06	-----																											
07	-----																											
08	-----																											
09	-----																											
10	-----																											
					A-Z																							
					a-z																							
					DEL																							

## Chapter 6 EXT I/O (Handler) Port

EXT I/O terminal on the rear panel of the instrument supports external control, it provides output of test and comparison judgment signals, and accepts input TRG signals. All signals use optocouplers. Through the instrument panel settings, understanding the internal circuit structure and paying attention to safety issues will help to better connect the control system.



## 6.1 EXT I/O Port and Signals

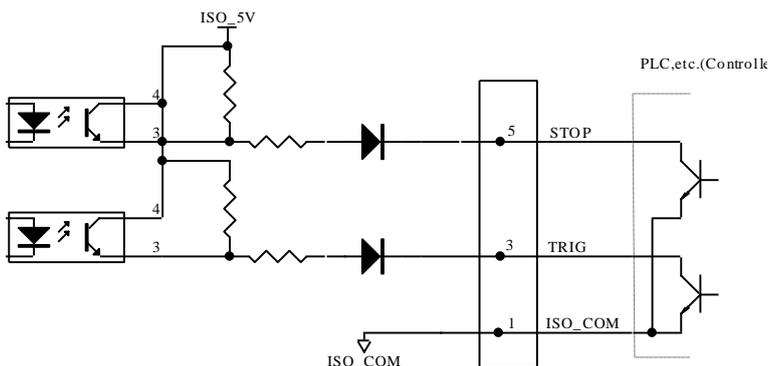
In this chapter, you will learn about the connection and introduction of EXT I/O.



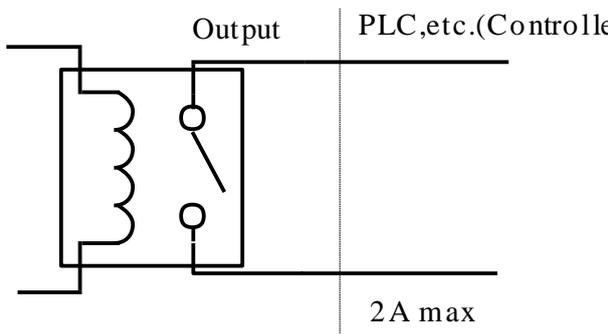
**Do not insert or remove the EXT I/O port during the test.**

**It is forbidden to connect the IO port to the test terminal.**

Input terminal schematic



Output terminal schematic

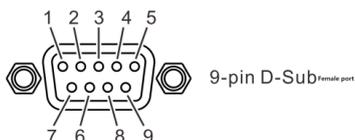
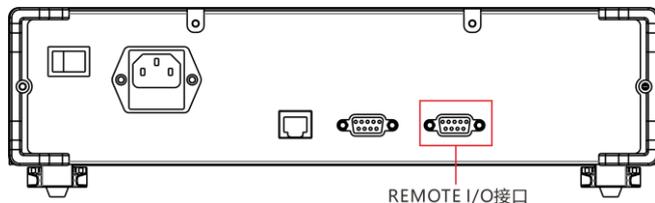


## 6.1.1 Detailed Port Signal

### Port and Signal Description

EXT I/O port connector uses 9-Pin D-SUB female terminal.

As shown:



### Port Details

(Instrument Terminal)

No.	Pin Name	Meaning
6, 7	NG	Unqualified output relay normally open signal
8, 9	GD	Qualified output relay normally open signal
1	GND	Isolated ground
3	XTRG	External trigger signal
5	XSTOP	External stop signal



**Note:** In order to avoid damage to the interface, the power supply voltage should not exceed the power supply requirements.

To avoid damage to the interface, please wire after the instrument is turned off.

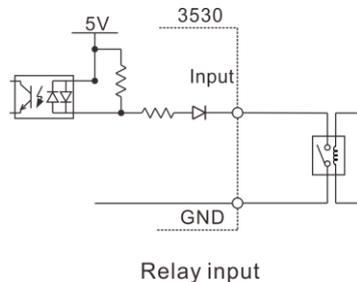
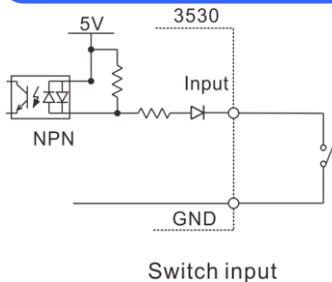
**If output signal is used by users to control the relay, the relay must use a reverse energy release diode.**

## 6.1.2 Port Signal Connection

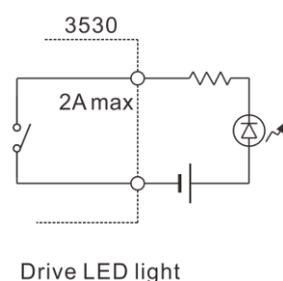
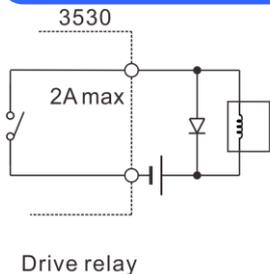
### Electrical Performance Parameters

- Output signal: Relay switch output.  
The maximum load voltage is 30V.  
Maximum output current: 2A.
- Input signal: Photoelectric isolation.  
Active low.  
Maximum current: 50mA.

### Input Circuit Connection



### Output Circuit Connection

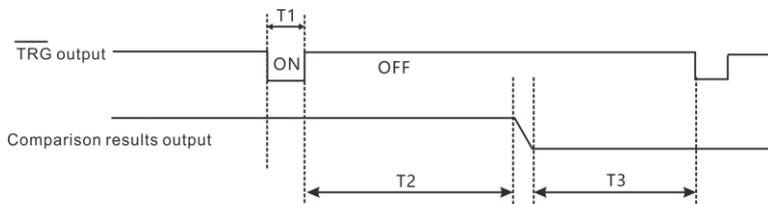


## 6.2 Timing diagram

The level of each signal indicates ON/OFF state of the contact, upper bar indicates that the low level is active.

### 6.2.1 Timing Chart at External Trigger

External trigger [EXT] setting (I/O output mode is hold)



T1: Minimum 0.5ms drop edge trigger

T2: Minimum 200mS(measurement time)

T3: Remain until the next trigger

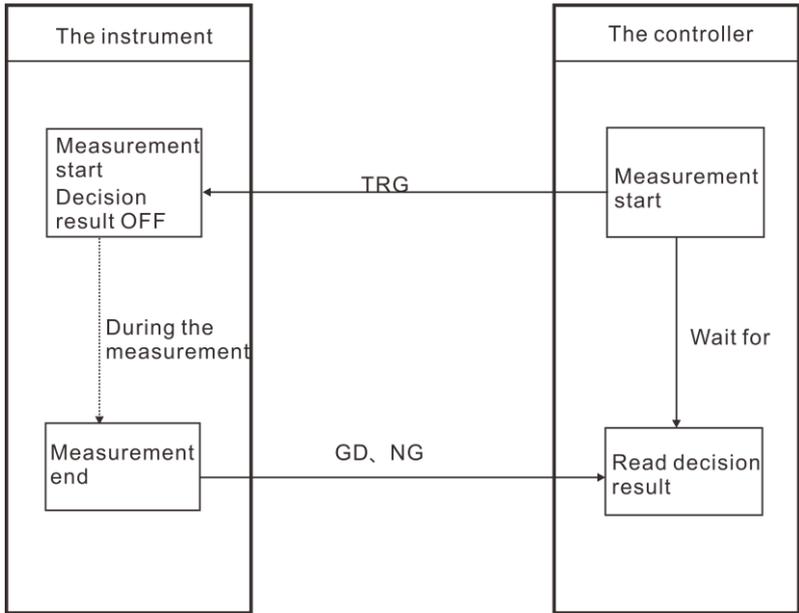
Note: ERR (low) test is abnormal, ERR (low) test is normal.

	Item	Time
T1	TRG, Signal pulse width	5mS <sub>MIN</sub>
T2	ADC sampling time	Fast 200mS Slow 1000mS
T3	Sorting output	1mS <sub>MAX</sub>

### 6.2.2 Reading Process at External Trigger

The following shows the flow from measurement start to measurement value acquisition when using an external trigger.

This instrument determines judgment result (GD, NG). When the response of the controller input circuit is slow, there will be a waiting time from the detection signal to the reading of the judgment result.



## Chapter 7 Communication

The instrument provides 2 communication modes, RS232C, LAN (Ethernet protocol uses TCP protocol) communication mode. The instrument provides SCPI communication protocol. For communication instructions, refer to the command set in the manual.

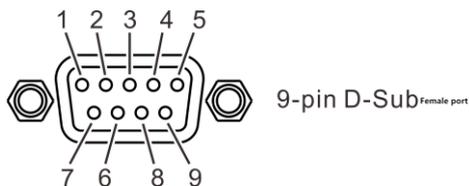
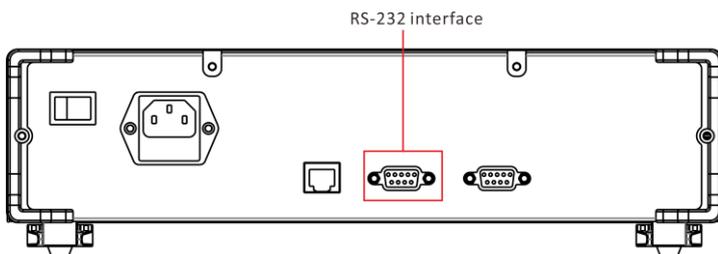


**It is forbidden to connect communication port and test terminal, otherwise it will damage the instrument.**

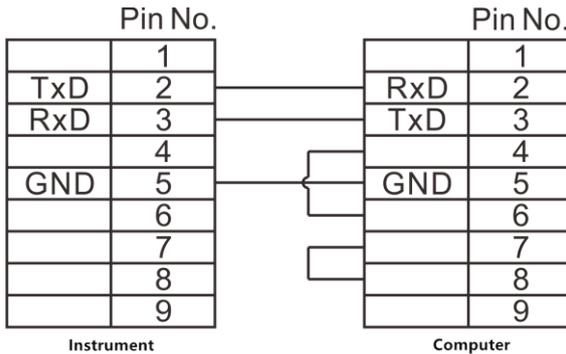
### 7.1 RS232 Communication Method

RS232 communication method adopts 3-wire communication method respectively.

#### 7.1.1 Interface and Cable



## 7.1.2 RS232 Connection Method



## 7.1.3 RS232 Communication Settings

### 1. Select Communication Page

Press [PAGE] key 3 times in the test page to switch to communication page, press [F1] to select RS232 communication mode.

MEAS	SET	SAVE	COM	SYS	
COM MODE <span style="border: 1px solid black; padding: 2px;">RS232</span>					RS232
RADIO <span style="border: 1px solid black; padding: 2px;">OFF</span>					TCP
BAUDRATE <span style="border: 1px solid black; padding: 2px;">9600</span>					

2. Use direction keys to select broadcast mode, press [F1], [F2] to select on/off, the broadcast mode is turned on, and data is automatically uploaded after the test;

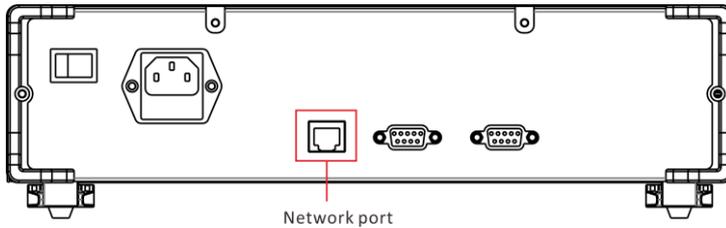
3. Use direction keys to select communication baud rate, press [F1-F4] function key to select frequency, press [ESC] to return to the measurement page.

## 7.2 LAN Communication Method

LAN port communication adopts TCP protocol communication.

### 7.2.1 Interface and Cable

Ethernet interface uses the standard RJ45 port, the cable uses Category 5 to access the Internet.



### 7.2.2 LAN Connection Method

#### Instrument Connected to Computer

When the instrument is connected to computer, the network cable uses a crossover cable.

A termination method adopts 568B standard:

Orange white	Orange	Green white	Blue	Blue white	Green	Gray white	Gray
--------------	--------	-------------	------	------------	-------	------------	------

: B termination method uses the 568A standard:

Gray white	Green	Orange white	Blue	Blue white	Orange	Gray white	Gray
------------	-------	--------------	------	------------	--------	------------	------

#### Instrument and Router Connection

When the instrument is connected to a router, network cable is directly connected.

Both terminals use the 568B standard:

Orange white	Orange	Green white	Blue	Blue white	Green	Gray white	Gray
-----------------	--------	----------------	------	---------------	-------	---------------	------

## 7.2.3 LAN Communication Settings

### 1. Select communication page

Press [PAGE] key 3 times on the test page to switch to communication page, press [F2] to select the TCP communication mode.

MEAS	SET	SAVE	COM	SYS	RS232
COM MODE					TCP
RADIO					OFF
IP					TCP
PORT					502
					000.000.000.000

2. Use direction keys to select broadcast mode, press [F1], [F2] to select on/off, the broadcast mode is turned on, and data is automatically uploaded after the test;

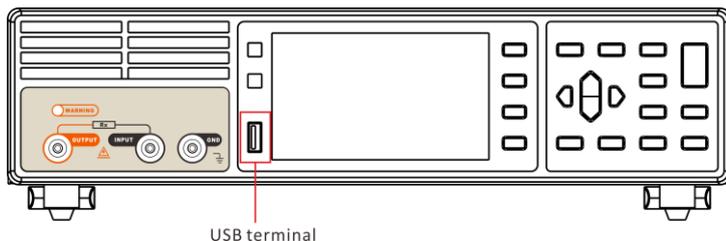
3. Use direction keys to select communication baud rate, press [F1-F4] function key to select frequency, press [ESC] to return to the measurement page.

Select the communication address on the communication page, enter [ENTER], use direction keys to set the address. After setting, press [ENTER] to confirm, press [ESC] to return.

## 7.3 USB Interface

The front panel of the instrument has a USB interface which is used as a HOST function. It is used to upgrade programs and save

data or settings after inserting a USB flash drive.



## Chapter 8 Parameter

### 8.1 General Parameters

General functions:

<b>Parameter</b>	Insulation resistance R, Leakage current I, Surface resistance Rs, Volume resistance Rv
<b>Measuring Range</b>	500Ω~9.9X10 <sup>15</sup> Ω, 2mA ~ 10fA
<b>Measuring Speed (MAX)</b>	Fast 5 t/s, Slow 1 t/s,
<b>Readback voltage accuracy</b>	0.5%±1V
<b>Range Over Display</b>	Over Range "-----"
<b>Input Terminal</b>	Banana plug
<b>Operation Key</b>	Rubber keys
<b>Display</b>	3.5 inches TFT
<b>Precision Guarantee Period</b>	1 year
<b>Operating Temperature and Humidity</b>	0°C~40°C <80%RH (No condensation)
<b>Storage Temperature and Humidity</b>	-10°C~60°C <80%RH (No condensation)
<b>Operating Environment</b>	Indoor, the highest altitude is 2000m

<b>Power Supply</b>	Input voltage: 198V ~ 240V AC Frequency: 47Hz/63Hz
<b>Power Consumption</b>	10 W
<b>Size</b>	Approx. 331 mm x 329 mm x 80 mm
<b>Weight</b>	Approx. 4.1kg

## 8.2 Accuracy

Test conditions for the following indicators:

Temperature: 20±3°C

Humidity: <80%RH

Warm-up time ≥ 15 minutes

Calibration validity: 1 year

### CKT3530/CKT3530A:

Insulation resistance: take 11 typical voltage values, accuracy 1% (10M-1G); 3% (1G-10G); 5% (10G-100G); 10% (100G-1T); 20% (greater than 1T).

Range Voltage	1	2	3	4	5	6	7
1V	0.5K-50K	5K-500K	50K-5M	500K-50M	5M-500M	50M-5G	500M-100T
10V	5K-500K	50K-5M	500K-50M	5M-500M	50M-5G	500M-50G	5G-1000T
25V	12.5K-1.2M	125K-12.5M	1.2M-125M	12.5M-1.2G	125M-12.5G	1.2G-125G	12.5G-2500T
50V	25K-2.5M	250K-25M	2.5M-250M	25M-2.5G	250M-25G	2.5G-250G	25G-5000T
75V	37.5K-3.8M	375K-37.5M	3.8M-375M	37.5M-3.8G	375M-37.5G	3.8G-375G	37.5G-7500T
100V	50K-5M	500K-50M	5M-500M	50M-5G	500M-50G	5G-500G	50G-10000T
125V	62.5K-6.2M	625K-62.5M	6.2M-625M	62.5M-6.2G	625M-62.5G	6.2G-625G	62.5G-12500T

250V	125K-12.5M	1.2M-125M	12.5M-1.2G	125M-12.5G	1.2G-125G	12.5G-1.2T	125G-25000T
500V	250K-25M	2.5M-250M	25M-2.5G	250M-25G	2.5G-250G	25G-2.5T	250G-50000T
750V	375K-37.5M	3.8M-375M	37.5M-3.7G	375M-37.5G	3.7G-375G	37.5G-3.8T	375G-75000T
1000V	500K-50M	5M-500M	50M-5G	500M-50G	5G-500G	50G-5T	500G-100000T