

Model 3005A Digital Insulation Resistance Tester

USER MANUAL

Dear Customer,

Thank you for purchasing our Model 3005A Digital Insulation Resistance Tester!

Please read this manual carefully before using the device.

Keep this manual for reference.

Amblyonix Industrial Instrument Company LOGO

1 Before Using the Device	3
2 The Model 3005A Digital Insulation Resistance Tester	4
2.1 Overview	4
2.2 How the Model 3005A Digital Insulation Resistance Tester works	4
2.2.1 Measuring principle	5
3 Product Information	5
3.1 What's Included in the Box?	5
3.2 Model 3005A Digital Insulation Resistance Tester Structure	6
3.3 Model 3005A Digital Insulation Resistance Tester Features	7
3.4 Model 3005A Digital Insulation Resistance Tester Technical Specifications	8
3.5 Measuring Range and Accuracy	9
3.5.1 Insulation Resistance Range and Accuracy	9
3.5.2 Voltage Range and Accuracy	10
4 Using the Model 3005A Digital Insulation Resistance Tester	11
4.1 Switching on the Device	11
4.2 Checking the Battery	11
4.3 Setting the Backlight	11
4.4 Setting the Alarm	11
4.5 Saving the data	12
4.6 Reviewing the data	12
4.7 Deleting the data	13
5 During the Test Procedures	13
5.1 Safe Use of Protective Wires	14
6 Test Procedures	15
6.1 DC Voltage Test	15
6.2 AC Voltage Test	16
6.3 Insulation Resistance Test	16-17
6.4 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Tests	18
6.4.1 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Functions	19
6.4.2 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Differences	19
6.4.3 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Applications	20
7 After Test Procedures	21
8 After-Sales Services	22

1. Before Using the Device

This manual describes the proper use of the **Model 3005A Digital Insulation Resistance Tester**.

This device conforms to International Electrotechnical Commission standards (**IEC61010**) on design, production, and testing. For your safety, please read and follow the safety instructions and precautions properly before using this device.

Electrical Safety Symbols		
Lightning bolt 	Double insulation 	Caution 
This symbol indicates risks of high voltage, electric shocks, or live wires.	This symbol indicates that the device is protected by double or reinforced insulation.	This symbol indicates a warning to avoid potential risk or danger.
IMPORTANT: You must read the instructions whenever the safety symbols appear in the manual. You must pay attention to the safety symbols on the device.		

- You must use this device in accordance with the manual to avoid the risk of danger.
- You must use this device carefully to avoid possible electric shock and personal injury.
- Make sure that this device and accessories are in good condition before use.
 - You can only use this device when there are no damaged, exposed wires, or broken parts in testing cables or insulation layers.
- Make sure to fully insert the connector plugs into the correct interfaces of this device.
- You must not impose over 600V **AC** or **DC** voltage on the part between the testing end and the device.
- To avoid explosions, you must not use this device in a flammable environment.
- You must not keep or store the device in a place with high temperature, moisture or condensation, or under direct sunlight.
- You must check the batteries regularly.
 - When the device displays a low battery symbol, charge the battery in a timely manner to increase the life of the battery.
 - You must dispose used batteries in a specified collection place accordingly.
- You must not disassemble the instrument without our company's permission.
 - We do not provide any maintenance or replacement warranty for device failure caused by disassembling equipment without our explicit written authorization.
 - We will not be liable for any physical or property damage caused by disassembly of the equipment without our permission.

2. The Model 3005A Digital Insulation Resistance Tester

2.1 Overview

The **Model 3005A Digital Insulation Resistance Tester** is a lightweight and portable megohmmeter designed for high voltage insulation resistance tests. You can use the device to measure the insulation resistance of insulating materials, motors, cables, transformers, and electrical installations. The device gives you real-time results in ohms or megohms that can be stored or exported for future analysis. It has strong anti-interference and is indispensable for

- electrical systems,
- electric telecommunications,
- substation testing applications,
- meteorology and computer rooms,
- oil fields,
- industrial enterprises, and
- electromechanical installation and maintenance.

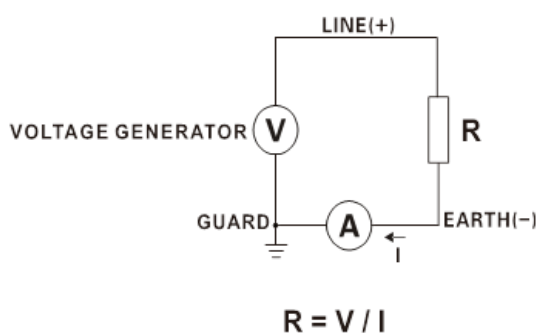
The **Model 3005A Digital Insulation Resistance Tester** is an industrial tester designed to provide years of dependable service. The device is powered by advanced lithium-ion battery and can perform hundreds of insulation resistance tests from a single charge. It has selectable functions that are programmable for measuring **DC** voltage, **AC** voltage, insulation resistance (**IR**), polarization index (**PI**), and dielectric absorption ratio (**DAR**).

2.2 How the Model 3005A Digital Insulation Resistance Tester works

The insulation resistance (**IR**) quality of electrical systems deteriorates over time due to environmental conditions and the presence of electrical and mechanical stress. The performance and life of electrical systems depend on the insulation conditions. That is why it is vital to check the **IR** of electrical systems periodically. The **Model 3005A Digital Insulation Resistance Tester** generates a high voltage across the insulator to measure resistance. It safeguards electrical systems from abrupt current leakage in wires that lead to accidental damage, blown circuits, or electrical shocks.

2.2.1 Measuring principle

The **Model 3005A Digital Insulation Resistance Tester** generates a high voltage (**V**) that triggers electron flow across the insulator. It measures the flowing current (**I**) and calculates the insulation resistance value (**R**) according to the formula, Resistance = Voltage/ Current (**$R=V/I$**).



3. Product Information

3.1 What's Included in the Box?

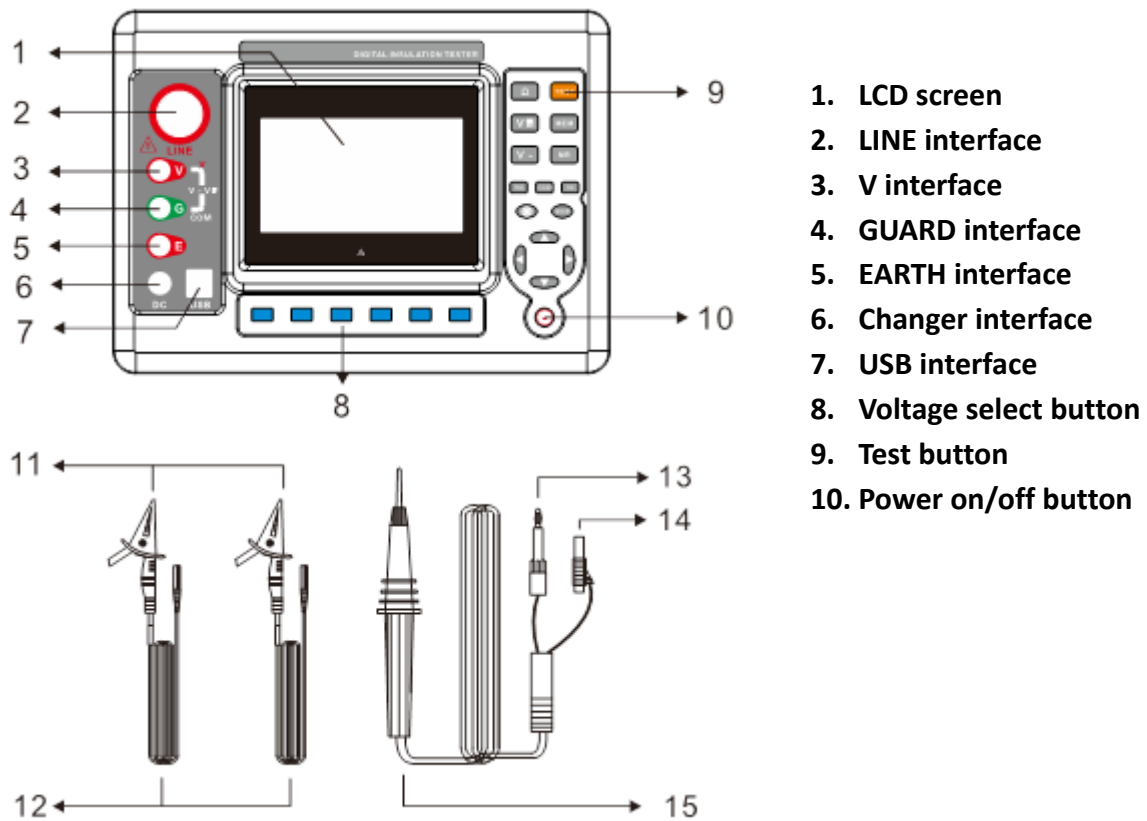
This section shows what's inside the rugged aluminum case.

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- 1 Digital insulation resistance tester
- 1 Red high-voltage probe
- 2 High voltage test cables
- 1 Monitoring software CD
- 1 USB communication line
- 1 12.6 V Battery
- 1 Charger
- User Manual
- Warranty Card

3.2 Model 3005A Digital Insulation Resistance Tester Structure

This section shows the structure of the **Model 3005A Digital Insulation Resistance Tester**.



3.3 Model 3005A Digital Insulation Resistance Tester Features

This section highlights the features of the **Model 3005A Digital Insulation Resistance Tester**.

Excellent design

The device is beautiful, upscale, and has a shockproof, dustproof, moisture-proof structure. It is ultra-lightweight, compact, and portable, but powerful for industrial field use.

Measuring voltage

The device is compatible with different voltage ranges, ranging from 100V to 5000V, depending on the dielectric strength of the insulation.

Multifunctional

The device is suitable for insulation resistance tests and voltage tests. It can also measure dielectric absorption ratios and polarization indexes.

Front-panel interactive interface

The device is easy to use with a unique interactive interface that displays easy-to-read measurements and test routines.

Display mode

The device has a 4-bit large liquid crystal LCD with high resolution.

USB communication interface

The device is equipped with a USB interface and software monitoring that allows uploading stored data to the computer, saving, and printing.

Communication Line

The device uses one USB communication line.

Data storage

The device is equipped with an onboard memory that can store 500 test results.

Data review

The device has a memory recall (**MR**) feature that allows the user to review stored data.

Overload warning

The device has an overload warning (**OL**) feature that warns the user when the measurement range exceeds the allowable range.

Backlight feature

The screen has a gray backlight feature that is suitable for use in dim places.

Automatic shut-down

The device shuts down automatically after 15 minutes of inactivity.

Alarm feature

The device is designed to alarm when the measured voltage value is greater than the alarm set value or the insulation resistance value is less than the alarm set value.

Safety Regulations full compliance

The device is equipped with strong anti-interference circuit architecture and is in full compliance with IEC 61010-1, IEC 1010-2-31, IEC 61557-1,5, IEC60529 (IP54) pollution grade 2, CAT III 300V.

3.4 Model 3005A Digital Insulation Resistance Tester Technical Specifications

This table shows the technical specifications of the **Model 3005A Digital Insulation Resistance Tester**.

Base conditions	23°C±5°C, below 75%rh
Test Voltage Ranges	100V, 250V, 500V, 1000V, 2500V, 5000V
Test Voltage Accuracy	(±10%)
Insulation Resistance Range (GΩ)	0.01MΩ – 2000GΩ
Insulation resistance resolution	0.01MΩ – 1GΩ
DC Voltage Range	0 – 1000V
DC Voltage Range Resolution	0.1V
AC Voltage Range	0 – 750V
AC Voltage Range Resolution	0.1V
Output short-circuit current	≥5mA (5KV)
Power supply	12.6V rechargeable battery
LCD screen size	108mm×65mm
Instrument size	L/W/H: 10.9 " × 9.0 " × 6.0 "
Instrument weight	6.0 lbs (including battery)
Insulation resistance	≥50MΩ (between measuring line and housing)
Voltage withstand	AC3kV/60Hz 1 minute
Working temperature and humidity	-10°C – +50°C < 85%RH
Storage temperature and humidity	-15°C – +55°C < 90%RH
Test Lines	3m red high voltage test cable
	1.5m black high voltage test lead
	1.5m green high voltage test lead
Power Consumption	Standby: 30mA Max (backlight off)
	Standby: 42mA Max (backlight on)
	Measuring : 300mA Max (backlight off)

3.5 Measuring Range and Accuracy

3.5.1 Insulation Resistance Range and Accuracy

This table shows the output voltage, measuring range, accuracy, and resolution for the insulation resistance (IR) test.

Test Function	Output Voltage	Measure Range	Accuracy	Resolution
Insulation Resistance	100V (±10%)	0MΩ – 5MΩ	±5%rdg±5dgt	0.01MΩ
		5MΩ – 50MΩ	±5%rdg±5dgt	0.01MΩ
		50MΩ – 500MΩ	±5%rdg±5dgt	0.1MΩ
		0.5GΩ – 5GΩ	±5%rdg±5dgt	0.01GΩ
		5GΩ – 20GΩ	±10%rdg±5dgt	0.1GΩ
	250V (±10%)	0 MΩ – 10MΩ	±5%rdg±5dgt	0.01MΩ
		10 MΩ – 100MΩ	±5%rdg±5dgt	0.1MΩ
		100MΩ – 1000MΩ	±5%rdg±5dgt	1MΩ
		1GΩ – 10GΩ	±5%rdg±5dgt	0.01GΩ
		10GΩ – 30GΩ	±5%rdg±5dgt	0.1GΩ
	500V (±10%)	0 MΩ – 20MΩ	±5%rdg±5dgt	0.01MΩ
		20 MΩ – 200MΩ	±5%rdg±5dgt	0.1MΩ
		200MΩ – 2000MΩ	±5%rdg±5dgt	1MΩ
		2GΩ – 20GΩ	±5%rdg±5dgt	0.01GΩ
		20GΩ – 50GΩ	±10%rdg±5dgt	0.1GΩ
	1000V (±10%)	0MΩ – 50MΩ	±5%rdg±5dgt	0.01MΩ
		50 MΩ – 500MΩ	±5%rdg±5dgt	0.1MΩ
		500 MΩ – 5000MΩ	±5%rdg±5dgt	1MΩ
		5GΩ – 50GΩ	±5%rdg±5dgt	0.01GΩ
		50GΩ – 100GΩ	±10%rdg±5dgt	0.1GΩ
		0 MΩ – 10MΩ	±5%rdg±5dgt	0.01MΩ

	2500V (±10%)	10 MΩ – 100MΩ	±5%rdg±5dgt	0.1MΩ
		100 MΩ – 1000MΩ	±5%rdg±5dgt	1MΩ
		1 GΩ – 10GΩ	±5%rdg±5dgt	0.01GΩ
		10 GΩ – 100GΩ	±5%rdg±5dgt	0.1GΩ
		100 GΩ – 300GΩ	±10%rdg±5dgt	1GΩ
	5000V (±10%)	0 MΩ – 20MΩ	±5%rdg±5dgt	0.01MΩ
		20 MΩ – 200MΩ	±5%rdg±5dgt	0.1MΩ
		200 MΩ – 2000MΩ	±5%rdg±5dgt	1MΩ
		2 GΩ – 20GΩ	±5%rdg±5dgt	0.01GΩ
		20 GΩ – 200GΩ	±5%rdg±5dgt	0.1GΩ
		200 GΩ – 2000GΩ	±10%rdg±5dgt	1GΩ

Note: These are the common electrical unit conversions.

$$1 \text{ T}\Omega (\text{Tera ohm}) = 1000\text{G}\Omega = 10^{12}\Omega$$

$$1 \text{ G}\Omega (\text{Giga ohm}) = 1000\text{M}\Omega = 10^9\Omega$$

$$1 \text{ M}\Omega (\text{Mega ohm}) = 1000\text{K}\Omega = 10^6\Omega$$

3.5.2 Voltage Range and Accuracy

This table shows the measuring range, accuracy, and resolution for the **DC** and **AC** voltage tests.

Test Function	Measure Range	Measure Range	Resolution
DC Voltage	DC 0.0V~1000V	±1.5%rdg±3dgt	0.1V
AC Voltage	AC 0.0V~750V	±1.5%rdg±3dgt	0.1V

4 Using the Model 3005A Digital Insulation Resistance Tester

This section provides steps on how to use the **Model 3005A Digital Insulation Resistance Tester**.

4.1 Power On/Off

Press  to switch on the device.

After switching on, Automatic Power Off (**APO**) appears in the lower corner of the screen.

The device shuts down automatically after 15 minutes of inactivity.

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4.2 Checking the Battery

After switching the power on, check the battery level. If the LCD screen displays a low battery sign, it indicates that the battery is running low. The voltage drops to 10V when the battery power runs low. Charge the battery in time to ensure measurement accuracy and to ensure long battery life.

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4.3 Setting the Backlight

Press “” to switch on or switch off the backlight.

Use the backlight function during test procedures in dim places.

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4.4 Setting the Alarm

1. Press “” to switch on or switch off the alarm function.
2. Press **MODE** to set the alarm value setting mode.
3. Press **Ω** to select the resistance value setting.
4. Press **V[—]** to select **DC** voltage setting.
5. Press **V[~]** to select **AC** voltage setting.
6. Scroll through , , ,  to select the desired value.
7. Press **MODE** to save and exit.

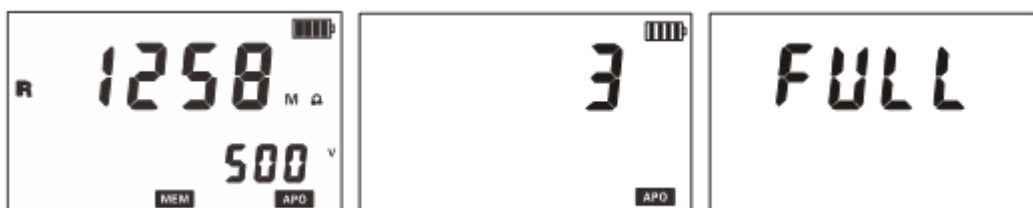
If...	And...	Then...
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you switched on the alarm function	the measured voltage value is greater than the critical set value	The LCD screen flashes the  symbol and emits a beep-beep-beep alarm sound.
	the insulation resistance value is less than the critical set value	

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4.5 Saving the data

1. Press **MEM** to lock the current data after the test.
The LCD screen displays the **FULL** symbol if the storage is full.
2. Press **MEM** to save and exit.



4.6 Reviewing the data

1. Press **MR** to enter the review data mode.
The LCD screen displays the **MR** symbol.
2. Scroll through , , ,  to select the data that you want to review.
3. Press **MEM** to save and exit.

Note: If there is no stored data, the LCD screen displays the **NULL** symbol.



4.7 Deleting the data

1. In the data review state, press **CLEAR** to enter data deletion mode.

2. Press **NO** to return to the data review state.
3. Press **YES** to delete the stored data.



5 During the Test Procedures

This section provides safety instructions during the test in a live working environment.

Please read and follow the instructions properly to ensure safe and proper use of the device.

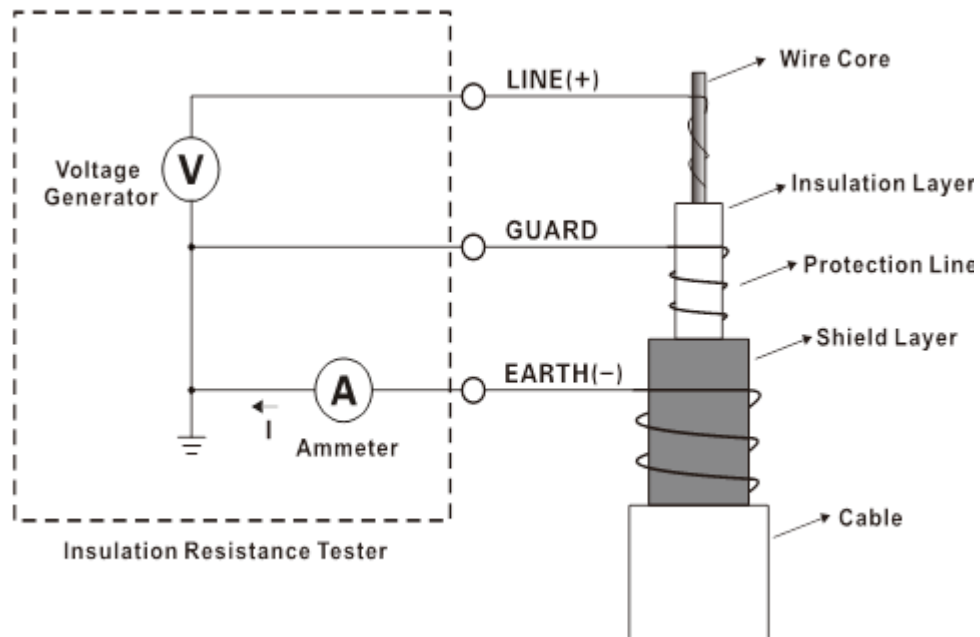


- You must wear high-voltage insulating gloves during the test procedures.
- You must not use high-frequency signal generators like mobile phones and others to avoid error when measuring.
- You must not touch the bare conductors and circuits under test.
- You must not use this device when there are damaged, exposed, or broken parts in testing wires or insulation layers.
- You must not charge batteries or perform data transmission uploads during the measurement process.
- You must pay attention to measuring ranges and specific environmental conditions during the usage of this device.
- You must not use the device when the battery cover is open, especially during adverse weather conditions.
- The device generates a high voltage, make sure to connect the test leads properly. Before pressing the test button, remove your hands from the test leads to avoid the risk of electric shock.
- When the test is complete, wait for one minute before removing the test leads.

5.1 Using the Guard Terminal



When measuring the insulation resistance of a cable, the leakage current of the cable surface is in parallel to the current that passes through the interior of the insulation. Then, the current converges resulting in an error in the insulation resistance value. To avoid this occurrence, use a protection wire guard to guard the leakage current, as shown in the figure below. After connecting to the guard terminal, the leakage current does not flow through the indicator and the insulator accurately measures the insulation resistance. You must use the guard test cable to connect to the guard terminal.



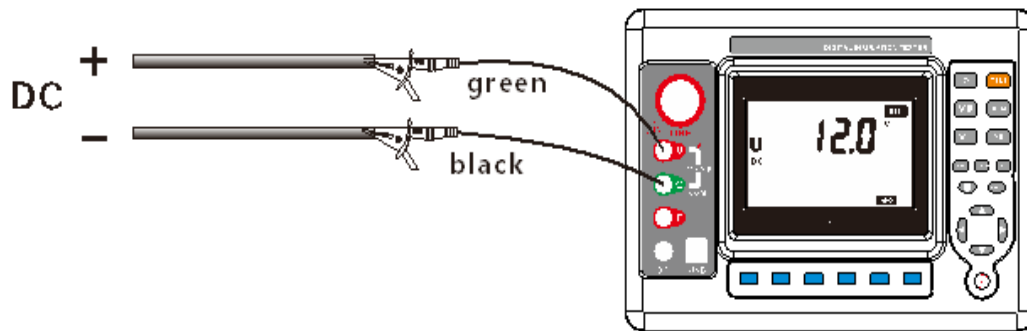
6 Test Procedures

This section provides important instructions on how to perform **DC** voltage, **AC** voltage, insulation resistance (**IR**), polarization index (**PI**), and dielectric absorption ratio (**DAR**) tests.

6.1 DC Voltage Test



The input **DC** voltage must not exceed 1000V.



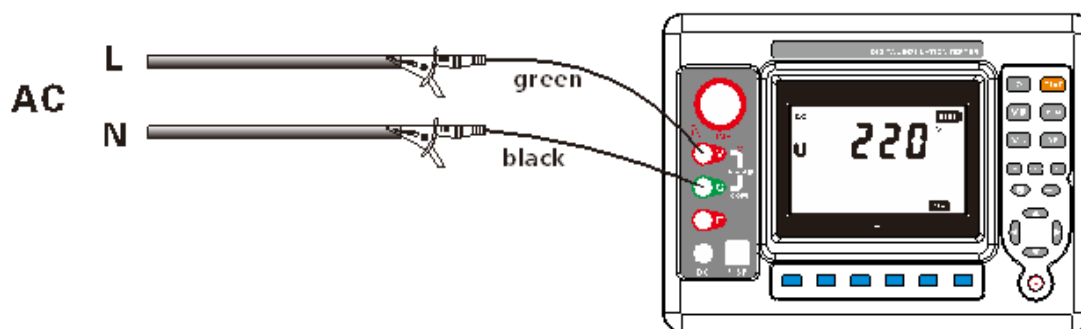
1. Press  to switch on the device.
2. Press **V[—]** to switch to **DC** voltage test mode.
3. Connect the green connector plug into the **V** interface and then connect the safety alligator clip to the unit under test.
4. Connect the black connector plug into the **G** interface, and then connect the safety alligator clip to the unit under test.
5. Press **TEST** to start the test.

The LCD screen displays the real-time **DC** voltage value.

6.2 AC Voltage Test



The input **AC** voltage must not exceed 750V.



1. Press power button to switch on the device.
 2. Press **V~** to switch to **AC** voltage test mode.
 3. Connect the green connector plug into the **V** interface and then connect the safety alligator clip to the unit under test.
 4. Connect the black connector plug into the **G** interface and then connect the safety alligator clip to the unit under test.
 5. Press the **TEST** to start the test.
- The LCD screen displays the real-time **AC** voltage value.

6.3 Insulation Resistance Test

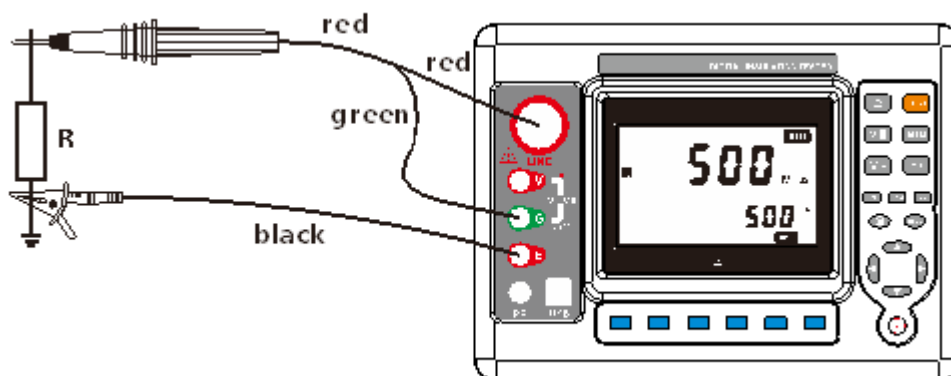


- You can only perform insulation resistance tests on non-energized circuits.
- Before the insulation resistance test, check if the test circuit wiring is in good condition and if the circuit under test is energized. An energized circuit can damage the instrument and affect measurement accuracy.
- Make sure to connect the black grounding wire to the grounding port of the circuit under test.
- After the test, do not touch the circuit immediately. Wait until the discharge is complete before touching the circuit; stored charge can cause electric shock.
- To ensure measurement accuracy, do not twist the test leads together.

The table shows the guaranteed temperature and humidity of the insulation resistance accuracy.

Insulation resistance range	Guaranteed humidity value of the insulation resistance	Guaranteed temperature of the insulation resistance accuracy
0Ω – 100 MΩ	<85% RH (No condensation)	

101 M Ω – 20 G Ω	<75% RH (No condensation)	23°C $\pm$ 5°C
21 G Ω – 1000 G Ω	<65% RH (No condensation)	



1. Press **Ω** to gear.
2. Press **100V**, or **250V**, or **500V**, or **1KV**, or **2.5KV**, or **5KV** to select the voltage value.
3. Connect the black connector plug into the **EARTH** interface, and then connect the safety alligator clip to the grounding port of the circuit under test.
4. Connect the banana plug of the red high voltage test cable into the **LINE** terminal, and then connect the high-voltage probe to the circuit under test.
5. Connect the shielded cable connector into the **GUARD** interface.
6. Press the **TEST** to start the test.
The device emits an audible beep during testing.
The LCD screen displays the real-time insulation resistance value.
7. After the measurement is complete, press **MEM** to lock the current display data.
The device saves the locked display data in storage automatically.

6.4 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Tests



- You can only carry out **PI** and **DAR** tests on uncharged circuits.
- Before the test, check if the test circuit wiring is in good condition and if the circuit under test is energized.

1. Press **Ω** to gear.
2. Press **100V**, or **250V**, or **500V**, or **1KV**, or **2.5KV**, or **5KV** to select the voltage value.
3. Press **MODE** to set the corresponding mode.

The LCD displays

- **10:01m** - polarization index mode,
- **60:15S** - absorption mode 15-second mode, and
- **60:30S** - absorption mode 30-second mode.

The LCD does not display small values for the insulation resistance measurement mode.

4. Connect the black connector plug into the **EARTH** interface, and then connect the safety alligator clip to the grounding port of the circuit under test.
5. Connect the banana plug of the red high voltage test line into the **LINE** terminal, and then connect the high-voltage probe to the circuit under test.
6. Press the **TEST** to start the test.

The LCD displays the real-time PI and DAR values.

7. Press  to view the divisor of the DAR or PI value, the value of 60 in "60:15S" mode.
8. Press  to view the dividend of the DAR or PI value, the value of 15 in "60:15S" mode.
9. Press  or  to return.

6.4.1 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Functions

The **Model 3005A Digital Insulation Resistance Tester** automatically calculates the PI and DAR values. The function of the **PI** and **DAR** tests is to check if the leakage current of the insulator has increased. The results indicate the change in insulation resistance after the measured circuit withstands the measured voltage.

6.4.2 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Differences

DAR refers to the short-term **IR** test that you can perform to increase the leakage current while the applied voltage polarizes the atoms in the insulation. You can measure the IR when the leakage current stabilizes within one minute. **DAR** test is suitable for general insulation testing such as house wiring insulation, tool handles, and other equipment which can be tested in a short time.

You can perform a **PI** test when **DAR** is not enough to reflect the long-term process of absorption. **PI** test is suitable for insulation with higher index or large capacities such as transformers, generators, cables, and other electrical equipment. The ratio between the insulation resistance (**R10min**) at 10 minutes and the insulation resistance (**R1min**) at one minute describes the entire process of insulation absorption.

The **Model 3005A Digital Insulation Resistance Tester** calculates the **PI** and **DAR** values by:

Polarization Index =	$\frac{R\ 10\ Min}{R\ 1\ Min}$	R10Min = resistance value measured by the voltage applied for 10 minutes
		R1Min, R60Sec = resistance value measured by the voltage applied for 1 minute

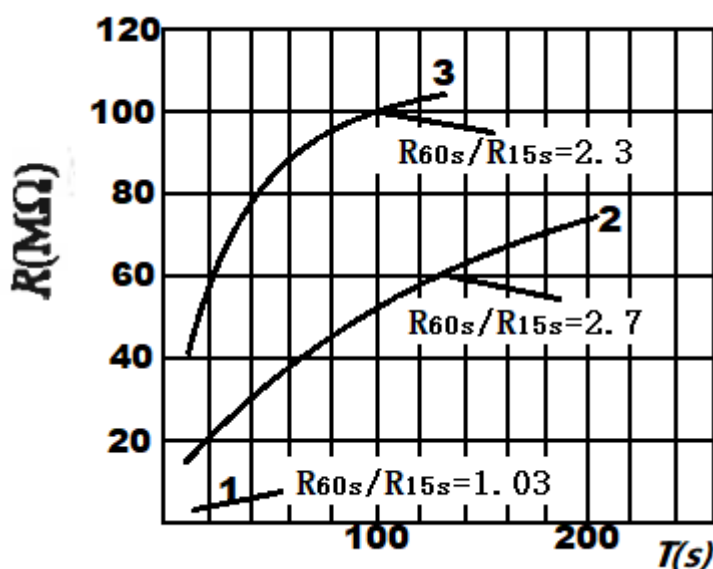
Absorption Ratio =	<u>R 60 Sec</u> R 15 Sec	
		R15Sec= resistance value measured by the voltage applied for 15 seconds
Absorption Ratio =	<u>R 60 Sec</u> R 30 Sec	R30Sec= resistance value measured by the voltage applied for 30 seconds

Note: You can select between 15 seconds and 30 seconds **DAR** calculation time, depending on the index capacity of the circuit under test.

6.4.3 Polarization Index (PI) and Dielectric Absorption Ratio (DAR) Applications

In engineering, **IR**, **PI**, or **DAR** reflect the degree of moisture in the insulation of generators, oil-immersed power transformers, and other equipment. The **PI** and **DAR** values decrease when the insulation gets wet. It is an important indicator of whether the insulation is affected by moisture. Sometimes the insulation has obvious defects, but the **PI** and **DAR** values remain good. For example, the insulation breaks down under high voltage, but the **PI** and **DAR** values are still good. In such a case, you cannot use **PI** and **DAR** tests to find other local insulation defects other than moisture and dirt.

The chart shows the relationship between insulation resistance and time.



1. 15 degrees Celsius before drying
2. 73.5 degrees Celsius at the end of the drying
3. 27 degrees Celsius after running for 72H

The table shows the **PI** reference judgment value :

Polarization Index	Above 4	4 – 2	2.0 – 1.0	Below 1.0
Judgment	Best	Good	Need to pay attention	Bad

The table shows the **DAR** reference judgment value:

Absorption ratio	Above 1.4	1.25 – 1.0	Below 1.0
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7 After Test Procedures

This section provides safety instructions after the test procedures.

Please read and follow the instructions properly to ensure safe and proper use of the device.



- You must not touch the circuit immediately after the test. Wait until the discharge is complete before touching the circuit; stored charge can cause electric shock.
- When replacing the battery, remove the test leads from the front panel, and switch **OFF** the device.
- When cleaning the instrument, use a soft cloth to remove dust or dirt.
- You must not keep or store the device in a place with high temperature, moisture or condensation, or under direct sunlight radiation.

8 After-Sales Services

The **Model 3005A Digital Insulation Resistance Tester** is under warranty for a period of one year from the date of purchase. In situations where warranty service is required, you must contact our After-sales department or visit our website for more information.

Warranty inclusions:

- Replacement of Parts
- Maintenance
- Technical Services

Warranty conditions:

- We do not provide maintenance and replacement warranty for device failure caused by disassembling equipment without authorization.
- We are not responsible for any physical or property damage caused by
 - negligence
 - abuse
 - misuse, or
 - improper installation.