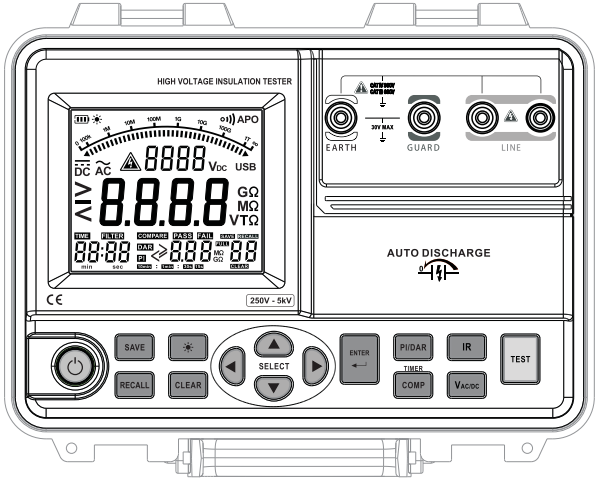
Operating Manual

High Voltage
Insulation Resistance Tester



Y01-04-0193

Please read this operating manual carefully before using this product, and keep it properly for future use.

尺寸：148*100mm
黑框不要印

Contents

Statement

Limited guaranty and limited liability

PEAKMETER guarantees that under normal use and maintenance, its products are free from defects in materials and workmanship. The guarantee period is within one year from the date of purchase of products. This guaranty is limited to the original purchaser or end user of PEAKMETER's authorized retailer and does not apply to disposable batteries, testing lines, alligator clip connectors or any product damage that PEAKMETER considers to be caused by misuse, modification, negligence, contamination and accidental or abnormal operation or handling. If you need maintenance service, please contact AKMETHER customer service center first, and then send the products to the service center for maintenance. If PEAKMETER determines that the product failure is caused by negligence, misuse, contamination, modification, accidental or improper operation or handling conditions, including over-voltage failure caused by not using products at its specified rating; or caused by wear and tear of the machine parts during daily use, PEAKMETER will estimate the repair cost and repair it after obtaining the buyer's consent. After repairing, PEAKMETER will send the products back to the buyer at the buyer's expense. PEAKMETER is not responsible for any special, indirect, accidental or subsequent damage or loss, including data loss due to any reason or reasoning. As certain countries or states do not permit the limitation of the duration of an implied warranty or the exclusion and limitation of accidental or subsequent damage, the limitation and exclusion clauses of this guaranty may not apply to every buyer. If certain provisions of this guaranty are ruled invalid or unenforceable by a court or other adjudicating body with appropriate jurisdiction, such judgment shall not affect the validity or enforceability of any other provisions.

1. Summary

MS5215 is a battery powered digital high voltage insulation resistance tester. It is designed in new circuit and controlled by microprocessor chip control; and has high precision, high stability and high reliability. Its insulation resistance measurement is output in five-stage test voltages (250V, 500V, 1000V, 2500V, 5000V); its short circuit testing current is about 3mA; themaximum testing range of insulation resistance is 5TΩ (the testing range is from 0.1 MΩ to 5TΩ); the basic testing accuracy is ±5% ;PI (polarization index) and DAR (dielectric absorption ratio) can be calculated automatically. It also has AC and DC voltage (automatic discrimination) testing function. It is not only applicable to the measurement and maintenance of power equipment and power supply lines on site, but also applicable to the insulation resistance measurement of insulation materials and various electrical equipment such as motors, transformers, cables and electrical appliances. The MS5215 is exquisitely and meticulously designed and is durable and easy to operate, so it is an ideal tool for numerous overhauls, debugging and preventive maintenance.

- Referenced standard:

IEC/EN 61010-1,-2-030:300V CAT IV /600V CAT Ⅲ pollution degree 2
IEC/EN 61326-1， -2-2(EMC)
EN50581(RoHS)

- Automatic discharge: After the test is completed, the instrument will discharge quickly and automatically to protect the safety of testers.
- Test function prohibited when the terminal to be tested is charged: Before the test for the insulation resistance starts, the instrument will automatically detect the voltage of the terminal to be tested. When the voltage (AC or DC voltage) is ≥ 30V, the instrument will be prohibited for testing. LCD displays the voltage value of the terminal to be tested and the character "UE. HI", and buzzer sends out warning buzzer to protect the safety of testers.
- Timing measurement function: Automatic measurement in the specified time.
- Comparing function: Under the testing state of insulation resistance and the COMPARE (comparison) function has been enabled, the LCD will directly display the comparison result: "PASS" or "FAIL" to meet the needs of customers for efficient batch testing.
- LCD analog bar (bar graph): dynamic and intuitive display of measurement results.
- Storage function: up to 99 groups of display data can be stored.
- Back light function: It is convenient for working in dim light environment or at night.
- Automatic shutdown function: Without any key operation, the instrument will automatically shut down after 10 minutes to save power (except in the test state of insulation resistance).

2. Safety instructions

- Before use, read through this manual to understand the contents, especially the contents of "Danger", "Warning" and "Attention".
- Please keep the operating manual with the instrument for easy consulting at any time.
- The sign "⚠" on this instrument means the contents that users shall pay special attention to in order to operate this instrument safely.

⚠ **Danger:** indicates that misoperation will result in serious or fatal injury.

⚠ **Warning:** indicates that misoperation is likely to cause serious or fatal injury.

⚠ **Caution:** indicates that misoperation may cause personal injury or instrument damage.

⚠ **Danger:**

- Do not measure in a circuit above AC/DC600V.
- Do not use this instrument around explosive gas or steam or in a humid environment.
- Do not operate when the surface of the instrument is wet or the operator's hands are wet.
- Do not touch the conductive part of the testing meter leads during measuring.
- Do not contact the circuit under test during measuring.
- Do not open the battery cover and case during measuring.
- Please select an appropriate insulation test voltage before selecting the insulation resistance test.

⚠ **Warning:**

- If the instrument is abnormal, please stop using it. For example, the instrument housing is damaged or the test line is broken to expose the metal part.
- Please do not install replacement parts or make any unauthorized modifications to the instrument. Please send the instrument to our company or our designated distributor for repairing.
- Do not replace the battery when the instrument is wet.
- Make sure that all test wires are firmly connected to the test port of the instrument.
- When opening the battery cover, make sure the instrument is turned off.

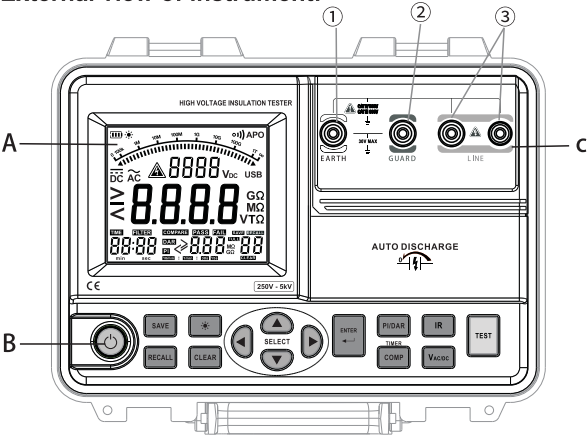
⚠ **Caution:**

- After use, press the "POWER" key to shut down. If you do not use the instrument in a long time, please take out the battery to store it.
- Please do not place the instrument in high temperature, humidity, condensation place and direct sunlight for a long time.
- Please use a damp cloth or mild detergent to clean the instrument housing, and do not use abrasives or solvents.
- When the instrument is wet, please dry it before storing or testing.

Definition of symbols:

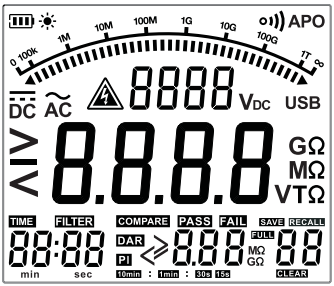
	Warning, danger		Warning, dangerous voltage, electric shock danger
	Complies with European Union Directives		Earthing
	Double insulation		This product shall not be discarded as household garbage, nor shall it be treated as unclassified municipal waste.

3. External view of instrument:



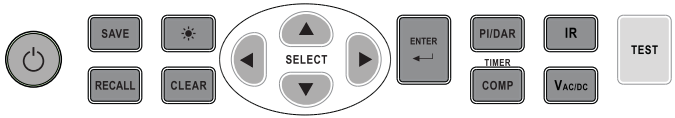
A: LCD display area: Display of measurement data and functions and unit symbols
B: Key area: Various function keys
C: Port area: 1 earthing port 2 protection port 3 high voltage output port

4. LCD full display diagram:



	Battery voltage indication symbol	DAR	Dielectric absorption ratio symbol	PI	Polarization index symbol
	Back light symbol	V_{DC}	DC voltage symbol	SAVE	Storage symbols
–	Negative voltage symbol	TIME	Timing symbol	RECALL	Viewing symbol
APO	Automatic shutdown symbol	min	Minutes symbol	FULL	Data full symbol
	Bar chart (analog bar)	sec	Second sign	CLEAR	Data clearing symbol
DC	DC (voltage) symbol	COMPARE	Comparing functional symbol	>	Greater-than sign
AC	AC(voltage)symbol	PASS	Pass symbol	<	Less-than sign
	High voltage warning symbol	FAIL	Unpass(fail)symbol		

5. Key function:



5.1 Power button:

Press the POWER key once for starting-up, and then press it again for shutdown. After starting, the default function stage is insulated 1000V measurement function stage.

5.2 The SAVE key: SAVE

SAVE (storage) function: Press this key, the instrument will store the data currently displayed on LCD. When the storage number is greater than 99, the "FULL" character on the LCD is lit up, indicating that the stored data is full and the data can no longer be stored inside (the instrument can store 99 groups of display data at most).

5.3 Back light key:

Back light function: Press this key, the Back light is turned on, and press this key again for shutdown. After starting, the back light key is turned on by default.

5.4 RECALL key: RECALL

The RECALL key is used to view stored data. Press this key to recall the saved data (starting with the data numbered 1); press this key again to exit RECALL mode.

5.5 CLEAR key : CLEAR

The CLEAR key is used to clear stored data. In RECALL mode, press this key, LCD will display "CLr" flashing, prompting " erase stored data"; press ENTER key, all stored data will be erased, LCD display "RECALL no" character.

5.6 ▲ Key

- Under the non-test state of the insulation resistance shift, press this key to select the insulation test voltage (250V, 500V, 1000V, 2500V, 5000V insulation measurement function stages are optional) from the low to the high for circulating selection.
- When the TIMER function is enabled under the non-test state of the insulation resistance stage, press this key to select the timing measurement time optional from 1 minute to 60 minutes (circulating selection from the low to the high), and press ENTER to confirm.
- In RECALL mode, view the stored data (circulating selection from the low to the high).

5.7 ▼Key

- Under the non-test state of the insulation resistance range, press this key to select the insulation test voltage (250V, 500V, 1000V, 2500V and 5000V insulation measurement function stages are optional) from the high to the low for circulating selection.
- When the TIMER function is enabled under the non-test state of the insulation resistance stage, press this key to select the timing measurement time from 1 minute to 60 minutes (circulating selection from the high to the low), and press ENTER to confirm.
- In RECALL mode, view the stored data (circulating selection from the high to the low).

5.8 ◄Key

In COMPARE mode, press this key to select (circulating selection from the large to the small) comparison values.

5.9 ►Key

In COMPARE mode, press this key to select (circulating selection from the small to the large) comparison values.

5.10 ENTER key: ENTER

- After the TIMER function is enabled, press ▲ key and ▼key to select the test timing time, and press this key to confirm.
- In RECALL mode, press CLEAR key, LCD will display "CLr" (flashing), prompting "erase stored data"; press ENTER key, all stored data will be erased.

5.11 PI/DAR Key: PI/DAR

When PI (polarization index)/DAR (dielectric absorption ratio) is switched and insulation resistance is tested, the instrument will automatically calculate polarization index and dielectric absorption ratio. Polarization index: PI= (resistance value at 10 minutes after starting measurement) "resistance value at 1 minute after starting measurement). Dielectric absorption ratio 1: DAR (CN) = (resistance value at 1 minute after starting measurement). Resistance value at 15 seconds after starting measurement), dielectric absorption ratio 2: DAR= (resistance value at 1 minute after starting measurement) ^ resistance value at 30 seconds after starting measurement). Press this key, the LCD will display the values of polarization index and dielectric absorption ratio. After the insulation resistance measurement function stage is entered, the default display is: dielectric absorption ratio 1 (DAR (CN)), which is applicable to Chinese standard.

5.12 COMPARE/TIMER

COMPARE (comparing function): Under the non-test state of the insulation resistance measurement function stage, press this key for a short time to enable the comparing function, and press the◄ key and ►key to select different comparing resistance values. The optional comparing values are 1 MΩ, 2 MΩ, 3 MΩ, 4 MΩ, 5 MΩ, 10 MΩ, 20 MΩ, 30 MΩ, 40 MΩ, 50 MΩ, 100 MΩ, 200 MΩ, 300 MΩ, 400 MΩ, 500 MΩ, 1 GΩ, 2 GΩ, 3 GΩ, 4 GΩ, 5 GΩ and 10GD. When the comparing function is enabled, the default comparison value is 10MD. When the measured value is ≥ to the comparison value, the "PASS" character on the LCD is lit, otherwise, the "FAIL" character is lit.

TIMER (Timing Function): Press "COMPARE/TIMER key" for about 3 seconds to start the setting function for timing measurement time under the non-test state of the insulation resistance measurement function stage. At this time, the data on minutes flashes, press ▲ key and ▼ key to select the required timing time (optional from 1 minute to 60 minutes, and the default is 1 minute when starting). Press the ENTER key to confirm that the timing function is enabled and the "TIME" character on LCD will flash.

5.13 IR Key :

Select key for resistance measurement function stage: Press this key to enter resistance measurement function stage. After startup, the insulation 1000V measurement voltage function stage is defaulted.

5.14 VAC/DC Key:

AC and DC voltage measurement function stage selection key: press this key to enter the voltage measurement function stage, AC and DC voltage will be automatically discriminated, when the voltage < 30V, LCD displays "Lo V".

5.15 TEST key:

At the resistance measurement function stage, press this key to start the insulation resistance test function, and then press it again to stop the test function. It is not required to press this key when voltage is measured in voltage function stage.

6. Preparation before measurement

①Press the "POWER" key to start up. After starting up, the default function is 1000V measurement function stage.

② Observe the battery symbol in the upper left corner of LCD. If the battery symbol shows "(batt)", which means that the battery has been exhausted and needs to be replaced, otherwise the instrument cannot be used normally.

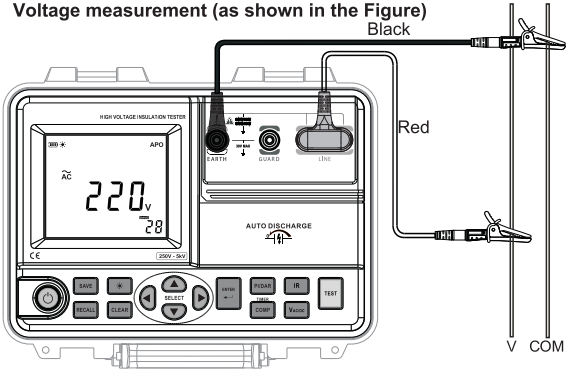
Remarks: When low resistance (< 10MΩ) is measured in the insulation resistance range, the battery consumption will be very high, and the battery voltage will be reduced. When the battery voltage is about < 7.8 V, the LCD will display the "(batt)" character. Therefore, the test time for low resistance shall be shortened as far as possible.

Comparison table of battery voltage and battery symbol:

	Above 10.5V
	9.1-10.5V
	7.8-9.1V
(batt)	Under 7.8V

7. Measurements

7.1 Voltage measurement (as shown in the Figure)



DC Voltage Automatic Distinguishing Function: When the input voltage signal is measured in the voltage range, the instrument will automatically distinguish whether it is AC voltage (ACV) or DC voltage (DCV) and provides precise measurement (to switch function selection buttons is not required), which also avoids the danger of high voltage electric shock to testers due to high voltage misjudgment.

⚠Warning

1 Do not apply AC/DC voltage exceeding 600V, so as not to cause personal injury or instrument damage accidents.

2 The meter leads tip in accordance with the corresponding safety regulations shall be used. When using meter leads that are different from the safety regulation and standard of the host machine, the lower safety standard is taken as the standard.

3 Do not use the pencil-type probe hook to measure the voltage, because the exposed metal part will cause electric shock.

4 When measuring high voltage, corresponding protective measures shall be taken, such as wearing gloves.

5 Disconnect the instrument from the tested circuit in time after measuring.

Measuring sequences:

1 Insert the red testing meter lead tip into the "LINE" hole and the black testing meter leads tip into the "EARTH" hole.

2 Press the VAC/DC key to select the function stage to the voltage function stage.

3 Connect the two test meter lead tip in parallel with the tested circuit reliably.

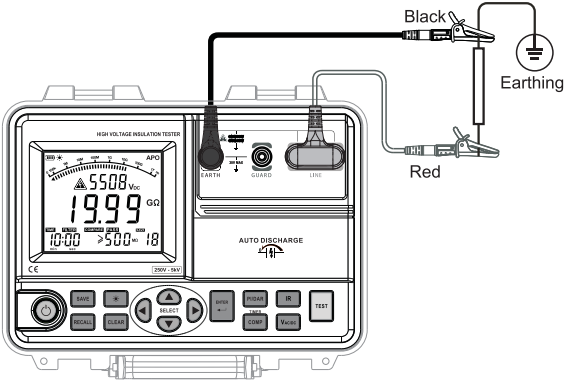
4 The measured voltage value displayed on LCD (it is not required to press the TEST key). When DC voltage is measured and the red meter lead tip indicates negative signal, LCD displays "-" (negative) polarity.

Notes:

- When there is no voltage input or the input voltage value is <30 V, the LCD displays "Lo V".
- When the input signal exceeds 30V, the instrument will automatically distinguish AC voltage (ACV) or DC voltage (DCV).

5 The "SAVE" key, "☀" key, "RECALL" key, "IR" key and "ON/OFF" key in this function stage are enabled; other keys are disabled.

7.2 Insulation resistance measurement



Warning

① Do not apply any voltage to the measuring jack.

② Please wear high-voltage insulation gloves for measurement.

③ Before measuring, please make sure that the measured object (line) has been deenergized and is in a state of no live.

④ During measuring, this instrument will generate high voltage, so please do not touch the measured object.

⑤ After measuring, the instrument will discharge quickly and automatically, without manual discharge (in order to protect testers from electric shock danger).

Caution

① When measuring the insulation resistance, the test terminal of this instrument will output high voltage.

② The insulation resistance of some tested objects is unstable, its display value will fluctuate. It takes a long time to measure the measured substance containing capacitive components.

③ When measuring the absolute resistance, the EARTH earthing terminal is positive and the LINE terminal is negative.

④ When the tested object is earthed, the EARTH earthing terminal is usually connected to the ground, and the LINE terminal is connected to the tested line.

⑤ In order to prevent measurement errors, it is required to try not to touch the measuring meter leads tip, the measured object and the earthing terminal. Especially, when measuring the absolute resistance above 100 GΩ, the testing meter leads tip shall be far away from each other to make the display value more stable.

⑥ The instrument will make a weak "sizzling" sound when the measured absolute resistance value is relatively small, which is not a fault.

Operation cautions:

- The continuous test time shall not exceed 15 seconds when the resistance less than 10 MΩ is measured in 5000V function stage, when the resistance less than 5 MΩ is measured in 2500V function stage, the resistance less than 2 MΩ is measured in 1000V function stage, the resistance less than 1 MΩ is measured in 500V function stage and the resistance less than 500 kΩ is measured in 250V function stage.

- If the function stage is voltage range, press IR key to switch the function stage to insulation resistance measurement range (after starting up, the default function stage is insulation resistance measurement range), and press ▲ key or ▼key to select the appropriate insulation resistance test voltage (250V, 500V, 1000V, 2500V and 5000V are optional).
- Before measuring the insulation resistance, the circuit to be test must be completely powered off and completely isolated from the power supply circuit.
- Insert the red testing meter lead tip into the "LINE" hole, insert the black test meter lead tip into the "EARTH" hole, and connect the corresponding red crocodile clip into the high voltage terminal to be tested and the black alligator clip into the earthing terminal to be tested.
- Before pressing TEST key to start measurement, the instrument will detect the external terminal voltage to be measured and the battery voltage. If the AC or DC voltage of the terminal to be measured is ≥ 30V or the battery voltage is judged to be low, it will be prohibited to measure the instrument.
- In addition to the measurement of very large resistance values, in most tests only two test lines (red and black) are required, and the green test lines are not required to connect. When the green test wire is used to measure the insulation resistance from the core to the outer layer of a similar cable, the green test wire is connected to the shield of the cable.

Continuous measurement:

The default state of startup is continuous measurement mode, at this moment, if the "TIME" character on LCD is not lit, press the "TEST" key, and the instrument starts to output high voltage for measurement, the high voltage warning symbol flashes, and the red indicator light on TEST key flashes synchronously, and the measured voltage value and insulation value are displayed on LCD. When the "TEST" key is pressed again, the instrument stops measuring, and the final measured value is kept on the LCD.

Timing measurement:

In the non-test state of the resistance measurement function stage, press "COMPARE/TIMER key" for about 3 seconds to enable the timing measurement time setting function. At this time, the number on the minute flashes. Press the ▲ key and ▼ key to select the timing time (optional from 1 minute to 60 minutes, and default to 1 minute when enabled), and press ENTER key to confirm. The timing function is enabled, "TIME" on LCD is lit. Press the "TEST" key to enable timing measurement, and the timer starts timing. When the timing time is equal to the set time, the instrument stops measuring, and the finally measured value is kept on the LCD. To exit the timer function, you are required to press and hold the "COMPARE/TIMER button" again for about 3 seconds.

Polarization index measurement:

Polarization index: PI = (resistance value at 10 minutes after starting measurement)/resistance value at 1 minute after starting measurement).

When measuring the insulation resistance, the instrument will calculate the polarization index synchronously, and it is possible to press the "PI/DAR" key to view the polarization index (PI) value. When the polarization index is not measured, the LCD displays "--"; the maximum test value of polarization index is 9.99, when it is exceeded, "OL" is displayed; when the measurement port of the instrument is open-circuited or the test value is greater than the maximum measured value of the insulation function stage, the effective polarization index will not be measured, and the LCD will display "no" character; when the measurement of instrument is short-circuited, the wrong polarization will be obtained Index, LCD will display "Err" characters.

PI	≥4.0	4.0～2.0	2.0～1.0	<1.0
Standard	Best	Good	Fair	Bad

Measurement of dielectric absorption ratio:

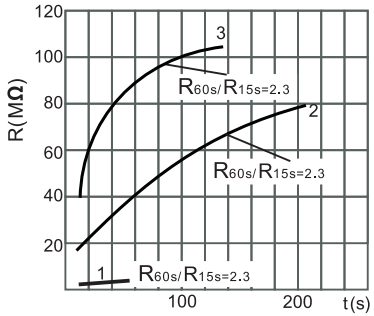
Dielectric absorption ratio 1: DAR (CN) = (resistance value at 1 minute after starting measurement)/(resistance value at 15 seconds after starting measurement).
Dielectric absorption ratio 2: DAR= (resistance value at 1 minute after starting measurement)/(resistance value at 30 seconds after starting measurement).
When measuring the insulation resistance, the instrument will calculate the dielectric absorption ratio synchronously, and press the "PI/DAR" key to check the dielectric absorption ratio (1, 2). When the dielectric absorption ratio is not measured, the LCD displays "--"; the maximum test value of dielectric absorption ratio is 9.99, and "OL" is displayed when this value is exceeded; when the instrument is in open-circuited measurement or the test value is greater than the maximum measurement value of the insulation function stage, the effective dielectric absorption ratio will not be measured, and the LCD will display "no" character; when the instrument is in short-circuited measurement, the wrong dielectric absorption ratio will be obtained, and the LCD will display the word "Err".

DAR	≥1.4	1.4～1.0	<1.0
Standard	Best	Good	Bad

Remarks: When the insulation resistance test starts and the polarization index (PI)/dielectric absorption ratio (DAR) is enabled, the buzzer will sound when the timer is timed to 15 seconds, 30 seconds, 1 minute and 10 minutes, indicating that the test value is recorded for PI and DAR calculation at this time.

Uses of PI (Polarization Index) and DAR (Dielectric Absorption Ratio):

For the tested items with large capacity and long absorption process, such as transformers, generators, cables, capacitors and other electrical equipment, sometimes the absorption ratio R60S/R15S cannot enough reflect the whole process of absorption. The ratio of insulation resistance for a long time, that is, the ratio of insulation resistance at 10min (R10min) to the insulation resistance at [min (R1min)] PI, can be used to describe the whole process of insulation absorption. PI is called polarization index of insulation. In engineering, the insulation resistance and absorption ratio (or polarization index) can reflect the damp degree of insulation of generators, oil-immersed power transformers and other equipment. After the insulator is damp, the absorption ratio (or polarization index) value decreases (as shown in Below), so it is an important indicator to judge whether the insulator is damp.
It should be noted that sometimes the insulator has obvious defects (such as insulator is broken down at high voltage) and the absorption ratio (or polarization index) value is still good. Absorption ratio (or polarization index) cannot be used to find local insulation defects other than damp and dirt.



1- 15℃ before drying; 2- 73.5°C at the end of drying;
3- After running for 72 hours, cool it to 27℃.

The figure shows the relationship between insulation resistance R of a generator and time t

Comparing function:

In the non-test state of the insulation resistance measurement function stage, press the "COMPARE/TIMER" key to enable the comparison function, and press the◄ key and ►key to select different comparison values. The optional comparison values are 1 M Ω, 2 M Ω, 3 M Ω, 4 M Ω, 5 M Ω, 10 M Ω, 20 M Ω, 30 M Ω, 40 M Ω, 50 M Ω, 100 M Ω, 200 M Ω, 300 M Ω, 400 M Ω, 500 M Ω, 1 G Ω, 2 G Ω, 3 G Ω, 4 G Ω, 5 G Ω and 10 G Ω. After enabling the comparison function, the default comparison value is 10MΩ. When the measured value is ≥ to the comparison value, the "PASS" character on the LCD is lit, otherwise, the "FAIL" character is lit. When the comparing function is enabled, the polarization index and dielectric absorption ratio measurement functions are turned off. Press the "PI/DAR" key to exit the comparing function.

8. Saving, viewing and clearing functions

Saving function:

Under the insulation measurement mode or voltage measurement mode, press "SAVE" key, the instrument will store the data currently displayed on LCD. When the storage number is greater than 99, the "FULL" character on the LCD is lit up, indicating that the stored data is full and the data can no longer be stored inside (the instrument can store 99 groups of display data at most).

RECALL function:

Press the "RECALL" key to enter the data viewing mode, the "RECALL" character on the LCD is lit, and the saved data will be recalled (as shown below), and press the ▲ key or ▼key to select; press the RECALL key again to exit the mode. When no data is stored, the LCD displays "RECALL no".

The CLEAR key is used to clear stored data. In RECALL mode, press this key, LCD will display " " (flashing) by pressing this key, prompting "erase stored data"; press ENTER key, the stored data will be erased.

9. Technical indicators:

Description of measuring accuracy: ± (% of reading + number of least significant digits)
The guarantee period is one year
Measured environmental temperature: 23°C±5°C
Measured environmental humidity: 45~75%RH (except for special instructions)
Measuring of insulation resistance:

Rated voltage	250V	500V	1000V	2500V	5000V
Measurement range	0.0MΩ~250GΩ	0.0MΩ~500GΩ	0.0MΩ~1000GΩ	0.0MΩ~2.50TΩ	0.0MΩ~5.00TΩ
Open circuit voltage	DC250V 100%~120%	DC500V 100%~120%	DC1000V 100%~120%	DC2500V 100%~120%	DC5000V 100%~120%
Output circuit (specified load)	At 250KΩ load: 1mA~1.2mA	At 500KΩ load: 1mA~1.2mA	At 1MΩ load: 1mA~1.2mA	At 2.5MΩ load: 1mA~1.2mA	At 5MΩ load: 1mA~1.2mA
Accuracy	0.0MΩ~9.99GΩ: ±(5%+3) 10.0GΩ~50.0GΩ: ±(10%+5) 50.1GΩ~250.0GΩ: ±(20%+10), (> 50.0GΩ, humidity ≤50%RH)	0.0MΩ~9.99GΩ: ±(5%+3) 10.0GΩ~50GΩ: ±(10%+5) 50.1GΩ~500GΩ: ±(20%+10) (> 50.0GΩ, humidity ≤50%RH)	0.0MΩ~9.99GΩ: ±(5%+3) 10.0GΩ~100GΩ: ±(10%+5) 101GΩ~500GΩ: ±(20%+10) 501GΩ~1000GΩ: ±(30%+20) (> 50.0GΩ, humidity ≤50%RH)	0.0MΩ~9.99GΩ: ±(5%+3) 10.0GΩ~100GΩ: ±(10%+5) 101GΩ~500GΩ: ±20% 501GΩ~2.50TΩ: ±(30%+20) (> 100GΩ, humidity ≤50%RH)	0.0MΩ~9.99GΩ: ±(5%+3) 10.0GΩ~100GΩ: ±(10%+5) 101GΩ~1.00TΩ: ±20% 1.01TΩ~5.00TΩ: ±(30%+20) (> 100GΩ, humidity ≤50%RH)
Short circuit current	about 3mA;				

Voltage measurement:

	Voltage type	Testing range	Resolution	Accuracy
Voltage measurement	ACV	30~600V(50/60Hz)	1V	±(2%+3)
	DCV	±30~±600V	1V	±(2%+3)

Other technical indicators:
Over-range indication function: the LCD ">" symbol of the insulation resistance shift lights up, and the LCD display "OL" of the voltage shift "OL" lights up.
Current consumption: about 1200mA (maximum), about 40mA in standby (when back light key is off), about 18 mA increased when back light key is turned on.
Dimension (Length*width*height): 284mm*221mm*121mm
Weight: About 2.5 kg (including battery)
Battery: Ten -section alkaline batteries (IEC LR14)
Elevation: Operation elevation ≤ 2000 m and storage elevation ≤ 12000 m
Storage conditions: temperature-20 ° C to 60 ° C/humidity 75% RH or less (non-condensing)
Operating conditions: temperature 0 ° C to 40 ° C/humidity 85% RH or less (non-condensing)
Annex:

Battery (1.5 V (LR14) alkaline battery)	Ten-section batteries
Testing meter leads tip	Three pieces (red, green, black)
Hook for alligator clip meter leads stick (No safety specifications)	1 set
MS5215 Operating Manual	1

Special attention: do not touch the metal part of the hook when using it, otherwise there is a risk of electric shock and personal injury

10. Back light functions

When the light is dim or tested at night, it is necessary to light up the back light function, press " ☀ " and then press this key to turn off the back light. After starting, the back light key is turned on by default. Key, the back light is lit;

11. Auto power-off

After about 10 minutes without any operation, the instrument will automatically shut down to save battery power. To reboot, you need to press the "POWER" key again.
Notes:
- This function is invalid when the insulation resistance is measured.
- If you don't use this instrument for a long time, please take out the battery to avoid leakage of battery liquid.

12. Service and maintenance:

⚠ **Warning:**
To prevent the possibility of electric shock, fire or personal injury:
- When the battery indicator shows that the power is insufficient, please replace the battery in time to prevent incorrect measurement value.
- Do not mix old and new batteries and attention shall be paid to battery polarity when installing batteries.

- Do not operate this instrument when the battery cover is removed or the casing is opened, because you may be exposed to dangerous voltages, causing electric shock accident.
- Please remove the test wire before replacing the battery.
- Only approved professional and technical personnel can repair this product.

12.1 Cleaning

Clean the shell regularly with a damp cloth and mild detergent; do not use corrosive agents or solvents; after cleaning, please dry it with a dry cloth and store it.

12.2 Replacing the battery

Replace the battery in following steps:

1 Make sure the instrument is turned off, otherwise press the "POWER" key to turn it off.

2 Unscrew the fastening screws on the battery cover with a standard screwdriver, and then remove the battery cover.

3 Remove and replace the battery.

4 Fit the battery cover and tighten the screws.