# POWER PROBE INT500 Insulation Tester and Multimeter User Manual



**POWER PROBE INT500 Insulation Tester and Multimeter User Manual**

Contents



## Introduction

This Insulation Tester is an accurate, professional industry tool for measuring ACV, DCV, Frequency, Low Pass Filter, EarthBond Resistance, Capacitor, Insulation Resistance.

### ⚠ Safety Information

Understand and follow operating instructions carefully.

### ⚠ WARNING

- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Always use proper terminals, switch position, and range for measurements.
- To reduce the risk of fire or electric shock, do not use this product around explosive gas or in damp locations.
- Verify the Meter operation by measuring a known voltage. If in doubt, have the Meter serviced.
- Do not apply more than the rated voltage, as marked on Meter, between terminals or between any terminal and earth ground.
- To avoid false readings that can lead to electric shock and injury, replace battery as soon as low battery indicator blinks / appears.
- Avoid working alone so that assistance can be rendered.
- Do not use the Tester if the Tester is not operating properly or if it is wet.
- Individual protective device must be used if hazardous live parts in the installation where the measurement is to be carried out could be accessible.
- Disconnect the test leads from the test points before changing the position of the function rotary switch.

- Never connect a source of voltage when the function rotary switch is not in voltage position.
- When using test leads or probes, keep your fingers behind the finger guards.
- Use caution with voltages above 30Vac rms, 42 Vac peak, or 60Vdc. These voltages pose a shock hazard.
- Remove test lead from Meter before opening the battery door or Meter case.
- DO NOT USE the test leads when the internal white insulation layer is exposed.
- DO NOT USE the test leads above maximum ratings of CAT. Environment, voltage and current, that are indicated on the probe and the probe tip guard cap.
- DO NOT USE the test leads without the probe tip guard cap in CAT III and CAT IV environments.
- Probe assemblies to be used for MAINS measurements shall be RATED as appropriate for MEASUREMENT CATEGORY III OR IV according to IEC 61010-031 and shall have a voltage RATING of at least the voltage of the circuit to be measured.
- Only replace the blown fuse with the proper rating as specified in this manual.
- Do not attempt a resistance measurement when the open voltage is above the fuse protection rating. Suspected open voltage can be checked with voltage function.
- Never attempt a voltage measurement with the test lead inserted into the Ω input terminal.
- Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, or capacitance.

| | |
|---|---|
|  | Risk of electric shock |
|  | See instruction manual |
|  | DC measurement |
|  | Equipment protected by double or reinforced insulation |
|  | Battery |
|  | Fuse |
|  | Earth |
|  | AC measurement |
|  | Bluetooth |
|  | Conforms to EU directives |
|  | Do not discard this product or throw away. |
|  | Both direct and alternating current |
|  | This product CONFORMS TO UL STD 61010-1,61010-2-034 |

## Symbols as marked on the Meter and Instruction manual

## Unsafe Voltage

To alert you to the presence of a potentially hazardous voltage, when the Tester detects a voltage ≧ 30 V in insulation test, or a voltage overload (OL), the ” “ symbol is displayed and High voltage indicator is turned on.

### Maintenance

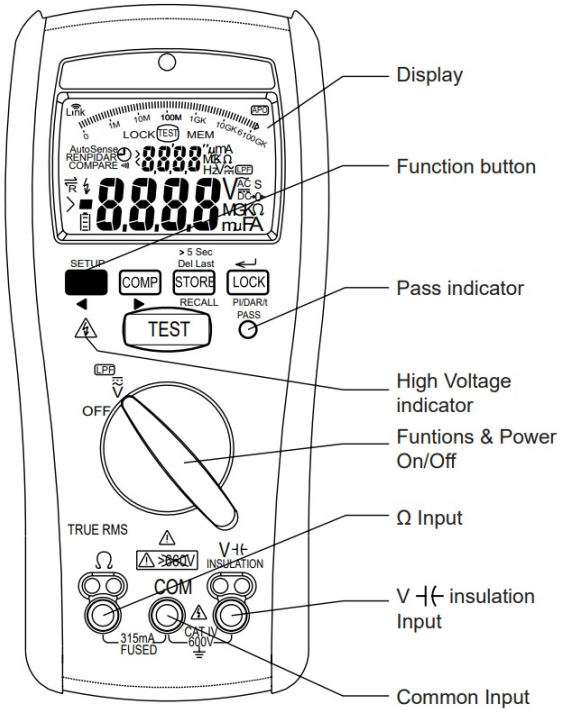
Do not attempt to repair this Meter. It contains no user service able parts. Repair or servicing should only be performed by qualified personnel.

### Cleaning

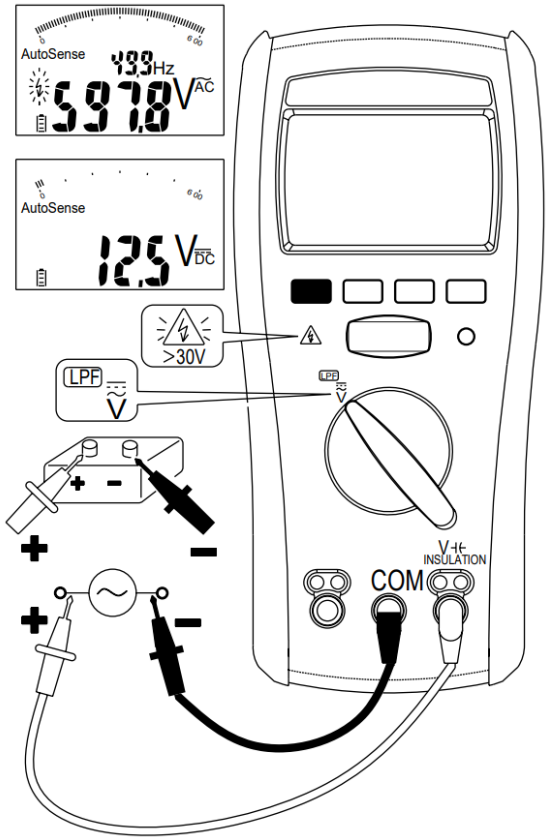
Periodically wipe the case with a dry cloth and detergent. Do not use abrasives or solvents.

## The Meter Description

### Front Panel Illustration




### Measuring ACV/DCV : Auto sense function



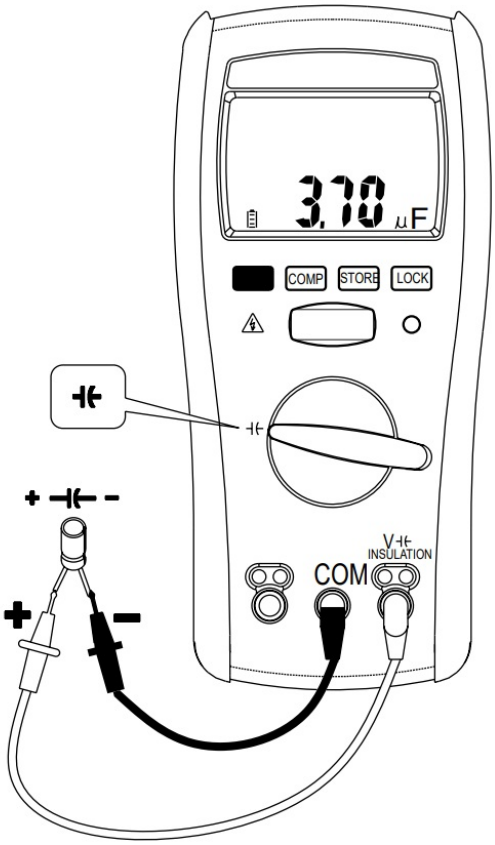

Auto sense mode: The meter displays ACV or DCV whichever is higher (>1V).

If the measured voltage is above 660Vac/dc, “> 660Vac/dc” will appear on the display

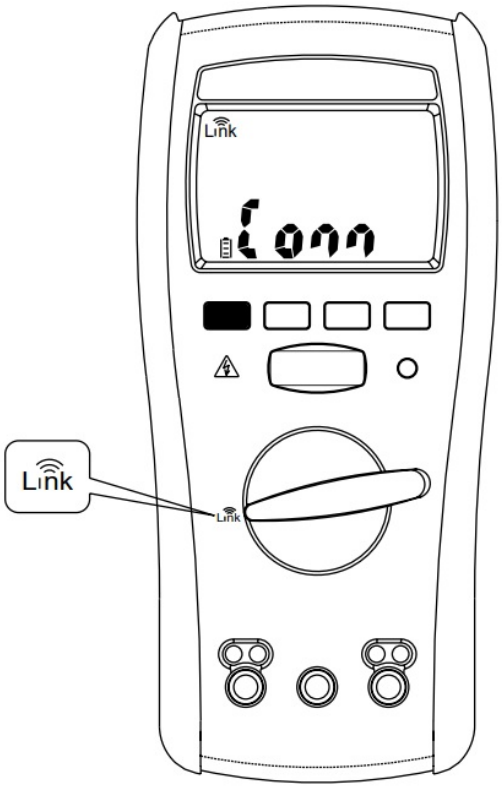
**⚠ WARNING**

When connecting the test leads to the DUT (Device Under Test) connect the common test leads before connecting the live leads; When removing the test leads, remove the test live leads before removing the common test leads. Don't apply more than AC/DC 600V between the V-COM terminals.

**Measuring Capacitance**

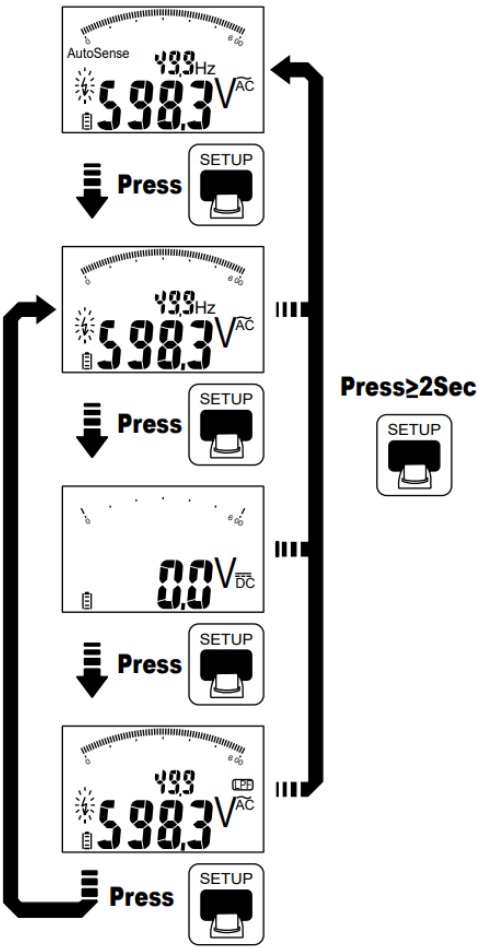



**Wireless Link**



The meter uses Bluetooth low energy (BLE) V5.0 wireless technology to download the stored data. The open-air communication range is up to 6m. The LINK icon of the meter will freeze on LCD after the connection establishes successfully

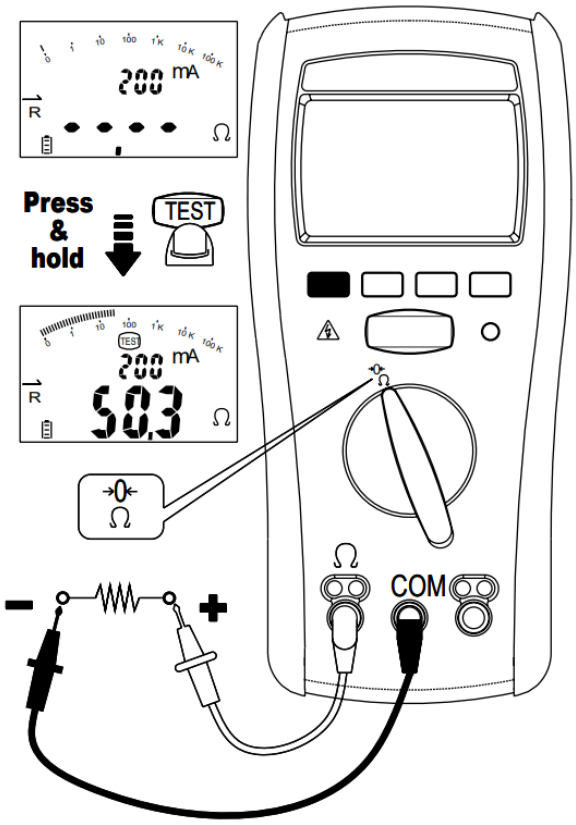
**Switch Auto Voltage sense/ACV/DCV/LPF function when the rotary switch is in voltage position**




**WARNING**

Do not use the High Frequency Rejection (Low Pass Filter) to verify the presence of hazardous voltages. Voltages greater than what is indicated may be present. First, make a voltage measurement without the filter to detect the possible presence of hazardous voltage. Then select the filter function.

## Measuring Earth-Bond Resistance (Continuity)




1. **Before starting the test :**

   **(a)** The circuit under test must be completely de-energized.

   **(b)** Check the fuse is good. See the chapter “Testing the fuse”.

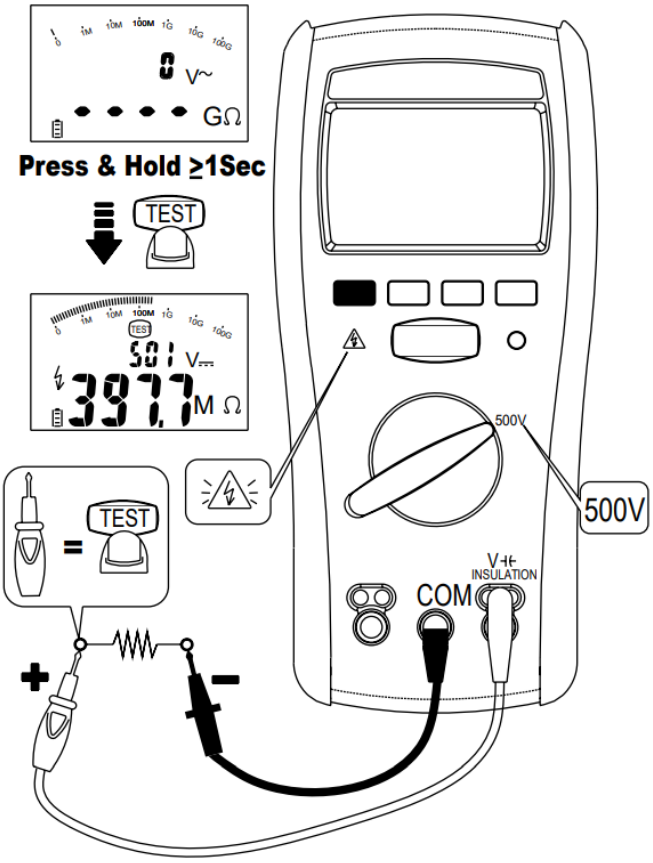
   **(c)** Short the test leads before measurement, and press the Function button to zero the wire resistance of probe. If the wire resistance is <10Ω, the resistance offset value will be saved, and the “->0<-” symbol will be displayed on LCD.

2. **Lock mode :**

   Press the Lock button to enter the Lock Mode. Then press the TEST button to start the test. The test voltage will continue to be applied until the TEST/LOCK button is pressed again.

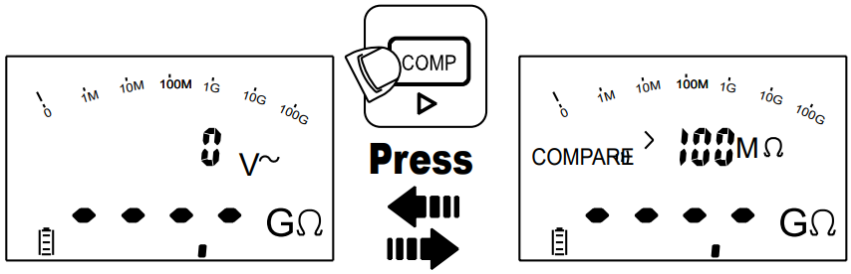
3. The meter displays the ” ” symbol and the maximum resistance for the range when measured resistance is higher than the maximum display range.

**Measuring Insulation Resistance**




1. **Before starting the test :**
   The circuit under test must be completely de-energized. If the voltage detected is above 30V, “>30V” will appear on the display. In this condition, the test is inhibited.
2. Press the Function button to display insulation resistance or Leakage current during the test or when the test stops.
3. Lock mode: Press the Lock button to enter the Lock Mode. Then press TEST button >1sec to start the test. The test voltage will continue to be applied until the TEST/LOCK button is pressed again.
4. Stop the output test voltage before removing the test leads (to enable the tester to discharge capacitive circuits). If the screen displays volts, wait until it reaches zero.
5. The meter displays the ” ” symbol and the maximum resistance for the range when measured resistance is higher than the maximum display range.

**Using the Compare function**

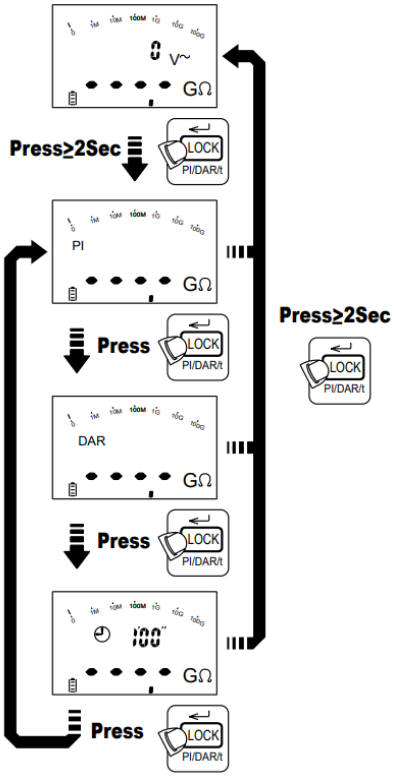



Before starting the Insulation Resistance test, select the comparative value in Setup mode: 0.5MΩ, 10MΩ, 20MΩ, 50MΩ, 100MΩ, 200MΩ, 500MΩ, 1000MΩ.

Before starting the Earth-Bond Resistance test, select the comparative value in Setup mode: 0.5Ω, 1Ω, 2Ω, 3Ω, 4Ω, 5Ω, 10Ω, 20Ω, 30Ω, 40Ω. If the measured value is better than the selected compare value, the Pass indicator

will be green, otherwise it is red.

### Measuring PI/DAR/Timer




Press TEST button to start/interrupt the PI/DAR test. Press Function button during the PI/DAR test to switch display the output voltage / leakage current / the time left of the test.

PI(Polarization Index)=R10-min/R1-min DAR(Dielectric Absorption Rations)=R1-min/(R30-sec or R15-sec) Timer : Countdown timer

**R10-min :** the insulation resistance measured at the 10 minute after pressing the TEST button.

**R1-min :** the insulation resistance measured at the 1 minute after pressing the TEST button.

**R30-sec :** the insulation resistance measured at the 30 seconds after pressing the TEST button.

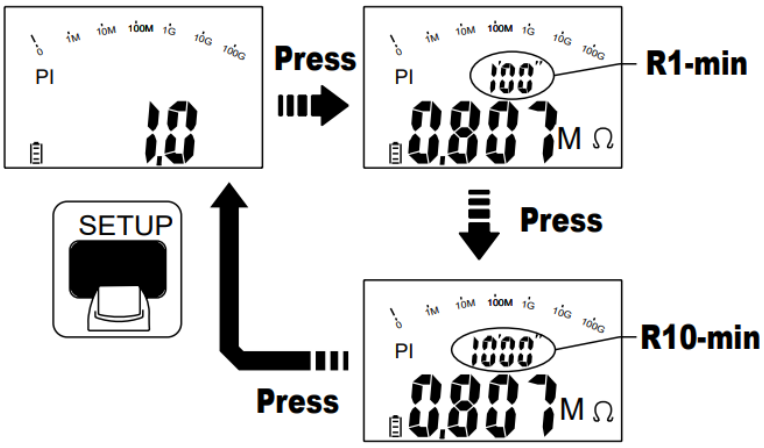
**R15-sec :** the insulation resistance measured at the 15 second after pressing the TEST button.

**NOTE:** R30-sec or R15-sec can be set in setup mode
**NOTE:** Countdown time interval can be set in setup mode

If the reading for DAR is bigger than 1.3 or PI is bigger than 2, it indicate a good insulation quality. When the measured resistance is higher than the maximum range, the screen will display “Err” symbol for PI/DAR value.

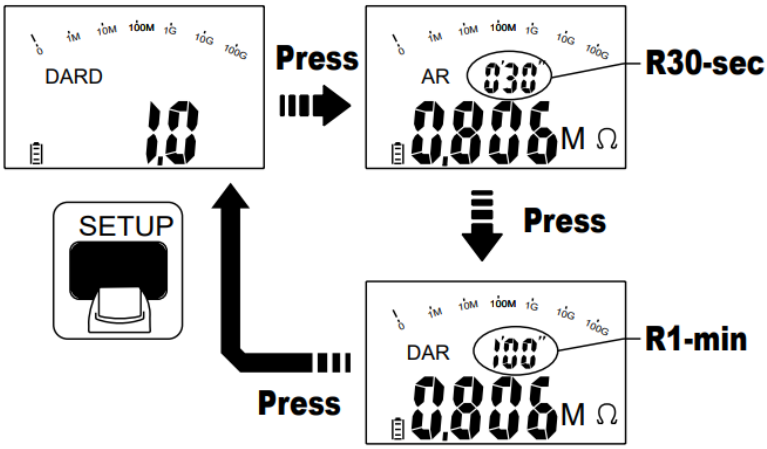
**Show the measured values after the PI test is completed**

**PI=R10-min/R1-min**

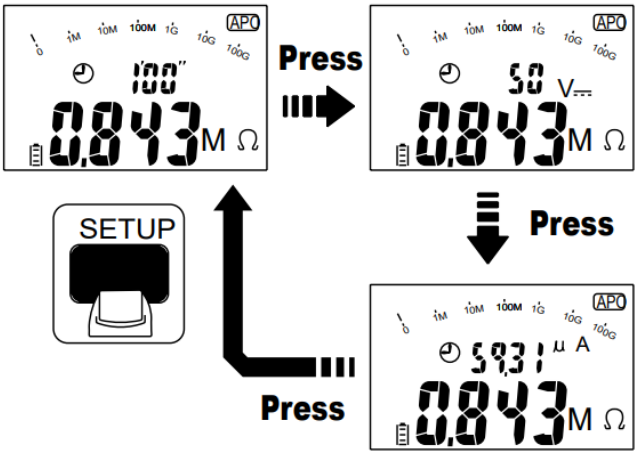



**Show the measured values after the DAR test is completed**

**DAR=R1-min/R30-sec**




**Show the measured values after the countdown timer test is completed**




## Using the Store function

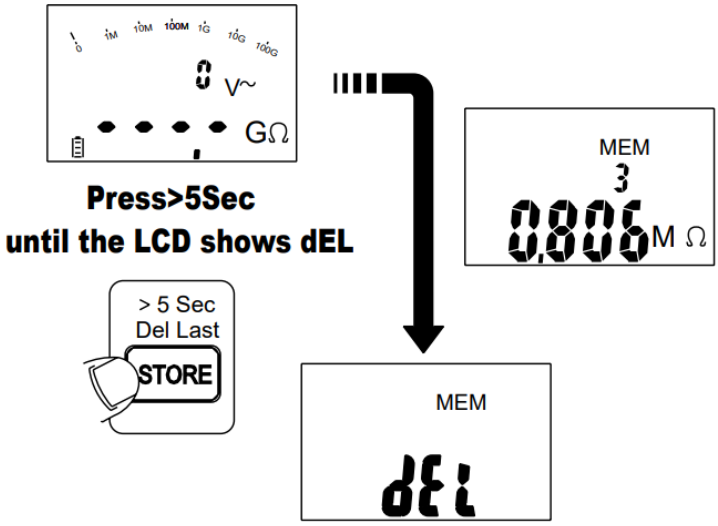
**Store/Recall button :**

1. Press Store/Recall button to store the test result. The screen will show MEM symbol and the number of stored data when the Store/Recall button is pressed.
2. In PI / DAR mode, Insulation, and Earth-bond resistance, Store / Recall button is only available when the individual test is completed.

3. Up to 1500 recordings / recording sets of each function (Voltage, Continuity, Capacitance, Insulation, PI, DAR).
4. In Insulation, PI / DAR mode, the meter saves 3 different readings at the same time (Recording Set).

| **Mode** | **Recording Set** | | |
|---|---|---|---|
| Insulation | Output Voltage | Leakage Current | Insulation Resistance |
| PI mode | PI value | R1-min | R10-min |
| DAR mode | DAR value | R30-Sec or R15-Sec | R1-min |
| Earth-bondResistance | Resistance | | |
| Voltage | Voltage | | |
| Capacitance | Capacitance | | |

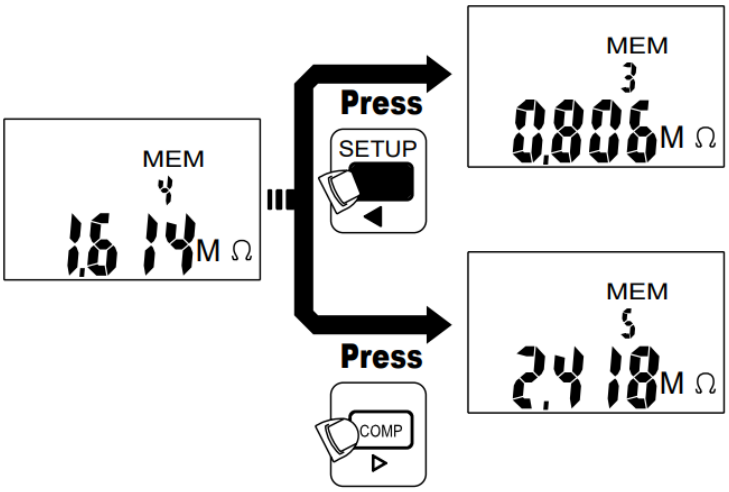
**Delete the last one recording set in the mode**




## Using the Recall function

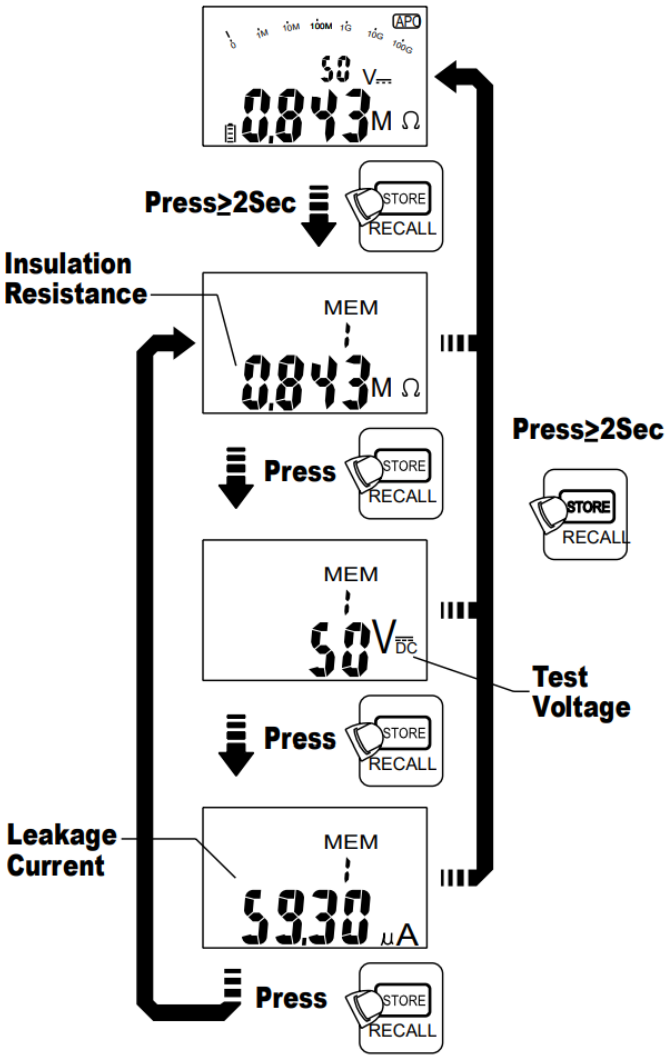
Press the Store/Recall button ≧ 2 sec to enter/exit the RECALL mode. If the memory is empty, the meter will display the “nOnE ” symbol.

**Search the stored value under RECALL mode**



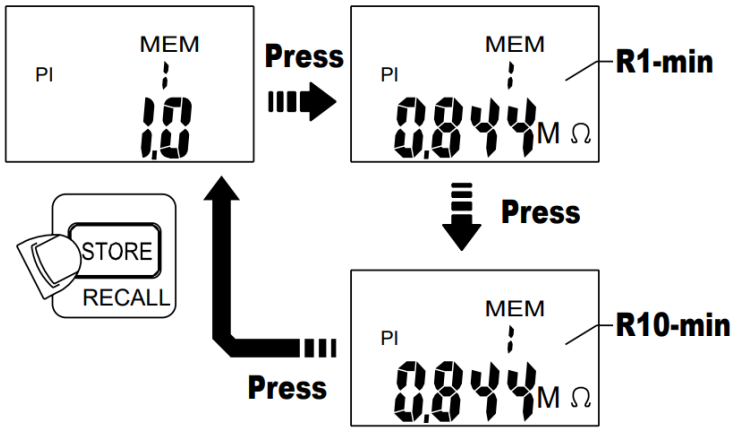
**Read the stored value of insulation test under RECALL mode**

In RECALL mode, press STORE button can show the insulation resistance, test voltage, and leakage current of the selected reading set.



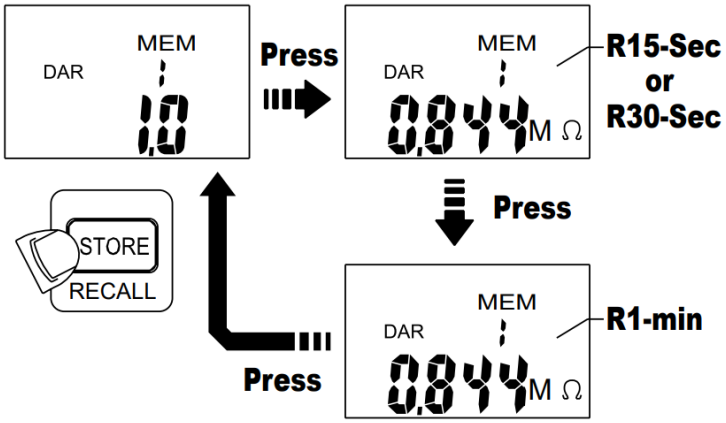

**Read the stored value of PI test under RECALL mode**

In RECALL mode, press STORE button can show insulation resistance of the selected reading set.

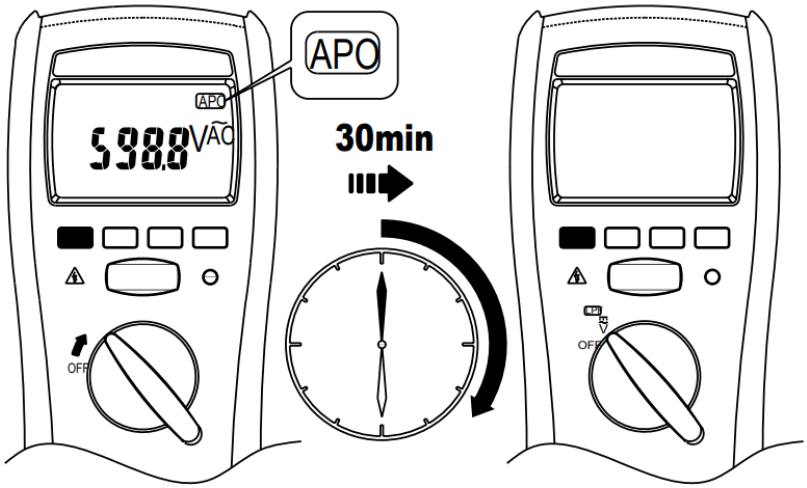



**Read the stored value of DAR test under RECALL mode**

In RECALL mode, press STORE button can show insulation resistance of the selected reading set.




**Auto Power Off (Battery Saver)**




Restore power by switching rotator or by pressing any button.

**Auto Backlight**

The backlight is automatically turned on at dark environment.

## Power-up options :

Press the following button while turning meter on from OFF position.

**Test button :** display of the software version.
**Store button :** Reset all stored data
**Lock button :** Show the full display of the LCD
**Function button :** Enter Setup Mode

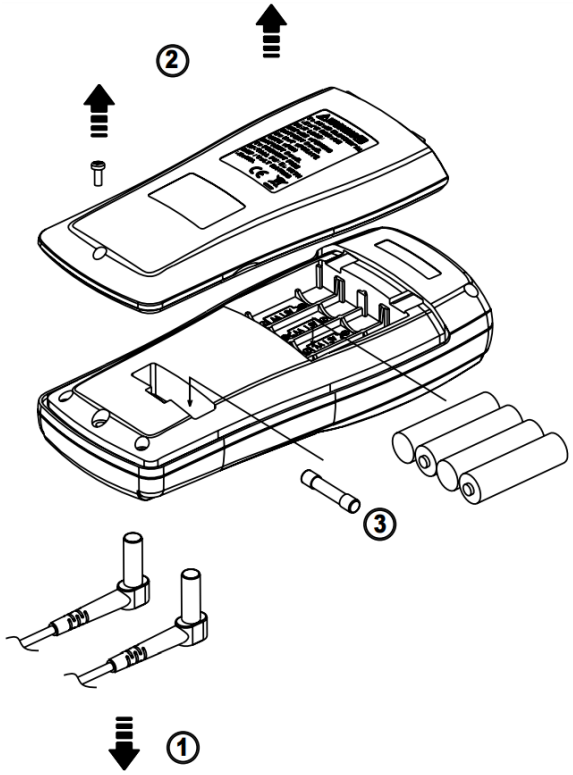
## Setup Mode

| Function | Options | Default |
|---|---|---|
| Automatic Backlight | On, Off | On |
| Continuity short current | 20mA, 200mA | 200mA |
| Pass threshold of Insulation Resistance | 0.5, 10, 20, 50, 100,200, 500, 1000MΩ | 100MΩ |
| Pass threshold of Earth-bond Continuity | 0.5, 1, 2, 3, 4, 5, 10,20, 30, 40Ω | 2Ω |
| Direction of Continuity | Single, Bi-directional | Single |
| DAR Timer | 15, 30s | 30s |
| Count-down Timer | 1 minute to 40minutes | 1 minute |
| APO Timer | Off, 10, 20, 30, 40,50, 60 minutes | 30 minutes |
| Delete All Recording Of Earth-bond Continuity | Yes, No | No |
| Delete All Recording Of Insulation Resistor | Yes, No | No |
| Delete All Recording Of Voltage | Yes, No | No |
| Delete All Recording Of Capacitance | Yes, No | No |
| Delete All Recording Of PI | Yes, No | No |
| Delete All Recording Of DAR | Yes, No | No |
| Reset | Yes, No | No |

1. Press the Test button to select the function to be adjusted.
2. Press the Function button and Comp button to adjust the options.
3. Press the Lock button to record the option.

## Battery and Fuse Replacement

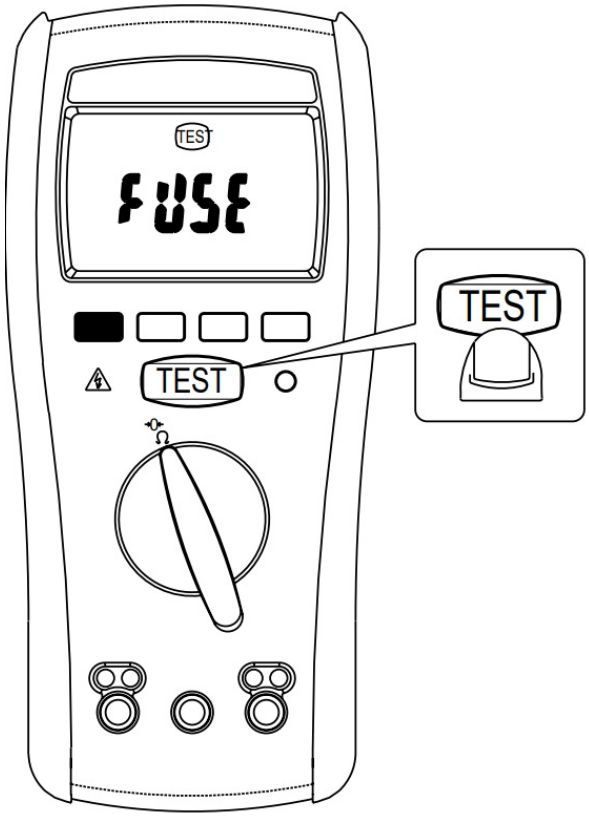
**Refer to the following figure to replace fuse and the batteries :**




**Caution**

- Use only a fuse with the amperage, interrupt, voltage, and speed rating specified.
- Fuse rating : Fast, 315mA, 1000V, at least 10kA Interrupt Rating.
- Replace battery as soon as low battery indicator blinks / appears to avoid false reading.
- When the battery is too low for reliable operation , the meter displays “ bAtt ”. The meter will not operate at all until the battery is replaced.
- 1.5V x 4 alkaline batteries.

### Testing the fuse




- Remove the test leads before testing the fuse.
- If the display reading is FUSE, the fuse is bad and should be replaced.

## Specifications

### General Specifications

**Display Count :** 4000 counts.
**Overage display :** " >OL Reading " or " >-OL Reading "
**Conversion Rate :** 2 times / second
**Dimensions (W x H x D) :** 96mm x207mm x 54mm with holster
**Weight :** 630g including battery.
**Power requirement :** AA size ALKALINE Battery * 4
**Batteries Life :** 1.5 AA ALKALINE battery

Resistance Measurements : Tester can perform at least 2600 earth-bond resistance measurements with new alkaline batteries at room temperature. These are standard tests of 1Ω with a duty cycle of 5 seconds on and 25 seconds off.

**Insulation test:** Tester can perform at least 1100 insulation tests with new alkaline batteries at room temperature. These are standard tests of 1 MQ at 1000 V with a duty cycle of 5 seconds on and 25 seconds off.

**Installation Category:** IEC/EN 61010-1, IEC/EN 61010-2-034
**Compliance to EN 61557:** IEC/EN 61557-2 IEC/EN 61557-4
**EMC:** EN 61326-1

| CAT | Application field |
|---|---|
| II | It is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation. |
| III | It is applicable to test and measuring circuits connected to the distribution part of the building's lo w-voltage MAINS installation. |
| IV | It is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation |

## Environmental Conditions

#### Indoor Use

**Pollution degree :** 2
**Operating altitude :** 2000m (6562ft)
**Operating temperature :** Non-condensing <5°C, 5°C ~ 30°C ( ≦ 80% RH), 30°C ~ 40°C ( ≦ 75% RH), 40°C ~ 50°C ( ≦ 45%RH)
**Storage temperature :** -20°C to 60°C , 0 to 80% R.H. (batteries not fitted)
**Temperature Coefficient :** 0.15 x (Specified accuracy) /°C, < 20°C or > 26°C .
**IP Rating :** IP40
**Shock vibration :** Random Vibration per MIL-PRFF Class 2
**Drop Protection :** 4 feet drop to hardwood on concrete floor.

## Electrical Specifications

Accuracy is given as ±(% of reading + counts of least significant digit) at 23°C ± 3°C, with relative humidity Less than 70% R.H., and is specified for 1 year after calibration.

## ACV Function

- ACV and ACA specifications are ac coupled, true RMS.
- For square wave, accuracy is unspecified.
- For non-sinusoidal waveforms, Additional Accuracy by Crest Factor (C.F.): Add 1.0% for C.F. 1.0 to 2.0 Add 2.5% for C.F. 2.0 to 2.5 Add 4.0% for C.F. 2.5 to 3.0
- Max. Crest Factor of Input Signal: 3.0 @ 3000 counts 2.0 @ 4500 counts 1.5 @ 6000 counts
- Frequency Response is specified for sine waveform.

#### AC Voltage

| Range | OL Reading | Resolution | Accuracy |
|---|---|---|---|
| 600.0V | 660.0V | 0.1V | ±(1.0%+5D) |

**Input Impedance:** 10MΩ// less than 100pF
**Frequency Response:** 50Hz to 400Hz
**Overload Protection:** AC/DC 600V

#### DC Voltage

| Range | OL Reading | Resolution | Accuracy |
|---|---|---|---|
| 600.0V | 660.0V | 0.1V | ±(1.0%+5D) |

**Input Impedance:** 10MΩ
**Overload Protection:** AC/DC 600V

**Frequency**

| Range | OL Reading | Resolution | Accuracy |
|---|---|---|---|
| 100.0Hz | 100.0Hz | 0.1Hz | ±(1.0%+3D) |
| 1000Hz | 1100Hz | 1Hz | |

**ACV Minimum Sensitivity:** > 60V
**Minimum Frequency:** 10Hz
**Overload Protection:** AC/DC 600V

**Low Pass Filter**

Available for ACV Add ±4% to specified accuracy @ 50 to 60Hz Accuracy is specified for 50 to 60Hz

**Cut- off Frequency(-3dB):** 1kHz
**Overload Protection:** AC/DC 600V

**Capacitor**

| Range | OL Reading | Resolution | Accuracy |
|---|---|---|---|
| 100.0nF | 100.0nF | 0.1nF | ±(3.0%+10D) |
| 1000nF | 1000nF | 1nF | ±(3.0%+5D) |
| 10.00uF | 11.00uF | 0.01uF | |

**Overload Protection:** AC/DC 600V

**Earth-bond Resistance (Continuity)**

| Range | OL Reading | Resolution | Accuracy |
|---|---|---|---|
| 40.00Ω | 40.00Ω | 0.01Ω | ±(1.5%+5D)* |
| 400.0Ω | 400.0Ω | 0.1Ω | ±(1.5%+3D) |
| 4.000kΩ | 4.000kΩ | 0.001kΩ | |
| 40.00kΩ | 44.00kΩ | 0.01kΩ | |

- <1.00Ω add 3dgt
- output current mode in 20mA add 10dgt
- Automatic bi-directional test mode add 0.5%+5D

**Output Current:** >200mA @ <2Ω or >20mA@ <2Ω
**Output Voltage:** >4V

**Insulation Resistance**

| Range | OL Reading | Resolution | Accuracy* |
|---|---|---|---|
| 400.0kΩ | 400.0kΩ | 0.1kΩ | ±(2.5%+5D) |
| 4.000MΩ | 4.000MΩ | 0.001MΩ | |
| 40.00MΩ | 40.00MΩ | 0.01MΩ | |
| 400.0MΩ | 400.0MΩ | 0.1MΩ | |
| 4.000GΩ | 4.000GΩ | 0.001GΩ | ±(20%+3D) |
| 40.0GΩ | 40.0GΩ | 0.1GΩ | |
| 200GΩ | 220GΩ | 1GΩ | |

- Above specifications only apply when high quality silicone leads with test clips are being used with no hands touch.

**Test Voltage vs. Maximum resistance range:**

50V/10.0GΩ, 100V/20.0GΩ, 250V/40.0GΩ, 500V/100GΩ, 1000V/200GΩ

**Test Voltage vs. Minimum resistance range:**

50V/50.0kΩ, 100V/100.0kΩ, 250V/250.0kΩ, 500V/0.500MΩ, 1000V/1.000MΩ

**Short Circuit Test Current:** <2mA, +0%, -50%
**Test Voltage Accuracy:** -0%, +2%+2V
**Auto discharge function:** discharge time <1 sec for C ≤ 1uF
**Maximum Capacitive load:** Operable with up to 1uF load
**Live Circuit Detection:** if ≥ 30V ac/dc at inputs, test inhibited

## Limited Warranty

This meter is warranted to the original purchaser against defects in material and workmanship for 2 years from the date of purchase. During this warranty period, Manufacturer will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction.

This warranty does not cover fuses, disposable batteries, ordamage from abuse, neglect, accident, unauthorized repair, alteration, contamination, or abnormal conditions of operation or handling.

Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. The manufacturer shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you.

## Documents / Resources

| | |
|---|---|
|  | POWER PROBE INT500 Insulation Tester and Multimeter [pdf] User Manual<br>INT500 Insulation Tester and Multimeter, INT500, Insulation Tester and Multimeter, Tester and Multimeter |

## References

- User Manual