

Section One

Introduction

⚠ Warning

Read the manual before servicing this instrument.

Generalization

This Instrument is an intelligent micro device for insulation resistance measurement, whose circuit design employs microcomputer design technology as its core, combines large-scale integrated circuit and digit circuit, provides with powerful measurement and data processing software, and accomplishes parameter measurement of insulation resistance and voltage with features of stable performance and user-friendly operation. This Instrument is an ideal choice for users who conduct measurement and maintenance of field electrical equipments and power supply line.

- The design conforms to the following Safety Requirements:
IEC61010-1(CAT III 600V, POLLUTION degree II)
IEC61557-1,2(Electronic safety requirements for low voltage distribution system below AC 1000V and DC 1500V)
- Insulation measurement voltage in large ranges: 100V,250V,500V,1000V.
- Insulation resistance measurement as high as 20GΩ.
- Automatic voltage release function.
- White backlight function to view the test results in dimly areas.
- Insulation resistance PI (polarization index) measurement: the ratio of measured resistance value of insulation excitation voltage applied for 10 minutes to the measured value applied for 1 minutes.
- Insulation DAR (absorption ratio) measurement: the ratio of measured resistance value of insulation excitation voltage applied for 15 seconds with the measured value applied for 60 seconds.
- Insulation timing measurement: sets time of insulation measurement, the Instrument facilitates automatic measurement in setting time, and stop insulation measurement when the set time comes.

- Simultaneous display of real output voltage and measured insulation resistance.
- Lock function of measurement key.
- Detection and warning function of voltages from the measured body.
- For comparison test, the limit value 'Pass/Fail(✓/✗)' can be preset to evaluate the measurement result and give an audio alarm.
- Data Store/Recall Function for independent measurement data (Max.100 groups) saving in the internal storage.
- The Instrument employs panel calibration technology, by which the Instrument connects to Standard Device, undertakes the panel calibration in accordance with the procedure, stores the relevant calibrated data and finish stipulated periodical calibration to ensure the Instrument reaching its accuracy and features.
- Small and sturdy structure design, easy for operation, adaptable to spot transportation and bad environment.

Open-case Inspection

Check the product to see whether it is damaged in the shipment or not. Check the materials to see whether they are the same as shown in the packing list. Keep the packing materials for late delivery.

Standard and chosen accessories supplied are listed as follows. Chosen ones are bought at purchaser's options.


Standard accessories:

- 1 Test probe (including alligator clip): H000013
- 1 user's manual
- 8 1.5V Alkaline (LR6) batteries
- 1 Hand rope

Optional accessories (additional cost required): power adapter (DC15V)(P070000-00)

Safety Information

The design, manufacture and test of the Instrument reach the IEC 61010-1, IEC61557-1, and IEC61557-2 Safety Requirements. This Manual contains all warnings and safety regulations that must be followed to ensure safe operation and retain the Instrument in safe condition. Read the following instructions before operation.

Mark  in the Instrument means the operator needs to refer to related parts in the Manual to ensure safe operation.

 **Danger is reserved for conditions and actions that are likely to cause serious or fatal injury.**

 **Warning is reserved for conditions and actions that are likely to cause serious or fatal injury.**


 **Caution is reserved for conditions and actions that can cause injury or instrument damage..**

 **Warning**

- **Read carefully and make sure well understanding of the Manual before using this Instrument.**
- **Follow the instructions in the Manual whenever operating,keep the Manual in good condition for reference whenever necessary.**
- **Mis-operation may cause accidents and damages to the Instrument in measurement.**

 **Danger**


- **Never make measurement on a circuit in which electrical potentials exceeding AC/DC1000V.**
- **Do not attempt to make measurement in the presence of flammable gasses. Otherwise,the use of the Instrument may cause sparking,which can lead to an explosion.**
- **Never attempt to use the Instrument if its surface or your hands are wet.**
- **Do not exceed the maximum range allowed.**
- **Do not press the PRESS TO TEST key before connecting the Test Leads.**
- **Never open the battery cover during a measurement.**
- **Cut off the power and remove any measuring parts connected to the Instrument before opening the battery cover.**

 **Warning**






- **Never attempt to make any measurement if any abnormal conditions,such as a broken cover or exposed metal parts are present on the Instrument and Test Leads.**
- **Replace Test Lead with new one in same specification and same electrical specification when it is broken.**

- Do not replace batteries if the Instrument is wet.
- Ensure that the Test Leads are firmly inserted into the terminals.
- Ensure that the Instrument powers off when the battery cover is open.

 **Caution**

- Set and ensure the Range Switch to the appropriate position before making measurement.
- Set the Range Switch to 'OFF' position after use and remove the Test Leads.
- Remove the batteries if the Instrument is to be stored and will not be in use for a long period.
- Do not use the Instrument when mark  displays.
- Do not use or keep the Instrument in high-temperature, high-humidity, explosive, strong electromagnetic and dewy environment or expose to direct sunlight.
- Do not use abrasives or solvents. Use a damp cloth with neutral detergent for cleaning the Instrument.
- Do not store the Instrument if it is wet. Store it after it dries.

Symbols

| | |
|---|-------------------------------------|
|  | possible danger of electronic shock |
|  | double insulated |
|  | direct current |
|  | alternating current |
|  | earth ground |

Section Two
Technical Specification
Safety and Conformity

| | |
|-------------------------------|---|
| Overload Protection | Insulation resistance function: AC1200V/10 seconds; voltage function: AC720V/DC1000V/10 seconds |
| Legal Conformity | IEC61010-1(CAT III 600V,POLUTION degree II) IEC61557-1,2(electronic safety requirements for low voltage distribution system below AC 1000V and DC 1500V |
| Electromagnetic Compatibility | conforms to IEC61326-1,Group 1,Class B |
| Surge Protection | 6kV (as per IEC61010.1-2001) |
| Identification Mark | CE |
| Quality Standard | develops ,designs and manufactures as per ISO 9001 |

General Feature

| | |
|--|---|
| Display Screen | digit: displays in 2000 digits; white backlight |
| Operation Temperature and Moisture Range | 0~40 °C,relative moisture≤85%(no condensation) |
| Storage Temperature and Moisture Range | -20 °C~60 °C,relative moisture≤90%(no condensation) |
| Accuracy Required Temperature and Moisture Range | 23±5°C,relative moisture≤75%(no condensation) |
| Ambient Condition for Operation | Indoor,outdoor operation(no waterproof),at an altitude of 0 ~ 2,000 meter |

| | |
|---------------------------|---|
| Stored Data | 100 groups |
| Indicator for Over-range | Voltage: OL; Insulation resistance: > 1999 |
| Battery Type | eight 1.5V Alkaline (LR6) batteries |
| Low Battery | displays battery mark |
| Automatic Power-off | The default value is 5 minutes if no operation ,and adjustable. |
| Closed – case Calibration | no internal adjustments needed |
| Measurement | 178(L)×110(W)×59(D)mm |
| Weight | about 500g |
| Calibration Period | One year |

Measurement Range and Accuracy

Error limits are given as: \pm ([% of reading]+[number of least significant digits]),warranty for one year. (Note: 'number of least significant digits' means the digits increased or decreased in least significant digits)

Ambient temperature: 23±5°C ; Ambient moisture: 45~75%RH

Insulation Resistance Measurement(RISO)

| Rated voltage | Measurement range | Open-circuit voltage | Rated measured current | Accuracy |
|----------------------|--------------------------|-----------------------------|---------------------------------|-----------------|
| 100V | 0~19.99MΩ | DC 100V +20% ,-0% | 1mA nominal value 100kΩ load | 5%+5 |
| | 20.0~199.9MΩ | | | |

| | | | | |
|---|--------------|-----------------------|---------------------------------|------|
| 250V | 0.00~19.99MΩ | DC 250V +20% ,-0% | 1mA nominal value 250kΩ load | 5%+5 |
| | 20.0~199.9MΩ | | | |
| | 200~499MΩ | | | |
| 500V | 0.00~19.99MΩ | DC 500V +20% ,-0% | 1mA nominal value 500kΩ load | 5%+5 |
| | 20.0~199.9MΩ | | | |
| | 200~999MΩ | | | |
| 1000V | 0.00~19.99MΩ | DC 1000V +20% ,-0% | 1mA nominal value 1MΩ load | 5%+5 |
| | 20.0~199.9MΩ | | | |
| | 200~1999MΩ | | | |
| | 2.00~19.99GΩ | | | |
| <ul style="list-style-type: none"> ● Short circuit measurement current of insulation measurement: 1.5 mA nominal value ● Automatic discharge time of insulation measurement: when the capacitance C = 1μF or lower, discharge time <1 second. ● Alive circuit detection of insulation measurement: before the measurement's initialization, the Instrument warns and prohibits measurement if terminal voltage is higher than 30v. ● Maximum capacitive load of insulation measurement: available for any operation when the value is below 1μF. | | | | |

Voltage Monitoring Display (insulation resistance range)

| Voltage range | Measurement range | Accuracy |
|----------------------|--------------------------|-----------------|
| 1000V | 0~1000V | 2%+3 |

AC/DC Voltage Measurement

| Measurement function | D/C voltage | A/C voltage |
|---|--------------------|--------------------|
| Measurement range | 0~±1000V | 30~750V(45~200Hz) |
| Resolution ratio | 1V | |
| Accuracy | 2%+3 | |
| <ul style="list-style-type: none">● Output impedance: 10MΩ.● Measurement speed rate: about 2 times / s | | |

Section Three
Instrument Layout
Instrument Body

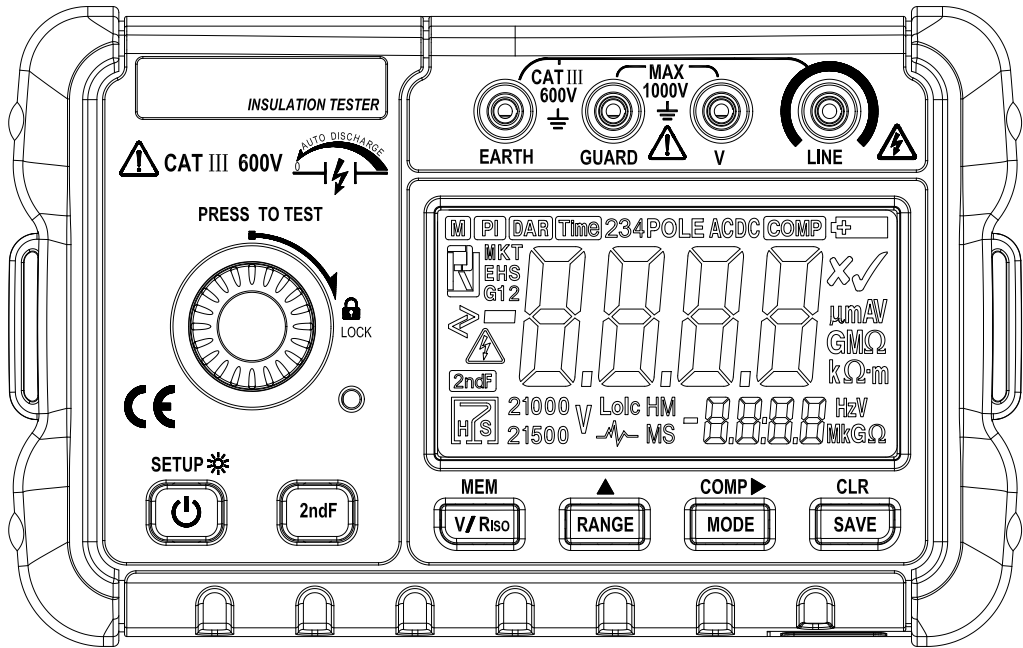


Figure 1

Terminals

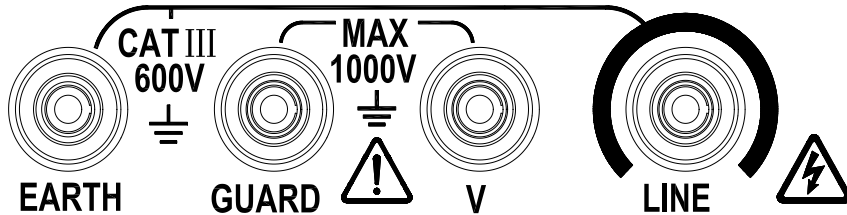


Figure 2

| Terminal | Illustration |
|----------|------------------------------|
| LINE | voltage output terminal |
| V | voltage measurement terminal |
| GUARD | protection terminal |
| EARTH | earth ground terminal |

Display

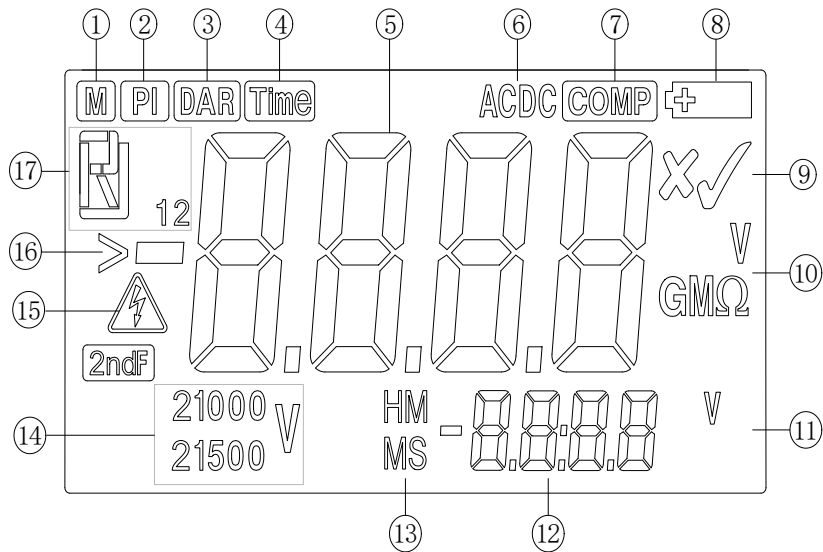



















Figure 3

| No. | Mark and information | Illustration |
|-----|---|---|
| 1 |  | Recall/delete saving data |
| 2 |  | Absorption ratio measurement |
| 3 |  | Polarization index measurement |
| 4 |  | Timing measurement |
| 5 |  | Main screen |
| 6 |  | AC voltage,DC voltage |
| 7 |  | compare |
| 8 |  | Low battery mark |
| 9 |  | Fail / Pass |
| 10 |  | Main display area unit: V (volt) Resistance unit: MΩ (mega ohms),GΩ (Gilbert ohms) |
| 11 |  | Auxiliary display area unit: V (volts) |
| 12 |  | Auxiliary screen(can be used for time display) |
| 13 |  | Time display: hour : minute minute: second |
| 14 |  | Display part of insulation voltage range: 100V,250V,500V,1000V |

| | | |
|----|---|--|
| 15 | V,M Ω ,G Ω | Unit in the Auxiliary Screen: V,M Ω ,G Ω |
| 16 |  | Select Yellow Key function |
| 17 |  | High voltage mark,displays when voltage is higher than 30V |
| 18 |  | R,R1,R2 insulation resistance |

Press Key

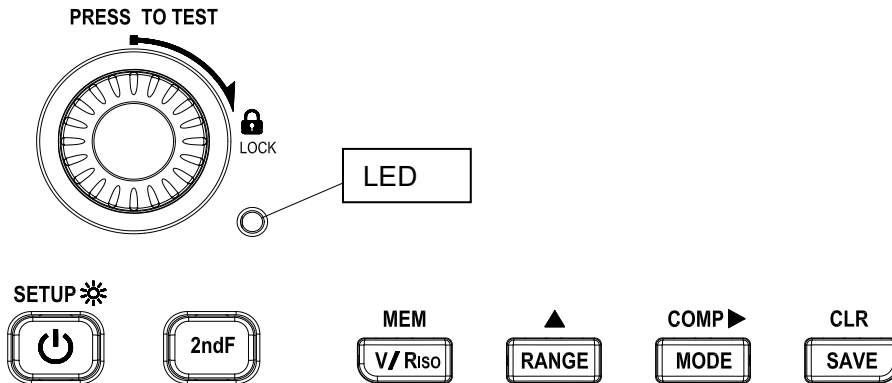












Figure 4

| Press key | Illustration |
|---|---|
|  | Turn on the Instrument or backlight. To power on the Instrument and turn on/off the backlight,press for less than 2 seconds; and turn off the Instrument for more than 2 seconds. |
|  | Press to select measurement functions: voltage measurement,insulation resistance measurement; default voltage measurement |
|  | under insulation resistance measurement function: press to select output voltage range: 100V,250V,500V,1000V,the default value is 100V. under PI and DAR function: press to shift display value; under MEM function: press to shift display value; under Instrument Setting function: changing setting value. |
|  | under insulation resistance measurement function: press to select measurement function: insulation measurement →timing measurement(Time) →polarization index measurement(PI)→ absorption ratio measurement(DAR) →insulation measurement under voltage measurement function: press to select AC/DC: AC,DC ,default : DC under MEM function: press to recall next data; under Instrument Setting function: right shifts of setting position; |

| | |
|---|--|
|  | <p>under insulation resistance measurement and voltage measurement function: press to store data.</p> <p>under MEM function: press to delete data;</p> <p>under Instrument Setting function: press to save setting data;</p> |
|  | <p>Press to start measurement once</p> <p>Long press (or lock) to start continuous measurement; loosen (or unlock) to stop measurement.</p> |
|  | <p>Press to select 'Yellow Key' function,</p> |
|  | <p>Enter into/ exit from the Instrument Setting function</p> |
|  | <p>Recall/ delete data in the saving part</p> |
|  | <p>Enter/exit the comparison function</p> |

Use the power adapter

Open the soft rubber door on the side of the instrument, and insert the special power adapter of the instrument into the power socket (the instrument must be turned off when inserting or pulling out the special power adapter; It is best to remove the battery when using a special power adapter).

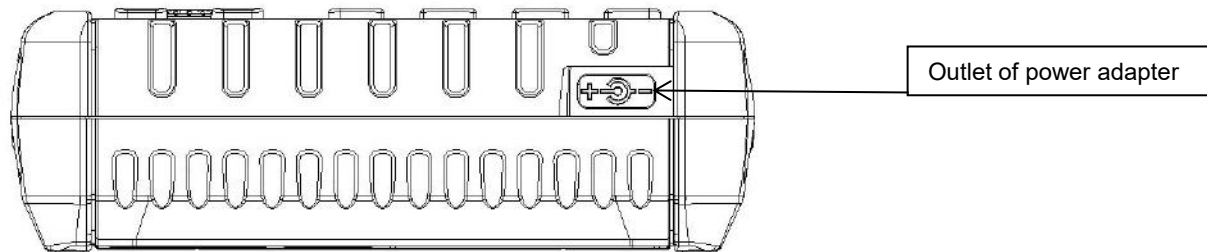



Figure 5

Section Four

Preparation before Measurement

Power-on

To turn on the Instrument,press  key to connect with the power.

To turn off the Instrument,press  key for more than 2 seconds to cut the power.

When being powered-on,the Instrument starts inner-self diagnose and displays power-on mark firstly,and then undertakes relevant operations.

⚠ Note

Power-on: to guarantee correct power-on operation,cut off the power for 5 seconds before restarting.

Automatic Power-off

Users could set automatic power- off function. (See 'Instrument Settings')

The factory default sets that the Instrument will automatically power off if no operation is conducted within 5 minutes.

The automatic power-off function is not available if the setting value is 0.

Turning on the Backlight

SETUP*



After powering on,press key for once to turn on the backlight,repres

SETUP*



key to turn off the backlight.


Automatically Turning off the Backlight

Users can set backlight time (See 'Instrument Settings')

The default value is 5 minutes; the Instrument will turn off the backlight if Users does not turn off the backlight within 5 minutes.

The automatically turning off the backlight function is not available if the setting value is 0.

Low Battery Display

Mark  displayed in the Main Screen after powering on means low battery,please replace with new ones (recharge if the batteries are chargeable) and then use.

⚠ Warning

To avoid electrical shock hazard or personnel injury due to wrong readings,replace the batteries as soon as possible if the Main Screen displays  mark; or charge the batteries if they are chargeable.

Connecting Test Leads

Firmly insert the Test Leads into the Instrument Terminals,connect the Test Lead(red) to the LINE terminal,the Guard Wire to the Guard terminal(if necessary),and the Earth Wire (black) to the EARTH terminal.

⚠ Danger

When pressing the measurement key under insulation resistance measurement,the Test Lead will produce high voltage,and may cause electrical shock if touching.

Section Five


Starting Measurement

Voltage Measurement (See Figure 6 for Connection Sketch Map)


Danger

- To avoid electric shock, do not measure when the earth voltage AC/DC is higher than 600V/1000V in the loop circuit. Do not measure even if the internal voltage is below 600V/1000V and the earth voltage is higher than 600V/1000V.
- When measuring voltage of electric line with large current, the measurement must be done in the subloop of the breaker, otherwise it may cause personnel injury.
- When measuring voltage, please pay attention to avoid the short circuit of the metal part of the Test Leads and loop circuit, which may cause electric shock.
- Do not undertake measurement when opening the Battery Cover.

(1) When turning the Instrument on, press  key to connect with the power;

(2) Press  key to select direct current, alternating current voltage measurement functions (DCV/ACV displays in the right corner of the Screen)

(3) Insert the red Test Lead into 'V' terminal and black Test Lead to 'G' terminal.

(4) Insert the red and black probes into the circuit under measurement, when measuring the D/C voltage, the cathode mark '-' displays in the LED if voltage of the red lead is negative. The mark  displays when the measurement value ≥ 30 voltage or ≤ -30 voltage. The measurement can be realized without pressing the measurement keys.

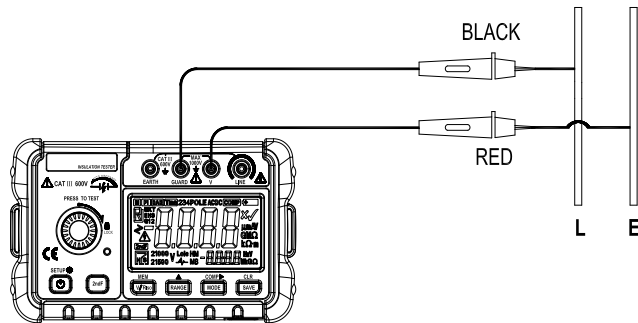


Figure 6

Insulation Resistance Measurement (See Figure 7 for Connection Sketch Map)

⚠ Danger

Before measurement, make sure no electricity exists in the circuit under measurement; do not measure electrophorus equipment or insulation of electrophorus wire.

- The User must wear insulating gloves.

In insulation resistance measurement, the Instrument outputs dangerous voltage, thus the User must be careful and make sure the measured body has been firmly clipped, and press the measurement key to output high voltage after moving your hands away.

- Do not undertake measurement when opening the battery cover.

⚠ Warning


Do not short circuit the two test probes under high voltage output state or measure insulation resistance after high voltage output, which will produce flame, cause fire and damage the Instrument.

 **Note**

- **When high voltage mark displays or the buzzer beeps warning sounds,the measurement can not be undergone even if pressing the measurement key.**
- **Due to different measured objects,the insulation resistance value may be instable,or cause the displayed resistance value may be instable.**
- **Insulation impedance may make bibi sounds during measurement,which is not a stoppage.**
- **Capacitive load measurement may cost long time.**

When measuring insulation resistance,the voltage of measurement terminals output from the positive polarity of EARTH terminal to the negative polarity of TEST terminal. During measurement,earth test lead connects to the EARTH end,and when Users make ground measurement of insulation and earthen the measured body,method of connecting earth terminal to the positive polarity could obtain low resistance value,and is most available for detecting defective insulation.

(1)Make sure the measured circuit has been fully released ,and isolated from the power circuit. Shift the function to the necessary insulation resistance range.

(2)Press  key to select insulation resistance measurement function(R displays in the left upper corner of the Main Screen) ;

(3)Insert the red Test Lead into 'LINE' terminal and black Test Lead to 'EARTH' terminal.

(4)Insert the red and black probes into the circuit under measurement.

(5)Press  key to select voltage range of measured voltage.

(6)Press measurement key to undertake measurement.

(7)The Instrument designed with auto-discharge function. When finishing the measurement,do not take off the test leads,release the measurement key and make the Instrument discharge the voltage produced in measurement automatically.

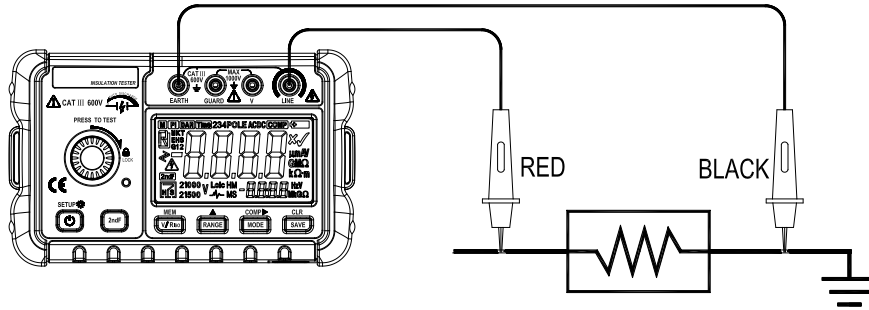


Figure 7

⚠ Danger

- Do not touch the circuit immediately after measurement. The stored charge in the circuit may cause electric shock.
- Do not take off the test leads immediately, and Users cannot touch the measured circuit until the discharging work is finished.

Continuous Measurement



When continuous measurement of insulation resistance is needed, press the measurement key and switch towards the right, lock the measurement key to undergo continuous measurement mode. When the measurement is finished, switch the measurement key towards the left to restore the original position.

⚠ Danger

The head part of Test Leads may produce high voltage when measuring, please note to avoid electric shock.

Timing Measurement(Time)

The Instrument can automatically undertake insulation resistance measurement in timing measurement.

Step one: under insulation resistance function, firstly select voltage range, and then press  key to select timing measurement mode. The mark  and information 'MS' lights in the lower part of LCD, the Auxiliary Screen displays measured time.

Time setting: see Instrument Settings.

Step two: press and lock measurement key to start measurement, the Auxiliary Screen displays set time.



When the set time comes, then the Instrument automatically finish the measurement, the Auxiliary Screen displays voltage measurement, the insulation resistance value in the Main Screen and the measured voltage value in the Auxiliary Screen will not refresh.

In the timing measurement, the User needs to press the measurement key until the set time, thus continuous measurement function is very convenient. If the User releases the key before reaching the set time, the Instrument displays the present measured value of insulation resistance; repress the measurement key to restart a new measurement,

Polarization Index Measurement(PI)

The polarization index defines as the ratio of measured resistance value of insulation excitation voltage applied for 1 minutes (R1) with the measured value applied for 10 minutes (R2).


$$PI = \frac{R2}{R1}$$

Step one: under insulation resistance function, firstly select voltage range, and then press  key to select PI measurement mode. The mark  lights in the lower part of LCD.

Step two: press and lock measurement key to start measurement, the Auxiliary Screen displays set time, and the Main Screen displays insulation resistance value.

When the set time comes, then the Instrument automatically finishes the measurement, the Auxiliary Screen displays voltage measurement, the Main Screen displays PI value.



In the PI measurement, the User needs to press the measurement key until the set time, thus continuous measurement function is very convenient. If the User releases the key before reaching the set time, the Instrument displays the present measured value; repress the measurement key to restart a new measurement,

Step three: press  key to shift among 'R1', 'R2', 'PI' displays.

Absorption Ratio Measurement(DAR)

The absorption ratio defines as the ratio of measured resistance value of insulation excitation voltage applied for 15 seconds (R1) with the measured value applied for 60 seconds (R2).

$$DAR = \frac{R2}{R1}$$

Step one: under insulation resistance function, firstly select voltage range, and then press  key to select measurement mode of absorption ratio. The mark  lights in the lower part of LCD.

Step two: press and lock measurement key to start measurement, the Auxiliary Screen displays set time, and the

Main Screen displays insulation resistance value.

When the set time comes, then the Instrument automatically finishes the measurement, the Auxiliary Screen displays voltage measurement, the Main Screen displays DAR value.

In the DAR measurement, the User needs to press the measurement key until the set time, thus continuous measurement function is very convenient. If the User releases the key before reaching the set time, the Instrument displays the present measured value of insulation resistance; repress the measurement key to restart a new measurement,

Step three: press  key to shift among 'R1', 'R2', 'DAR' displays.

Use of Guard Line

When measuring the insulation resistance of cables, the leakage currents in the cover join with the current through the insulator interior, which cause the errors in insulation resistance value. To avoid this phenomenon, use the guard line (any conductive naked wire) to roll up the leakage current carrying part, and connect to the protection terminal; the leakage current won't carry through the indicator, thus only the volume resistance of the insulator could be measured.

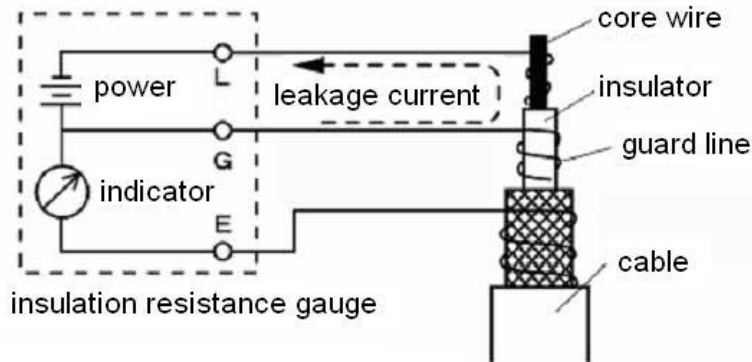







Figure 8

Please use the attached guard line to connect protection terminal.

Use the COMPARE (comp) function

Start the comparison test function to preset the limit 'pass/fail(✓/✗)' to evaluate the measurement results and give an audio alarm.

The function of comparison test is only valid for insulation resistance test, but not for PI and DAR.

Press the   key to start the comparison function, and the  symbol will be displayed on the screen after the comparison function is started. Press the   key again to turn off the comparison function.

The following three parameters need to be set for the comparison function. Please refer to Chapter 6 'Instrument Settings' for details.

The first parameter **LoBb** : select the comparison audio alarm mode: select 'Lt', then the test value is less than the preset limit value for audio alarm; Select 'Gt' to give an audio alarm when the test value is greater than the preset limit.

Second parameter **rELr** : set the comparison limit range: 20.00 MΩ, 200.0MΩ, 2000MΩ or 20.00 GΩ.

The third parameter **rEL"** : set the comparison limit, with the setting range of 00.00MΩ~ 19.99GΩ.

Section Six

Store/recall the Measurement Results

⚠ Note

- Please undertake 'cancel data' operation for initial use of storing function.


The instrument can store 100group measurement results.

How to Save the Data

When measurement is finished, press ^{CLR}SAVE key. Then the Main Screen displays 'SAVE' in the lower left part, the memory number in the auxiliary part add one automatically, and the measurement result is saved successfully.

The stored data are parameters of all measurement.

⚠ Note

- Please undertake 'cancel data' operation for initial use of storing function.
- Data cannot be saved while the low battery mark  displays on the Main Screen.
- When the saved data reaches to the maximum limit of the capacity, 'FULL' is displayed on the Auxiliary Screen and no more data can be saved.




How to Recall the Saved Data

The saved data could be read on the Main Screen according to following sequence:

⚠ Warning



To avoid electrical shock, remove the Test Leads off in MEN function.

(1) Remove the Test Leads.

(2) Press   key to enter into MEM function. When the Main Screen displays  in the lower right part, the Instrument will read the last record in default setting.

(3) Press  key to recall next data; Press  key to recall the remained contents of present data.

Note: when no data saved, the Main Screen displays ———, the memory number in the Auxiliary Screen is 0.

(4) Press   key to exit from the MEM function.




How to Delete the Data





The saved data could be read on the Main Screen according to following sequence.



 Warning

To avoid electrical shock, remove the Test Leads off in MEM function.



(1) Remove the Test Leads.

(2) Press   key to enter into MEM function. When the Main Screen displays  in the lower right part, the Instrument will read the last record in default setting.



(3) Press  key, the Main Screen displays mark  to enquire whether to delete data or not. For YES, repress  key, and the Main Screen displays  mark to ensure deleting data in this part. The Main Screen shows mark '----' after 1 second, and the buzzer beeps a sound to indicate finishing deletion; Conversely, press any other key to cancel deletion work.

(4) Press   key to exit from the MEM function.

Section Seven Instrument Setting



To enter into instrument setting function, please power on the Instrument first and then press   key.











Under setting mode, the Auxiliary Screen displays set items; the Main Screen shows factory default value.

Press  key to modify setting; press  key to save set value (mark SAVE displays in the lower left part, indicating the set items have been saved)

When the modification has finished, repress   key to exit setting mode.

Detailed operation illustrates as the following table:

| Setting Items | | Function | Default Value |
|-------------------------|------------------|--|---------------|
| AP_{OFF} | power-off timing | Setting range is 0~90 minutes, press  key to select blinking position, press  key to set flicker digits; Setting as 0 indicates canceling auto-power-off function. | 5 minutes |

| | | | |
|-------------|---------------------------------|---|-----------|
| bLOF | backlight time setting | Setting range is 0~90 minutes,press  key to select blinking position ,press  key to set flicker digits; Setting as 0 indicates canceling automatic backlight turning off function. | 5 minutes |
| bEEP | beeper | ON or OFF ,press  key to select | ON |
| tInE | time for timing measurement | The set range is 00:10~ 59:30(minute ,second) ,use  (shifting) and  (increasing key) key to set time. | 1 minutes |
| CObb | Compare ringing modes | Lt (Sound below the set value)or Ut (Sound above the set value),press  key to select. | Ut |
| rELr | Compare the limit range | 20.00MΩ,200.0MΩ,2000MΩ,20.00GΩ,press  key to select. | 20.00GΩ |
| rEL" | Compare limit values | The set range is 00.00MΩ ~ 19.99GΩ,press  key to select blinking position ,press  key to set flicker digits.The range and unit depend on the set range. | 00.00MΩ |
| FRct | Back to factory default setting | NO or YES,press  key to select,YES indicates returning to factory default value. | NO |

Section Eight

Instrument Maintenance

This section provides some basic maintenance procedures. Repair, calibration, and servicing not covered in this Manual must be performed by qualified personnel. For maintenance procedures not described in this manual, contact a Service Center.

General Maintenance

Periodically wipe the case with a damp cloth and detergent; do not use abrasives or solvents.

- Take out the batteries if the Instrument will not be used for a long time.
- Dirt or moisture in the terminals can affect readings.

Clean the terminals as follows:

- (1) Turn the Instrument off and remove all test leads.
- (2) Shake out any dirt that may be in terminals.
- (3) Soak a new swab with alcohol. Clean each terminal with the swab.

Replacing the Batteries

This Instrument is powered by eight AA batteries (IEC LR6).

⚠ Warning

To avoid electrical shock or personal injury:

- Remove Test Leads from the Instrument before opening the battery door.
- Close and latch the Battery Cover before using the meter.

⚠ Note

- The new and old Batteries cannot be mixed.
- Make sure the battery's poles are in accordance with the marks illustrated in battery pool when replacing them.
- Take out the batteries if the meter will not be used for a long time.
- Dispose the old batteries in accordance with the local law.

Replace the batteries as follows. (See Figure 8):

- (1) turn off the Instrument and remove all Test Leads from the Terminals;
- (2) take off the protector of the Instrument, remove the battery cover by using a standard-blade screwdriver to turn the battery door fasteners, and then take off the battery case;

- (3)replace with new batteries;
- (4)reinstall the battery case and tighten screws.

Appendix

Insulation Resistance Measurement Principal

Volta metric method,DC voltage excitation output,measurement of excitation voltage and leakage current.

Operation principal: resistance=voltage/current $R_X=V/I$

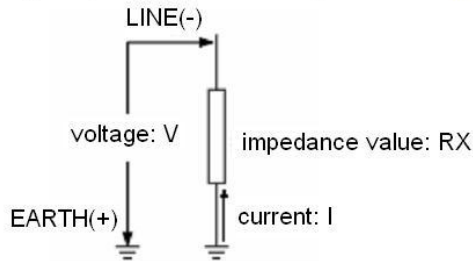


Figure 9

Notice of the Manual

- The present operation instruction is subject to change without notice.
- The content of the operation instruction is regarded as correct. Whenever any user finds its mistakes,omission,etc.,he or she is requested to contact the manufacturer.
- The present manufacturer is not liable for any accident and hazard arising from the customer misuse or inadvertent operation.
- The functions described in this operation instruction should not be used as grounds to apply this product to a particular purpose.