# KM 375 Operating Manual

## I. Overview

Welcome to use the product!

This is a real digital insulating resistance tester + digital multi-meter. It has features of complete functions, high accuracy, reliability in operation, and convenience in use. Output test voltage can be switched among 100V/250V/ 500V/1000V/2500V. It can monitor the output high voltage in a real-time way. At any time, the user can observe actual measurement voltage that is output by the meter, effectively avoiding misjudgment caused due to output voltage not conforming to the rated value. The measurement range of the meter can reach up to 50GΩ. The measurement time can be set up according to requirements. After a measurement is completed, the measured result can be kept automatically. Functions of the digital multimeter include AC/DC voltage, resistance, capacitance, frequency, diode, and ON/OFF measurement. The functions of the digital multimeter are completely separated from those of the insulating resistance tester. When use functions of the multimeter, you need not be worried that you would suffer electric shock due to high voltage generated by the insulating resistance tester. The product is applicable to measurement of the insulating resistance of various insulating materials and electric equipments such as transformers, motors, cables, switches, and electric apparatuses. It is also applicable to maintenance, test, and inspection of various electric equipments. It is compact in structure, convenient to carry, and an ideal electrical and electronic testing meter of yours.

## II. Safety information

1. The design of this measuring appliance conforms to the safety standard of IEC 61010 CATⅢ1000V , Please read this handbook carefully before use.

2. Description of safety marks:

⚠ Warning, be careful ⚠ Risk of high voltage

3. It is strictly prohibited to use the meter before its rear cover is put in place. Otherwise, it might cause an electric shock.

4. Check and make sure the insulating layer of the test cable is in good condition without any breakage.

5. To avoid electric shock, do not touch the test cable and the circuit under test when performing a test.

6. Make sure one end of the test cable is securely inserted into the terminal.

7. During test, any range must not exceed its specified maximum input value.

8. During test, do not operate the switch knob for changing a range to avoid damaging the meter.

9. Voltage over 30V can cause danger of electric shock. Be careful when taking measurement.

10. Before performing insulation test, make sure the range selection switch has been set within an appropriate voltage range.

11. Do not perform insulating resistance test in a combustible environment. Spark may cause explosion.

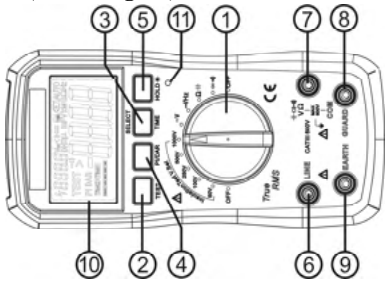
12. Stop using the meter, if its case or test cable is broken during use and the metal is exposed

13. When open the rear cover for changing battery, make sure the test cable has been removed out of the test terminal and the range switch switched to OFF position.

14. Take the battery out when the meter will not be used for a long time.

15. When "[+]" is displayed in the meter, It should be charged in time to ensure the measurement accuracy

## III. Name and function of parts (see the figure)




**1.Function switch knob**

Switch among power N/OFF, measurement voltage of the insulating resistance, and various functions of the multimeter.

**2. TEST:** it is used to measure the insulating resistance

**3. TIME/SELECT:** it is used to set the measurement time of the insulating resistance as well as various function switch of the same position

**4. PI/DAR:** The button is used to configure the test instrument for insulation polarization index or absorption ratio testing. Press the button, the screen displays DAR(absorption ratio), and the time ratio (Time2:Ttime1) is set to 1MIN: 15S.In the second short voltage, the time ratio of insulation polarization index (Time2:Ttime1) is set to 1MIN: 30S;Press the third time, the screen displays PI(polarization index), and the current time ratio (Time2:Ttime1) is set to 10MIN: 60S;After the fourth short press, the PI/DAR(Polarization index/absorption ratio) test function is canceled. After selecting the desired time ratio, the test can be performed by pressing the test button.

**5. HOLD/☀** Short press this key to enter the reading hold measurement mode, and after another press, exit the mode. Long press this key, the backlight is turned on and kept on, and after another press the backlight is turned off.

**6. LINE** input terminal (connected to line terminal of the to-be-tested object).

**7. V/Ω** input terminal: common positive input terminal of the digital multimeter;

**8. COM/GUARD** input terminal (COM is common EARTH of the multi-meter /guard is shielded terminal of the insulating resistance).

**9. EARTH** input terminal (connected to EARTH terminal of the to-be-tested object)

**10.** Liquid crystal display

**11.** Insulation resistance measurement and short-circuit beeping indicator light

## IV. General characteristics

1. Auto range: "OL" will be displayed for overload in multi-meter.
2. Display mode: Liquid crystal display; maximum display: 3999 or 5999;
3. Sampling rate: 2 times per second;
4. The meter can display actual insulation test voltage. LED light is used to indicate high voltage output status;
5. Operating environment: 0°C-40°C, less than 75%RH;
6. Storage environment:-10°C-60°C, less then 80%RH;
7. Indication for insufficient battery capacity: "[+]" is displayed;
8. Power supply: 2 pieces of 14500-3.7V Li-ion battery
9. Auto power off: 15 minutes after it is turned on if no key is pressed or the knob is not turned. Long press HOLD to wake up in sleep mode.
10. Auto discharge function.
11. External dimension: 189(length)×89(width)×55(height)mm
12. Weight: Approx. 380g (including the battery)

## V. Technical characteristics and operating description of the insulation tester

Accuracy: ±(% reading +number), one-year warranty

Environment to guarantee the accuracy: 23°C±5°C, less than 75%RH

**Rated measurement voltage, valid measurement range, and precision**

| Rated Voltage | Measurement range | Accuracy |
|---|---|---|
| 100V | 0.1MΩ-2GΩ | ±(5%+5), |
| 250V | 0.25M-5G Ω | 0.25M-399.9MΩ:±(3%+5), |
| 500V | 0.5M-10GΩ | 0.4G-2GΩ:±(5%+5), |
| 1000V | 1M-20G Ω | 2.001G-50GΩ:±(10%+5) |
| 2500V | 2.5M-50GΩ | |

**Display range**

| Rated voltage | range (auto range ) | Resolution |
|---|---|---|
| 100V | 4M/40M/400M/2GΩ | 0.001MΩ~0.001GΩ |
| 250V | 4M/40M/400M/4G/5GΩ | 0.001MΩ~0.01GΩ |
| 500V | 4M/40M/400M/4G/10GΩ | 0.001MΩ~0.01GΩ |
| 1000V | 4M/40M/400M/4G/20GΩ | 0.001MΩ~0.01GΩ |
| 2500V | 40M/400M/4G/40G/50GΩ | 0.01MΩ~0.1GΩ |

**Characteristics of the measurement terminal**

| Rated voltage | Open circuit voltage | Drop resistance | Short circuit current | buzzer alarm |
|---|---|---|---|---|
| 100V | 90%-110% | 0.1 MΩ | ⩾1 mA | ⩽0. 6MΩ |
| 250V | | 0.25MΩ | | ⩽1MΩ |
| 500V | | 0.5MΩ | | ⩽2MΩ |
| 1000V | | 1MΩ | | ⩽4MΩ |
| 2500V | | 2.5MΩ | | ⩽10MΩ |

## Usage for insulating resistance measurement

**1. Insulating resistance test**

1) Connection of the test terminals

Insert the red test lead into LINE & EARTH terminal. Insert the black test lead GUARD terminal (GUARD terminal is not used when leakage current is not considered). all test probe tips Connects clamp. Make a good connection respectively.

2) Test connecting cable

Connecting cable of EARTH terminal of the meter is earth cable;

Connecting cable of LINE terminal of the meter is circuit cable;

Connecting cable of GUARD terminal of the meter is shielding cable and connected to surface of the to-be-tested object to prevent surface leakage and affect impedance test.

3) Rated voltage selection

Select a rated voltage you need in the insulating resistance test. Turn the range switch knob to a corresponding voltage position, and press "TIME" to make selection among 15s/30s/1min/10min according to test time requirement

4) Connect pen of the test bar to another terminal of the to-be-tested object. Press high voltage switch (TEST). Here, the red indicator light turns on, indicating high voltage output for test is connected. Actual high voltage value can be displayed in the meter.

After the test is started, numerical value is displayed in the meter. The displayed value is the insulating resistance value of the object under test. For convenience of use, when the set test time comes, the meter cuts high voltage off automatically, and locks and saves the measured result. If there is a need to remeasure, press any key to release the lock status and start the measurement over again.

Attention: do not short-circuit the two test pens with high voltage output or take measurement of insulating resistance after high voltage is output. The improper operation is very easy to generate spark, cause fire disaster, and damage the meter.

**Special attention in operation:**

Before test, make sure the to-be-tested circuit is not electrified. Do not take measurement of any electrified equipment or electrified circuit. During test, dangerous voltage output exists in the meter. Be sure to operate it carefully. Ensure the to-be-tested object is securely clamped and keep your hands away from the test clamp before press TEST key to output high voltage.

Attention in operation:

When the measured resistance is lower than the preset alarm value, the buzzer will sound, please press the TEST key in time to terminate the measurement.

5) Absorption ratio and polarization index measurement: the measurement wiring method is the same as the measurement of insulation resistance, just set to the absorption ratio or polarization index. Press PI/DAR once, and the screen displays DAR (absorption ratio) and time ratio (Time2:Time1) : set the time ratio as 1MIN:15S; , the insulation absorption ratio can be set to 1MIN:30S; Short press the third time, the screen displays PI(Polarization index) and time ratio 10MIN:60S. Short press the fourth time to cancel the insulation resistance polarization index and absorption ratio test function. Select one of the time ratios and press the TEST button to measure it. (The main display of the screen changes into a timer. When it reaches Time1, the beep sounds, and the meter records the value at this time. When Time2 arrives, the beep records the value at this time, and calculates the ratio of insulation resistance at two moments).

## IV. Technical characteristics and operating description of the multimeter

Accuracy: ±% reading ± number, one-year warranty

Environment to guarantee accuracy: 23°C±5°C, less than 75%RH

**DC voltage (DCV)**

| Range | Accuracy | Resolution |
|---|---|---|
| 6V~600V | ±(0.5%+5) | 0.001V~0.1V |
| 1500V | ±(1%+5) | 1V |

Input impedance: 10MΩ. Input impedance: 10MΩ.

**AC voltage (ACV)**

| Range | Accuracy | Resolution |
|---|---|---|
| 6V~600V | ±(1.2%+5) | 0.001V~0.1V |
| 1500V | ±(2%+5) | 1V |

Frequency range: 40Hz～1kHz. Input impedance: 10MΩ.

Display: True-RMS (Sine wave virtual value calibration)

**Resistance**

| Range | Accuracy | Resolution |
|---|---|---|
| 600Ω~600kΩ | ±(0.8%+5) | 0.1Ω~0.1kΩ |
| 6MΩ | ±(1%+3) | 0.001MΩ |
| 60MΩ | ±(2%+3) | 0.01MΩ |

Overload protection: 250V RMS

**Capacitance**

| Range | Accuracy | Resolution |
|---|---|---|
| 10nF | ±(3%+20) | 0.001nF |
| 100nF~1mF | ±(3%+5) | 0.01nF`0.1μF |
| 10mF~100mF | ±(8%+10) | 0.001mF~0.01mF |

Overload protection: 250V RMS

**diode**

Display approximate forward voltage value of the diode. Test condition: Forward DC current of approx. 0.5mA, reverse DC voltage of approx. 3.2V.

**Continuity test**

When the ON resistance is less than approx. 50Ω, the buzzer in the meter buzzes. Test condition: open circuit voltage of approx. 1V.

**Operating description of the digital multimeter**

**AC/DC voltage measurement**

Turn the switch to "V⎓ or "V~" range. Insert black lead into "COM" jack. Insert red lead in "VΩ" jack. Connect the other end of test probe tips in parallel to two terminals of the to-be-tested circuit. The value on the LCD screen can be directly read;

Press the SELECT button while in the ACV function to go to voltage frequency measurement mode. It can measure the frequency range of 10Hz to 20KHz under the condition that the voltage is AC 1V-600V.

⚠Attention: 1) Input voltage should not exceed the limited value 600V. If does, there is danger of damaging the meter circuit.

2) When perform measurement of high voltage circuit, be sure that human body will not contact the high voltage.

**Resistance and Capacitance measurement**

⚠ **Warning!** When perform resistance and continuity measurement, it is necessary to guarantee that no voltage is applied across the to-be-tested circuit or component.

Set the switch to Ω⊣⊢position. Here, the meter is preset to resistance range. Insert red lead into "VΩ" jack, and black lead into "COM" jack. Connect the other end of test probe tips in parallel to two terminals of the to-be-tested circuit or component and read the resistance value.

Press "SELECT" key to switch to ⊣⊢ position. Connect the other end of test probe tips in parallel to two terminals of the to-be-tested capacitor and read the capacitance value.

**diode and Continuity measurement**

Turn the switch to "" position. Insert red lead into "VΩ" jack and black lead into "COM" jack (polarity of the red lead is "+"). Connect the other end of test probe tips in parallel to two terminals of the to-be-tested diode and read the forward voltage value. When the diode is reversely connected or the input terminal is open-circuited, "OL" will be displayed on the screen.

Press "SELECT" key to switch to position. When the tested resistance value is less than approx. 50Ω, the buzzer would buzz. This is continuity test. When the pens are open-circuited or input is overloaded, "OL" will be displayed on the screen.

## VII. Battery replacement and charging

Do not replace the battery during the test. In addition, in order to avoid electric shock, please close the range switch before replacing the battery, and remove the test wire first. Loosen the screw on the battery cover of the machine and open the battery cover. Replace the rechargeable battery, close the battery cover and tighten the screw.

Note: The battery should not be installed with the wrong polarity.

When receiving the meter, please first use our company with the charging adapter and mobile phone charger (DC5V-USB output: 1A or above charger is available) to charge the lithium battery, fully charged before loading into the meter for use. The charging adapter will limit the maximum charging current to about 350mA, and when the battery shows the battery symbol in the meter, the time to fully charge is about 2 hours.

Before charging, please check that the battery is not broken, the battery polarity should not be inverted, the indicator light does not light when the charging base is inverted, the indicator light does not light when the battery is installed, please immediately check whether the battery is inverted or broken short circuit, and remove the battery in time. When charging, the red light indicates that the Li-ion battery is charged, and the green light indicates that the battery is full or not connected. When the battery symbol is displayed or the meter is not powered on, charge the LI-ion battery first, and then install the machine to check whether it is normal.

**Lithium batteries should avoid overcharging and over-discharging, mechanical damage, and being used in high-temperature environments to prevent external or internal short circuits of the batteries, which may lead to thermal runaway, combustion, and explosion. When the meter is not used for a long time, the lithium ion battery should be fully charged storage. It is recommended not to charge it more than 3 months.**

## VIII. Instrument maintenance

1 keep meter and watch pen clean, dry and lossless, available clean cloth or detergent to clean the case, do not use abrasive or organic solvent.

2. Avoid mechanical damage, vibration, impact, corrosion, avoid high temperature position and strong magnetic field.

**IX**. Attachments

1. A set of test lines: including 2 red test leads, 1 black test lead, and test clip for each.
2. One manual
3. One Charging transfer seat

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