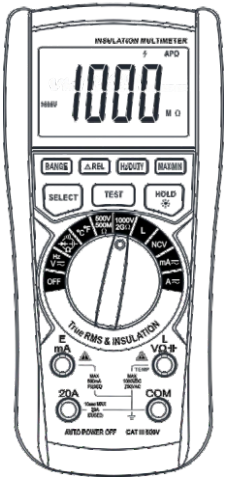
Insulation Resistance Digital Multimeter Manual



The product is a precision instrument. To avoid damage and injury caused by wrong operation, please read the operation manual carefully before operation.

Contents

I. Overview

This instrument is a stable, highly reliable 3 5/6digit multimeter. The meter uses a 24mm high LCD display for clear readings. It can be used to measure DC voltage, AC voltage, DC current, AC current, resistance, insulation resistance, capacitance, Inductance, frequency, non-contact voltage detection, duty cycle, temperature, diode and continuity testing. It also has unit symbol display, backlight display, data hold, automatic range switching, automatic power off and alarm functions. The whole machine uses an 8 bit microprocessor that can directly drive the LCD and a dual integral A/D conversion integrated circuit, providing high-resolution, high-accuracy digital display. This meter is fully functional, highly accurate, easy to use, and is an ideal tool for laboratories, factories, radio enthusiasts, and households.

II. Safety Precautions

The meter is designed in accordance with IEC1010 regulations (safety standards issued by the International Electrotechnical Commission). Please read the safety precautions before use.

1. Before measurement, check whether the test pen is in reliable contact, correctly connected, and well insulated to avoid electric shock.
2. Do not input beyond the specified limit value during measurement to prevent electric shock and damage to the instrument.
3. Be careful when measuring voltages higher than 60V DC or 40V AC to prevent electric shock.
4.Select the correct function to prevent misoperation!
5.When switching functions, the test pen should leave the test point.
6. Do not allow the test pen to be inserted into the current terminal to measure voltage!
7. Do not arbitrarily change the meter circuit to avoid damaging the meter and endangering safety.
8. Safety symbol explanation: "⚠" indicates dangerous voltage, "⏚" indicates grounding, "⧈" indicates double insulation, "⚠" indicates that the operator must refer to the manual, "🔋" indicates low voltage symbol.

III. Features

I. General Features

1-1. Maximum LCD Display: 6000, 3 5/6digit automatic polarity and unit display
1-2. Sampling Rate: Approximately 3 times per second
1-3. Overrange Display: Displays “OL”
1-4. Low Voltage Display: "🔋" symbol appears
1-5. Operating Environment: (0~40) °C, relative humidity <80%
1-6. Storage Environment: (-10~50) °C, relative humidity <80%
1-7. Power Supply: 6 x 1.5V batteries (“AA” size)
1-8. Dimensions: (200mm×92mm×50mm) (length × width × height)
1-9. Weight: Approximately 480g (including batteries)
1-10. Accessories: One instruction manual, shockproof cover, TP01 thermocouple,

one set of test leads, one set of crocodile clips and six 1.5V AA batteries.

2. Technical Characteristics

2-1. Accuracy: ± (percentage of reading + number of least significant digits), accuracy guaranteed at an ambient temperature of (23±5) ℃ and relative humidity <75%, calibration warranty period is one year from the date of manufacture.

2-2. Direct Current Voltage (DCV)

Range	Accuracy	Resolution
600mV	±(0.5%+5)	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	±(1.0%+5)	1V

Input Impedance: >40MΩ for 600mV range, 10MΩ for others.

Overload Protection: 1000V DC or 750V AC peak.

2-3. Alternating Current Voltage (ACV) (True RMS)

Range	Accuracy	Resolution
6V	±(0.8%+10)	1mV
60V		10mV
600V		100mV
750V	±(1.0%+10)	1V

Input Impedance: 10MΩ.

Overload Protection: 1000V DC or 750V AC peak.

Frequency Response: (40~1000) Hz for 750V range, (40~2000) Hz for other ranges.

Display: True RMS response (calibrated with sine wave RMS value).

2-4. Direct Current (DCA)

Range	Accuracy	Resolution
6mA	±(1.0%+5)	1μA
60mA		10μA
600mA		100μA
6A		1mA
20A	±(2.0%+5)	10mA

Maximum Measurement Voltage Drop: Full-scale mA is 600 mV, A is 200mV.

Maximum Input Current: 20A (no more than 10 seconds). Overload Protection: 0.5/250V fuse. 13A/250V fuse.

2-5. Alternating Current (ACA)

Range	Accuracy	Resolution
6mA	±(1.5%+10)	1μA
60mA		10μA
600mA		100μA
6A		1mA
20A	±(2.0%+10)	10mA

Maximum Measurement Voltage Drop: Full-scale mA is 600mV, A is 200mV.

Maximum Input Current: 20A (no more than 10 seconds)
Overload Protection: 0.5/250V fuse. 13A/250V fuse.
Frequency Response: 20A range is (40~100) Hz, other ranges are (40~400) Hz.
2-6. Resistance (Ω)

Range	Accuracy	Resolution
600Ω	±(0.8%+5)	0.1Ω
6kΩ	±(0.8%+2)	1Ω
60kΩ		10Ω
600kΩ		100Ω
6MΩ		1kΩ
60MΩ	±(1.2%+5)	10kΩ

Open Circuit Voltage: >500mV. Overload Protection: 250V DC or AC peak.
Note: When using the 600Ω range, short circuit the test leads first to measure the lead resistance, then subtract it from the actual measurement. or short-circuit the test leads and press the “REL” key to read directly.
2-7. Capacitance (C)

Range	Accuracy	Resolution
60nF	±(2.5%+6)	10pF
600nF	±(2.5%+5)	100pF
6uF		1nF
60uF		10nF
600uF	±(5.0%+8)	100nF
6mF		1uF
60mF		10uF

Overload Protection: 250V DC or AC peak.
2-8. Inductance（L）

Range	Accuracy	Resolution
6mH	±(1.5%+5)	1uH
60mH		10uH
600mH		100uH
6H		1mH
60H		10mH
100H		100mH

Test frequency: about 1kHz. Overload Protection: 250V DC or AC peak.
2-9. Frequency (F) Switch to display at ACV

Range	Accuracy	Resolution
10Hz	±(1.0%+3)	0.01Hz
100Hz		0.1Hz
1000Hz		1Hz
10kHz		10Hz
50kHz		10Hz

Input Sensitivity: 0.7V

2-10. Insulation Resistance Testing

Range	Accuracy	Conditions
500MΩ	±（4.0%±2）	500V
2000MΩ		1000V

Warning: This range has high voltage output, beware of electric shock!

2-11. Diode and Continuity Testing

Range	Displayed value	Conditions
	Diode forward voltage drop	Forward DC current approximately 1.5mA, reverse voltage about 4V.
	When resistance value is less than 50Ω, the buzzer sounds.	Open circuit voltage about 2V.

Overload Protection: 250V DC or AC peak.

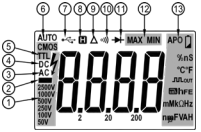
Warning: For safety, do not input voltage in this range!

2-12. Temperature (°C/°F)

Range	Displayed value	Resolution
-40°C~1000°C	＜400°C ±(1.0%+5) ≥400°C ±(1.5%+15)	1°C
-40°F~1832°F	＜750°F ±(1.0%+5) ≥750°F ±(1.5%+15)	1°F

Sensor: Type K (Nickel-Chromium-Nickel Silicon)

Warning: For safety, do not input voltage in this range!



IV. Operating Instructions

4-1. Control Panel Explanation

①LCD Display: Shows the measured values and units.

No.	Function	Meaning
1	1000V	Output high voltage value symbol.
2	-	Indicates negative readings.
3	AC	AC voltage or current measurement.
4	DC	DC voltage or current measurement.
5	COMS TTL	Not applicable.
6	AUTO	Multimeter is in auto range mode.
7		Not applicable.

8	H	Data hold function is enabled.
9	△	REL relative value measurement.
10	·))	Continuity buzzer is activated.
11	▶|–	Diode measurement.
12	MAX MIN	Measures maximum, minimum.
13	APO hFE nS %,°C,°F MΩ, kΩ, Ω Hz, kHz,MHz mV, V uA, mA, A nF, uF, mF mH, H	Auto power-off indicator, low battery symbol. Function not applicable. Duty cycle, Celsius temperature, Fahrenheit temperature. Megaohm, kiloohm, ohm. Hertz, kilohertz, megahertz. Millivolt, volt. Microampere, milliampere, ampere. Nanofarad, microfarad, millifarad. Millihenry, henry.

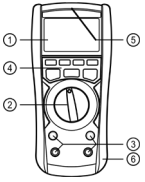
②Rotary Switch: Used to change measurement functions and ranges

Function	Description
V≂	Alternating current voltage, direct current voltage measurement. Press SELECT key to switch frequency/duty cycle measurement.
Ω▶|–·))–|–	Resistance, diode, continuity, capacitance measurement, press SELECT key to choose diode, continuity, resistance, capacitance measurement, cycle through options.
°C/°F	Temperature measurement, press SELECT key to switch between °C or °F.
500MΩ/500V 2GΩ/1000V	Insulation resistance measurement, Press [TEST] key to measure and hold test value.
L	Inductance measurement
NCV	Non-contact voltage detection.
mA≂	Direct current measurement (from 0mA to 600mA), press SELECT key to switch alternating current measurement (from 0mA to 600mA).
A≂	Direct current measurement (from 0A to 20A), press SELECT key to switch alternating current measurement (from 0A to 20A).

③Input Ports:

Port	Description
VΩHz–|– L	Input terminal for measuring voltage, resistance, frequency, capacitance, diode, and continuity. High voltage end for insulation test. Positive input terminal for temperature.
mA E	Measures 0mA to 600mA current (continuous measurement up to 18 hours for <600mA). Ground end for insulation test.
20A	Measurement input terminal for 0A to 20.00A current (20A overload protection for up to 10 seconds).
COM	Common terminal, negative input terminal for temperature.

④Function Keys



SELECT Key：

1) Function selection key, triggered action. Press this key to select the desired measurement mode:C hoose DC or AC in modeC hoose Ω/ ⊣⊢ / ·))) / ⊣⊢ in Ω ⊣⊢ ·))) mode. Choose °C or °F in temperature measurement mode. Switch frequency/duty cyclemeasurement in alternating current voltage measurement mode by pressing SELECT key.

2) The multimeter automatically powers off after 15 minutes of inactivity, entering sleep mode. A built in buzzer emits 5 beeps within the last minute before power-off. to restart power, press this function key to reconnect the power.

3) Holding this key while turning on the power cancels the auto power-off feature.

RANGE Key:

Selects auto range or manual range mode. The multimeter starts in auto range mode, displaying "AUTO" symbol. Press this function to switch to manual range, increasing one range at a time from low to high, cycling through. Holding this key for more than 2 seconds returns to auto range mode.

△REL Key: Relative value measurement or zeroing key.

1) Voltage, current, resistance can be measured as relative values. Press this key, "△" symbol appears on the display, enters manual range mode, and takes the current display value as the reference value. Then it displays the difference between the measurement value and the reference value. Press this key again to exit relative value measurement.

2) Zeroing function for capacitance range when residual digits are present. Press to display zero.

Hz/Duty Key:

In ACA/ACV measurement, press this key to switch between frequency, duty cycle, voltage, or current measurement.

MAX/MIN Key: Measures maximum and minimum values.

HOLD/☀ Key:

1) Data hold key, triggered action. Briefly press this key, the current measured value is held on the LCD display, "H" symbol appears, press again to exit hold mode.

2) Backlight control key, press for more than 2 seconds to turn on the display backlight, press again for more than 2 seconds to turn off the backlight. If the backlight is on and this key is not pressed, it will automatically turn off after 30 seconds.

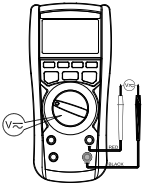
TEST Key:

Insulation resistance test, press this key to start measurement, press again to cancel the test, the reading and "H" symbol are automatically held on the screen.

⑤Non-contact voltage sensing detection area.

⑥Shockproof cover, battery door. See figure

4-2. Direct Current Voltage Measurement



1. Insert the black test lead into the "COM" jack, the red test lead into the "VΩHz⊣⊢" jack.
2. Turn the function switch to "V⎓", press "SELECT" key to choose DC measurement mode.
3. The multimeter starts in auto range mode, displaying "AUTO" symbol. Press "RANGE" key to switch to manual range mode, with options of 600mV, 6V, 60V, 600V, 1000V ranges.
4. Touch the test leads to the test points, the voltage and polarity of the point connected to the red test lead are displayed on the screen.

Note:

1. In manual range mode, if the LCD displays "OL", it indicates that the range has been exceeded, and the range switch must be turned to a higher range.
2. Do not measure voltages exceeding 1000V, as this may damage the multimeter circuit and trigger an audible alarm.
3. When measuring high voltage circuits, be cautious to avoid high-voltage contact.

4-3. Alternating Current Voltage Measurement

1. Insert the black test lead into the "COM" jack, the red test lead into the "VΩHz⊣⊢" jack.
2. Turn the function switch to "V⎓", press "SELECT" key to choose AC measurement mode, press Hz/Duty key to switch alternating current voltage/frequency/duty cycle measurement.
3. The multimeter starts in auto range mode, displaying "AUTO" symbol. Press "RANGE" key to switch to manual range mode, with options of 6V, 60V, 600V, 750V ranges.
4. Touch the test leads to the test points, the voltage between the two points connected to the test leads is displayed on the screen.

Note:

1. In manual range mode, if the LCD displays "OL", it indicates that the range has been exceeded, and the range switch must be turned to a higher range.
2. Do not measure voltages exceeding 750V AC, as this may damage the multimeter circuit and trigger an audible alarm.
3. When measuring high voltage circuits, be cautious to avoid high-voltage contact.

4-4. Direct Current Measurement

1. Insert the black test lead into the "COM" jack, the red test lead directly into the "mA" or "20A" jack (maximum 600mA) and (maximum 20A).
2. Turn the function switch to "mA/20A", connect the test leads in series to the circuit under test, the measured current value and the current polarity at the red test lead point are simultaneously displayed on the screen.

Note:

1. If unknown the current range, set range switch to highest, then adjust by display value..
2. If the LCD displays "OL", it indicates that the range has been exceeded, and the range switch must be turned to a higher range.
3. When the 20A range measurement value is ≥10A, the built-in buzzer will emit several beeps to remind you to use caution.
4. The maximum input current is 600mA or 20A (depending on the red test lead insertion position), exceeding the rated current will blow the fuse and may even damage the multimeter.

4-5. Alternating Current Measurement

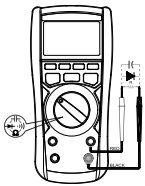
1. Insert the black test lead into the "COM" jack, the red test lead directly into the "mA" or "20A" jack (maximum 600mA) and (maximum 20A).
2. Turn the function switch to "mA/20A", press "SELECT" key to choose AC measurement mode, press Hz/Duty key to switch alternating current/frequency/duty cycle measurement.
3. Connect test leads in series to the tested circuit. The measured current shows on the screen.

Note:

1. If unknown the current range, set range switch to highest, then adjust by display value.
2. If “OL” shows, it indicates the measurement exceeds the range. Increase the range.
3. 20A Range Caution: When measuring values ≥10A in the 20A range, the meter’s built-in buzzer will emit several beeps as a caution.
4. Maximum Input Current: The maximum input current is 600mA or 20A (depending on where the red probe is inserted). Exceeding the rated current can blow the fuse or even damage the meter.

4-6. Resistance Measurement

1.Insert the black probe into the “COM” jack and the red probe into the “VΩHz⊣⊢” jack.
2.Turn the function switch to the “Ω⊣◁)⊣⊢” position and connect the probes across the resistor to be measured.
3.Press the “RANGE” button to select auto or manual ranging.
4.For small resistance values, short the probes and press the “REL” button once before measuring the unknown



resistance to display the actual resistance value.

Note:

1.Use the highest range when manually selecting ranges without prior knowledge of the resistance to be measured.

2.If “OL” is displayed, it indicates that the measurement exceeds the range. Increase the range.

3.When measuring resistances over 1MΩ, readings may take a few seconds to stabilize, which is normal for high resistances.

Ensure all power sources are turned off and all capacitors are fully discharged before measuring in-circuit resistances.

4.Large measurement errors may occur due to other components in the circuit or potential differences across the resistor.

5.Do not input voltage in the resistance range.

4-7. Capacitance Measurement

1.Turn the function switch to the “Ω” position.

2.Insert the black probe into the “COM” jack and the red probe into the “VΩHz” jack.

3.If the display does not show zero, press the “△REL” button once to zero it.

4.Connect the capacitor to be measured with the correct polarity to the “COM” and “VΩHz” inputs using the test probes (note the “+” polarity of the red probe), and the screen will display the capacitance.

Note:

1.Do not input voltage or current signals when measuring capacitance.

2.Press the “△REL” button to zero the display before each test to ensure accuracy.

3.Capacitance measurement only has an auto-ranging mode.

4.Fully discharge the capacitor before testing to avoid damaging the meter.

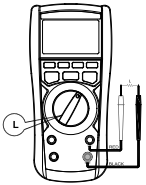
4-8. Inductance Measurement

1.Function Switch: Set the function switch to the “L” position.

2.Test Leads: Insert the black test lead into the “COM” jack and the red test lead into the “mA” jack.

3.Measurement: Connect the inductance to be measured with the test leads to the “COM” and “mA” input terminals. The screen will display the inductance capacity.

4.Zero Adjustment: If the display shows a reading other than zero when the test leads are short-circuited, press the “△REL” button to zero it before measuring.



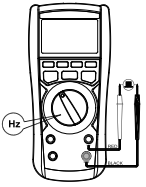
Note:

1.Voltage/Current Input: It is strictly forbidden to input voltage or current signals while in the inductance measurement mode.

2.Pre-Test Zeroing: If there is a reading when the test leads are short-circuited before each test, press

the “△REL” button once to zero it, ensuring measurement accuracy.

3.Range Mode: Inductance measurement operates only in the automatic range mode.



4-9. Frequency Measurement

1.Connect the probes or shielded cable to the “COM” and “VΩHz⊣⊢” inputs.

2.Turn the function switch to the “Hz” position and connect the probes or cable across the signal source or load to be measured (must be greater than 3Hz).

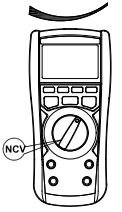
3.Press the “Hz/DUTY” button to switch between frequency/duty cycle and display the measured signal’s frequency or duty cycle reading.

Note:

1.Use shielded cable when measuring small signals in noisy environments.

2.Do not touch high-voltage circuits when measuring high-voltage circuits.

4-10. Non-Contact Voltage Detection



Warning: This function may cause false alarms due to different external interference sources. Use the measurement results for reference only. Set the function switch to the “NCV” position. When the line to be tested is near the top of the meter, the meter displays signal strength, and the buzzer emits a beeping alarm.

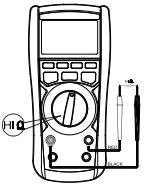
Note:

1.Voltage may still be present even if there is no indication. Do not rely solely on the non contact voltage detector to determine if there is voltage in a conductor.

2.Detection may be affected by socket design, insulation thickness, and type.

3.External interference sources (such as flashlights, motors, etc.) may cause misjudgments.

4-11. Insulation Resistance Measurement



1.Turn the function switch to the 500V/500MΩ,1000V/2GΩ position.

2.Insert the black probe into the “E” jack and the red probe into the “L” jack (be careful of electric shock from the high voltage output of the red probe!).

3.Press the “TEST” button to start measuring. The insulation resistance value is displayed on the screen. Press this button again to cancel the test, and the measured data and the "H" symbol are automatically held on the screen. The hold is automatically canceled

when measuring again or switching to another function.

4-12. Diode and Continuity Test

1.Insert the black probe into the “COM” jack and the red probe into the “VΩHz” jack (note the “+” polarity of the red probe).

2.Turn the function switch to the “Ω” position and press the “SELECT” button to choose the diode measurement mode.

3.Forward measurement: Connect the red probe to the positive pole of the diode and the black probe to the negative pole. The display will show an approximate value of the diode’s forward voltage drop.

4.Reverse measurement: Connect the red probe to the negative pole of the diode and the black probe to the positive pole. The display will show “OL”.

5.A complete diode test includes both forward and reverse measurements. If the results do not match the above, the diode is faulty.

6.Press the “SELECT” button to choose the continuity test mode.

7.Connect the probes to two points of the circuit to be tested. If the resistance value is below approximately 50Ω, the built-in buzzer will sound.

Note:

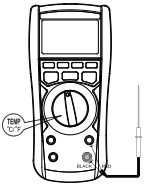
1.Do not input voltage in the “Ω” range.

2.Ensure all power sources are turned off and all capacitors are discharged before in-circuit testing. Any potential or AC signal will cause the buzzer to sound.

4-13. Temperature Measurement

1.Turn the function switch to the “°C/°F” position. Press the “SELECT” button to choose between °C or °F measurement mode.

2.Insert the cold end (free end) black plug of the thermocouple sensor into the “COM” jack and the red plug into the “VΩHz” jack. Place the working end (temperature measuring end) of the thermocouple sensor in the area to be measured. The display will show the temperature of the area being measured in Celsius. (Note the polarity. if reversed, the displayed value will decrease as the measured temperature rises.)



Note:

1.If the input is open, the ambient temperature will be displayed.

2.Do not arbitrarily replace the temperature sensor, as this will affect the accuracy of the measurement.

3.Do not input voltage in the temperature range.

4-14. Auto Power Off

1.If the meter is not used for 15 minutes, it will automatically power off and enter sleep mode. The built-in buzzer will emit 5 beeps 1 minute before powering off. To restart the power, press any button to reconnect the power.

2.Hold down the “SELECT” button while turning on the device to cancel the auto

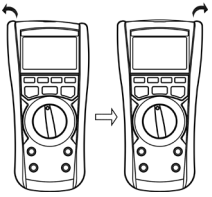
power-off feature.

V. Meter Maintenance

This meter is a precision instrument. Do not arbitrarily change the circuit.

Note:

1. Do not input voltages higher than 1000V DC or 750Vrms AC.
2. Do not measure voltage in current, resistance, diode, and continuity ranges.
3. Do not use the meter for testing if the battery is not properly installed or the back cover is not tightened.



4. Before replacing the battery or fuse, move the test probes away from the test points and turn off the power switch.
5. Protect the meter from water, dust, and impact.
6. Do not store or use the meter in high temperature, high-humidity, flammable, explosive, or strong magnetic field environments.
7. Clean the exterior of the meter with a damp cloth and mild detergent. Do not use abrasives or strong solvents such as alcohol.
8. If the meter is not used for a long time, remove the battery to prevent battery leakage and corrosion.
9. Monitor the battery usage. When the "▭" symbol appears on the screen, replace the battery as follows:

9-1. Remove the shockproof cover as shown in Figure 2.

9-2. Use a Phillips screwdriver to unscrew the battery door screws and remove the battery door.

9-3. Remove the battery and replace it with a new one. Although any standard battery can be used, alkaline batteries are recommended for extended use.

9-4. Install the battery door and tighten the screws.

9-5. Reinstall the shockproof cover by reversing the steps shown in the figure.

10.When replacing the fuse, use a fuse of the same specification and model.

10-1. Remove the shockproof cover as described above, then unscrew the screws on the battery door and back cover and open the back cover.

10-2. Remove the fuse and replace it with a new one.

10-3. Reattach the back cover, tighten the screws on both the battery door and back cover, and then reinstall the shockproof cover using the reverse steps as illustrated.

VI. Troubleshooting

If your instrument is not functioning properly, the following methods can help you quickly resolve common issues. If the problem persists, please contact the service center or dealer.

Malfunction Phenomenon	Inspection Parts and Methods
No Display	□Check if the power is connected; □Verify the hold switch;
Symbols Appear	□Replace the battery.
No Current Input	□Replace the fuse
Large Display Error	□Replace the battery.

- **Changes to this manual will be made without prior notice.**
- **The contents of this manual are believed to be correct. If users find any errors or omissions, please contact the manufacturer.**
- **Our company is not responsible for accidents and hazards caused by user errors.**
- **The functions described in this manual should not be used as a reason to use the product for special purposes.**