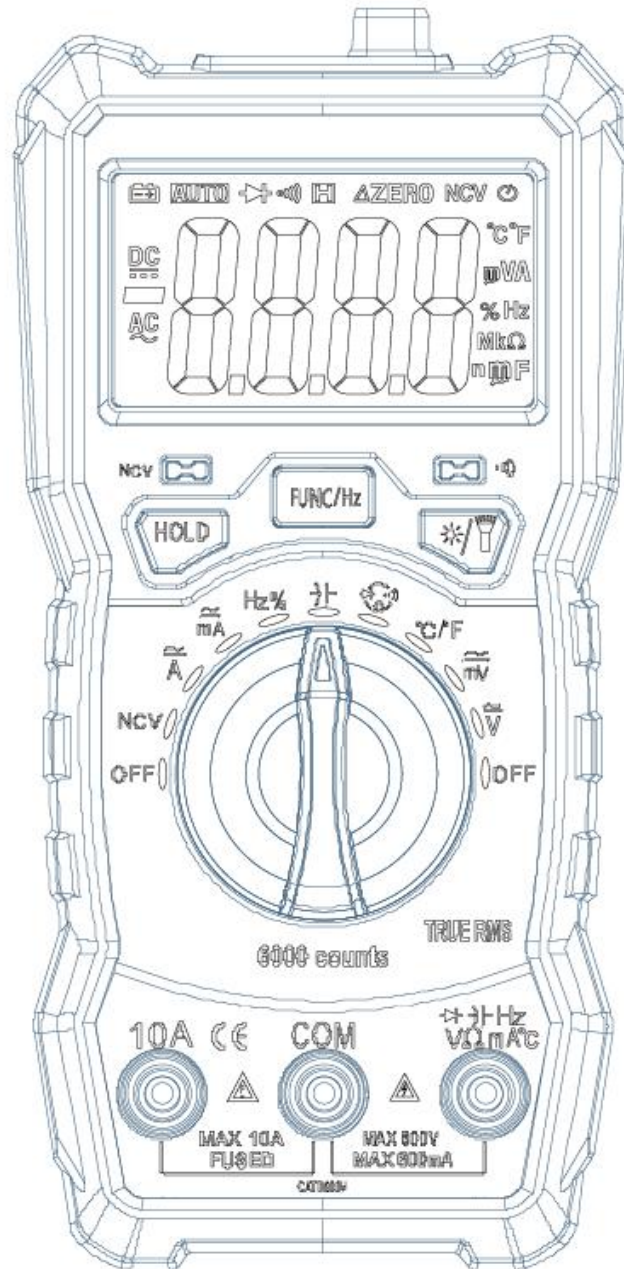


Instructions

Auto-ranging Digital Multimeter with TRUE RMS



Brief Introduction

The meter is a multi-function instrument with high measurement accuracy, fast response, and high safety level. Embedded with a special IC up to 6000 counts, this IC is composed of high-precision A/D converter with high-speed digital processor that can do high-speed true RMS calculation for AC 1KHz. It is with accurate measurement, high resolution, fast operation speed, complete software calibration, no change in long-term use in accuracy.

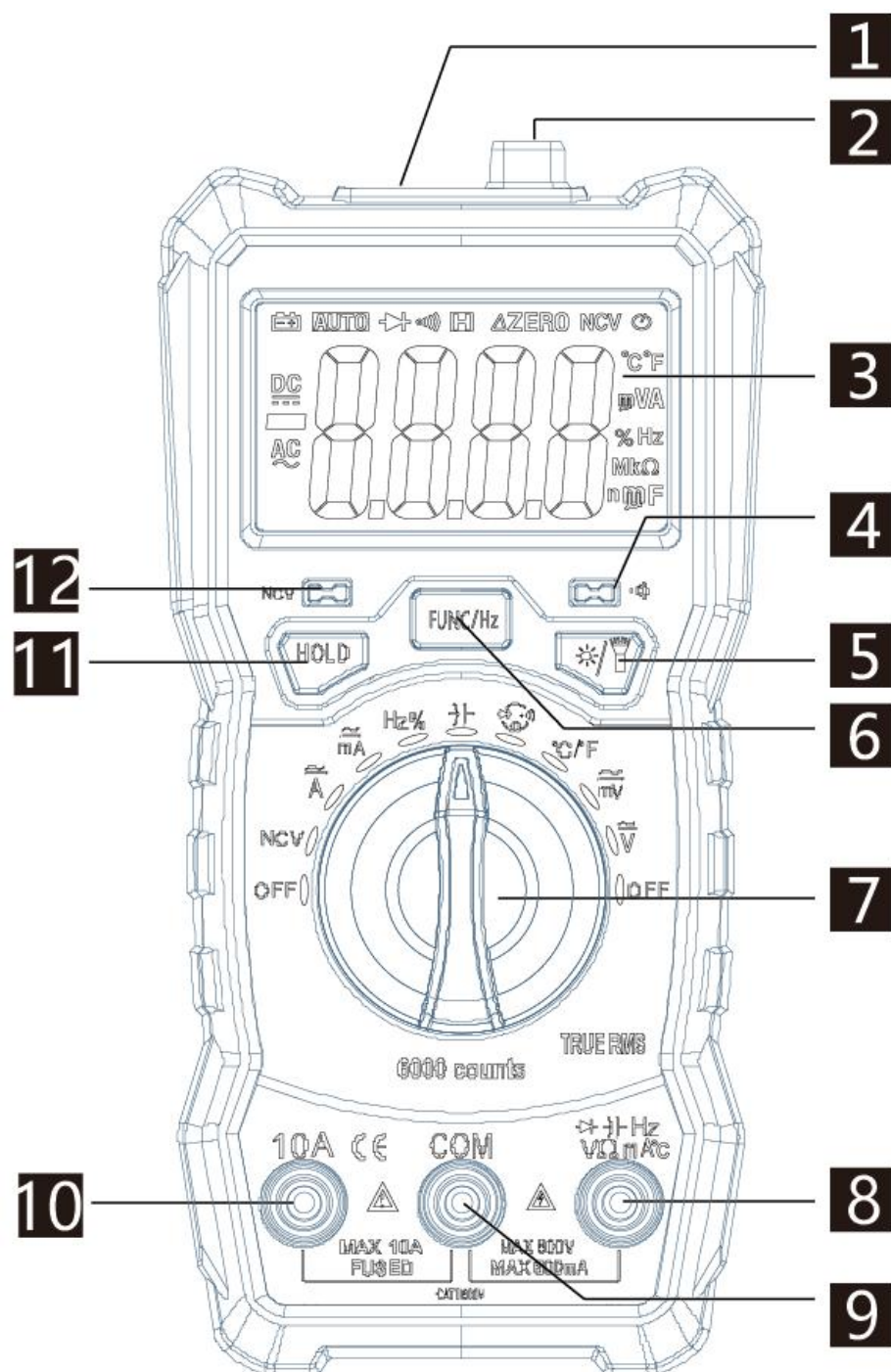
The appearance of the entire instrument is aesthetically pleasing, and it is suitable for various industrial applications. The circuit design is safe and reliable. The entire meter has many measurement functions and a friendly man-machine interface. It can meet the needs of various application groups such as professional engineers and maintenance engineers.

This meter can be used to measure AC and DC voltage AC and DC current, resistance, capacitance, temperature diodes and circuit continuity test.

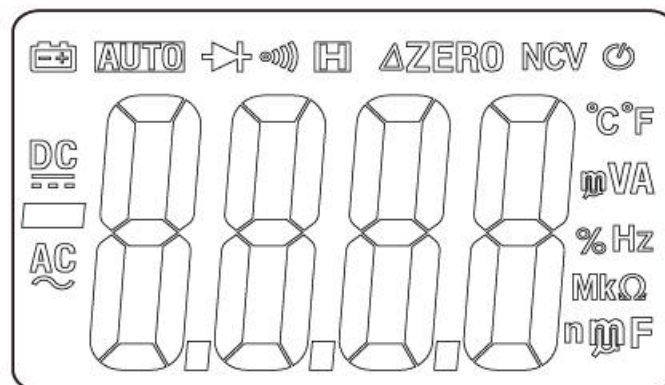
The meter is equipped with a backlight, allowing users to read the measurement display in a dark place.

Panel Indication

- 1: Backlight
2. NCV sensing area
3. LED display
4. Buzzer
5. Backlight button
6. "FUNC/HZ" function selection button
7. Rotary switch
8.  HzVΩmA°C input socket
9. COM input socket
10. 10A input socket
11. Hold button
12. NCV indicator



Symbols instructions:



symbols	instructions
	low battery
	auto power off
	negative input polarity
	alternative current input
	direct current input
	buzzer
	diode
	transistor
	data hold
	temperature
	non contact voltage test
V, mV	voltage unit
A, mA, μ A	current unit
Ω , k Ω , M Ω	resistance unit
MkHz	frequency unit
mF, nF, μ F	frequency unit

Safety Information

Safety instructions

*When using this meter, the user must comply with all the standard safety regulations in the following two aspects

A: Protection against electric shocks

B: Preventing the misuse of the instrument's safety procedures

*To ensure your personal safety, please use the test pen provided with the meter, check before use, and make sure they are intact.

Safety symbols:

	warning
	AC (alternative current)
	DC (direct current)
	ground
	double insulation
	fuse
	European Union standard
	high voltage warning
CAT II	II category 600V overvoltage protection

Safety notices:

- The use of meter instruments near devices with large electromagnetic disturbances will be unstable and may even cause large errors.
- Do not use when the appearance of the meter or the test pen is broken.
- If the meter is not used correctly, the safety functions provided by the meter may fail.
- Care must be taken when working around bare conductors or buses.
- Do not use this instrument near explosive gas vapor or dust.
- The correct input function must be used to measure the range.
- The input value must not exceed the limit of the input value specified

- for each range to prevent damage to the instrument,
- Do not touch the unused input when the instrument is connected to the circuit under test.
 - When the measured voltage exceeds 60 Vdc or 30 Vac, use caution to prevent electric shock.
 - When measuring with a test pen, place your finger behind the guard ring of the test.
 - Before converting the range, it must be ensured that the test pens have left the circuit under test.
 - Before carrying out a resistance, diode, capacitance measurement or continuity test, the circuit under test must be powered off and all high-voltage capacitors in the circuit under test should be discharged.
 - Do not measure the resistance on a live circuit or perform buzzer test.
 - Before conducting the current measurement, the fuse of the meter should be checked. Before connecting the meter to the circuit under test, the power of the circuit under test should be turned off.
 - When performing TV repairs or measuring power conversion circuits, care must be taken in the high-amplitude voltage pulses in the circuit under test to avoid damage to the meter.
 - The instrument uses three pieces AAA 1.5V batteries as the power supply. The battery must be properly installed in the battery compartment of the meter.
 - When the battery with low voltage symbol "" appears, replace the battery immediately. Insufficient battery power can make the meter read incorrectly, which may result in electric shock or personal injury.
 - When measuring voltages, do not exceed 600V. Do not use the instrument when the instrument's housing or part of the housing is removed.

Maintenance:

- When opening the instrument case or removing the battery cover, pull out the test pen first.
- The specified replacement parts must be used to service the meter.
- Before opening the meter, all relevant power must be disconnected. At the same time, you must ensure that you do not have static electricity to avoid damage to the meter.
- Instrument components, instrument calibration and maintenance operation instructions are operated by professionals.
- When opening the instrument housing, some capacitance in the instrument must be noticed. Even after the instrument is turned

off, dangerous voltages are kept.

- If the instrument is observed any abnormality, the table should be immediately stopped and sent for repair, and to ensure that it can not be used before inspection qualified.

When not in use for a long time, please remove the battery, and avoid storing in high temperature and humidity.

Input protection measures

- The limit voltage is 600V when the voltage is measuring.
- The limit voltage is 250 ACV or the equivalent RMS voltage when the frequency, resistor, buzzer or the diode is measuring.
- The fuse (F200mA/250V) will work to protect when the uA and mA is measuring.

General maintenance

In order to avoid electric shock or damage to the instrument, it cannot be the inside of the instrument. Before opening the housing or the battery cover, the connection of the test meter and the input signal must be removed.

Periodically use a damp cloth and a small amount of detergent to clean the meter housing. Do not use abrasives or chemical solvents. Input sockets, if soiled or wet, may affect readings.

Technical datasheet

Comprehensive indicators

*Operating conditions:

600V CAT II Pollution grade: 2

Height: under 2000m

Working temperature: 0-40°C (<80%RH, not considered <10°C)

Storage temperature: -10-60°C (<70%RH, take off battery)

*Test or calibrate surrounding temperature: 20°C ± 2°C

*The biggest voltage between measurement end and ground: 600V

*Fuse protection: mA range, fuse: F 600mA/250V

A range, fuse: F10A/250V

*Conversion rate: about 3s/second

*Display: 6000 counts LED display

*Overload: 'OL' displayed

*Low voltage display of battery: "+" displayed when the working voltage is low

*Input polarity indicator: "- " shown automatically

- *Battery:3 X1.5V AAA
- *Size: 147mm (L)*71mm (W)*45mm (H)
- *Weight: about 220g (battery excluded)

Accuracy index

Accuracy: $\pm$ (%reading+digit) ,one year warranty from the manufacture date

Conditions: surroundings temperature from 18°C to 28°C, <80%RH

Direct current of voltage

Range	Resolution	Accuracy
600mV	0.1mV	$\pm$ (0.5%readings+5digits)
6V	1mV	
60V	10mV	
600V	100mV	

Input resistance: 10M Ω

Maximum input voltage: 600V

Alternative current of voltage True RMS

Range	Resolution	Accuracy
600mV	0.1mV	$\pm$ (1%readings+4digits)
6V	1mV	
60V	10mV	
600V	100mV	

input resistance: 10M Ω

Maximum input voltage: 600V

Frequency response: 40HZ to1KHz TRMS

Resistance

Range	Resolution	Accuracy
600 Ω	0.1 Ω	$\pm$ (0.8%readings+5digits)
6k Ω	1 Ω	
60k Ω	10 Ω	
600k Ω	100 Ω	
6M Ω	1k Ω	
60M Ω	10k Ω	

Overload protection:250V DC/AC

Open circuit voltage: 2.4V

Diode and Buzzer

Function	Test Conditions
	The display shows the forward voltage drop
	It buzzes when the resistor is less than 30Ω and the indicator light

Overload protection: 250V **DC/AC**

Direct current **DCA**

Range	Resolution	Accuracy
60mA	0.01mA	± (1.2%readings+5digits)
600mA	0.1mA	
10A	10mA	± (3%readings+5digits)

Overload protection: mA range with F 200mA/250V and 20A range with F10**A**/250V

When the current is more than 5 A, the test time should be less than 10 mins and one min should be given to stop testing after such measurement.

Alternative current **ACA**

Range	Resolution	Accuracy
60mA	0.01mA	± (1.5%readings+5digits)
600mA	0.1mA	
10A	10mA	± (3%readings+5digits)

Overload protection: mA range with F 600mA/250V and 20A range with F10**A**/250V

Max input current: mA: 600mA RMS 10A :10A RMS

When the current is more than 5 A, the test time should be less than 10 mins and one min should be given to stop testing after such measurement.

Frequency response: 40Hz to 1KHz true RMS

Frequency

Range	Resolution	Accuracy
9.999Hz	0.001Hz	$\pm (1.5\% \text{ readings} + 5 \text{ digits})$
99.99Hz	0.01Hz	
999.9Hz	0.1Hz	
9.999KHz	0.001KHz	
99.99KHz	0.01KHz	
999.9KHz	0.1KHz	
9.999MHz	0.001MHz	

Input voltage range: 200mV-10V **AC** RMS

Overload protection: 250V DC/AC

Capacitance

Range	Resolution	Accuracy
60nF	0.01nF	$\pm (4.0\% \text{ readings} + 5 \text{ digits})$
600nF	0.1nF	
6μF	1nF	
60μF	10nF	
600μF	100nF	
6mF	0.1μF	
100mF	0.001mF	

Overload protection: 250V

Temperature

Range	Resolution	Range	Accuracy
°C	1°C	-20°C~1000°C	$\pm (1.0\% \text{ readings} + 3 \text{ digits})$
°F	1°F	-4°F~1832°F	

Operation instruction

Regular operation

Press the "FUNC/HZ" button and enter into function selection mode. The reading hold mode can keep the current reading on the display, change the measurement function position or press and hold the key again to exit the data hold mode.

Backlight and the torch function

The meter has backlight and illumination function for users' convenient

reading of measuring results in the dark situations. To enter and exit this mode, please operate as below:

1. Short press "/ 
" key to turn on backlight and short press again to exit. It turns off automatically with no operation for 15S.2. Long press "/ 
" to turn on the illumination function and the backlight at the same time. Short press the key again to turn off the illumination function. It turns off automatically with no operation for 30S.

Auto power off

After about 15 minutes after power on, if there is no operating instrument, it will give audible voice prompts, will automatically cut off the power, enter the hibernation mode, in the automatic shutdown mode, any key can be restarted.

ACV and DCV measurement

Do not measure any voltage greater than 600V to prevent electric shock or damage to the instrument.

Do not apply more than 600V voltage between the common and earth to prevent electric shock or damage to the instrument.

ACV or DCV measuring:

1. Turn the switch to " mV" or " V" , press "FUNC-Hz" to choose AC or DC.
2. Connect the black test pen to the COM jack and the red pen to the V jack.
3. Measure the voltage value of the circuit under test with the other two ends of the test pens.
4. The reading will be shown on the LED display as well as the polarity of the end connected with the red lead.

Notes:

*The meter shows readings in range DCV 600mV and 6V even there is no input voltage or test pens connection. Then short circuit V- Ω and "COM" to make the meter shows zero.

*Please change to a higher range id the "OL" is shown .

*Under range ACV, short pressing the "FUNC-Hz" key can test the frequency of the alternative current power. Please refer to the frequency measurement.

*The AC voltage values measured with this instrument are all true RMS values (square root). For sine waves and other waveforms (without DC offset) such as square waves, triangular waves and staircase waves, these measurements are accurate.

Resistance measurement

To avoid damage to the meter or device under test, all power to the circuit under test should be cut off before measuring resistance, and all high-voltage capacitors should be fully discharged.

Resistor measuring:

1. Rotate the rotary switch to "/Ω" and press "FUNC-Hz" to choose Ω.
2. Connect the black test pen and the red test pen to the "COM" input socket and "V-Ω" input socket
3. Use the test pen to test the resistance value of the circuit.
4. The resistance value shows on the display window .

Notes:

- *The resistance value measured on the circuit is usually different from the rate resistance.
- *To measure the low resistance accurately, please short-circuit the two test pens to read out the short-circuit resistance of the test leads, and subtract it by the readings to get accurate resistance value.
- *At 60 Mohms range, the reading will stabilize after a few seconds, which is normal for high resistance measurements.
- *When the meter is not in circuit, the display will show "OL", indicating that the measurement value is out of the measurement range.

Diode measurement

To avoid damage to the meter or device under test, all power to the circuit under test should be cut off before measuring diode, and all high-voltage capacitors should be fully discharged.

Test a diode outside the circuit.:

1. Rotate the rotary switch to "/Ω" and press "FUNC-Hz" to choose .
2. Connect the black test pen and the red test pen to the "COM" input socket and "V-Ω" input socket
3. Connect the black test pen and red test pen to the negative and positive electrodes of the diode under test.
4. The meter will display the forward bias value of the diode under test. If the polarity is reversed, then it shows 'OL' .

The normal diode in the circuit still produces a forward voltage drop of 0.5V to 0.8V, but the reverse bias reading will depend on the variety of the resistance value of the other channels between the two test pens.

Buzzer test

To avoid damage to the meter or device under test, all power to the circuit under test should be cut off before measuring on-off of the circuit and all high-voltage capacitors should be fully discharged.

For on-off state of the circuit:

1. Rotate the rotary switch to "/Ω" and press "FUNC-Hz" to choose ""
2. Connect the black test pen and the red test pen to the "COM" input socket and "V-Ω" input socket
3. Measure the resistance of the circuit under test at the other end of the test pens. If the resistance of the circuit under test is not greater than about 50 ohms, the indicator light will turn on and the buzzer will sound continuously.

Frequency measurement

Do not test any voltage higher than 250V to prevent electric shock or damage to the instrument.

Frequency measuring:

1. Turn the switch to HZ%.
2. Connect the black test pen to the COM jack and the red pen to the Hz jack.
3. Measure the frequency value of the circuit under test with the other two ends of the test pens.
4. Press the "FUNC-Hz" button to show the readings of the frequency.

Current measurement

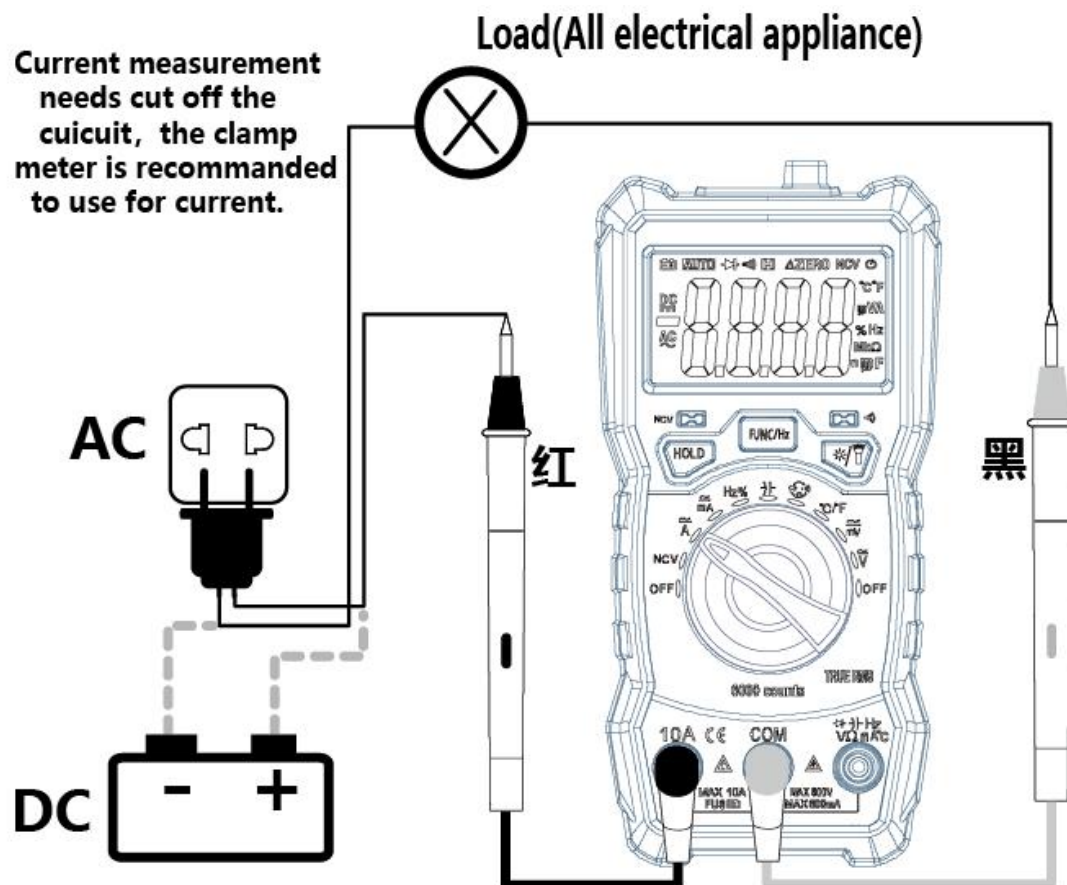
Do not attempt current measurement on the circuit when the voltage between the open circuit voltage and ground exceeds 250 volts. If the fuse is blown during measurement, you may damage the meter or harm yourself. To avoid damage to the meter or test equipment, use the correct input socket, function gear, and range before making measurements before making measurements. When the test pen is plugged into the current input socket, do not connect the other end of the test pen in parallel to any circuit.

Current measurement:

1. Rotate the rotary switch to " $\approx A$ " or " $\approx mA$ " and press "FUNC-Hz" to

choose AC/DC.

2. Connect the black test pen to the “COM” input socket. If the measured current is less than 600mA, connect the red test pen to the “mA” input socket. If the measured current is between 600mA and 10A, connect the red test lead to the “10A” input jack.
3. The circuit to be tested is disconnected, the black test pen is connected to the disconnected circuit, the lower voltage end thereof, and the red test pen is connected to the disconnected circuit at the higher voltage end.
4. Connect the power supply of the circuit and then read the displayed reading. If the display shows only “OL”, this indicates that the input exceeds the selected range. The rotary switch should be placed at a higher range.
5. Long press the “FUNC-Hz” to show the frequency of the alternative signal in the ACA mode.



Capacitance measurement

To avoid damage to the meter or device under test, all power to the circuit under test should be cut off before measuring capacitance. All high-voltage capacitors should be fully discharged.

Capacitance measuring:

1. Turn the rotary switch to  position.
2. Connect the black test pen and the red test pen to the “COM” input socket and  input socket
3. Measure the capacitance value of the circuit under test with the other two ends of the test pens. The reading will be shown on the LED display window.

Notes:

*It needs a certain time to measure the big capacitor.

*Take note of the polarities of the capacitor to connect correctly to protect the meter.

NCV test

Rotate the rotary switch to the NCV position and place the top of the meter close to the conductor. If the meter detects the AC voltage meter, light the corresponding signal strength indicator according to the detected signal strength (low-yellow, high-red), and the buzzer will send out different frequency alarms.

Notes:

1. Even if there is no indication that the voltage may still exist, do not rely on non-contact voltage detectors to determine if there is a voltage detection operation on the conductor, which may be affected by factors such as socket depth, insulation thickness, and type, etc.
2. When the input voltage is input to the instrument, due to sensing in the presence of voltage, the voltage-sensing indicator light may light.
3. Interference sources in the external environment, such as flashlights, motors, etc., may accidentally trigger non-contact voltage detection.

Temperature measurement

1. Switch the rotate to “°C (°F)” and the meter shows the surrounding temperature.

2. Take off the test pens and connect the “com” and “V Ω mA” injects with the right polarity ends of the thermocouples.
3. The meter shows the approximate temperature from the thermocouple.

Battery and fuse replacement

Replace batteries and fuses to avoid electric shock or personal injury caused by erroneous readings. When the symbol “+” appears on the instrument display, replace the battery immediately. Use only the specified fuse, instant fuse. To avoid electric shock or personal injury, turn off the battery cover and replace it with a new one before turning it on. The test pen has been disconnected from the measurement circuit.

Please follow the steps below to replace the battery:

1. Turn off the power of the instrument
2. Pull all the test pens out of the input socket
3. Use a screwdriver to loosen the screws fixing the battery.
4. Remove the battery cover
5. Remove the old battery or the damaged fuse
6. Replace the new one Batteries or new fuses
7. Install batteries cover and close the screws.

Accessories

1. An instruction
2. A pair of test leads
3. A piece of thermocouple
4. Three pieces of AAA batteries