

DIGITAL MULTIMETER

OPERATION MANUAL






1. SUMMARIZE

The instrument is a steady performance, battery-driven digital multimeter. It uses the LCD with 30mm-high figure to make the reading clear. The function of 15 sec. backlight displaying and overload protection make operation more convenient.

The instrument has the function of measuring DCV, ACV, DCA, ACA, resistance, capacitance, test, temperature and frequency, and diode, triode and continuity test. The instrument takes dual-integral A/D converter as keypoint, is an excellent tool.


2. SAFETY NOTE

This series meter's design meets the article of IEC1010 (security standard enacted by IEC). Please read the following before operation.

1. Do not input a limited voltage higher than DC 1000V or AC 750V when measuring ranges.
2. Voltage less than 36V is a safety voltage. When measuring voltage higher than DC 36V, AC 25V, check the connection and insulation of test leads to avoid electric shock.
3. Be sure to keep the test leads off the testing points when converting function and range.
4. Select correct function and range to avoid fault operation.
5. When measuring current, do not input current over 20A.
6. Safety symbols
 “” exists high voltage, “” GND, “” dual insulation, “” must refer to manual, “” low battery

3. CHARACTERISTIC

1. GENERAL

- 1-1. Displaying: LCD displaying,
- 1-2. Max. indication: 1999 (3 1/2), auto polarity indication,
- 1-3. Measuring method: dual slope A/D transfer,
- 1-4. Sampling rate: approx. 3 times/sec
- 1-5. Over range indication: MSD displays “1” or “-1”,
- 1-6. Low battery indication: “” symbol displays,
- 1-7. Operation: (0~40)°C, relative humidity <80%,
- 1-8. Power: one 9V battery (NEDA1604/6F22 or equivalent)
- 1-9. Size: 189×97×35 mm (length×width×height)
- 1-10. Weight: approx. 375g (including a battery)
- 1-11. Accessories: test leads, user manual, holster, gift box, and 9v battery.

1-12. testing accessories: a pair of alligator clip, a test accessory for Triode, banana-type hot thermocouple..

2. TECHNICAL CHARACTERISTIC

2-1. Accuracy: $\pm(a\% \times \text{rdg} + d)$ at $(23 \pm 5)^\circ\text{C}$, R.H. <75%, one year guaranteed from the production date.

2-2. TECHNICAL DATA

2-2-1. DC VOLT (DCV)

Range	Accuracy	Resolution
200mV	$\pm(0.5\%+3)$	100uV
2V		1mV
20V		10mV
200V	$\pm(1.0\%+5)$	100mV
1000V		1V

Input resistance: 10M Ω .

Overload protection: 200mV range: 250V DC or AC peak value.

Other range: 1000VDC or AC peak value.

2-2-2. AC VOLT (ACV)

Range	Accuracy	Resolution
2V	$\pm(0.8\%+5)$	1mV
20V		10mV
200V		100mV
750V	$\pm(1.2\%+5)$	1V

Input resistance: 10M Ω .

Overload protection: 1000VDC or AC peak value.

Frequency response: less than 200V range: (40~400) Hz,

750V range: (40~200) Hz.

Displaying: sine wave rms (mean value response).

2-2-3. DC CURRENT (DCA)

Range	Accuracy	Resolution
20uA	$\pm(0.8\%+4)$	0.01uA
200uA		0.1uA
20mA		10uA
200mA	$\pm(1.2\%+4)$	100uA
2A	$\pm(1.5\%+5)$	1mA
20A	$\pm(2.0\%+5)$	10mA

Max. input volt drop: 200mV

Max. input current: 20A (the test time should be in 10 seconds)

Overload protection: 2A/250V quick-action fuse, 20A un-fused

2-2-4. AC CURRENT(ACA)

Range	Accuracy	Resolution
200mA	$\pm(2.0\%+5)$	100uA
2A	$\pm(3.0\%+5)$	1mA
20A	$\pm(3.0\%+10)$	10mA

Max. measuring volt drop: 200mV

Max. input current: 20A (the test times should be in 10 seconds)

Overload protection: 2A/250V quick-action fuse, 20A un-fused

Frequency response: (40~200)Hz

Display: sine wave RMS (mean value response)

2-2-5. RESISTANCE(Ω)

Range	Accuracy	Resolution
200 Ω	$\pm(0.8\%+5)$	0.1 Ω
2k Ω	$\pm(0.8\%+3)$	1 Ω
20k Ω		10 Ω
200k Ω		100 Ω
2M Ω		1k Ω
200M Ω	$\pm[5.0\%(RDG-10)+20]$	100 k Ω

Open voltage: less than 3V

Overload protection: 250VDC and AC peak value

NOTE:

A. at 200 Ω range, should make the test leads short, and measure the wire resistance, then, subtract from the actual measuring.


B. at 200M Ω range, should make the test leads short, the meter will display 1.0M Ω . It's normal and has no effect on the accuracy. Should be subtracted from actual measuring.

2-2-6. CAPACITANCE(C)

Range	Accuracy	Resolution
20nF	$\pm(2.5\%+20)$	10pF
2uF		1nF
200uF		100nF

Overload protection: 36VDC or AC peak value.

2-2-7. DIODE AND CONTINUITY TEST

Range	Displaying	Test condition
	Positive voltage drop of diode	The positive DC current is approx. 1mA, negative voltage is approx. 3V
	Buzzer sounds, the resistance is less than $(70\pm 20)\Omega$	open voltage is approx. 3V

Overload protection: 250VDC or AC peak value

Warning: DONOT input any voltage at this range for safety!

2-2-8. TRANSISTOR hFE DATA TEST

Range	Displaying	Test condition
hFE NPN or PNP	0 ~ 1000	Basic current is approx. 10uA, Vce is about 3V

2-2-9. HOT WIRE TEST

Range	Displaying	Alarming Way	condition
TEST	000or1	sound, light	Standard AC hot wire test

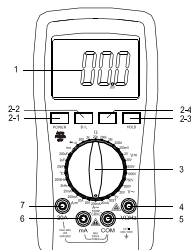
Overload protection: DC 500V or AC peak value

CAUTION: BE CAREFUL WHEN YOU OPERATE IT.

4. OPERATION

4-1. Panel description (SEE THE FIG).

- LCD: display the measuring value
1. POWER switch: turn on/off the power.
2. B/L switch: turn on/off the back light.



- 2-3. HOLD key: press it, the max. of presently measured value is held on LCD and "HOLD" symbol displays. Press it again, "HOLD" symbol disappears, and the meter is exited the holding mode.

2-4. The light of hot wire testing,

3. Range knob: to select measuring function and range.
4. Voltage, resistance and frequency COM
5. GND, the anode COM of test accessory,
6. 2A current test COM, the cathode COM of test accessory,
7. COM for measuring current 20A

4-2. DCV measurement

1. Apply the black test lead to "COM" terminal and the red one to "V/ Ω " terminal.
2. Set the knob to a proper DCV range, and connect the leads crossly to the electric circuit under test, LCD displays polarity and voltage under test connected by the red test lead.

NOTE:

1. Firstly users should set the knob to the highest range, if users had no idea about the range of voltage under test, and then select the proper range based on displaying value.
2. If LCD displays "1", it means meter is over the max. Value of range, thus should set the knob to a higher range.
3. Do not input a voltage over DC 1000V.
4. Be carefully while measuring a high voltage. DONOT touch the circuit.

4-3. ACV measurement

1. Apply the black test lead to "COM" terminal and the red one to "V/ Ω " terminal.
2. Set the knob to a proper ACV range, and then connect the leads crossly to the electric circuit under test.

NOTE:

1. Firstly users should set the knob to the highest range, if users had no idea about the range of voltage under test, and then select the proper range based on displaying value.
2. If LCD displays "1", it means meter is over the max. value of range, thus should set the knob to a higher range.
3. Do not input a voltage over 750Vrms.
4. Be carefully while measuring a high voltage. DO NOT touch the circuit.

4-4. DCA Measurement

1. Apply the black test lead to "COM" terminal and the red one to "mA" terminal (the Max. 2A) or to "20A" (the Max. 20A);
2. Set the knob to a proper DCA range, and connect the leads crossly to the electric circuit under test; LCD displays polarity and current under test connected by the red test lead.

NOTE:

1. Firstly users should set the knob to the highest range, if users had no idea about the range of current under test, and then select the proper range based on displaying value.
2. If the LCD displays "1", it means the current is over range. Now you need to set the knob to the higher.
3. Max. input current is 2A or 20A (subject to where the red test lead apply to), too large current will blow the fuse. Too large continuous current will heat the circuit, affect the accuracy or damage the meter while measuring at the range of 20A, because there is no protection.

4-5. ACA Measurement

1. Apply the black test lead to "COM" terminal and the red one to "mA" terminal (the Max. 2A) or to "20A" (the Max. 20A);
2. Set the knob to a proper ACA range, and connect the leads crossly to the electric circuit under test.

NOTE:

1. Firstly users should set the knob to the highest range, if users had no idea about the range of current under test, and then select the proper range based on displaying value.
2. If the LCD displays "1", it means the current is over range. Now you need to set the knob to the higher.
3. Max. input current is 2A or 20A (subject to where the red test lead apply to), too large current will blow the fuse. Be sure the test is less than 10 seconds. Please keep the leads off the circuit while switching the function and range knob. Too large continuous current will heat the circuit, affect the accuracy or damage the meter while measuring at the range of 20A, because there is no protection.

4-6. Resistance Measurement

1. Apply the black test lead to "COM" terminal and the red one to "V/Ω" terminal.
2. Set the knob to a proper resistance range, and connect the leads crossly with the resistor under tested.

NOTE:

1. The LCD displays "1" while the resistance is over the selected range. The knob should be adjusted to a higher range. When measuring value is over 1MΩ, the reading will take a few seconds to be stable. It's normal for high resistance measuring.
2. When input terminal is in open circuit, overload displays.
3. When measuring in line resistor, be sure that the power is off and all capacitors are released completely.
4. Do not input any voltage at resistance range.

4-7. Capacitance Measurement

1. Apply the knob to proper capacitance range, and insert the measuring accessories or test leads into "COM" and "mA" terminal. Note: "COM" terminal is for positive pole ⊕, "mA" terminal is "⊖".
2. Connect test leads with the two points of capacitor, be wary of polarity if necessary.

NOTE:

1. If the capacitance under tested is over the max. value of selected range, LCD displays "1", thus, should set the knob to a higher range.
2. It's normal that there is a remained value on LCD before capacitance measurement, and it doesn't affect the measurement.
3. When measuring at large capacitance range, if capacitor is crept badly or broken, LCD displays a value and it's unstable.
4. Release the capacitor completely before measuring.

4-8. TRANSISTOR hFE

1. Set the knob to hFE range. Inset the test leads to "COM" and "mA". Note: "COM" terminal is for positive pole ⊕, "mA" terminal is "⊖".
2. Verify the transistor under tested is NPN or PNP, insert emitter, base and collector to proper jack.

4-9. Diode and Continuity Test

1. Apply the black test lead to "COM" terminal and the red one to "V/Ω" terminal (the polarity of red lead is "+").
2. Set the knob to "→|)" range, connect test leads with the diode under tested, the red test connect to diode positive polarity, the reading is the approx. value of diode forward volt drop.
3. Apply test leads to two points of tested circuit, if the inner buzzer sounds, the resistance is less than (70 ± 20)Ω.

4-10. Hot Wire Test

1. Pull out the black test lead from "COM" jack, and set the red one to "V/Ω" jack,
2. Set the knob to TEST range, and set the red test lead to the tested circuit,
3. If LCD displays "1" and the light and sound alarming, it means the circuit of the red test lead tested is hot wire; if there is no any response, it means it is neutral wire.

NOTE:

1. The function is only for testing AC standard live wire (AC 110V~AC 380V).
2. Be careful to operate at this range.

4-11. Data Hold

Press the Hold switch, the measured value is held on LCD, press it again and the function is cancelled.

4-12. AUTO POWER OFF

The meter will be into sleeping mode when it works for (20 ± 10) minutes. Press "POWER" key twice to restart the power.

4-13. BACKLIGHT

Press "B/L" key to turn on the backlight, and it will turn off after 15 secretary

NOTE:

When turning on backlight, the working current will be enlarged, it leads to shorten battery usage and enlarge accuracy of some functions.

5. Maintenance

Do not try to modify the electric circuit.

- 5-1. Keep the meter away from water, dust and shock.
- 5-2. Do not store and operate the meter under the condition of high temperature, high humidity, combustible, explosive and strong magnetic place.
- 5-3. Wipe the case with a damp cloth and detergent, do not use abrasives and alcohol.
- 5-4. If do not operate for a long time, should take out the battery to avoid leakage.
 - 5-4-1. When "🔋" signal displays, should replace the battery following the steps
 - 5-4-1-1. Unlock the button and remove the battery case.
 - 5-4-1-2. Take out the old battery and replace the new one. It's better to use alkaline battery for longer life.
 - 5-4-1-3. Fit on the battery case and lock the button.
 - 5-4-2. fuse change: When replacing fuse, please change another same type and specification fuse.

6. If the meter does not work properly, check the meter as following:

Conditions	Way to solve
No reading on LCD	<ul style="list-style-type: none"> ■ Turn on the power ■ Set the HOLD key to a correct mode ■ Replace battery
🔋 signal appears	<ul style="list-style-type: none"> ■ Replace battery
No current or temperature input	<ul style="list-style-type: none"> ■ Replace fuse
Big error Value	<ul style="list-style-type: none"> ■ Replace battery

- The specifications are subject to change without notice.
- The content of this manual is regarded as correct, error or omits. Pls. contact with factory.
- We hereby will not be responsible for the accident and damage caused by improper operation.
- The function stated for this User Manual cannot be the Reason of special usage.