

DIGITAL MULTIMETER OPERATION MANUAL

1. GENERAL DESCRIPTION

This 4 1/2 digital multimeter with highly stable performance is driven by 9V battery. It uses a LCD with 28mm high figure, which makes the reading clearer and the operation more convenient.

The digital multimeter holds functions of measuring DCV, ACV, DCA, ACA, resistance, capacitance, transistor, diode, and continuity, etc. It also can provide special functions including unit symbol display, data hold, backlight and auto power off. It adopts dual-integral A/D converter as its core. It is an ideal tool for labs, factories and radio-technology.

2. SAFETY PRECAUTIONS

The instrument is designed according to IEC1010 standard (safety standard issued by International Electro technical Committee). Please read the safety note before operation.

2-1. Do not input voltage higher than DC 1000V or AC 750V at any ranges.

2-2. The voltage below 36V is safe. To avoid electric shock, check the test leads and insulation first and make sure the connection is correct before measuring voltage over 36DCV or 25ACV.

2-3. The test leads should be removed from the test point before changing functions and ranges.

2-4. Choose correct function and range to avoid wrong operation.

2-5. Do not input current higher than 20A when measuring current.

2-6. Specifications of safety signal

“” Exists dangerous voltage “” GND “” dual insulation

“” Operator must refer to the manual “” low battery indication

3. SPECIFICATIONS

3-1. GENERAL

3-1-1. Display: LCD display

3-1-2. Max. display: 19999 (4 1/2) auto-polarity display

3-1-3. Measuring method: dual integral A/D transfer

3-1-4. Sampling rate: approx. 3 times/s

3-1-5. Over-range display: “1” or “-1” displayed in the top digit.

3-1-6. Low battery display: “” symbol shows up

3-1-7. Operation conditions : (0~40)°C , relative humidity <80% R.H

3-1-8. Power: 9V battery (NEDA1604/6F22 or equivalent)

3-1-9. Dimension: 185mm×93mm×35 mm

3-1-10. Weight: approx. 290g (including battery)

3-1-11. Accessories: user manual, test leads, holster, gift box, and 1*9V battery.

3-2. TECHNICAL SPECIFICATIONS

3-2-1. Accuracy: ±(a% × reading + digits) at 23 ± 5°C, <75% R.H. One year guarantee from production time.

3-2-2.DCV

Range	Accuracy	Resolution
200mV	±(0.05%+3)	10uV
2V		100uV
20V		1mV
200V		10mV
1000V	±(0.1%+5)	100mV

Input impedance: 10MΩ at all ranges

Overload protection: 250 DCV or AC peak value at 200mV range, 1000 DCV or AC peak

value at other ranges

3-2-2.AC

Range	Accuracy	Resolution
2V	±(0.8%+25)	10uV
20V		1mV
200V		10mV
750V		100mV

Input impedance: 10MΩ at all ranges

Overload protection: 1000 DCV or AC peak value at other ranges

Frequency response: below 200V range: 40~400Hz, 750V range: 40~200Hz

Displaying: sine wave RMS (average value response)

3-2-3.DCA

Range	Accuracy	Resolution
200uA	±(0.5%+4)	0.01uA
2mA		0.1uA
20mA		1uA
200mA	±(0.8%+6)	10uA
20A	±(2.0%+15)	1mA

Max. measuring voltage drop: 200mV

Max. input current: 20A (less than 10 seconds)

Overload protection: 0.2A / 250V fast blow fuse; 20A range doesn't have fuse.

3-2-4.ACA

Range	Accuracy	Resolution
200mA	±(1.5%+25)	10uA
20A	±(2.5%+35)	1mA

Max. measuring voltage drop: 200mV

Max. input current: 20A (less than 10 seconds)

Overload protection: 0.2A / 250V fuse, 20A range doesn't have fuse.

Frequency response: 40~200Hz

Displaying: sine wave RMS (average value response)

3-2-5. RESISTANCE (Ω)

Range	Accuracy	Resolution
200Ω	±(0.2%+10)	0.01Ω
2kΩ		0.1Ω
20kΩ		1Ω
200kΩ		10Ω
2MΩ		100Ω
200MΩ		± [5%(reading-10.00)+10]

Open circuit voltage: less than 3V;

Overload protection: 250 DCV or ACV peak value;

Note:

a. In 200Ω range, the test leads should be shorted first to measure the resistance of the wire, then, subtracts the wire resistance from the actual measuring value.

b. In 200MΩ range, the test leads should be shorted first, and LDC will display 10.00MΩ, which is normal situation. It should be subtracted from the real measurement. For example: the test resistance is 100MΩ, the LCD will show 110MΩ. 110MΩ-10MΩ=100MΩ.

3-2-6.CAPACITANCE

Range	Accuracy	Resolution
2nF	±(3.5%+10)	0.1pF
20nF		1pF
200nF		10pF
2uF		100pF
200uF	±(3.8%+20)	10nF

2nF	±(3.5%+10)	0.1pF
20nF		1pF
200nF		10pF
2uF		100pF
200uF	±(3.8%+20)	10nF

Testing frequency: 400Hz;

Overload protection: 36 DCV or ACV peak value.

3-2-7.FREQUENCY

Range	Accuracy	Resolution
200kHz	±(3%+15)	10Hz

Input sensitivity: 1V RMS;

Overload protection: 250 DCV or ACV peak value (less than 10sec.).

3-2-8.DIODE AND CONTINUITY TEST

RANGE	DISPLAY DESCRIPTION	TEST CONDITION
→ ⊖)	Diode forward voltage drop	Forward DC current is about 1mA, backward voltage is approx. 3V
	Buzzer rings when the impedance between the two test points is less than (30±10) Ω	Open voltage is approx. 3V

Overload protection: 250 DCV or ACV peak value;

Warning: do not input any voltage at this range for safety!

3-2-9. hFE

Type	Range	Testing condition
hFE NPN or PNP	0~1000	Base DC current is approx. 10uA, V _{ce} is approx. 3V

4. OPERATION INSTRUCTION

4-1. Front panel

①. LCD: display the measuring value;

②. Function key;

②-1. Power switch: turn on or off the meter

②-2. HOLD key: press the key, the measuring value will be held and “HOLD” symbol appears; Press it again, to exit the hold mode and “HOLD” symbol will disappear.

②. B/L: Backlight, lasts for 10 seconds;

③. hFE terminal: for measuring transistor hFE;

④. Knob switch: for changing functions and ranges;

⑤. Capacitance (Cx) terminal;

⑥. Common terminal for voltage, resistance, current, frequency and GND testing;

⑦. Battery case;

4-2. DCV measurement

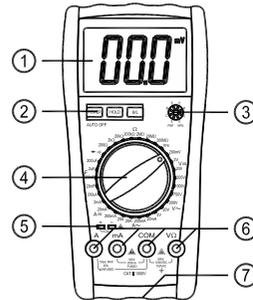
4-2-1. Insert the black test leads into “COM” terminal and the red one into V/Ω/Hz terminal.

4-2-2. Switch the knob to a proper DCV range, then, connect the test leads across the measuring circuit, the voltage and polarity of the point which connected with the red test lead will be displayed on LCD.

NOTE:

1. If the voltage under measuring is unknown beforehand, turn the knob to the highest range, then, switch to a proper range according to the display.

2. Before the measurement there are some remained digits at low voltage range, which is normal and will not affect measurement. If LCD displays “1”, it means over-range; The range knob must be switched to a higher range.



3. Do not input a voltage over 1000V, or the meter might be damaged.
4. Be careful when measuring high voltage circuit.

4-3. ACV measurement

- 4-3-1. Insert the black test lead into “COM” terminal and the red one to V/Ω/Hz terminal.
- 4-3-2. Switch the knob to a proper ACV range, and then connect the test leads across the measuring circuit.

NOTE:

1. If the ACV range under measuring is unknown beforehand, turn the knob to the highest range, then, switch to a proper range according to display.
2. Before the measurement there are some remained digits at low voltage range, which is normal and will not affect measurement. If LCD displays “1”, it means over-range; The range knob must be switched to a higher range.
3. Do not input a voltage over 750V rms, or, the meter might be damaged.
4. Be careful when measuring high voltage circuit.

4-4. DC current measurement

- 4-4-1. Insert the black test lead into “COM” terminal and the red one to “mA” terminal (Max.200mA), or “20A”terminal (max. 20A).
- 4-4-2. Switch the knob to a proper DCA current range, then, connect the test leads across the measuring circuit. The current value and polarity of the point which connected with the red test lead will be displayed on LCD.

NOTE:

1. If the range under measuring is unknown beforehand, turn the knob to the highest range, then, switch to a proper range according to display.
2. If LCD displays “1”, it means over-range; The range knob must be switched to a higher range.
3. The max. input current is 200mA or 20A (subject to the position where the red test lead insert into), large current may blow the fuse. Be careful at 20A range, because there is no fuse protection at this range, large current may heat the circuit, even damage the meter.

4-5. AC current measurement

- 4-5-1. Insert the black test lead into “COM” terminal and the red one to “mA” terminal (Max.200mA), or “20A”terminal (max. 20A).
- 4-5-2. Switch the range knob to a proper AC current range, then, connect test leads across the circuit under measuring.

NOTE:

1. If the current range under measuring is unknown beforehand, turn the knob to the highest range, then, switch to a proper range according to display.
2. If LCD displays “1”, it means over-range; The range knob must be switched to a higher range.
3. The max. input current is 200mA or 20A (subject to the position where the red test lead insert into), large current might blow the fuse. Be careful at 20A range, because there is no fuse protection at this range, large current may heat the circuit, even damage the meter.

4-6. Resistance measurement

- 4-6-1. Insert the black test leads into “COM” terminal and the red one into V/Ω/Hz terminal.
- 4-6-2. Switch the knob to a proper resistance range, then, connect the test leads across the resistance under measuring.

NOTE:

1. If LCD displays “1”, it means over-range; The range knob must be switched to a higher range. When measuring value is over 1MΩ, the reading needs a few seconds to be stable. It's normal for high resistance measurement.
2. When input terminal is open-circuit, overload symbol will be displayed.
3. Before measuring on-line resistance, be sure that power is off and all capacitor are discharged.
4. If big error appears, perhaps it was affected by other elements on line or there is voltage on the resistance.
5. Do not input voltage at this range.

4-7. Capacitance measurement

- 4-7-1. Set the knob to proper capacitance range, and insert the capacitor into “Cx” terminal.
- 4-7-2. Connect the test leads to the two points of capacitor. Pay attention to the polarity.

NOTE:

1. If “1” displays, it means over-range, then, set it to a higher range.
2. Before the measurement, there are some remained digits, which will not affect measuring results;
3. If there is large leakage current or the capacitor is breakdown when measuring large capacitance, some unstable digits will be displayed;
4. Please do not measure the capacitor on line;
5. Before measuring, discharge the capacitor completely to avoid damaging the meter.

4-8. Frequency measurement

- 4-8-1. Insert the test leads or shielded cable into “COM” and V/Ω/Hz terminal.
- 4-8-2. Switch the range knob to frequency range, and then connect the test leads across the signal source or the measured load.

NOTE:

1. When input is over 10V rms, reading is possible but maybe over range.
2. It's better to use shielded cable on noisy conditions when measuring small signal.
3. Be careful when measuring high voltage circuit.
4. Do not input a voltage over 250 DCV or AC peak value to avoid damaging the meter.

4-9. Transistor hFE

- 4-9-1. Switch the knob to hFE range.
- 4-9-2. Choose transistor's type NPN or PNP first, then, insert emitter, base and collector separately into proper terminal.

4-10. Diode and continuity test

- 4-10-1. Insert the black test lead into “COM” terminal, and the red one into V/Ω/Hz terminal (the polarity of the red test lead is “+”).
 - 4-10-2. Switch the knob to \rightarrow (diode) range, and then connect the test leads to the diode under measuring, and the reading is the approximate value of diode forward voltage drop.
 - 4-10-3. Backward measuring: connect the red test to the diode cathode (-), and the black test leads to the diode anode (+). The LCD will display “OL”;
 - 4-10-4. A complete diode test includes forward and backward measurement. If the result doesn't meet the above descriptions, it means the diode is broken.
 - 4-10-5. Connect the test leads to two points of circuit under measuring. If the built-in buzzer sounds, the resistance between the two points is less than approx. (30±10)Ω.
- NOTE: Do not input voltage at “ \rightarrow (diode)” range to avoid damaging the meter.

4-11. DATA HOLD

PRESS “HOLD” key, the current data will be hold on LCD. Press it again, this function will be cancelled.

4-12. Auto power off

After (20±10) minutes of turning on the meter, it will auto power off and enter the dormancy mode. Press “POWER” key for twice, it will turn on again.

4-13. Backlight

Press “B/L”key, the backlight will turn on for 10 sec. If you need it, press it again.

5. MAINTENANCE

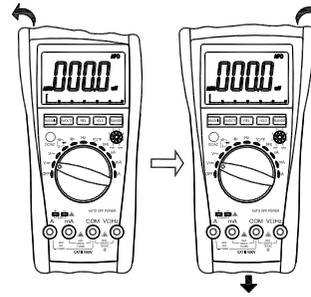
Do not try to modify the electric circuit.

- 5-1. Don't input voltage higher than DC 1000V or AC 750V;
- 5-2. Don't measure the voltage at resistance range;
- 5-3. Don't use the meter when the battery isn't installed or the back case isn't fixed.
- 5-4. Before replacing fuse, please take the test leads away from the measuring point and cut off the power.
- 5-5. Keep the meter away from water, dust and shock.
- 5-6. Do not store or operate the meter under high temperature, high humidity, combustible, explosive and strong magnetic environment.
- 5-7. Wipe the case with a damp cloth and moderate detergent. Do not use abrasives and alcohol to clear the meter.
- 5-8. To avoid leakage, remove the battery from the battery compartment if the meter will not

be used for a long time.

- 5-9. When \square (battery) symbol shows up, replace the battery according to following steps:

- 5-9-1. Follow picture 2 to remove the holster.
- 5-9-2. Unlock the battery door and remove the cover;
- 5-9-3. Replace the old battery with the new one. For longer using life, it's better to use alkaline battery.
- 5-9-4. Fix the battery door.
- 5-9-5. Follow the picture to put on the holster.
- 5-10. Fuse change: When replacing fuse, please use fuse with same type and specification.
- 5-10-1. Follow the picture, and remove the holster at first, then unlock the battery door and remove the cover;
- 5-10-2. Take out the fuse and replace it with a new one.
- 10-3. Fix the battery door, and put on the holster.



6. TROUBLE SHOOTING

If the meter does not work properly, check the meter as following steps: (If the problems still cannot be solved, please refer to repairing center or contact the local dealers.)

CONDITIONS	SOLUTIONS
No reading on LCD	<ul style="list-style-type: none"> ■ Turn on the meter ■ Release HOLD key ■ Replace battery
\square symbol shows up	<ul style="list-style-type: none"> ■ Replace battery
No readings when current input	<ul style="list-style-type: none"> ■ Replace fuse
Big ACV error	<ul style="list-style-type: none"> ■ Make sure the frequency is not over 400Hz
Error Value	<ul style="list-style-type: none"> ■ Replace battery

- The specifications are subject to changes without prior notice.
- The content of this manual is regarded as correct. If users find out any mistakes or omissions, please kindly contact the manufacturer.
- The manufacturer will not be responsible for accidents and damage caused by improper operations. The functions described in this User Manual shall not be considered as the reason for any special usages.