

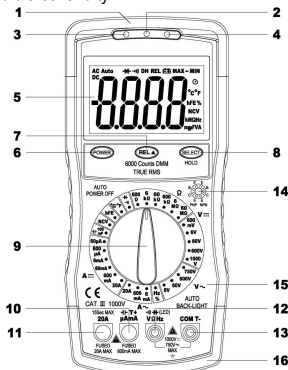
DIGITAL MULTIMETER OPERATOR'S MANUAL

1. Overview

The multimeter is characterized at slim size, portable, stable performance and anti-dropping capacity. Using 6000 counts digit LCD monitor with character 25mm high, they offer clear readings. With overall circuitry design centering on large-scale IC A/D converters in conjunction and over-load protection circuit, the meters give excellent performance and exquisite making as a handy utility instrument.

The meters can be used to measure DC & AC voltage, DC & AC current, resistance, capacitor, frequency, duty cycle, temperature, transistor hFE, Non Contact AC Voltage (NCV) detection, positive diode voltage fall and audible continuity.

2. Panel Layout



- ① NCV detection area: Non Contact AC Voltage (NCV) detection area.
- ② **CDS** sensor: The CDS sensor can reaction to the ambient brightness range, then automatically control the LCD backlight to lighten or go out.
- ③ NCV red light: Non Contact AC Voltage (NCV) detection red light.
- ④ NCV green light: Non Contact AC Voltage (NCV) detection green light.
- ⑤ LCD display: 6000 counts digit, full function symbol display.
- ⑥ **POWER** key: Press the "POWER" key to power on or off the meter.
- ⑦ **REL**▲ Key: Press the "REL▲" key, the meter enters relative measuring mode, "REL" is displayed on the LCD and the present reading becomes the reference value and displayed on the display. Relative measurement $REL\Delta = \text{measurement value} - \text{Reference value}$. Press it again to exit.
- ⑧ **SELECT/HOLD** key: This key work on the "→↔↔" range, press the key to choose diode or continuity test, on the "C/F" range, change to °C or °F test, on the Hz range, change to Hz or Duty test; On other range, press the "SELECT/HOLD" key to lock display value, and the "DH" sign will appear on the display, press it again to exit. If press and hold **SELECT/HOLD** key to power on, "Auto Power Off" function will be disabled.
- ⑨ Rotary Switch: Use this switch to select functions and ranges.
- ⑩ **→↔↔+μAmA**: →↔↔μAmA Input Jack and Temperature "°" Input Jack
- ⑪ **20A**: 20A Input Jack
- ⑫ **VΩHz**→↔↔: V/Hz/Ω→↔↔ Input Jack
- ⑬ **COM**→: COM and Temperature "°" Input Jack
- ⑭ Transistor hFE test Input Jack
- ⑮ Crust of meter
- ⑯ Protective casing

3. Safety Information

3-1 The meter is designed according to IEC-1010 concerning electronic measuring instruments with an over-voltage category 1000V (CAT III) and pollution 2.

3-2 Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.

3-3 safety symbols:

⚠ Important safety information, refer to the operating manual.

⚡ Dangerous voltage may be presence.

□ Double insulation (protection Class II)

4. Special Cautions for Operation

4-1 The meters can be safe only according to standard procedures when used in conjunctions with the supplied test leads. To replace damaged test leads with only the same model or same electric specifications.

4-2 To avoid risk of electric shock, do not use the meters before the cover is in place.

4-3 The range switch should be right position for the testing.

4-4 To avoid electric shock and damaging the instruments, the input signals are forbidden to exceed the specified limits.

4-5 When measuring TV set or switched power, attention should be paid to the possible pulses that may bring destruction to the circuit.

4-6 Range switch position is forbidden to be changed at random during measurement.

4-7 Take caution against shock in the course of measuring voltage higher than DC 60V & AC 30V.

4-8 Protection fuse should be replaced only with same type and same specification.

4-9 After operation is finished, set function switch at OFF to save battery power.

4-10 If the meter is without usage for long time, take out battery to avoid damage by battery leakage.

5. GENERAL SPECIFICATIONS

5-1 Max Voltage between input terminal and Earth Ground: CAT III 1000V

5-2 Over-range Indication: display "OL" for the significant digit.

5-3 Automatic display of negative polarity "−".

5-4 Low Battery Indication: "E" displayed.

5-5 Max LCD display: 6000 counts digit.

5-6 Auto range & Manual range control

5-7 Auto Power Off: When measurement exceeds 15 minutes without switching mode and pressing key, the meter will switch to standby mode. Press any key to exit standby mode. When restart the system, press and hold **SELECT/HOLD** key to disable auto power off.

5-8 Mechanical blocking system & Function switch indicator lamp

5-9 Auto LCD backlight

5-10 Fuse protection: 800mA/250V Fast Fuse, 20A/250V Fast Fuse

5-11 Power supply: 9V battery (6F22 or NEDA 1604)

5-12 Operating Temp.: 0°C to 40°C (relative humidity <85%)

5-13 Storage Temp.: -10°C to 50°C (relative humidity <85%)

5-14 Guaranteed precision Temp.: 23±5°C (relative humidity <70%)

5-15 Dimension: 195x88x40mm

5-16 Weight: approx. 350g (including battery)

6. Testing Specifications

Accuracy is specified for a period of year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 70%.

6-1 DC Voltage

Range	Resolution	Accuracy
600mV	0.1mV	±(0.5% of rdg + 2 digits)
6V	1mV	
60V	10mV	
600V	100mV	
1000V	1V	±(0.8% of rdg + 2 digits)

-- Impedance: 10MΩ

-- Overload protection: 1000V DC or 750V AC rms

6-2 AC Voltage (True RMS)

Range	Resolution	Accuracy
6V	1mV	±(1.0% of rdg + 3 digits)
60V	10mV	
600V	100mV	
750V	1V	±(1.5% of rdg + 3 digits)

-- Impedance: 10MΩ

-- Overload protection: 1000V DC or 750V AC rms

-- Frequency Range: 40 to 2kHz

6-3 DC Current

Range	Resolution	Accuracy
60μA	0.01μA	±(1.2% of rdg + 2 digits)
600μA	0.1μA	
6mA	1μA	
60mA	10μA	
600mA	100μA	±(2.0% of rdg + 3 digits)
20A	10mA	

-- Overload protection: 800mA/250V Fast Fuse, 20A/250V Fast Fuse, 20A up to 15 seconds

6-4 AC Current (True RMS)

Range	Resolution	Accuracy
6mA	1μA	±(1.5% of rdg + 3 digits)
600mA	100μA	
20A	10mA	±(2.5% of rdg + 5 digits)

-- Overload protection: 800mA/250V Fast Fuse, 20A/250V Fast Fuse, 20A up to 15 seconds

-- Frequency Range: 40 to 2kHz

6-5 Resistance

Range	Resolution	Accuracy
600Ω	0.1Ω	±(1.0% of rdg + 3 digits)
6kΩ	1Ω	±(1.0% of rdg + 2 digits)
60kΩ	10Ω	
600kΩ	100Ω	
6MΩ	1kΩ	
60MΩ	10kΩ	±(1.5% of rdg + 3 digits)

-- Overload protection: 250V DC or AC rms

6-6 Capacitance (Auto Range)

Range	Accuracy	Resolution
9.999nF	±(3.0% of rdg + 10 digits)	1pF
99.99nF	±(2.5% of rdg + 5 digits)	10pF
999.9nF		100pF
9.999μF		1nF
99.99μF	±(5.0% of rdg + 10 digits)	10nF
999.9μF	±(10.0% of rdg + 20 digits)	100nF
9.999mF		1μF
99.99mF		10μF

-- Overload protection: 250V DC or AC rms

6-7 Frequency (Auto Range)

Range	Accuracy	Resolution
9.999Hz	± (0.1% of rdg + 5 digits)	0.001Hz
99.99Hz		0.01Hz
999.9Hz		0.1Hz
9.999kHz		1Hz
99.99kHz		10Hz
999.9kHz		100Hz
9.999MHz		1kHz

-- Sensitivity: sine wave 0.6V rms (9.999MHz: 1.5V rms)

-- Overload protection: 250V DC or AC rms

6-8 Duty cycle

0.1%~99.9%: ± (2.0% of rdg + 2 digits), Frequency lower than 10kHz

-- Sensitivity: sine wave 0.6V rms



-- Overload protection: 250V DC or AC rms

6-9 Temperature

Range	Accuracy	Resolution
°C	-20~150°C	± (3°C + 1digit)
	150~1000°C	± (3% of rdg + 2digits)
°F	-4~302°F	± (5°F + 2digits)
	302~1832°F	± (3% of rdg + 3digits)

- NiCr-NiSi K-type sensor
- Overload protection: 250V DC or AC rms

6-10 Diode and Audible continuity test

Range	Description	Test Condition
	Display read approximately forward voltage of diode	Forward DC current approx. 1.5mA Reversed DC voltage approx. 4V
	Built-in buzzer sounds if resistance is less than 50Ω	Open circuit voltage approx. 2V

Overload protection: 250V DC or AC rms

6-11 Transistor hFE test

Test range: 0-1000

I_b=10μA, V_{ce}=1.8V Approx.


6-12 Non Contact AC Voltage (NCV) detection


Test voltage range: 90V~1000V AC rms

The NCV red light and green light will light up alternately together with sound.

7. OPERATING INSTRUCTIONS


7-1 Attention before operation

7-1-1 Check battery. When the battery voltage drop below proper operation range, the  symbol will appear on the LCD display and the battery need to be changed.

7-1-2 Pay attention to the  besides the input jack which shows that the input voltage or current should be within the specified value.

7-1-3 The range switch should be positioned to desired range for measurement before operation.

7-2 Measuring DC Voltage


7-2-1 Set the rotary switch at the desired  range position.

7-2-2 Connect the black test lead to **COMT-** jack and the red to **VΩHz** jack.


7-2-3 Connect test leads across the source or load under measurement.

7-2-4 You can get reading from LCD. The polarity of the red lead connection will be indicated along with the DC voltage value.

NOTE:

1. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
2. When only the figure "OL" or "-OL" is displayed, it indicates over-range situation and the higher range has to be selected.
3.  means you can't input the voltage more than DC 1000V or AC 750V, it's possible to show higher voltage, but it may destroy the inner circuit or pose a shock.
4. Be cautious against shock when measuring high Voltage.

7-3 Measuring AC Voltage

7-3-1 Set the rotary switch at the desired  range position.


7-3-2 Connect the black test lead to **COMT-** jack and the red to **VΩHz** jack.

7-3-3 Connect test leads across the source or load under measurement.

7-3-4 You can get reading from LCD.

NOTE: See DC voltage measurement note 1~4.

7-4 Measuring DC Current


7-4-1 Set the rotary switch at the desired  range position.

7-4-2 Connect the black test lead to **COMT-** jack and the red to the **μA mA** jack for a maximum 600mA current, for a 600mA to 20A current, move the red lead to the **20A** jack.


7-4-3 Connect test leads in series with the load under measurement.

7-4-4 You can get reading from LCD. The polarity of the red lead connection will be indicated along with the DC current value.

NOTE:

1. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
2. When only the figure "OL" or "-OL" is displayed, it indicates over-range situation and the higher range has to be selected.
3.  means the socket mA's maximum current is 600mA and 20A's maximum current is 20A, over 600mA or 20A current can be protected by the fast fuse.
4. On the 20A range, the measuring time should be less than 15 seconds to prevent precision from affecting by circuit heating.

7-5 Measuring AC Current

7-5-1 Set the rotary switch at the desired  range position.

7-5-2 Connect the black test lead to **COMT-** jack and the red to the **μA mA** jack for a maximum 600mA current, for a 600mA to 20A current, move the red lead to the **20A** jack.

7-5-3 Connect test leads in series with the load under measurement.

7-5-4 You can get reading from LCD.

NOTE: See DC current measurement note 1~4.

7-6 Measuring Resistance

7-6-1 Set the rotary switch at the desired **Ω** range position.

7-6-2 Connect the black test lead to **COMT-** jack and the red to **VΩHz** jack.


7-6-3 Connect test leads across the resistance under measurement.

7-6-4 You can get reading from LCD.

NOTE: Max. input overload: 250V rms<10sec

1. When only the figure "OL" or "-OL" is displayed, it indicates over-range situation and the higher range has to be selected.
2. For measuring resistance above 10MΩ, the meter may take a few seconds to get stable reading.
3. When the input is not connected, i.e. at open circuit, the figure "OL" or "-OL" will be displayed for the over-range condition.
4. When checking in-circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been discharged fully.

7-7 Measuring Capacitance


7-7-1 Set the rotary switch at the desired  range position.

7-7-2 Connect the black test lead to **COMT-** jack and the red to **μA mA** jack.

7-7-3 Connect test leads across the capacitance under measurement.

7-7-4 You can get reading from LCD.

NOTE: Max. input overload: 250V rms<10sec

1. Capacitors should be discharged before being tested.
2. When testing large capacitance, it will take longer time before the final indication (For 100uF~99.99mF range, it will take about 10 seconds).
3. When testing small capacitance (≤1uF), to assure the measurement accuracy, first press "REL  ", then go on measuring.

7-8 Measuring Frequency & Duty cycle

7-8-1 Set the rotary switch at the desired **"Hz"** range position.

7-8-2 Connect the black test lead to **COMT-** jack and the red to **VΩHz** jack.

7-8-3 Push **"SELECT/HOLD"** key to choose **Frequency** or **Duty cycle** test.

7-8-4 Connect the probe across the source or load under measurement.

7-8-5 You can get reading from LCD.

7-9 Measuring Temperature

7-9-1 Set the rotary switch at the desired **"°C/°F"** range position, push **"SELECT/HOLD"** to choose **°C** or **°F** measurement.

7-9-2 Connect the black banana plug of the sensor to **COMT-** jack and the red banana plug to the **μA mA** jack.


7-9-3 Put the sensor probe into the temperature field under measurement.

7-9-4 You can get reading from LCD.

NOTE:

1. The accessory of the meter WRNM-010 type contact thermocouple limit temperature is 250 °C (300 °C shortly), please use special probe for test higher temperature.
2. Please don't change the thermocouple at will, otherwise we can't guarantee to measure accuracy.
3. Please don't importing the voltage in the temperature function.

7-10 Diode & Audible continuity Testing

7-10-1 Set the rotary switch at the  range position, push **"SELECT/HOLD"** to choose **Diode** or **Audible continuity** measurement.

7-10-2 Connect the black test lead to **COMT-** jack and the red to **VΩHz** jack.

7-10-3 On **diode** range, connect the test leads across the diode under measurement, display shows the approx. forward voltage of this diode.

7-10-4 On **Audible continuity** range, connect the test leads to two point of circuit, if the resistance is lower than approx. 50Ω, the buzzer sounds.

NOTE: Make sure the power is cut off and all capacitors need to be discharged under this measurement.

7-11 Transistor hFE Test

7-11-1 Set the rotary switch at the desired **"hFE"** range position.

7-11-2 Determine whether the transistor is NPN or PNP and locate the Emitter, Base and Collector leads. Insert the leads into the proper holes in the socket on the front panel.

7-11-3 You can get reading of the approximate hFE value from LCD.

NOTE: Don't connect an external voltage to measuring terminals.

7-12 Non Contact AC Voltage detection


7-12-1 Set the rotary switch at the desired **"NCV"** range position, the NCV green LED light will light up.

7-12-2 Hold the Meter so that the meter's top is vertically and horizontally centered and contacting the conductor, when the live voltage ≥ 90V AC rms, the NCV red LED light and green LED light will light up alternately together with sound.

NOTE:

1. Even without LED indication, the voltage may still exist. Do not rely on non-contact voltage detector to determine the presence of voltage wire. Detection operation may be subject to socket design, insulation thickness and different type and other factors.
2. When the meter input terminals presence voltage, due to the influence of presence voltage, voltage sensing indicator may also be bright.
3. Keep the meter away from electrical noise sources during the tests, i.e., florescent lights, dimmable lights, motors, etc.. These sources can trigger Non-Contact AC Voltage detection function and invalidate the test.

8. Battery replacement

8-1 When the battery voltage drop below proper operation range the  symbol will appear on the LCD display and the battery need to be changed.

8-2 Before changing the battery, power off the meter and remove the test leads from the terminals. Open the cover of the battery cabinet by a screwdriver.

8-3 Replace the old battery with the same type battery (9V 6F22 or NEDA 1604).

8-4 Close the cover of the battery cabinet and fasten the screw.

9. Fuse replacement

9-1 This meter is provided with a 800mA/250V fast fuse to protect the temperature test and the current measuring circuits which measure up to 600mA, with a 20A/250V fuse to protect the 20A range.

9-2 Ensure the meter is not connected to any external circuit, power off the meter and remove the test leads from the terminals. Open the cover of the battery cabinet by a screwdriver.

9-3 Replace the old fuse with the same type and rating: 5×20mm 800mA/250V fast fuse or 5×20mm 20A/250V fast fuse.

9-4 Close the cover of the battery cabinet and fasten the screw.

10. Maintenance

10-1 You must replace the test leads if the lead is exposed, and should adopt the leads with the same specifications as origin.

10-2 Use only moist fabric or small amount of detergent but not chemical solution for cleaning.

10-3 Do not use the meter before the back cover is properly closed and screw secured. Upon any abnormality, stop operation immediately and send the meter for maintenance.

10-4 Please take out the battery when not using for a long time.

11. Accessories

[1] Test Leads: electric rating 1000V 20A

[2] "K" type thermocouple sensor probe

[3] Operator's Manual

Above picture and content just for your reference. Please be subject to the actual products if anything different or updated. Please pardon for not informing in advance.