

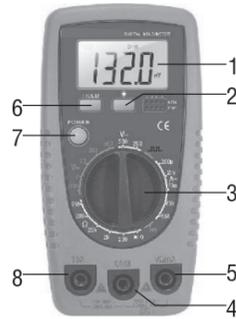
DIY DIGITAL MULTIMETER OPERATOR'S MANUAL

1. Overview

DIY Digital Multimeter is a compact, portable, and stable meter for electrical and electronic measurements. Using 3 1/2 digits 2000 count LCD display, the character 15mm 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 an exquisite making as a handy utility instrument. The meters can be used to measure DC & AC voltage, DC Current, Resistance, positive Diode voltage fall, hFE parameters for transistor and Continuity.

2. Panel Layout

- ① LCD Display: 3 1/2 digits, character 15mm high
- ② Back Light Button Switch: Press this button to switch on back light for dimly lit areas where it is difficult to read the display when measuring, the light will automatically turn off in 5 seconds. Back light reduces Battery life.
- ③ Rotary Switch: use this switch to select functions and ranges
- ④ "COM" Input Jack
- ⑤ "V Ω mA" Input Jack
- ⑥ Data-hold Switch (HOLD)
- ⑦ Power
- ⑧ "10A" Input Jack



3. Safety Information

- 3-1 The meters is designed in according with IEC-61010-1 Safety Standards with an over-voltage category (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 is safe 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 at 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.

5. GENERAL SPECIFICATIONS

- 5-1 Max Voltage between input terminal and Earth Ground: CAT III 600V
- 5-2 Over-range Indication: display "1" or "-1" for the significant digit.
- 5-3 Automatic display of negative polarity "-".
- 5-4 Low Battery Indication: "E" displayed
- 5-5 Max LCD display: 1999 (3 1/2 digits)
- 5-6 Fuse protection: F-200mA/250V (Ø5x20mm)
- 5-7 Power Supply: 9V battery, 6F22 or NEDA 1604
- 5-8 Operating Temp.: 0°C to 40°C (relative humidity <85%)
- 5-9 Storage Temp.: -10°C to 50°C ((relative humidity <85%)
- 5-10 Guaranteed precision Temp.: 23±5 °C (relative humidity <85%)
- 5-11 Dimension: 143 X 73 X34.5 mm(with holster)

5-12 Weight: approx: 200g (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 75%.

6-1 DC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	± (0.5% of rdg + 2 digits)
2V	1mV	
20V	10mV	
200V	100mV	± (0.8% of rdg + 3 digits)
500V	1V	

-- Input Impedance: 10M Ω

-- Overload protection: 250V for 200mV range, effective DC or AC 600V for other ranges

6-2 AC Voltage

Range	Resolution	Accuracy
200V	0.1V	± (1.2% of rdg + 10 digits)
500V	1V	

-- Frequency Range: 40 to 400Hz

-- Response: average, calibrated in rms of sine wave

6-3 DC Current

Range	Resolution	Accuracy
200μA	0.1μA	± (1.0% of rdg + 2 digits)
2mA	1μA	
20mA	10μA	
200mA	100μA	± (1.5% of rdg + 2 digits)
10A	10mA	± (3.0% of rdg + 5 digits)

-- Overload protection: F 200mA/250V fuse

Note:

10A range: not fused

6-4 Resistance

Range	Resolution	Accuracy
200 Ω	0.1 Ω	± (0.8% of rdg + 3 digits)
2K Ω	1 Ω	
20K Ω	10 Ω	
200K Ω	100 Ω	
2M Ω	1K Ω	± (1.0% of rdg + 3 digits)

-- Over-load protection: 250V effective value

6-5 Transistor hFE Test

Range	Test Range	Test Current / voltage
NPN & PNP	0-1000	I _b =10μA / V _{ce} =3V

6-6 Diode Test AT III

Range	Resolution	Function
▶	1mV	Display: read approximate forward voltage of diode

-- Over-load Protection: 250V effective value

-- Forward DC current: approximate 1mA

-- Reversed DC voltage: approximate 3.0V

6-7 Continuity

Range	Function
•••••	Built-in buzzer will sound if resistance is less than 70 Ω ± 30 Ω

-- over-load protection: 250V effective value

--open circuit voltage: approximate 3.0V

6-8 Square wave output

Range	Output frequency	V _{p-p}	Impedance
□	50Hz ± 10Hz	5V ± 2V	470K Ω

7. OPERATING INSTRUCTIONS

7-1 Attention before operation

7-1-1 Check 9V battery. If the battery voltage is less than 7V, display will show "E", the battery should be replaced at this time to ensure measuring precision.

7-1-2 Pay attention to the "Δ" 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 Connect the black test lead to "COM" jack and the red to "V Ω mA" jack.

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

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

7-2-4 Reading will be displayed on the LCD. The polarity of the red lead connection will be indicated along with the 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 '1' or '-1' is displayed, it indicates over-range situation and the higher range has to be selected.
3. "Δ" means you can't input the voltage more than 600V, 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 Connect the black test lead to "COM" jack and the red to "V Ω mA" jack.

7-3-2 Set the rotary switch at the desired "V~" range position.

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

7-3-4 Reading will be displayed on the LCD.

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 '1' is displayed, it indicates over-range situation and the higher range has to be selected.
3. "Δ" means you can't input the voltage more than 600V, 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.

7-4 Measuring DC Current

7-4-1 Connect the black test lead to "COM" jack and the red to the "V Ω mA" jack for a maximum 200mA current, for a maximum 10A current, move the red lead to the 10A jack.

7-4-2 Set the rotary switch at the desired "A" range position.

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

7-4-4 Reading will be displayed on the LCD. The polarity of the red lead connection will be indicated along with the 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 '1' or '-1' is displayed, it indicates over-range situation and the higher range has to be selected.
3. "Δ" means the socket mA's maximum current is 200mA and 10A's maximum current is 10A, over current will destroy the fuse. Since 10A is not fused, the measuring time should be less than 1 second to prevent precision from affecting by circuit heating.

7-5 Measuring Resistance

7-5-1 Connect the black test lead to "COM" jack and the red to "V Ω mA" jack.

7-5-2 Set the rotary switch at the desired "Ω" range position.

7-5-3 Connect test leads across the resistance under measurement.

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

NOTE:

1. When only the figure '1' or '-1' is displayed, it indicates over-range situation and the higher range has to be selected.
2. For measuring resistance above 1M Ω, 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 '1' 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.
5. the value scale to be measured is unknown beforehand, set the range selector at the highest position.
6. Under the Low Resistance Range, the Users are requested to Short the meter probes to get the resistance of test leads, which is Needed to deduct from this measurement.

7-6 Transistor Testing

7-6-1 Set the rotary switch at "hFE" position.

7-6-2 Determine whether the transistor under testing is NPN or PNP and locate the emitter, base and collector leads. Insert the leads into proper holes of hFE socket on the front panel.

7-6-3 Read the approximate hFE value at the testing condition of base current I_b10μA and V_{ce} 3V.

7-7 Diode Testing

7-7-1 Connect the black test lead to "COM" jack and the red to "V Ω mA" jack. (the polarity of red lead is '+')

7-7-2 Set the rotary switch at the "▶" range position.

7-7-3 Connect the red lead to the anode and the black lead to the cathode of the diode under testing.

7-7-4 Reading will be displayed on the LCD.

NOTE:

1. The meter will show approximate forward voltage drop of the diode.
2. If the lead connections is reversed, only '1' will be displayed.

7-8 Continuity Testing

7-8-1 Connect the black test lead to "COM" jack and the red to "V Ω mA" jack.

7-8-2 Set the rotary switch at the "•••••" range position.

7-8-3 Connect test leads across two points of the circuit under testing.

7-8-4 If continuity exists (i.e. resistance less than about 70 Ω ± 30 Ω), built-in buzzer will sound.

NOTE:

If the input open circuit, the figure "1" will be displayed.

7-9 Square wave output

7-9-1 Connect the black test lead to "COM" jack and the red to "V Ω mA" jack.

7-9-2 Set the rotary switch at the desired "□" range position.

7-9-3 The meter output square wave : Frequency=50Hz ± 10Hz

V_{p-p}= 5V ± 2V,

output Impedance ≈ 470K Ω

(The LCD display is insignificant)

8. Maintenance

8-1 Before attempting to remove the battery door or open the case, be sure that test leads have been disconnected from measurement circuit top avoid electric shock hazard.

8-2 To avoid electrical shock, remove test leads from measurement circuits before replacing the fuse. For protection against fire, replace fuses only with specified ratings: F-200mA/250V fuse.

8-3 Your must replace the test leads if the lead is exposed, and should adopt the leads with the same specifications as origin.

8-4 Use only moist fabric or small amount of detergent but not chemical solution for cleaning.

8-5 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.

9. Accessories

[1] Test Leads: electric rating 1000V 10A

[2] Battery: 9V, 6F22 or NEDA 1604

[3] Fuse: F-200mA/250V (Less than the CAT standard)

[4] Operator's Manual

[5] Holster