



Digital Multimeter DM 81 User Manual




Digital Multimeter - DM 81 User Manual


I. General Instruction

This meter DM-81 is 3 1/2 digital multi-function meter, which focus on large scale integrated circuit design and A/D converter, as well as full overload protection, meter can measure AC/DC voltage, AC/DC current, resistance, capacitance, diode forward voltage drop, transistor hFE parameter, the transmission signal detection of infrared remote controller (remote control) and live wire recognition.

II. Safety Precaution

- This meter complies with IEC 61010-1, CAT.I 1000V standards, before operation, please read this user manual carefully.
- To avoid risk of electric shock, do not use the meter before the battery cover is in place.
- Carefully check the conditions of test leads, such as insulation, breakage or others, if test leads is in bad condition, do not use it with the meter.
- The range switch should be at right position for the testing.
- To avoid electric shock and damaging the instrument, the input signals are forbidden to exceed the specified limits.
- Range switch position is forbidden to be changed at random during measurement.
- To avoid electric shock, make sure max voltage between input terminal “COM” and Earth Ground “ \equiv ” does not exceed over 1000V.
- Take caution against shock in the course of measuring voltage higher than DC 60V & AC 30Vrms.
- Once LCD display showed ‘’, to change the battery to guarantee the accuracy of measurement.
- Use only moist fabric or small amount of detergent Do not use chemical solution for cleaning the meter.
- Do not store meter in high temperature and humidity conditions.
- Take out of battery before storage.

III. General Description

- 1) DC basic Accuracy: $\pm 1\%$
- 2) Low battery indication: “”
- 3) Max. display: 1999 (3 1/2 digits)
- 4) Auto power off: automatically powered off in 15 minutes
- 5) Δ 20A input Jack: no fuse
- 6) Δ mA input jack fuse: 200mA/250V fuse
- 7) Installed battery: 9V NEDA/6F22 or equivalent battery
- 8) Environmental conditions
Working Temp.: 0°C~ 40°C Humidity: <80%

Storage Temp.: -10°C~ 50°C Humidity: <85%
 Accuracy Guaranty Temp.: 23°C±5°C; Humidity: <70%

IV. Specifications

1. DC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	± (1.2%+5)
2V	1mV	
20V	10mV	
200V	100mV	
1000V	1V	± (1.5%+5)

- Input Impendancy: 1MΩ@200mV&2V, effective @10MΩ for other ranges
- Overload Protection: 250V for 200mV & 2V range, effective DC or AC 1000V for other ranges

2. AC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	± (2%+5)
2V	1mV	± (1.8%+5)
20V	10mV	± (1.5%+5)
200V	100mV	
750V	1V	± (2%+7)

- Input Impendancy: 1MΩ@200mV&2V, effective @10MΩ for other ranges
- Frequency Range: 40Hz ~ 400Hz (40Hz-100Hz @200V/700V)
- Overload Protection: 250V for 200mV & 2V range, effective DC or AC 1000V for other ranges
- Response: average, calibrated in RMS of sine wave

3. DC Current

Range	Resolution	Accuracy
2mA	1μA	± (1.5%+5)
200mA	100μA	± (2%+5)
20A	10mA	± (3%+5)

- Overload Protection: 200mA/250V fuse, 20A range without fuse
- Max Input Current: 20A (≤10 seconds)
- Δ Measured by the voltage drop: full range as 200mV

4. AC Current

Range	Resolution	Accuracy
2mA	1μA	± (2%+5)
200mA	100μA	± (2.5%+5)
20A	10mA	± (3%+7)

- Overload Protection: 200mA/250V fuse, 20A range without fuse
- Max Input Current: 20A (≤10 seconds)
- Δ Measured by the voltage drop: full range as 200mV

-- Frequency Range: 40Hz ~ 400Hz

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

5. Resistance

Range	Resolution	Accuracy
200Ω	0.1Ω	± (1.5%+5)
2KΩ	1Ω	
20KΩ	10Ω	
200KΩ	100Ω	
2MΩ	1KΩ	
20MΩ	10KΩ	± (2%+5)
200MΩ	100KΩ	± (5%+5) -10

-- Overload Protection: 220V effective value

-- Open circuit Voltage: < 1V (200MΩ@ range 2.8V)

-- Δ 200MΩ range short display approx. 10 digits, measuring value = displayed value - 10 digits

6. Capacitance



Range	Resolution	Accuracy
20nF	10pF	± (3%+10)
200nF	100pF	
2μF	1nF	
200μF	10nF	± (5%+10)

-- Overload Protection: 36V or AC peak value

7. Transistor hFE Test

Range	Description	Measuring Condition
hFE	Display : 0 ~ 10008	I _{bo} ≈10μA, V _{ce} ≈2.8V

8. Diode and Continuity Test

Range	Description	Measuring Condition
	Read approximate forward voltage of diode	Forward DC current approx. as 1mA; Inverse DC voltage approx. as 2.8V
	Built-in buzzer will sound if resistance is less than 50Ω, display resistance approximate value	Open circuit voltage approximate as 2.8V

-- Overload Protection: 250V effective value

9. The transmission signal detection of infrared remote controller and live wire recognition (Δ), see operation instruction.

V. Operating Instruction

Pay attention to the “ Δ ” besides the input jack, which shows that the input voltage or current should be within the specified value. In addition, the range switch should be at right position for the testing.

1. Measuring DC Voltage

- 1> Connect the black test lead to COM jack and the red to V/ Ω jack.
- 2> Set the rotary switch at the desired “V $\overline{\text{---}}$ ” range position, connect test leads across the source or load under measurement, you can get reading from LCD. The polarity of the red lead connection will be indicated along with the voltage value.

NOTE:


- a. When the value scale to be measured is unknown, set the range selector at the highest position.
- b. When only the figure ‘1’ is displayed, it indicates over-range situation and the higher range has to be selected.
- c. “ Δ ” means you can’t input the voltage more than 1000V, it’s possible to show higher voltage, but it may destroy the inner circuit or pose a shock.
- d. Be cautious against shock when measuring high Voltage

2. Measuring AC Voltage

- 1> Connect the black test lead to COM jack and the red to V/ Ω jack.
- 2> Set the rotary switch at the desired “V-” range position, connect test leads across the source or load under measurement.

NOTE

Refer the Measuring DC Voltage a.b.d.

- a.  means you can't input the voltage more than 750V, it's possible to show higher voltage, but it may destroy the inner circuit or pose a shock.

3. Measuring DC Current

- 1> Connect the black test lead to COM jack, connect the red test lead to the mA jack once measuring current below 200mA and connect the red test lead to 20A jack once the measuring current is between 200mA to 20A.
- 2> Set the rotary switch at the desired A $\overline{=}$ range position, connect the test leads in series with the load under measurement, you can get the reading from LCD, the polarity of the red lead connection will be indicated along with the current value.

NOTE

- a. When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
- b. When only the figure '1' is displayed, it indicates over-range situation and the higher range has to be selected.
- c. The socket mA's maximum current is 200mA.
- d. Since 20A is not fused, the measuring time should be less than 10 seconds to prevent precision from affecting by circuit heating.

4. Measuring AC Current

- 1> Connect the black test lead to COM jack, connect the red test lead to the mA jack once measuring current below 200mA and connect the red test lead to 20A jack once the measuring current is between 200mA to 20A.
- 2> Set the rotary switch at the desired A \sim range position, connect the test leads in series with the load under measurement.

NOTE

- a. Refer the Measuring DC Current a.b.c.d.

5. Measuring Resistance

- 1> Connect the black test lead to COM jack and red to V/ Ω jack.
- 2> Set the rotary switch at the desired Ω range position and connect the test leads across the resistance under measurement.

NOTE

- a. For measuring resistance above 1M Ω , the meter may take a few seconds to get stable reading.
- b. For measuring high resistance, connect the resistance to V/ Ω and COM jacks to avoid interference.

- c. When checking in-circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been discharged fully.
- d. 200MΩ range short display approx. 10 digits, measuring value = displayed value - 10 digits, eg. Measuring 100MΩ, displayed value is 101.0, then the correct value will be $101.0 - 1.0 = 100.0\text{M}\Omega$.

6. Measuring Capacitance

Connect black test lead to COM jack and red to mA jack; put the capacitance to the end of test leads, pay attention on polarity.


NOTE

- a. The meter may take a few seconds to stabilize reading, this is normal for high capacitance measuring.
- b. Do not connect an external voltage or a charged capacitance (especially high capacitance) to the testing terminals.
- c. Once the high capacitance with serious leakage or breakdown, the measuring value will be not stable

7. Measuring Transistor hFE

- 1> Set the rotary switch to hFE range position.
- 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. Display the approximate hFE value at the testing condition of base current $I_b 10\mu\text{A}$ and $V_{ce} 3\text{V}$.


8. Measuring Diode


- 1> Connect the black test lead to “COM” jack and the red to “VΩmA ”jack. (the polarity of red lead is ‘+’)
- 2> Set the rotary switch at the “ ” range position, Connect the red lead to the anode and the black lead to

NOTE

- a. If the lead connection is reversed, meter displayed over-range
- b. The meter will show approximate forward voltage drop of the diode.


9. Measuring Continuity

- 1> Connect the black test lead to COM jack and set the rotary switch at the “ ” range position, connect the red lead to the anode and the black lead to the cathode of the diode under testing.
- 2> If resistance less than about 50Ω , built-in buzzer will be sound.

 NOTE

Continuity test is available to check open/short of the circuit.

10. Infrared Remote Control Transmitting Signal Detection ()


Set the rotary switch to  and align the emitter head vertically in line with the infrared receiver, make sure the deviation is not more than $\pm 15^\circ$ and the distance between (1-30 cm) and press the power button of remote controller. If the red LED glows at the same time, then the remote controller works properly.

 NOTE

- a. To avoid the intense light once applied this function.
- b. The emitter head vertically align to infrared receiver and the deviation is not more than $\pm 15^\circ$

11. Live Wire Recognition (Δ) (LINE TESTER).

Connect red test lead to V/ Ω jack and black to COM jack, hold the insulation part of black test lead and do not put into circuit under measurement; connect the red test lead to live wire, the meter will display Δ , when the red test lead connect the earth wire, the meter does not display Δ .

 NOTE

When the circuit is not ground or in serious leakage circuit, once connect earth wire might display Δ