

OPERATOR'S
MANUAL

IN07222
DIGITAL
MULTIMETER

PN: 31.11.7109

1. General Specification

This meter is completely portable, LCD, 3 ½ digits multimeter. Designed for use by electricians, technicians, serviceman and hobbyists who required an instrument that is accurate, reliable, and always ready for use. It is powered by a standard 9V battery, providing 150-200 operating hours, depending upon the type of battery and usage. It has rugged structure design, good feeling held in operator's hand and convenient use.

2. Electrical Specifications

The following specifications assume a 1-year calibration cycle and an operating temperature of 18°C to 28°C (64°F to 82°F), at relative humidity up to 80% unless otherwise noted.

2.1 DC Voltage

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

Input impedance: =1MΩ

Overload Protection: 500V DC/peak AC on all ranges

2.2 AC Voltage (Average sensing, calibrated to rms of sine wave)

Range	Resolution	Accuracy (50Hz ~ 500Hz)
200V	100mV	$\pm(2.0\% \text{ of reading} + 10 \text{ digits})$
500V	1V	

Input impedance: =1M Ω

Overload Protection: 500V AC/DC on all ranges

2.3 DC Current

Range	Resolution	Accuracy
200uA	0.1uA	$\pm(1.8\% \text{ of reading} + 2 \text{ digits})$
2mA	1uA	
20mA	10uA	
200mA	100uA	$\pm(2.0\% \text{ of reading} + 2 \text{ digits})$
5A	10mA	$\pm(2.0\% \text{ of reading} + 10 \text{ digits})$

Overload Protection: Fuse 1: (mA jack)0.5A/500V

Fuse 2: (5A jack)5A/500V

Measuring Voltage Drop: 200mV

2.4 Resistance

Range	Resolution	Accuracy
200 Ω	100m Ω	$\pm(1\% \text{ of reading} + 10 \text{ digits})$
2K Ω	1 Ω	$\pm(1\% \text{ of reading} + 4 \text{ digits})$
20K Ω	10 Ω	
200K Ω	100 Ω	
2M Ω	1K Ω	

Overload Protection: 500V DC/rms AC on all ranges.

2.5 Temperature

Range	Resolution	Accuracy	
		0°C~400°C	400°C~750°C
0°C~750°C	1°C	±1% ± 4d	±1.5% ± 15d


2.6 Battery Test (1.5V, 9V)

Range	Description	Test Condition
1.5V	The working current of the battery will be displayed, so the quality of battery could be judged.	Working current is about 40mA

2.7 Environment

Normal Operation: 18°C-28°C (64°F-82°F)
Usable Condition: 0°C-50°C (32°F-122°F)
Storage: -20°C-+60°C (30°F-140°F)
Battery removed and <80% R.H.
Relative Humidity: max.80%

2.8 Function Characteristics

Measurement method: Dual slope integration technical.
Reading rate: 3 reading/Sec.
Polarity: Automatic, indicated minus, assumed plus.
Overload indication: Blanking of all digits except MSD, decimal ,point and sign appropriate.
Power requirements: 9V Battery (NEDA 1604, 6F22).
Battery indication: Display indicates “” when approx. 20% of battery life remains.
Display: LCD 3 ½ digits (1999 count) 0.5” high

Data hold: All Function and Ranges with this feature.

Weight: 170g including battery approx.

2.9 Accessories

Manual, Testleads, 9V battery, Holster, Multi-function adapter, K-type thermocouple (give with temperature function only)

3. Operation and Recalibration

3.1 DCV & ACV MEASUREMENT

- 1) Set the Function range switch at the required position.
- 2) Connect black test lead to "COM" terminal and red test lead to the "VΩmA" input terminal.
- 3) Connect test leads to measuring point and read the display value the polarity of the red lead connection will be indicated at the same time as the voltage.

Note: Never try to measure the voltage above 500V! Although the indication is possible to show, there is danger of damaging the internal circuitry.

3.2 DC CURRENT MEASUREMENT

- 1) Connect the black test lead to the "COM" terminal and the red test lead to "VΩmA" terminal for a maximum of 200mA
- 2) Set the function range switch at the required position.
- 3) Connect test leads to measuring points and read the display value. The polarity at the red test lead connection will be indicated at the same time as the current.

Note:

- a) If the current range is unknown beforehand, set the function range switch to the highest range and work down.
- b) When only the figure "1" is displayed, over range is

being indicated and the function range switch has been set to a higher range.

- c) Excessive current will blow the fuse that must be replaced when the input is from "mA" terminal.
- d) A fuse does not protect the 10A range.

3.3 RESISTANCE MEASUREMENT

- 1) Connect black test lead to "COM" terminal and red test lead to the "V Ω mA" input terminal.
- 2) Set the function range switch to the Ω range.
- 3) Connect the test leads across the resistance under measurement and read the display value.

Note:

- a) The polarity of the red test lead is "+"
- b) When the input is not connected, i.e. at open circuit the figure "1" will be displayed for the over range condition.
- c) If the resistance value being measured exceeds the maximum value of the range selected an over range indication "1" will be displayed and function range switch must be set to a higher range.

3.4 TEMPERATURE MEASUREMENT

- 1) Set the rotary switch at $^{\circ}\text{C}$ position and the LCD display will show the current environment temperature.
- 2) Be sure the polarity of the thermocouple, put the cold end (free end) of the thermocouple sensor into "COM" & "V Ω mA" terminal.
- 3) The working end (testing end) on or inside the object being tested.
- 4) The value of the temperature is shown on the display.

Note:

- a) The surrounding temperature is shown when the circuit of the sensor is cut off.

- b) The limit temperature measured by the thermocouple given together with the instrument is 250°C, 300°C is acceptable within short period.

3.5 DIODE TEST

- 1) Set the rotary switch at the "✚" position.
- 2) Connect the black test lead to "COM" terminal and red test lead to "VΩmA" input terminal. (Note: the polarity of the red test lead is "+")
- 3) Connect the test leads across the diode and read the display value.

Note:

- a) When the input is not connected, i.e. at open circuit, the figure "1" will be displayed.
- b) Test condition: Forward DC current approx. 1mA. Reversed DC voltage approx. 3.0V.
- c) The meter displays the forward voltage drop and displays figure "1" for overload when the diode is reversed.

3.6 Battery Test

- 1) Set the FUNCTION switch to 1.5V.
- 2) Connect the black test lead to "COM" terminal and red test lead to "VΩmA" input terminal. (Note: the polarity of the red test lead is "+")
- 3) Connect the test lead to Battery and read the display value.

3.7 CONTINUITY TEST

- 1) Set the function range switch to the ")))" position.
- 2) Connect the black test lead to "COM" terminal and red test lead to "VΩmA" input terminal; (Note: the polarity of the red test lead is "+").
- 3) Built-in buzzer sounds if the resistance between two

probes is less than $30 \pm 20 \Omega$.

- 4) Connect the test leads across the diode and read the display value.

Note: When the input is not connected, i.e. at open circuit, the figure "1" will be displayed.

3.8 TRANSISTOR hFE TEST

- 1) Set the function range switch to the "hFE" position.
- 2) Use Multifunction Adapter connector to "COM" and "V Ω mA" terminal.
- 3) Make sure the transistor is "NPN" or "PNP" type.
- 4) Set Transistor correct insert into E.B.C Multifunction Adapter
- 5) Display reading is approx. transistor hFE value.

Note:

Test condition: Base current approx. 10uA. VCE approx. 2.8V

4. Battery And Fuse Replacement

- 4.1 Battery and fuse replacement should only done after the test leads have been disconnected and power is off.
- 4.2 Loosen screws with suitable screwdriver and remove battery door.
- 4.3 The meter is power by a single 9V battery (IEC 6F22, NEDA 1604, JIS 006P). Snap the battery connector leads to the terminals of a new battery and reinsert the battery into the case top. Dress the battery leads so that they will not be pinched between the case bottom can case top.
- 4.4 The meter is protected fast fuse (Fuse1 F0.5A/500V and Fuse2: F10A/500V) dimensions is $\Phi 5 \times 20\text{mm}$.
- 4.5 Replace the case bottom and reinstall the screws. Never operate the meter unless the case bottom is fully closed.