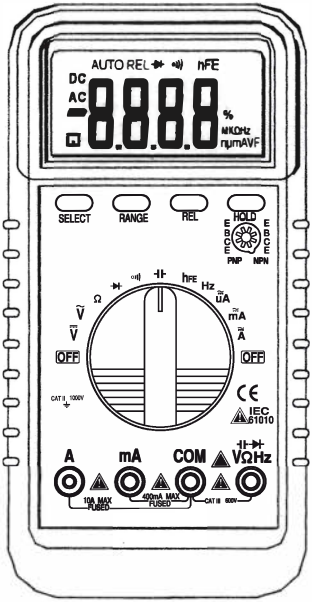
DIGITAL MULTIMETER



USER'S MANUAL

CONTENTS

1. SAFETY INFORMATION

This multimeter has been designed according to IEC61010 concerning electronic measuring instruments with an overvoltage category (CAT Ⅱ) and pollution 2.

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

1.1 PRELIMINARY

※ When using this meter, the user must observe all normal safety rules concerning:

— Protection against the dangers of electrical current.

— Protection of the meter against misuse.

※ Full compliance with safety standards can be guaranteed only if used with test leads supplied. If necessary, they must be replaced with the same model or same electronic ratings. Measuring leads must be in good condition.

1.2 DURING USE

※ Never exceed the protection limit values indicated in specifications for each range of measurement.

※ When the meter is linked to measurement circuit, do not touch unused terminals.

※ When the value scale to be measured is unknown beforehand, set the range selector at the highest position.

※ Before rotating the range selector to change

functions, disconnect test leads from the circuit under test.

※ When carrying out measurements on TV or switching power circuits, always remember that there may be high amplitude voltages pulses at test points which can damage the meter.

※ Never perform resistance measurements on live circuits.

※ Always be careful when working with voltages above 60V dc or 30V ac rms. Keep fingers behind the probe barriers while measuring.

1.3 SYMBOLS


Important safety information, refer to the operating manual.


Dangerous voltage may be present.


Earth ground


Double insulation (Protection class Ⅱ)

1.4 MAINTENANCE

※ Before opening the meter, always disconnect test leads from all sources of electric current.

※ For continue protection against fire, replace fuse only with the specified voltage and current ratings: FUSE 1: 500mA/250V FUSE 2: 10A/250V

※ If any faults or abnormalities are observed, the

meter can not be used any more and it has to be checked out.

※ Never use the meter unless the back cover is in place and fastened fully.

※ To clean the meter, use a damp cloth and mild detergent only, do not use abrasives or solvents on it.

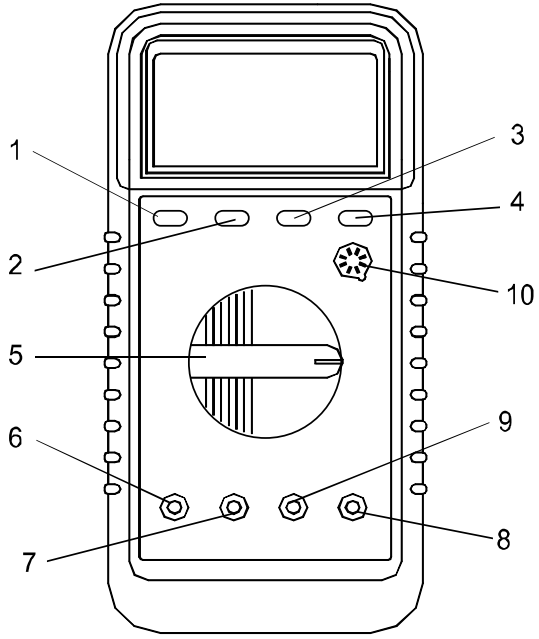
2. DESCRIPTION

This meter is an autoranging professional instrument with 3 3/4 digit LCD display, capable of performing functions:

- DC voltage measurement
- AC voltage measurement
- DC current measurement
- AC current measurement
- Resistance measurement
- Capacitance measurement
- Frequency measurement
- Diode test
- Transistor test
- Audible continuity test

Names of components

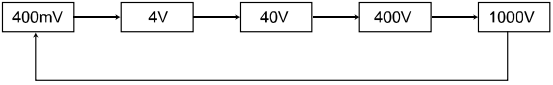
1-4. buttons
5. Rotary switch
6. A input jack
7. mA input jack
8. V/Ω/Hz/▶|/⊣⊢ input jack
9. COM input jack
10. Transistor input jack



2.1 SELECT (Function selection button)

This button is used to select ACA or DCA measuring mode.

2.2 RANGE (Auto/manual range selection button) This key is the auto/manual key. Power on default is auto measurement, and press one time to switch to the manual measurement. In manual measurement mode, the system will jump up one mode for each press until the highest mode, then return to the lowest mode as a loop. If press the key over 2 seconds, the system will switch back to auto measurement status. Frequency,current and capacitance measurement cannot use manual measurement. Fox example, at voltage range the changes are as the figure.



2.3 REL (Relative value measurement) The button is for relative value measurement except Hz, diode and continuity.

Push the button to get relative measurement mode, “REL” annunciate display on LCD. But store the displayed reading as a reference value. In the Relative mode, the value shown on the LCD is always the difference between the stored reference value and the present reading. If the new reading is the same as the reference value, the display will be zero.

2.4 DATA HOLD

When this button is pushed, the display will keep the last reading and “ H ” symbol will appear on the LCD.

Pushing it again returns the meter to normal mode.

2.5 INPUT JACKS

The unit has four input jacks that are protect against overload to the limits. During use, connect the black test lead to the COM jack and the red test lead as shown below:

Function	Red lead connection	Input limits
V	V/Ω/Hz	1000V dc or 750V rms ac
Ω	V/Ω/Hz	250V dc or rms ac
⊣◀	V/Ω/Hz	250V dc or rms ac
◀	V/Ω/Hz	250V dc or rms ac
μA/mA	mA	500mA dc or rms ac
A	A	10A dc or rms ac

μA/mA and A ranges are protected by fuses.

3. OPERATING INSTRUCTION

3.1 MEASURING VOLTAGE

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz/⊣◀/⊣⊢ jack.
2. Set the rotary switch at the desired V ⎓ or V ~ range position and connect test leads across the source or load under measurement.
3. Read LCD display. The polarity of the red connection will be indicated when making a dc voltage measurement.

3.2 MEASURING CURRENT

1. Connect the black test lead to the COM jack and the

red test lead to the mA jack for a maximum of 500mA. For a maximum of 10A, move the red lead to the A jack.
2. Set the function switch at μA, mA or A range to be used and push “SELECT” button to select DCA or ACA measuring mode.
3. Connect test leads in series with the load under measurement.
4. Read LCD display. The polarity of the red lead connection will be indicated when making a DC measurement.

3.3 MEASURING RESISTANCE

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz/▶|-|◀ jack. (NOTE: The polarity of red lead connection is positive “+”)
2. Set the rotary switch at Ω position and connect test leads across the resistance under measurement. Read LCD display.

NOTE:

1. For resistance above 1MΩ, the meter may take a few seconds to stabilize reading.
2. When the input is not connected, i.e. at open circuit, the figure “OL” will be displayed for the overrange condition.
3. When checking in - circuit resistance, be sure the circuit under test has all power removed and all capacitors are full discharged.

3.4 MEASURING FREQUENCY

1. Connect the black test leads to the COM jack and the red test lead to the V/Ω/Hz/▶|/⊣⊢ jack.
2. Set the rotary switch at Hz position and connect test leads across the source or load under measurement.

3.5 MEASURING CAPACITANCE

1. Set the rotary switch at desired ⊣⊢ position.
2. Before inserting capacitor under measurement into capacitance testing jack, be sure that the capacitor has been discharged fully.

WARNING!

To avoid shock, be sure the capacitor measuring adapter has been removed before changing to another function measurement.

3.6 CONTINUITY TEST

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz/▶|/⊣⊢ jack (Note: the polarity of red lead connection is positive "+").
2. Set the rotary switch at 🔊 position and connect test leads across two points of the circuit under testing. If continuity exists (i.e. resistance less than about 30Ω), built – in buzzer will sound.

3.7 DIODE TEST

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz/▶|/⊣⊢ jack. (NOTE: The polarity of red lead connection is positive " + ")

2. Set the rotary switch at ⊣◀⊢ position and connect the red lead to the anode, the black lead to the cathode of the diode under testing. The meter will show the approx forward voltage drop of the diode.

3.8 TRANSISTOR TEST

1. Set the rotary switch at hFE position.
2. Identify whether the transistor is NPN or PNP type and locate Emitter, Base and Collector lead. Insert leads of the transistor to be tested into proper holes of the testing socket on the front panel.
3. LCD display will show the approximate hFE value at the test condition of base current 10μA and Vce 3.2V.

4. SPECIFICATIONS

Accuracy is specified for a period of one year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 80%.

Accuracy specifications are given as:

± % of reading ± number of least significant digits.

4.1 GENERAL

MAXIMUM VOLTAGE BETWEEN TERMINALS AND EARTH GROUND: 1000V DC or 750 rms AC (sine).

FUSE PROTECTION: μA, mA: FUSE2: 500mA/250V

A: FUSE1: 10A/250V

POWER SUPPLY: 9V battery, NEDA 1604 or 6F22

DISPLAY: LCD, 3999 counts MAX, updates 2-3/sec

MEASURING METHOD:
Dual - slope integration A/D converter
OVERRANGE INDICATION:
“OL”figure only on the display
POLARITY INDICATION:
“–” displayed for negative polarity

LOW BATTERY INDICATION: “  ” displayed
OPERATING TEMPERATURE:
0°C to 40°C (32°F to 104°F)
STORAGE TEMPERATURE:
-10°C to 50°C (14°F to 122°F)
DIMENSION: 100×200×55mm
WEIGHT: 480g (including battery and Holster)

4.2 AC VOLTAGE

Range	Resolution	Accuracy
400mV	0.1mV	--
4V	1mV	± 0.8 % of rdg ± 3 digit
40V	10mV	
400V	100mV	
750V	1V	± 1.0 % of rdg ± 2 digits

Input Impedance: 10MΩ.
Frequency Range: 40Hz to 400Hz
Response: Average, calibrated in rms of sine wave

4.3 DC VOLTAGE

Range	Resolution	Accuracy
400mV	0.1mV	± 0.8 % of rdg ± 2 digit
4V	1mV	± 0.5 % of rdg ± 2 digit
40V	10mV	± 0.5 % of rdg ± 2 digit
400V	100mV	± 0.5 % of rdg ± 2 digit
1000V	1V	± 0.8 % of rdg ± 2 digits

Input impedance: 10MΩ, more than 100MΩ at 400mV range.

4.4 DC CURRENT

Range	Resolution	Accuracy
4mA	1μA	± 1.0 % of rdg ± 2 digits
400mA	0.1mA	± 1.2% of rdg ± 2 digits
10A	10mA	± 2.0 % of rdg ± 5 digits

Overload protection: F 500mA fuse for μA and mA ranges, F 10 A fuse for A range.

4.5 AC CURRENT

Range	Resolution	Accuracy
4mA	1μA	± 0.8% of rdg ± 3 digits
400mA	0.1mA	± 1.2% of rdg ± 3 digits
10A	10mA	± 2.5 % of rdg ± 5 digits

Overload protection: F 500mA fuse for μA and mA ranges, F 10 A fuse for A range.
Frequency Range: 40Hz to 400Hz
Response: Average, calibrated in rms of sine wave

4.6 RESISTANCE

Range	Resolution	Accuracy
400Ω	0. 1Ω	± 0.8% of rdg ± 3 digits
4KΩ	1Ω	± 0.8% of rdg ± 1 digits
40KΩ	10Ω	± 0.8% of rdg ± 1 digits
400KΩ	100Ω	± 0.8% of rdg ± 1 digits
4MΩ	1KΩ	± 0.8% of rdg ± 1 digits
40MΩ	10KΩ	± 1.2% of rdg ± 2 digits

Max. open circuit voltage: 3.2V

4.7 CAPACITANCE

Range	Resolution	Accuracy
40nF	10pF	<10nF:±[5.0% of (rdg - 80)+10]
400nF	100pF	
4μF	1nF	
40μF	10nF	
200μF	100nF	3.0%of rdg ± 20

4.8 FREQUENCY

Range	Resolution	Accuracy
9.999Hz(>1Hz)	0.001Hz	±0.2 %of rdg ± 5
99.99HZ	0.01Hz	
999.9Hz	0.1Hz	±0.2 %of rdg ± 5
9.999kHz	1Hz	
99.99kHz	10Hz	

4.9 DIODE

Function	Resolution	Test current	Open circuit voltage
▶|	1mV	25μA	3.0V

4.10 AUDIBLE CONTINUITY

Function	Description
	If resistance is lower than 30Ω, built-in buzzer will sound.

4.11 TRANSISTOR

Function	Range	Base current	Vce
h_{FE}	1 to 1000	25μA	3.0V

5. ACCESSORIES

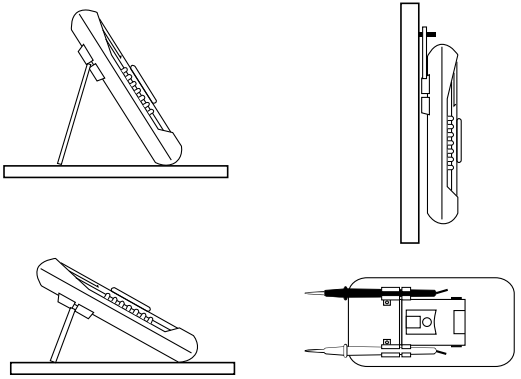
5.1 SUPPLIED WITH THE MULTIMETER

Test leads	Electric Rating 1000V, 10A	1 couple
Battery	9V NEDA 1604 or 6F22	1 pcs
Operating Manual		1 pcs
Holster		1 pcs

5.2 HOW TO USE THE HOLSTER

The holster is used to protest the meter and to make the measurement more comfortable, it comes with tow stands installed together. The figure shows how to use the holster to:

A: Support the meter with a standard angle.
B: Support the meter with a small angle using the little stand
C: Hang the meter on the wall using the little stand.
Take the little stand off from the back side of the large and insert it into holes located upper on the holster.
D. hold test leads



6. BATTERY & FUSE REPLACEMENT

If the sign " ⊟+ " appears on the LCD display, it indicates that battery should be replaced.

Remove screws on the back cover and open the case. Replace the exhausted battery with a new one.

Fuse rarely need replacement and blow almost always as a result of the operator's error. Open the case as mentioned above, and then take the PCB out from the front cover. Replace the blown fuse with same ratings.

⚠ WARNING

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuits to avoid electric shock hazard.

For protection against fire, replace fuse only with specified ratings:

FUSE1: 500mA/250V (quick acting)

FUSE2: F10A/250V

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