UNI-T

UT90A

Operating Manual

Environmental Friendly Digital Multimeter

Overview

This Operating Manual covers safety information related to the multimeter. Please read the relevant information carefully and observe all the **Warnings** and **Notes** strictly.

⚠Warning

To avoid electric shock or personal injury, read the "Safety Information"carefully before using the Meter.

Model UT90A is a 2000-count digital multimeter(referred to as "the Meter") featuring versatile functions, safe, stable and reliable performance. It can measure DC/AC voltage, DC/AC current, resistance, diode and continuity and offer a battery test. It is also equipped with large LCD, full icon display, input connection indication, overload protection, etc.

Unpacking Inspection

Open the package case and take out the Meter. Check the following items carefully for any missing or damaged part:

Item	Description	Qty
1	English Operating Manual	1 pc
2	Test Leads	1 pair
3	9V Battery (NEDA 1604, 6F22 or 006P)	1 pc
4	Holster	1 pc

In the event you find any missing or damaged item, please contact your dealer immediately.

Safety Information

This Meter complies with IEC61010 Overvoltage Category (CAT.II1000V, CAT.III 600V), Double Insulation, Pollution Degree 2 standards.

CAT.II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than CAT. III
CAT.III: Distribution level, fixed installation, with smaller transient overvoltages than CAT. IV

Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired.

In this manual, a **Warning** identifies conditions and actions that pose hazards to the user, or may damage the Meter or the equipment under test.

A **Note** identifies the information that user should pay attention to.

⚠Warning

To avoid possible electric shock or personal injury, and to avoid possible damage to the Meter or to the equipment under test, adhere to the following rules:

- **Before using the Meter inspect the case. Do not use the Meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Pay attention to the insulation around the connectors.**
- **Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads with identical model number or electrical specifications before using the Meter.**
- **When using the test leads, keep your fingers behind the finger guards.**
- **Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.**
- **When the Meter working at an effective voltage over 60V in DC or 30V in AC, special care should be taken for there is danger of electric shock.**
- **Use the proper terminals, function, and range for your measurements.**
- **The rotary switch should be placed in the right position and no any changeover of range shall be made during measurement to prevent damage of the Meter.**
- **Disconnect circuit power and discharge all high-voltage capacitors before testing current, resistance, diodes or continuity.**
- **Replace the battery as soon as the battery indicator appears. With a low battery, the Meter might produce false readings that can lead to electric shock and personal injury.**
- **When servicing the Meter, use only the replacem -ent parts with the same model number or identical electrical specifications.**
- **The internal circuit of the Meter shall not be altered at will to avoid damage of the Meter and any accident.**
- **Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.**
- **Turn off the Meter when it is not in use and take out the battery when not used for a long time.**
- **Constantly check the battery as it may leak when it has been using for some time, replace the battery as soon as leaking appears. A leaking battery will damage the Meter.**
- **Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampened.**
- **The Meter is suitable for indoor use.**

International Electrical Symbols

~	AC (Alternating Current).
⎓	DC (Direct Current).
≂	AC or DC.
⏚	Grounding.
⧈	Double Insulated.
🔋	Low Battery Indication.
)))	Continuity Test.
⊣◁	Diode.
▬	Fuse.
⚠	Warning. Refer to the Operating Manual.
CE	Conforms to Standards of European Union.

The Meter Structure (See Figure 1)

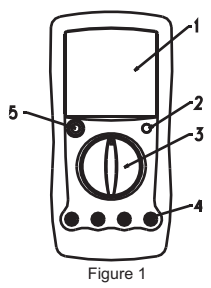

Figure 1

① LCD Display.
② Hold Button.
③ Rotary Switch.
④ Input Terminals.
⑤ Power Button.

Rotary Switch

The table below offers information about the rotary switch positions.

Rotary Switch Position	Function
V⎓	DC voltage measurement.
V~	AC voltage measurement.
A~	AC current measurement range from 0.1μA to 10A
A⎓	DC current measurement range from 0.1μA to 10A
⊣◁ /)))	⊣◁ : Diode test.
	))) : Continuity test.
Ω	Resistance measurement.
⊣⊢	Battery test.

Functional Buttons

The table below offers information about the functional button operations.

AC	voltage measurement.
⏻	Turn the power on and off.
HOLD	● Press **HOLD** once to enter hold mode. ● Press **HOLD** again to exit hold mode and the present value is shown. ● In Hold mode, **H** is displayed

Display Symbols (See Figure 2)

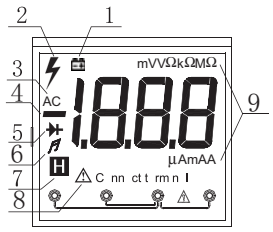

Figure2

No.	Symbol	Meaning
1	🔋	The battery is low. ⚠Warning: To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.
2	ϟ	High voltage indicator
3	AC	Indicator for AC voltage or current. The displayed value is the mean value.
4	−	Indicates negative reading.
5	⊣◁	Test of diode.
6	)))	The continuity buzzer is on.
7	H	Date hold is active.
8	⚠ Connect Terminal	Indicator of connecting test leads into different input terminals.
9	Ω,kΩ,MΩ	Ω: Ohm. The unit of resistance. kΩ: kilohm.1 x 10^3 or 1000 ohms. MΩ: Megaohm. 1 x 10^6 or 1,000,000 ohms.
	mV, V	V: Volts. The unit of voltage. mV: Millivolt. 1 x 10^{-3} or 0.001 volts.
	μA, mA, A	A: Amperes (amps). The unit of current. mA: Milliamp. 1 x 10^{-3} or 0.001 amperes. μA: Microamp. 1x 10^{-6} or 0.000001 amperes.

Measurement Operation

A.Measuring DC Voltage (See Figure 3)

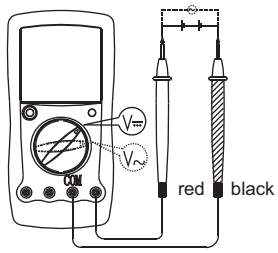

Figure 3

⚠Warning

To avoid harm to you or damage to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V DC/750V AC although readings may be obtained.

The DC voltage ranges are: 200.0mV, 2.000V, 20.00V, 200.0V and 1000V.

To measure DC voltage, connect the Meter as follows:

1. Insert the red test lead into the **VΩ⊣◁** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in V⎓.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (1000V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays **"1"** indicating the existing selected range is overloaded, it is required to select a higher range in order to obtain a correct reading.
- In each range, the Meter has an input impedance of approx. 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
- When DC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

B.Measuring AC Voltage (See Figure 3)

⚠Warning

To avoid harm to you or damage to the Meter from electric shock, please do not attempt to measure voltages higher than 1000V DC/750V AC although readings may be obtained.

The AC voltage ranges are: 2.000V, 20.00V, 200.0V and 750.0V.

To measure AC Voltage, connect the Meter as follows:

1. Insert the red test lead into the **VΩ ⊣◁** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in **V~** range.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display, which is RMS value of sine wave (mean value response).

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (750V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays **"1"** indicating the existing selected range is overloaded, it is required to select a higher range in order to obtain a correct reading.
- In each range, the Meter has an input impedance of approx. 10MΩ. This loading effect can cause measurement errors in high impedance circuits. If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).
- When AC voltage measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

C.Measuring DC Current (See Figure 4)

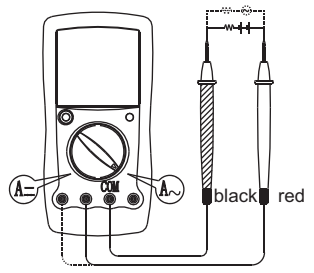

Figure 4

⚠Warning

Never attempt an in-circuit current measurement where the open circuit voltage between terminals and ground is greater than 250V .
If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. Use proper terminals, function, and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

The DC current ranges are: 200.0μA,2.000mA, 20.00mA, 200.0mA and 10.00A.

To measure current, do the following:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the **μAmA ⊣⊢** or **10A** terminal and the black test lead into the **COM** terminal.
3. Set the rotary switch to an appropriate measurement position in **A⎓** range.
4. Break the current path to be tested. Connect the red test lead to the more positive side of the break and the black test lead to the more negative side of the break.
5. Turn on power to the circuit.
   The measured value shows on the display.

Note

- If the value of current to be measured is unknown, use the maximum measurement position (10A) and **10A** terminal, and reduce the range step by step until a satisfactory reading is obtained.
- When DC current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

D. Measuring AC Current (See Figure 4)

⚠Warning

Never attempt an in-circuit current measurement where the voltage between terminals and ground is greater than 250V.
If the fuse burns out during measurement, the Meter may be damaged or the operator himself may be hurt. Use proper terminals, function, and range for the measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

The AC current ranges are: 200.0μA,2.000mA, 20.00mA, 200.0mA and 10.00A.

To measure current, do the following:

1. Turn off power to the circuit. Discharge all high-voltage capacitors.
2. Insert the red test lead into the **μAmA ⊣⊢** or **10A** terminal and the black test lead into the **COM** terminal.
3. Set the rotary switch to an appropriate measurement position in **A~** range.
4. Break the current path to be tested. Connect the red test lead to the more positive side of the break and the black test lead to the more negative side of the break.
5. Turn on power to the circuit.
   The measured value shows on the display. It is displayed as an RMS value of sine wave (mean value response).

Note

- If the value of current to be measured is unknown, use the maximum measurement position (10A) and **10A** terminal and reduce the range step by step until

a satisfactory reading is obtained.
- When AC current measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

E. Measuring Resistance (See Figure 5)

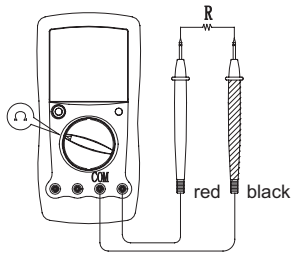

Figure 5

⚠Warning
To avoid damage to the Meter or to the devices under test, disconnect circuit power and discharge all the high-voltage capacitors before measuring resistance.

The resistance ranges are: 200.0Ω, 2.000kΩ, 20.00kΩ, 200.0kΩ, 2.000MΩand 20.00MΩ.

To measure resistance, connect the Meter as follows:
1. Insert the red test lead into the V Ω ⊣⊢ terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in Ω range.
3. Connect the test leads across with the object being measured.
   The measured value shows on the display.

Note
- The test leads can add 0.1Ω to 0.2Ω of error to the resistance measurement. To obtain precision readings in low-resistance, that is the range of 200Ω , short-circuit the input terminals beforehand and record the reading obtained (called this reading as X). (X) is the additional resistance from the test lead.
  Then use the equation:
  measured resistance value (Y) – (X) = precision readings of resistance.
- When shorted resistance value is ≥ 0.5Ω, please check for loose test leads or other reasons.
- For high resistance (>1MΩ), it normally takes several seconds to obtain a stable reading, and it is better to choose shorter test lead.
- When there is no input, for example in open circuit condition, the Meter displays **"1"**.
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

F.Testing Diodes & Continuity

⚠Warning
To avoid possible damage to the Meter and to the device under test, disconnect circuit power and discharge all high-voltage capacitors before testing diodes and continuity.

Testing Diodes (See Figure 6)

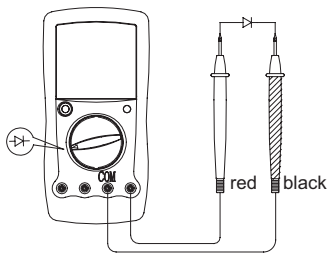

Figure 6

Use the diode test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

To test a diode out of a circuit, connect the Meter as follows:
1. Insert the red test lead into the VΩ⊣⊢ terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to ⊣⊢ .
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode.
   The measured value shows on the display.

Note
- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however, the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- Connect the test leads to the proper terminals as said above to avoid error display.
- The open-circuit voltage is around 3V when testing diode.
- The LCD will display **1** indicating open-circuit or wrong connection.
- The unit of diode is Volt (V), displaying the positive-connection voltage-drop value.
- When diode testing has been completed, disconnect the connection between the testing leads and the circuit under test.

Testing Continuity (See Figure 7)

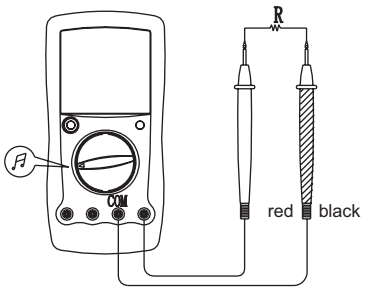

Figure 7

To test for continuity, connect the Meter as below:
1. Insert the red test lead into the VΩ⊣⊢ terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to ⊣⊢ .
3. Connect the test leads across with the object being measured.
   The buzzer does not sound when the resistance value is >100Ω. The circuit is disconnected.
   The buzzer sounds continuously when the resistance value is ⩽ 10Ω. The circuit is in good condition.

Note
- The LCD displays **1** indicating the circuit being tested is open.
- Open-circuit voltage is approx. 3V.
- When continuity testing has been completed, disconnect the connection between the testing leads and the circuit under test.

G.Battery Test (See Figure 8)

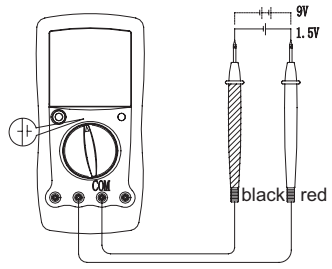

Figure 8

⚠Warning
To avoid damage to the built-In fuse and the Meter, measure the specified battery type and power supply only.

To carry out battery test, connect the Meter as follows:
1. Insert the red test lead into the μAmA⊣⊢ terminal and the black test lead into the **COM** terminal
2. Set the rotary switch to an appropriate measurement position in⊣⊢range.
3. Connect the red test lead on the anode of the battery being tested and the black test lead to the cathode in parallel..
4. The measured value shows on the display.

Note
- The range of 1.5V only fits for the measurement of 1.5V Battery. Inside load resistance is 38Ω.
- The range of 9V only fits for the measurement of 9V Battery. Inside load resistance is 450Ω.

General Specifications
- Maximum Voltage between any terminals and grounding: Refer to different range input protection voltage.
- ⚠Fuse Protection : H1A, 250V, fast type, 6x25mm of μA mA terminal
- ⚠Fuse Protection : H10A, 250V, fast type, 6x25mm of 10A terminal
- Measurement Speed : Updates 2-3 times /second.
- Maximum Display : 1999.
- Temperature : Operating: 0˚C~40˚C(32˚F ~104˚F).
  Storage: -10˚C~50˚C(14˚F ~122˚F).
- Relative Humidity : ⩽75% @ 0˚Cto below 30˚C; ⩽50% @ 30˚Cto 40˚C.
- Altitude : Operating : 2000m.
  Storage: 10000m.
- Battery Type : One piece of 9V (NEDA 1604 or 6F22 or 006P).
- Electro-Magnetic : When in an RF field of 1V/m: total accuracy = assigned accuracy + 5% of the range. Performance above 1V/m is not specified.
- Low Battery Indication : Display 🪫.
- Negative reading : Display −.
- Over Range Indicalion :Displayed Value>1999,display "1".(The safety and accuracy will only be guaranteed within the specified range.)
- Equipped with full icons display.
- Manual ranging.
- Polarity: Automatically display.
- Dimensions (HxWxL) : 179 x 88 x 39mm.
- Weight : 380g. (including holster and battery)
- Safety/Compliances : ETL CE(IEC/EN61010: CAT. II 1000V, CAT.III 600V Pollution,degreez.
- Certification : CE

Accuracy Specification
Accuracy:± (a% reading + b digits),guarantee for 1 year.
Operating temperature:18˚C~28˚C.
Relative humidity:<75%RH.
Temperature coefficient: 0.1 x (specified accuracy) / 1˚C.

A. DC Voltage

Range	Resolution	Accuracy	Overload Protection
200mV	0.1mV	±(0.5%+2)	230VAC
2V	1mV		1000V DC or 750V AC rms. continuous.
20V	10mV		
200V	100mV		
1000V	1V	±(0.8%+3)	

Remark: Input impedance: 10MΩ

B. AC Voltage

Range	Resolution	Accuracy	Overload Protection
2V	1mV	±(0.8%+5)	1000V DC or 750V AC rms. continuous.
20V	10mV		
200V	100mV		
750V	1V	±(1.0%+5)	

Remarks:
- Input impedance: 10MΩ .
- Frequency response: 40Hz~400Hz.
- Display RMS value of sine wave (mean value response).

C. DC Current

Range	Resolution	Accuracy	Overload Protection
200μA	0.1μA	±(0.8%+2)	Fuse H1A,250V, fast type,6x25mm
2mA	1μA		
20mA	10μA		
200mA	0.1mA		
10A	10mA	±(1.2%+5)	Fuse H10A,250V, fast type,6x25mm

Remarks:
- **At 10A Range:**
  For continuous measurement ⩽10 seconds and interval time between 2 measurement greater than 15 minutes.

D. AC Current

Range	Resolution	Accuracy	Overload Protection
200μA	0.1μA	±(1.0%+5)	Fuse H1A,250V, fast type,6x25mm
2mA	1μA		
20mA	10μA		
200mA	0.1mA		
10A	10mA	±(2.0%+5)	Fuse H10A,250V, fast type,6x25mm

Remarks:
- Frequency response: 40Hz – 400Hz.
- At 10A Range:
  For continuous measurement ⩽10 seconds and interval time between 2 measurement greater than 15 minutes.
- Displays RMS value of sine wave (mean value response).

E. Resistance

Range	Resolution	Accuracy	Overload Protection
200Ω	0.1Ω	±(0.8%+3) + shorted value	230V rms
2kΩ	1Ω	±(0.8%+3)	
20kΩ	10Ω		
200kΩ	100Ω		
2MΩ	1kΩ		
20MΩ	10kΩ	±(1.2%+5)	

F. Diodes & Continuity Test

Range	Resolution	Overload Protection
⊣⊢	1mV	230V rms
🔊	1Ω	

Remarks:
- **At⊣⊢ Range:**
  Open circuit voltage approximate 3V.
- **At 🔊 Range:**
  Open circuit voltage approximate 3V.
  The buzzer does not sound when the resistance value is >100Ω. The circuit is disconnected.
  The buzzer sounds continuously when the resistance value is ⩽10Ω. The circuit is in good condition.

Maintenance
This section provides basic maintenance information including battery and fuse replacement instruction.

⚠Warning
Do not attempt to repair or service your Meter unless you are qualified to do so and have the relevant calibration, performance test, and service information. To avoid electrical shock or damage to the Meter, do not get water inside the case.

A. General Service
- Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.
- To clean the terminals with cotton bar with detergent, as dirt or moisture in the terminals can affect readings.
- Turn the Meter off when it is not in use and take out the battery when not used for a long time.
- Do not store the Meter in a place of humidity, high temperature, explosive, inflammable and strong magnetic field.

B.Replacing the Fuses (See Figure 9)

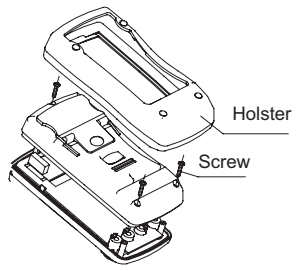

Figure 9

⚠ Warning
To avoid electrical shock or arc blast, or personal injury or damage to the Meter, use specified fuses ONLY in accordance with the following procedure.

To replace the Meter's fuse:
1. Turn the Meter off and remove all connections from the terminals.
2. Remove the holster from the Meter.
3. Remove the 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the fuse by gently prying one end loose, then take out the fuse from its bracket.
5. Install ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket.
   Fuse 1:H10A, 250V, fast type, 6x25 mm.
   Fuse 2: H1A, 250V, fast type, 6x25 mm.
6. Rejoin the case bottom and case top, and reinstall the 3 screws and holster.

Replacement of the fuses is seldom required. Burning of a fuse always results from improper operation.

C.Replacing the Battery (See Figure 9)

⚠Warning
To avoid false readings, which could lead to possible electric shock or personal injury , replace the battery as soon as the battery indicator 🪫 appears.

To replace the Meter's battery:
1. Turn the Meter power off and remove all connections from the terminals.
2. Take the Meter out from the holster.
3. Remove the 3 screws from the case bottom, and separate the case top from the case bottom.
4. Remove the battery from the battery connector.
5. Replace with a new 9V battery (NEDA1604, 6F22 or 006P).
6. Rejoin the case bottom and case top, and reinstall the 3 screws and the holster.

** END **

This operating manual is subject to change without notice.

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