

UT51~55 Operating Manual



Standard Digital Multimeter

Introduction

Digital Multimeter UT50 series (hereafter referred to as "the Meter") are 2000-count hand-held instruments featuring stable performance, versatile functions, high degree of reliability & accuracy. They are designed with large-scale integrated circuits, dual integral A/D converter as well as overloaded protection. The series can measure AC/DC voltage, AC/DC current, resistance, capacitance, frequency, temperature, diode and continuity, making the series a perfect tool for users.

Unpacking Inspection

Unpack the carton and take out the Meter. Check the following accessories for any missing or damaged component. Please contact your dealership immediately if any missing or damaged component is found.

Operating Manual-----1pc
Test Leads -----1 pair
WRN-01B Thermocouple----1set
(For UT53, UT55 Only)
Holster (Optional)

Safety Information

UT50 Series are designed and manufactured in compliance with: IEC61010, CAT 1000V, CAT 600V and CAT 300V, Double Insulation and Pollution Degree.

Warnings

Use the meter as specified in the manual, otherwise the protection offered by the Meter may be impaired.

- Do not use the Meter with back cover opened, it may cause electric shock.
- Set to a proper range for your measurement.
- Check the test leads for any damaged insulation or broken wires.
- Insert red and black test leads into proper input terminals and ensure good contact between them.
- Do not input signal beyond the rated values of the Meter, otherwise it may cause electric shock or damage to the Meter.
- Please use replacement parts with the same model or similar electrical specifications.
- To avoid electric shock, Do not apply any voltage above 1000V between COM and grounding.
- Please take caution when working voltage go above 60VDC or 30VAC RMS.
- To ensure the accuracy, please replace the batteries as soon as " " appears.
- Shut off the power timely after the measurements complete. Take out the batteries if not used for a long time.
- Do not use the Meter in places exposed to high temperature, high moisture. The performance of the Meter may be compromised if moisture-affected.
- To prevent damage to the Meter or personal injury, do not alter internal wiring randomly.

International Electrical Symbols

	Low Battery		Earth Ground
	Caution		Double Insulated
	AC		Diode
	DC		Buzzer
	Fuse		
	Dangerous Voltages		

Your Meter's Features

- 32 ranges.
- Liquid Crystal Display, digits height is 27mm.
- Overload display I.
- Maximum display 1999 (3 1/2 digit).
- Full range overload protection.
- Auto-Power Off (For UT53, UT54 and UT55 ONLY).
- Temperature:
Operating: 0°C to 40°C (32°F to 104°F).
Storing: -10°C to 50°C (14°F to 122°F).
- Altitude:
Operating: 2000m
Storing: 10000m.
- Relative Humidity: Max. relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- Low Battery display " ".
- Battery Type: 9V NEDA 1604 or 6F22 or 006P
- Strap for easy carry.
- Tilt stand design, three observation angles, is in favor of reading display.
- Dimension: 190mm x 88mm x 34mm.
- Weight: Meter only(excluding test leads) about 270g .Meter + holster + tilt stand about 550g.

Specifications

Accuracy is specified for one year after calibration, at operating temperatures 23°C +/- 5°C, with relative humidity at < 75%. Accuracy specifications take the form of: +/- (a% readings + digits)

Direct Current Voltage (DC Voltage)

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
200mV	100μV	± (0.5% + 1)				
2V	1mV					
20V	10mV					
200V	100mV					
1000V	1V	± (0.8% + 2)				

△ Input impedance: 10MΩ for all ranges.
Overload protection: 250VDC or AC RMS for 200mV range. 750VRMS or 1000Vp-p for other ranges.

Alternating Current Voltage (AC Voltage)

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
200mV	100μV	± (1.2% + 3)				
2V	1mV					
20V	10mV					
200V	100mV					
750V	1V	± (1.2% + 3)				

△ Input impedance: 10MΩ for all ranges.
Frequency: 40Hz-400Hz .
Overload protection: 250VDC or AC RMS for 200mV range. 750VRMS or 1000Vp-p for other ranges.

Display: Average Value (RMS of Sine Wave).

Direct Current Current (DC Current)

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
20μA	0.01μA	± (2% + 5)				
200μA	0.1 μA					
2mA	1 μA	± (0.8% + 1)				
20mA	10μA					
200mA	100 μA	± (1.5% + 1)				
2A	1mA	± (1.5% + 1)				
10A	10mA					
20A		± (2% + 5)				

△ Overload protection:
For UT51:
2A, 250V fast acting fuse, φ5x20mm(below 2A range)
10A, 250V fast acting fuse, φ5x20mm(at 10A range) .

For UT52/53/54/55:
315mA, 250V fast acting fuse, φ5x20mm (No fuse at 20A range).
Max current input :

For UT51: 10A (The measurement time for high current should be less than 10 seconds, and the interval time between two measurements should be greater than 15 minutes).

For UT52/53/54/55: 20A (The measurement time for high current should be less than 15 seconds, and the interval time between two measurements should be greater than 15 minutes).

Alternating Current Current (AC Current)

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
200μA	0.1μA	± (1.8% + 3)				
2mA	1μA					
20mA	10μA	± (1% + 3)				
200mA	100 μA					
2A	1mA	± (1.8% + 3)				
10A	10mA					
20A		± (3% + 7)				

△ Overload protection:

For UT51:

2A, 250V fast acting fuse, φ5x20mm(below 2A range)
10A, 250V fast acting fuse, φ5x20mm(at 10A range) .

For UT52/53/54/55:

315mA, 250V fast acting fuse, φ5x20mm (No fuse at 20A range).

Max current input :

For UT51: 10A (The measurement time for high current should be less than 10 seconds, and the interval time between two measurements should be greater than 15 minutes).

For UT52/53/54/55: 20A (The measurement time for high current should be less than 15 seconds, and the interval time between two measurements should be greater than 15 minutes).

Measuring voltage drop: 200mV for full ranges.
Display: Average Value (RMS of Sine Wave) .

Resistance

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
200Ω	0.1Ω	± (0.8% + 3)				
2KΩ	1Ω					
20KΩ	10Ω					
200KΩ	100Ω					
2MΩ	1KΩ	± (0.8% + 1)				
20MΩ	10KΩ					
200MΩ	100KΩ	± (5% (-10) + 10)				

△ Voltage at open circuit: ≤ 700mV (200MΩ range, open circuit voltage around 3V) .

Overload protection: 250VDC or AC RMS for all ranges.

Caution: At 200MΩ range, as test lead is short circuit the LCD normally display 10 digits is normal, deduct the 10 digits from the measured reading during measuring.

Capacitance

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
2nF	1pF	---				
20nF	10pF					
200nF	100pF					
2μF	1nF					
20μF	10nF					

△ Testing signal: around 400Hz 40mVrms

Frequency

Range	Resolution	Accuracy				
		UT51	UT 52	UT53	UT54	UT55
2kHz	1Hz	---				
20kHz	10Hz					

△ Input sensitivity: ≥ 100mVrms. Overload protection: 250Vrms.

Temperature

Range	Resolution	Accuracy		
		UT51, 52, 54	UT53	UT55
-20°C to 0°C	1°C	---		
0°C to 400°C				
400°C to 1000°C		± 2%		

Diode Test and Continuity Beeper

Range	Comment	Measuring Condition
	Display diode forward-voltage near value, Unit "mV"	Forward DC current abt 1mA Backward DC voltage about 2.8V
	Beeper sounds if Continuity Resistance ≤ 70Ω. Display near value. Unit "Ω"	Voltage at open circuit about 2.8V

△ Overload protection: 250V DC or AC RMS.

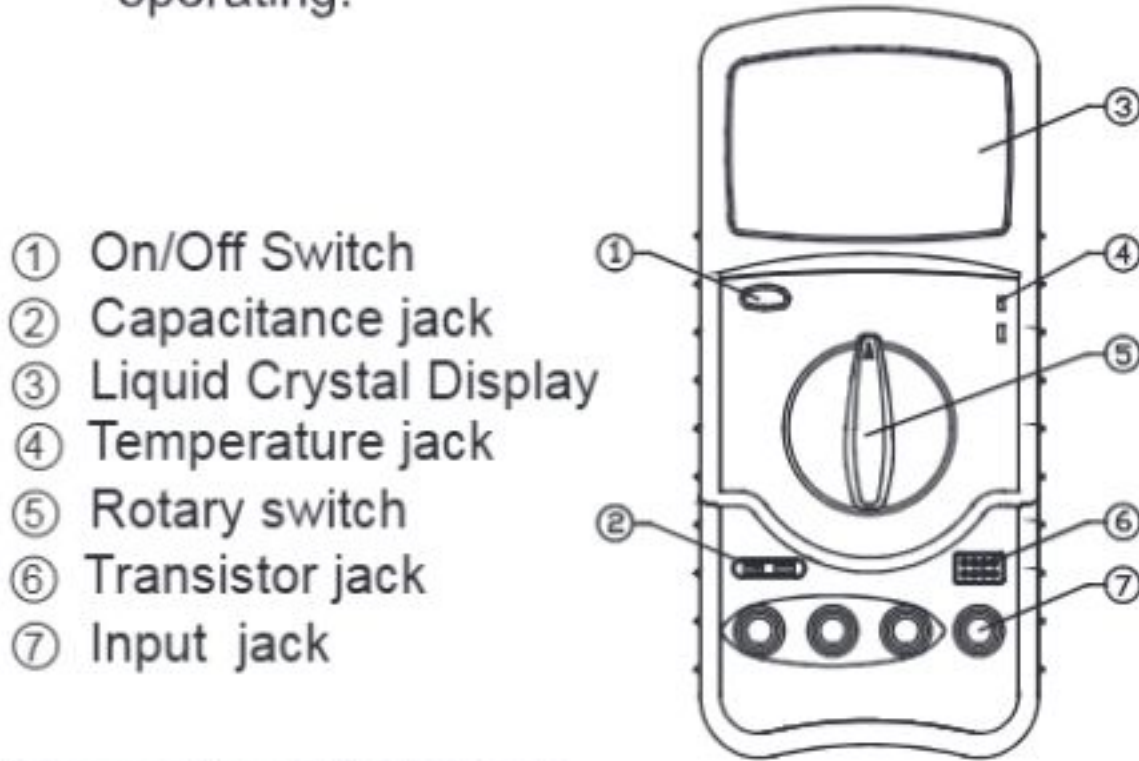
Transistor hFE test

Range	Comment	Measuring Condition
hFE	Can measure NPN or PNP transistor hFE. Range: 0-1000β	Basic polarity current abt 10μA, Vce about 2.8V

Making Measurements

Caution:

- (1) If there is no display or "1" is shown on the LCD when the Meter is switched on, replace the battery as soon as possible
- (2) Never exceed the maximum input voltage or current limits shown besides the input jacks "Δ", otherwise the Meter will be damaged and this is dangerous to life.
- (3) Turn the rotary switch to proper range before operating.



Measuring DC Voltage

1. Connect the black test lead to "COM" jack and red test lead to "V" jack.
2. Set the rotary switch to "V".
3. Connect the test leads across with the object to be measured. LCD appears the measuring value and also the polarity of the red test lead.

Caution

- (1) If magnitude of the voltage is unknown, always start with the highest range and reduce until satisfactory reading is obtained.
- (2) If "1" is shown on the LCD, which means the Meter is overloaded, then set to a higher measurement range.
- (3) "Δ" means never exceed the maximum input limits 1000V, otherwise internal circuit of the Meter will be damaged.
- (4) Take extra care of voltage leakage when measuring high voltage.

Measuring AC Voltage

1. Connect the black test lead to "COM" jack and red test lead to "V" jack.
2. Set the rotary switch to "V~".
3. Connect the test leads across with the object to be measured.

Caution

- (1) Refer to "DC Voltage Caution" 1, 2, 4.
- (2) "Δ" means never exceed the maximum input limit 750V, otherwise internal circuit of the Meter will be damaged.

Measuring DC Current

1. Connect the black test lead to "COM" jack. When measuring 200mA (2A for UT51) or below, connect the red test lead to mA jack. When measuring 20A (10A) or below, connect the red test lead to "A" jack.
2. Set the rotary switch to "A".
3. Connect the test leads in series with the object to be measured, the LCD display the measuring value and polarity of red test lead.

Caution

- (1) If magnitude of the current is unknown, always start with the highest range and reduce until satisfactory reading is obtained.
- (2) If "1" is shown on the LCD, which means the Meter is overloaded, then set to a higher measurement range.
- (3) "Δ" means never exceed the maximum input limit 200mA (2A for UT51), otherwise will cause the burn of fuse. 20A range does not have fuse protection while UT51 at 10A range has.

Measuring AC Current

1. Connect the black test lead to "COM" jack. When measuring 200mA (2A for UT51) or below, connect the red test lead to mA jack. When measuring 20A (10A), connect the red test lead to "A" jack.
2. Set the rotary switch to "A~".
3. Connect the test leads in series with the object to be measured.

Caution

- (1) Please refer to DC Current Caution 1, 2, 3.

Measuring Resistance

1. Connect the black test lead to "COM" jack and red test lead to "Ω" jack.
2. Set rotary switch to "Ω".
3. Connect the test leads across with the object to be measured.

Caution

- (1) If "1" is shown on the LCD, which means the Meter is overloaded, then set a higher measuring range. If resistance is above 1MΩ, the reading will only be steady after few seconds which is normal for measuring high value of resistance.
- (2) "1" is displayed when open circuit or no input.
- (3) Cut off the power to the circuit and discharge all capacitors before measuring resistance.
- (4) 10 digits display when short-circuiting 200MΩ, which should be subtracted from subsequent measured readings. For example, when measuring 100MΩ, the reading is 101.0, which should subtract the 10 digits to obtain a accurate reading.

Measuring Capacitance

Before measuring capacitance, remember it takes time for zeroing when changing ranges. Floating reading does not affect accuracy.

- (1) To avoid damage to the Meter or the equipment under testing, disconnect circuit powers and discharge capacitors before measuring capacitance.
- (2) Connect capacitor to the capacitance jack.
- (3) It takes some time to get a stable reading when measuring high capacitance.
- (4) Unit: 1pF=10⁻⁶μF, 1nF=10⁻³μF

Measuring Frequency

1. Connect red test lead to "Hz" jack and black test lead to "COM" jack.
2. Set the rotary switch to "kHz".
3. Connect the test leads across with the object being measured. LCD appears the measuring value.

Measuring Temperature

Connect one end of the bread temperature probe to the Meter and the other end to top or inside of the object being measured. LCD displays the measuring value with unit as "°C".

Measuring Diode and Continuity beeper

1. Connect the black test lead to "COM" jack and red test lead to "V" jack.
2. Set the rotary switch to "→" or "←".
3. Connect the test lead across with the object being measured. LCD appears the measuring value.
4. Connect the test lead to two ends of the object being measured, the beeper sounds if the resistant value between the two ends is less than 70Ω.

Measuring Transistor hFE

1. Set rotary switch to hFE.
2. Identify NPN or PNP, connect objects to the correspondent transistor jack.
3. LCD displays measuring value.
4. Measuring condition:
I_b ≈ 10μA, V_{ce} ≈ 2.8V

Auto-Power Off function(Only for 53 54 55)

1. The Meter equips with auto-power off function. It will be in a sleep condition once it has worked about 15 minutes, which only consume 7μA current during that time.
2. Press the on/off switch two times to power up again.

Maintenance

General Service

The Meter is a highly precise electrical testing instrument, do not attempt to change the circuit of your Meter on your own. Take a note of the following few points:

1. Do not input to DC Voltage above 1000V or AC above 750V RMS.
2. Do not input Voltage when the rotary switch is in "Current Range", "Ω" → "→" and "←".
3. Do not operate the Meter if battery is not inside the Meter or bottom cabinet is not securely screwed.
4. Disconnect the test leads and power off the Meter before replacing the Battery and Fuses.

Replacing the Battery

Caution

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 battery:

1. Disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.
2. Turn the Meter power OFF.
3. Remove the holster from the Meter.
4. Remove rubber feet and screws from the case bottom, and separate the case bottom from the case top.
5. Remove the battery from the battery compartment.
6. Replace the battery with a new 9V battery (NEDA 1604 or 6F22 or 006P).
7. Rejoin the case bottom and case top, and install the screws and rubber feet.

Replacing the Fuses

Caution

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.

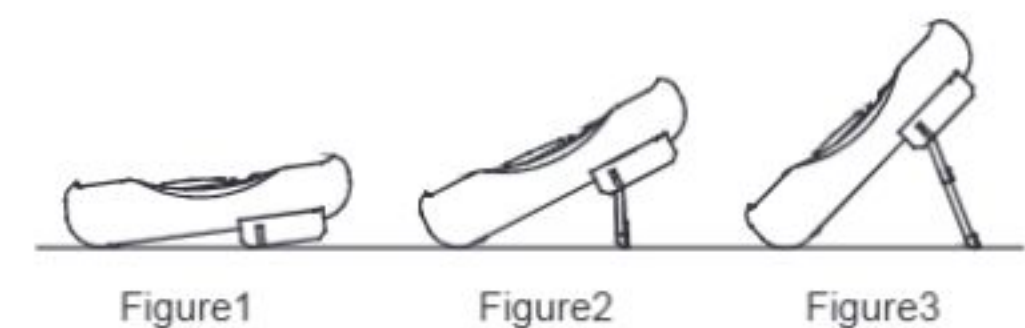
To replace the Meter's fuse:

1. Disconnect the connection between the testing leads and the circuit under test, and remove the testing leads away from the input terminals of the Meter.
2. Turn the Meter power OFF.
3. Remove the rubber feet and screws from the case bottom, and separate the case bottom from the case top.
4. Remove the fuse by gently prying one end loose, and 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.
UT51: 2A, 250V fast acting fuse, φ5x20mm (below 2A range)
10A, 250V fast acting fuse, φ5x20mm (at 10A range)
UT52/53/54/55: 315mA, 250V fast acting fuse, φ5x20mm
6. Rejoin the case bottom and the case top, and install the screw and rubber feet
Replacement of fuses is seldom required. Burning of a fuse always results from the improper operation.

Using Holster

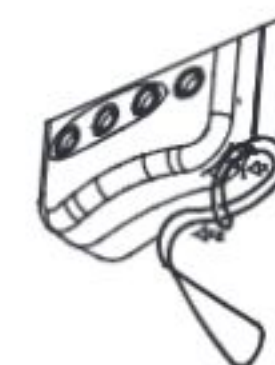
Three different ways to use holster:

1. Set holster parallel on the table, do not open the tilt stand (see diagram 1).
2. Set holster in a small angle on the table, tilt it up by the first part of tilt stand (see diagram 2).
3. Set holster in a large angle on the table, tilt it up by all two parts of tilt stand (see diagram 3).



Using Strap

1. Put the front end of the strap through the round metal of the Meter, see part 1 of the below diagram.
2. Put the bottom end of the strap through the front part and tie it up, see part 2 of the below diagram.



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* The manual is subject to changes without separate notice. *

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