UT33B/C/D

Operating Manual

Palm Size Digital Multimeter

Safety Information

This Meter complies with the standards IEC61010: in pollution degree 2, overvoltage
category (CAT I 600V, CAT II 300V) and double insulation.
CAT. I: Signal level, special equipment or parts of equipment, telecommunication,electronic, etc., with smaller transient overvoltages than overvoltages CAT. II.
CAT. II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than CAT. III
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 on.
International electrical symbols used on the Meter and in this Operating Manual are explained on page 10.

Rules For Safe Operation

⚠ 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.**
- **Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.**
- **The rotary switch should be placed in the right position and no any changeover of range shall be made during measurement is conducted to prevent damage of the Meter.**
- **When the Meter working at an effective voltage over 60V in DC or 42V rms in AC, special care should be taken for there is danger of electric shock.**
- **Use the proper terminals, function, and range for your measurements.**
- **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.**
- **When using the test leads, keep your fingers behind the finger guards.**
- **Disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes and current.**
- **Before measuring current, check the Meter's fuses and turn off power to the circuit before connecting the Meter to the circuit.**
- **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.**
- **Remove test leads and temperature probe from the Meter and turn the Meter power off before opening the Meter case.**
- **When servicing the Meter, use only the same model number or identical electrical specifications replacement parts.**
- **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.**
- **The Meter is suitable for indoor use.**
- **Turn the Meter off when it is not in use and take out the battery when not using 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.**

⎓	AC or DC		Low Battery
~	AC Current	→|	Diode
⎓	DC Current	▬	Fuse
⏚	Earth Ground	•))	Continuity Test
▣	Double Insulated	⚠	Safety Ruless
CE	Conforms to Standards of European Union		

The Meter Structure (figure 1)

1) LCD Display
2) HOLD Button
3) Display Backlight Button
4) Rotary Switch
5) COM Input Terminal
6) 10A Input Terminal
7) Other Input Terminals

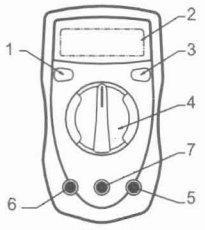

Figure 1

Below table indicated for information about the functional button operations.

Button	Operation Performed
HOLD button	• Press **HOLD** once to enter hold mode. • Press **HOLD** again to exit hold mode. • In Hold mode, is displayde an the present value shown.
BLUE button	• Press **BLUE** button once to turn the display backlight on. • Press **BLUE** button again to turn the display backlight off. • Display backlight will NOT be automatically off unless pressing the **BLUE** button.

Measurement Operation

A. DC Voltage Measurement(see figure 2)

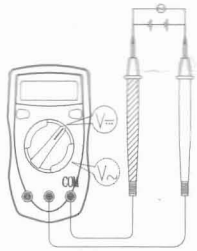

Figure 2

⚠ Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 500V although readings may be obtained.

The DC Voltage ranges are: 200mV, 2000mV, 20V,200V and 500V. To measure DC voltage, connect the Meter as follows:
1. Insert the red test lead into theVΩmAterminal 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.

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (500V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays "1" indicating the existing selected range is overload; 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. 10ΩW. 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. AC Voltage Measurement (see figure 2)

⚠ Warning

To avoid harms to you or damages to the Meter from electric shock, please do not attempt to measure voltages higher than 500Vrms although readings may be obtained.

The AC voltage measurement positions are: 200V and 500V. To measure AC Voltage,
connect the Meter as follows:
1. Insert the red test lead into the **VΩmA** 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 effective value of sine wave (mean value response).

Note

- If the value of voltage to be measured is unknown, use the maximum measurement position (500V) and reduce the range step by step until a satisfactory reading is obtained.
- The LCD displays "1" indicating the existing selected range is overload, 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. DC Current Measurement (see figure 3)

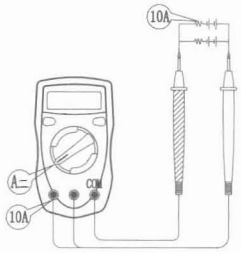

Figure 3

⚠ Warning

Never attempt an in-circuit current measurement where the voltage between terminals and ground is greater than 60V. 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 Model UT33B: the current measurement has 3 measurement positions on the rotary switch: 200μA, 200mA and 10A.
The Model UT33C/UT33D: the current measurement has 4 measurement positions on the rotary switch: 2000μA, 20mA, 200mA and 10A

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 **VΩmA** 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 reduce the range step by step until a satisfactory reading is obtained.
- When current measurement has been completed, disconnect the connectionbetween the testing leads
- and the circuit under test.

D. Measuring Resistance (see figure 4)

Figure 4

⚠ Warning

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

The Model UT33B/UT33C: The resistance measurement positions are: 200Ω, 2000Ω,20kΩ, 200kΩ and 20MΩ.
The Model UT33D: The resistance measurement positions are: 200Ω, 2000Ω, 20kΩ, 200kΩ,20MΩ and 200MΩ
To measure resistance, connect the Meter as follows:
1. Insert the red test lead into the **VΩmA** 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 0.3Ω of error to resistance measurement. To obtain precision readings in low-resistance measurement, 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.
- For high-resistance measurement (>1MΩ), it is normal taking several seconds to obtain a stable reading.
- When resistance measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

E. Diodes and Continuity Measurement (see figure 5)
Testing Diodes

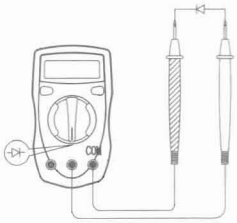

Figure 5

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

Use the diode test to check diodes,transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, and 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 **VΩmA** terminal and the black test lead into the **COM** terminal.
2. Set the rotary switch to ⊣◀ **(The Model: UT33B)** or ⊣◀ •)) **(The Model: UT33C/UT33D)**
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 LCD will display "1" indicating open-circuit for 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.

The Model UT33C/UT33D: Testing for Continuity
To test for continuity, connect the Meter as below:
1. Insert the red test lead into the **VΩmA** 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 sounds if the resistance of a circuit under test is less than 70Ω.

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

F. Model UT33C: Temperature Measurement (see figure 6)

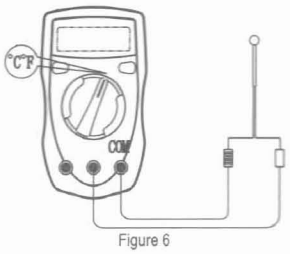

Figure 6

⚠ Warning
To avoid harms to you or damages to the Meter, please do not attempt to input voltages higher than 60V in DC or 30V in AC.
The Temperature measurement range is -40℃~1000℃or -40℉~1832℉.To measure temperature, connect the Meter as follows:
1. Insert the red temperature probe into the **VΩmA** terminal and the black temperature probe into the **COM** temperature.
2. Set the rotary switch to℃ or℉.
3. Place the temperature probe to the object being measured.
The measured value shows on the display.

Note
- The Meter automatically displays the temperature value inside the Meter when there is no temperature probe connection.
- The included point contact temperature probe can only be used up to 250℃(482℉).For any measurement higher than that, the rod type temperature probe must be used instead.
- When temperature measurement has been completed, disconnect the connection between the testing leads and the circuit under test.

G. The Model UT33B: Battery Test (see figure 7)

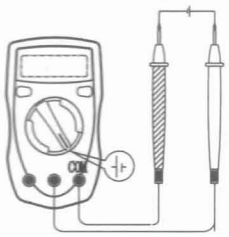

Figure 7

⚠ Warning
To avoid harms to you or damages to the Meter,please do not attempt to input voltages higher than 60V in DC or 30V in AC.
To test the battery, proceed as follows:
1. Insert the red test into the **VΩmA** terminal and the black test leads into the **COM** terminal.
2. Set the rotary switch to an appropriate measurement position in ⊣ range.
3. Connect the test leads across with the battery being measured ensuring the polarity is correct.
The measured value shows on the display, which is the voltage between the cathode and anode of the battery.

Note
- When battery testing has been completed, disconnect the connection between the testing leads and the circuit under test.

H. The Model UT33D: Square Wave Output
⚠ Warning
To avoid damages to the Meter, do not allow output terminals (red test lead) to reach higher than 10V.
To measure square wave output proceed as follows:
1. Set the rotary switch to ⊣⊢ OUT.
2. The square wave signal outputs between **VΩmA** and **COM** Terminals.

Note
- The frequency is approx. 50Hz.
- The output scope higher than 3Vpp when it is loaded 1MΩ.
- When square wave output testing has been completed, disconnect the connection between the testing leads and the circuit under test.

General Specifications
- Maximum Voltage (including transient overvoltage) between any Terminals and Grounding: 500V rms.
- Fused Protection for VWmA Input Terminal: 315mA, 250V fast type, ϕ5x20 mm
- 10A Terminal: Un-fused.
- Range: Manual ranging
- Maximum Display: Display: 1999.
- Measurement Speed: Updates 2~3 times /second.
- Temperature:
  Operating: 0℃~40℃ (32℉~104℉).
  Storage: -10℃~50℃ (14℉~122℉).
- Relative Humidity:75% @ 0℃ - 30℃;≤50% @ 31 - 40℃.
- Altitude: Operating: 2000 m.
  Storage: 10000 m.
- Battery Type: One piece of 9V Battery NEDA 1604 or 6F22 or 006P.
- Battery Deficiency: Display: ⊟ .
- Negative reading: Display: — .
- Overloading: Display: 1.
- Dimensions (HxWxL): 130 x 73.5 x 35mm.
- Weight: Approx. 156g (battery included).
- Safety/Compliances: IEC61010 CAT.I 600V overvoltage and double insulation standard.
- Certification: CE

Accuracy Specification
Accuracy: (a% reading + b digits), guarantee for 1 year.
Operating temperature: 23℃ ± 5℃.
Relative humidity: <75%.
Temperature coefficient: 0.1 x (specified accuracy) / 1℃.

A. DC Voltage

Range	Resolution	Accuracy			Overload Protection
		UT33B	UT33C	UT33D	
200mV	100μV	±(0.5%+2)			250V DC or AC
2000mV	1mV				500V DC or AC
20V	10mV				
200V	100mV				
500V	1V	±(0.8%+2)			

Remark: Input impedance: 10MΩ.

B. AC Voltage

Range	Resolution	Accuracy			Overload Protection
		UT33B	UT33C	UT33D	
200V	100mV	±(1.2%+10)			500V DC or AC
500V	1V				

Remarks:
1.Input impedance: approx. 5MΩ.
2.Displays effective value of sine wave (mean value response).
3.Frequency response 40Hz ~ 400Hz.

C. DC Current

Range	Resolution	Accuracy			Overloaf Protection
		UT33B	UT33C	UT33D	
200μA	0.1μA	±(1%+2)	·····		315mA, 250V fast type fuse: 5x20mm
2000μA	1μA	·····	±(1%+2)		
20mA	10μA				
200mA	100μA	±(1.2%+2)			
10A	10mA	±(2%+5)			Un-Fused

Remark:
1.At 10A Range: For continuous measurement ≤ 10 seconds and interval not less than 15 minutes.

D. Resistance

Range	Resolution	Accuracy			Overloaf Protection
		UT33B	UT33C	UT33D	
200Ω	0.1Ω	±(0.8%+5)			250V DC or AC
2000Ω	1Ω	±(0.8%+2)			
20KΩ	10Ω				
200KΩ	100Ω				
20MΩ	10KΩ	±(1%+5)			
200MΩ	100KΩ	±[5%(reading-10)+10) UT33D			

E. Diodes and Continuity Measurement (Continuity test only for UT33C/UT33D)

Range	Resolution	Remark	Overloaf Protection
⊣◀	1mV	Display approximate forward voltage drop:0.5v~0.8v	250V DC or AC
•))	1Ω	Buzzer beeps at<70W	

F. The Model UT33C: Temperature

Range	Resolution	Remark	Overloaf Protection
-40℃~150℃	1℃	±(1%+3)	250V DC or AC
150℃~1000℃		±(1.5%+15)	
-40℉~302℉	1℉	±(1%+4)	
302℉~1832℉		±(1.5%+15)	

G. The Mode UT33B:Battery Test

Range	Resolution	Internal Resistance
12V	10mV	240Ω
9V	10mV	1.8KΩ
1.5V	10mV	30Ω

H. The Mode UT33D:Square Wave Output

Range	Illustration
⊣⊢ OUT	Approx.output 50Hz square wave signel.As a simple signal source with 47KΩ resistance output.

Remark:
1.No overload protection.
2.Make sure voltage output of calibrated equipment level is less than 10V to avoid damages to the meter.

Maintenance
Replacing the Battery and Replacing the Fuses
⚠ Warining(Replacing the Battery)
To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator
" ⊟ "appears.
⚠ Warining(Replacing the Fuses)
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 battery and fuses:
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 to OFF position.
3. Remove the screw from case bottom, and separate the case bottom from the case top.
4. Remove the battery from the battery compartment.
5. Remove the fuse by gently prying one end loose, and then take out the fusefrom its bracket.
6. Replace the battery with a new 9V battery (NEDA 1604 or 6F22 or 006P).
7. Install ONLY replacement fuses with the identical type and specification as follows and make sure the fuse is fixed firmly in the bracket. 315mA, 250V, fast type, ϕ 5x20mm.
8. Rejoin the case bottom and case top, and reinstall the screw.

*** END ***

This opeating manual is subject to change without notice

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