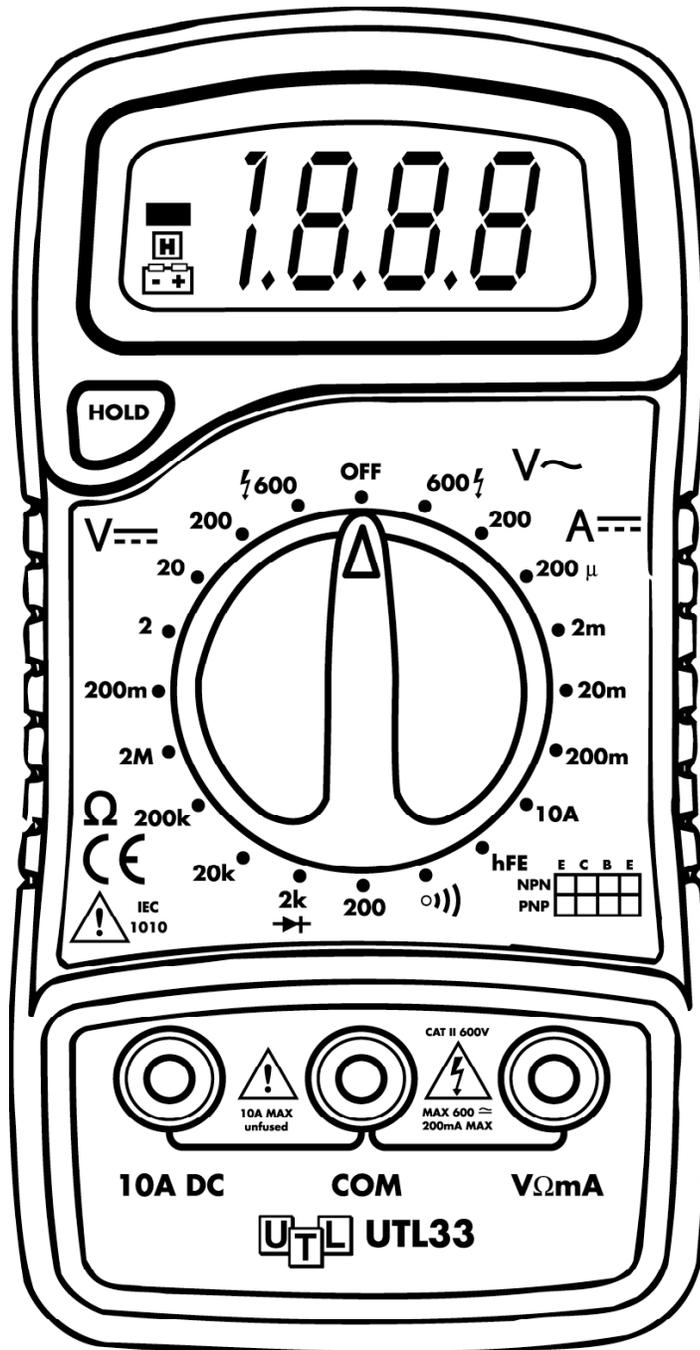


# UTL

## INSTRUCTION MANUAL

# UTL33

# Digital Multimeter



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## Introduction

The UTL33 is a full featured digital multimeter. It has the measurement functions (including temperature) needed to help technicians successfully troubleshoot, repair and verify appliance operation.

### Features include

- AC Voltage 200V/600V
- DC Voltage 200mV/2V/20V/200V/600V
- DC current 200µA/2mA/20mA/200mA/10A
- Resistance 200Ω/2kΩ/20kΩ/200kΩ/200MΩ
- Audible continuity
- Data hold
- Impact resistant boot with a tilt stand
- Compact pocket-design fits easily in tight spaces

## Safety Notes

Before using this meter, read all safety information carefully. In this manual the word "**WARNING**" is used to indicate conditions or actions that may pose physical hazards to the user. The word "**CAUTION**" is used to indicate conditions or actions that may damage this instrument.



### WARNING!

*Exceeding the specified limits of this meter is dangerous and can expose the user to serious or possibly fatal injury.*

- **DO NOT** attempt to measure any voltage that exceeds 600 volts with this meter - UEi offers numerous alternatives for measuring high voltage and current
- Voltages above 60 volts DC or 30 volts AC may constitute a serious shock hazard
- **DO NOT** attempt to use this meter if either the meter or the test leads have been damaged. Send unit in for repair by a qualified repair facility
- Test leads must be fully inserted prior to taking measurements
- Always turn off power to a circuit (or assembly) under test before cutting, unsoldering or breaking the current path. Even small amounts of current can be dangerous
- Always disconnect the live test lead before disconnecting the common test lead from a circuit
- When measuring high voltage, disconnect the power source before making test lead connections. Connect the test leads to the meter first then to the circuit under test. Reapply power
- If any of the following indications occur during testing, turn off the power source to the circuit under test:
  - Arcing
  - Flame
  - Smoke
  - Extreme Heat
  - Smell of Burning Materials
  - Discoloration or Melting of Components

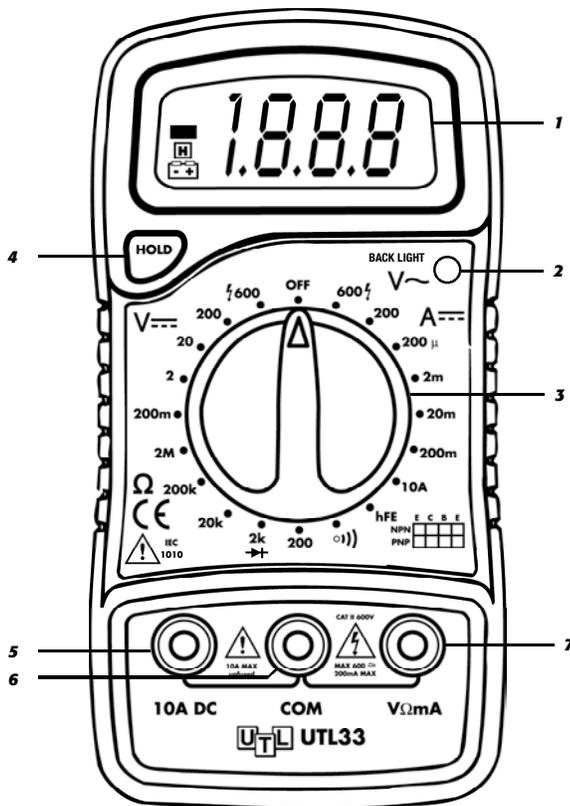
- Read the safety precautions associated with the equipment being tested and seek assistance or advice when performing unfamiliar tasks.
- Keep your fingers away from the test lead metal probe contacts and bus-bars when making measurements. Always grip the instrument and test-leads behind the hand guards (molded into the probes).
- In the event of electrical shock, ALWAYS bring the victim to the emergency room for evaluation, regardless of the victim's apparent recovery. Electrical shock can cause an unstable heart rhythm that may need medical attention.

## International Symbols

Dangerous Voltage	Ground
AC Alternating Current	Warning or Caution
DC Direct Current	Double Insulation (Protection Class II)
Either AC or DC	Fuse
Not Applicable to Identified Model	Battery

## Controls and Indicators

1. **Display:** 3-1/2 digit, 7 segment, 15 mm high LCD.
2. **Back Light:** (option) Push this button to turn on the back light.
3. **Rotary Switch:** This switch is used to select functions and desired ranges as well as to turn on/off the meter.
4. **Hold Button:** When this button is pushed, the display will keep the last reading and " " symbol will appear on the LCD until pushing it again.
5. **"10A" Jack:** Plug in connector for red test lead for 10A measurement.
6. **"COM" Jack:** Plug in connector for black (negative) test lead.
7. **"VΩmA" Jack:** Plug in connector for red (positive) test lead for voltage, resistance and current (except 10A) measurements.



## Operating Instructions

### DC Voltage Measurement

1. Connect the red test lead to the “VΩmA” jack and the black lead to the “COM” jack.
2. Set the rotary switch to the desired DC V position. If the voltage to be measured is not known beforehand, set range switch to the highest range position and then reduce it until satisfactory resolution is obtained.
3. Connect test leads across the source or load being measured.
4. Read voltage value on the LCD display along with the polarity of the red lead connection.

### DC Current Measurement

1. Connect the red test lead to the “VΩmA” jack and the black lead to the “COM” jack (For measurements between 200 mA and 10A, remove red lead to “10A” jack).
2. Set the rotary switch to the desired DC A position.
3. Open the circuit in which the current is to be measured, and connect test leads in series with the circuit.
4. Read current value on LCD display along with the polarity of red lead connection.

### AC Voltage Measurement

1. Connect the red test lead to the “VΩmA” jack and the black lead to the “COM” jack.
2. Set the rotary switch at desired AC V position.
3. Connect test leads across the source or load being measured.
4. Read voltage value on the LCD display.

### Resistance Measurement

1. Connect the red test lead to the “VΩmA” jack and the black lead to the “COM” jack (The polarity of red lead is positive “+”).
2. Set the rotary switch at desired AC V position.
3. Connect test leads across the resistor to be measured and read LCD display.
4. If the resistance being measured is connected to a circuit, turn off power and discharge all capacitors before applying test probes.

### Diode Test

1. Connect the red test lead to the “VΩmA” jack and the black lead to the “COM” jack (The polarity of red lead is positive “+”).
2. Set the rotary switch at “ $\rightarrow|$ ” position
3. Connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode. The approx. forward voltage drop of the diode will be displayed. If the connection is reversed, only figure “1” will be shown.

### Transistor Test

1. Set the rotary switch to “hFE” position.
2. Determine whether the transistor under testing is NPN or PNP and locate the emitter, base and collector leads. Insert the leads into proper holes of the “hFE” socket on the front panel.
3. Read the approximate “hFE” value at the test condition of base current 10μA and Vce 3V.

**NOTE:** To avoid electrical shock, remove test leads from measurement circuits before testing a transistor.

### Audible Continuity Test

1. Connect the red test lead to the “VΩmA” jack and the black lead to the “COM” jack.
2. Set the rotary switch at “ $\square$ ” position
3. Connect test leads to two points of circuit to be tested. If continuity exists, built-in buzzer will sound.

## Maintenance

### Periodic service



#### WARNING!

Repair and service of this instrument is to be performed by qualified personnel only. Improper repair or service could result in physical degradation of the meter. This could alter the protection from electrical shock and personal injury this meter provides to the operator. Perform only those maintenance tasks that you are qualified to do.

These guidelines will help you attain long and reliable service from your meter:

1. Calibrate your meter annually to ensure it meets original performance specifications.
2. Keep your meter dry. If it gets wet, wipe it dry immediately. Liquids damage electronic circuits.
3. Whenever practical, keep the meter away from dust and dirt, which can cause premature wear.
4. Although your meter is built to withstand the rigors of daily use, it can be damaged by severe impacts. Use reasonable caution when using and storing the meter.

### Cleaning and Decontamination

Periodically clean your meter's case using a damp cloth. **DO NOT** use abrasives, cleaning solvents or strong detergents, as they may damage the finish or affect the reliability of the structural components.

### Battery and Fuse Replacement

If "  " appears on display, it indicates that the battery should be replaced. Always use a fresh replacement battery of the specified size and type. Immediately remove the old or weak battery from the meter and dispose of it in accordance with your local disposal regulations. Old or defective batteries can leak chemicals that corrode electronic circuits.

To replace battery and fuse (200mA/250V) remove the 2 screws in the bottom of the case. Simply remove the old, and replace with a new one.



#### WARNING!

To avoid electric shock, be sure to turn off the meter's power and disconnect both test leads from any equipment before you remove or install batteries.

## Specifications

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

Maximum voltage between terminals and earth ground	CAT II 600V
Fuse protected	F 200mA/ 250V
Power	9V battery, NEDA 1604 or 6F22
Display	LCD, 1999 counts, updates 2-3/ sec
Measuring method	Dual-slope integration A/D converter
Over range indication	Only figure "1" on the display
Polarity indication	"-" displayed for negative polarity
Operating environment	0° to 40°C
Storage temperature	-10° to 50°C
Low battery indication	"  " appears on the display
Size	138 x 69 x 31 mm
Weight	Approx. 170g

### DC Voltage

Range	Resolution	Accuracy
200 mV	100 µV	±0.5% of reading ±2 digits
2 V	1 mV	
20 V	10 mV	
200 V	100 mV	
600 V	1 V	±0.8% of reading ±2 digits

Overload protection: 250V rms. For 200 mV range and 600V DC or rms. AC for other ranges.

### DC Current

Range	Resolution	Accuracy
200 µA	0.1 µA	±1% of reading ±2 digits
2 mA	1 µA	
20 mA	10 µA	
200 mA	100 µA	±1.5% of reading ±2 digits
10 A	10 mA	±3% of reading ±2 digits

Overload protection: F 200 mA/250V fuse. (10A range unfused)

### AC Voltage

Range	Resolution	Accuracy
200 V	100 mV	±1.2% of reading ±10 digits
600 V	1 V	

Overload protection: 600V DC or rms. AC for all ranges.

Frequency range: 40Hz to 400Hz.

Response: Average responding, calibrated in rms. of a sine wave.

## AC Voltage

Range	Description
	If continuity exists (about less than 1.5k), built-in buzzer will sound.
	Show the approx. forward voltage drop of the diode.

Overload protection: 250V DC or rms. AC.

## Resistance

Range	Resolution	Accuracy
200 $\Omega$	0.1 $\Omega$	$\pm 0.8\%$ of reading $\pm 3$ digits
2 k $\Omega$	1 $\Omega$	$\pm 0.8\%$ of reading $\pm 2$ digits
20 k $\Omega$	10 $\Omega$	
200 k $\Omega$	100 $\Omega$	
600 M $\Omega$	1 k $\Omega$	$\pm 1.0\%$ of reading $\pm 2$ digits

Maximum Open Circuit Voltage: 3.2V

Overload Protection: 250V DC or rms. AC for all ranges.

## Transistor "hFE" Test (0-1000)

Range	Test Range	Test Current	Test Voltage
NPN & PNP	0-1000	$I_b = 10 \mu A$	$V_{ce} = 3V$

# UTL UTL33

## Digital Multimeter

### Limited Warranty

The UTL33 is warranted to be free from defects in materials and workmanship for a period of one year from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEi's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEi shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

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*UTL is distributed by UEi*

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

