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## Introduction

The DL297T is an autoranging, true RMS digital multimeter that's packed full of functions, features, and outstanding value. This meter is unbeatable for portable power generator maintenance and electrical troubleshooting. Use temperature and frequency functions along with the process monitoring features to take on those tasks that you face daily in your technologically advanced workplace.

### Features include

- 1000 V DC / 750 V AC
- UL and CE listed
- Measures volts, amps, resistance, temperature, frequency and continuity
- Compare mode (CMP) for quick Go/No-Go tests
- HI/LO allows you to quickly recall upper and lower limits
- Relative mode (REL) displays change of value
- Record mode stores minimum, maximum and average values for 24 hours
- Hold features freezes the data on the display
- Fast responding analog bar-graph
- Low battery indicator and auto power-off with manual overdrive
- Ruggedized to withstand a ten foot drop

## 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.

- Always follow industry standard safety practices including protective clothing, gloves and safety glasses when appropriate
- Do not attempt to measure any voltage that exceeds the category-based rating of this meter
- Do not attempt to use this meter if either the meter or the test leads have been damaged. Turn it in for repair at a qualified repair facility
- Ensure meter leads are fully seated by making a quick continuity check of the leads prior to making voltage measurements
- Keep your fingers away from the test lead's metal probe contacts when making measurements. Always grip the leads behind the finger guards molded into the probes
- Use a current clamp adapter when measuring current that may exceed 10 amps. See the accessories in UEi's full-line catalog
- Do not open the meter to replace batteries or fuses while the probes are connected

### **WARNING!**

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

- DO NOT try to measure any voltage that exceeds 1000 DC or 750 AC volt peak
- Voltages above 25 volts AC or DC may constitute a serious shock hazard
- 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
- 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
- Higher voltages and currents require greater awareness of physical safety hazards - Before connecting the test leads; turn off power to the circuit under test; set the meter to the desired function and range; 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

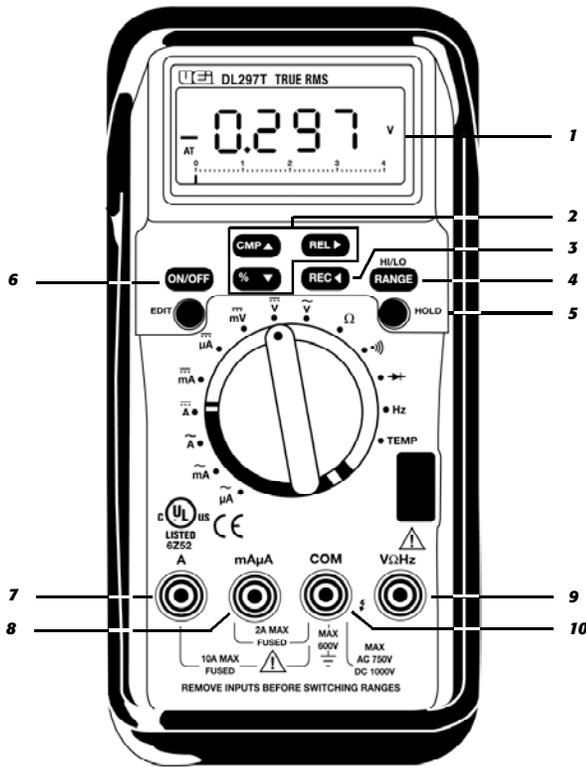
### **CAUTION!**

*Do not attempt to remove the meter leads from the circuit under test. The leads, the meter, or the circuit under test may have degraded to the point that they no longer provide protection from the voltage and current applied. If any of these erroneous readings are observed, disconnect power immediately and recheck all settings and connections*

## 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

## Contrds and Indicators



- Digital Display:** Readings are displayed on a 4-4/5 digit, 50,000 count (primary display) and 5,000 count (secondary display).
- "CMP", "REL" and "%" Push-buttons:** These three functions allow you to evaluate a stored reference value or values in the meter by comparing "CMP" or in relation to "REL" or as a percentage "%".
- REC Push-button:** Function allows you to record minimum, maximum and average values for a series of measurements on the same function and range.
- RANGE Push-button:** Puts the meter in manual range mode. holding it down for two seconds exits this mode.
- Hold Push-buttons:** Freezes the reading on the LCD for all functions and ranges.
- ON/OFF Push-buttons:** Turns the meter on and off. If the rotary switch or a push-button is not activated within 30 minutes, the meter automatically turns itself off.
- A Input Jack:** The red test lead is plugged into this jack for measuring current on the 10 AC or DC amp functions.
- mA $\mu$ A Input Jack:** The red test lead is plugged into this jack for measuring current on the 4m and 400m AC or DC amp functions.
- V $\Omega$ Hz Input Jack:** The red test lead is plugged into this jack for all AC V, DC V, Ohm, Continuity Buzzer, and Diode test functions.
- COM Input Jack:** The black test lead is plugged into this jack for all measurements except temperature.

## Operating Instructions

### Disabling the Auto Power Off Function

To disable the auto power off function for long-term measurements, turn the meter on while holding down the "HOLD" push-button. Auto power-off will be disabled until the meter is manually turned off.

### "CMP" Mode

Set the function and range switch to the desired location and turn on the meter. Depress the "CMP" push-button. You are now in the compare mode.

Now press the "EDIT" push-button. The "1" at the right side of the LCD will begin to blink and the arrow at the right of the bar graph will come on. This indicates that the value you put in will be the highest acceptable reading. Using the arrow push-buttons found on the "CMP, REL, % and REC" buttons, enter the HI value that you want your readings to be compared to.

Once the value is entered, press the "HI/LO" push-button. Now the arrow at the left of the bar graph will come on. This indicates that the value you put in will be the lowest acceptable reading. Using the arrow push-buttons, enter the LO value that you want your readings compared to.

Press the "EDIT" push-button to exit the mode. From this point on, all readings will be compared to the stored values and displayed on the LCD in one of three ways:

- "LO" - The reading is lower than the LO stored value
- "PASS" - The reading is between the stored values
- "HI" - The reading is higher than the HI stored value

### "REL" Mode

Set the function and range switch to the desired location. In the "REL" mode, the meter displays the difference between the stored value and the measured value.

Turn on the meter and press the "REL" push-button. "REL" will appear on the LCD and the bar graph pointer will be positioned at the center of the scale.

Press the "EDIT" push-button to exit the mode.

All measurements will be displayed as the difference between the stored value and the measured value. Negative readings are lower than the stored value. Positive readings are higher than the stored value. Pushing the "REL" button again exits the mode.

### "%" Mode

Set the function and range switch to the desired location. In the "%" mode, the meter displays the difference in percentage between the stored value and the measured value.

Turn the meter on and press the "%" push-button. The "%" sign will appear on the LCD and the bar graph pointer will be positioned at zero on the scale.

Press the "EDIT" push-button. Using the arrow buttons, enter the value you want the readings displayed as a percentage of. Once the value is entered, press the "EDIT" push-button to exit the mode.

All measurements will be displayed as the difference in percentage between the stored value and the measured value. Negative readings are lower than the stored value. Positive readings are higher than the stored value. Pushing the “%” button again exits the mode.

### “REC” Mode

This function allows you to record minimum, maximum and average values for a series of measurements on the same function and range.

Set the function and range switch to the desired location and turn on the meter. Press the “REC” push-button. “REC” will appear on the display.

The meter will beep every time a new maximum or minimum value is recorded. Press the “REC” button to scroll through the stored minimum, maximum and average values. This meter can only record in this mode for 24 hours.

Hold the “REC” button for two seconds to exit this mode.

### Disabling the Beeper

Hold down the “REC” push-button while turning on the meter.

### Changing the Temperature Function from °C to °F

Set the meter to °C mode. Hold down the “%” push-button while turning the meter on. °F will appear on the LCD.

### Measuring DC Volts



#### WARNING!

To avoid the risk of electrical shock, instrument damage and/or equipment damage, input voltages must not exceed 1000 V DC. Do not attempt to take any unknown voltage measurement that may be in excess of 1000 V DC.

1. Set function switch to the desired DC V range. If you do not know the value of the voltage to be measured, always start with the highest range and reduce the setting as required to obtain a satisfactory reading.
2. Plug the red test lead into the “VΩ” input jack and the black lead into the “COM” input jack of instrument.
3. Disconnect the power from the circuit to be tested.
4. Connect the test leads to the circuit to be tested.
5. Reapply power to the circuit. The measured voltage will appear on the display of the instrument.
6. If the red test lead is connected to the negative (or lower voltage) side of the circuit, a minus sign will appear on the left side of the display.
7. Disconnect power to the circuit before removing test leads from the circuit.

Function	Range	Resolution	Accuracy
DC V	400 mV	100 μV	±0.3% of reading, ±2 digits
	4 V	1 mV	±0.3% of reading, ±1 digit
	40 V	10 mV	
	400 V	0.1 V	
	1000 V	1 V	±0.75% of reading, ±3 digits

Maximum Input: 1000 DC V

### Measuring AC Volts



#### WARNING!

To avoid the risk of electrical shock, instrument damage and/or equipment damage, input voltages must not exceed 750 V peak AC. Do not attempt to take any unknown voltage measurements that may be in excess of 750 V peak AC.

1. Set function switch to the desired AC V range. If you do not know the value of the voltage to be measured, always start with the highest range and reduce the setting as required to obtain a satisfactory reading.
2. Plug the red test lead into the “VΩ” input jack and the black lead into the “COM” input jack of instrument.
3. Disconnect the power from the circuit to be tested.
4. Connect the test leads to the circuit to be tested.
5. Reapply power to the circuit. The measured voltage will appear on the display of the instrument.
6. Disconnect power to the circuit before removing test leads from the circuit.

Function	Range	Resolution	50-60Hz	45Hz-1KHz	1-10KHz	10-30KHz
AC V	4 V	1 mV	±0.75% +3 digits	±2.5% of reading ±5 digits	NA	NA
	40 V	10 mV				
	400 V	0.1 V			±2.5% of reading ±5 digits	
	750 V	1 V				

Maximum Input: 750 AC V peak

### Measuring DC Current (amps)



#### CAUTION!

The current functions are protected by a fuse of 600 volt rating. To avoid damage to the instrument, current sources having open circuit voltages greater than 600 volts DC or peak AC must not be measured.

**NOTE:** When taking current measurements, the meter must be connected in SERIES with the circuit, or circuit element under test. Never connect the test leads across a voltage source (in parallel). This can cause damage to the circuit under test or to the meter.

1. Set function switch to the desired DC A range. If you do not know the value of the voltage to be measured, always start with the highest range and reduce the setting as required to obtain a satisfactory reading.
2. Plug the red test lead into the “**A**” input jack and the black lead into the “**COM**” input jack of instrument.
3. Disconnect the power from the circuit to be tested.
4. Connect the test leads to the circuit to be tested.
5. Reapply power to the circuit. The measured voltage will appear on the display of the instrument.
6. Disconnect power to the circuit before removing test leads from the circuit.

Function	Range	Resolution	Accuracy	
μA	400	0.1 μA	±0.5% of reading, ±1 digit	
	4000	1 μA		
mA	40	0.01 mA		
	4000	0.001 A		
A	10	0.01		±1.0% of reading, ±5 digits

**NOTE:** “μA” and “mA” ranges are protected by a 2 amp, 600 volt fuse  
“A” range is protected by a 15 amp, 600 volt fuse

### Measuring AC Current (amps)



#### CAUTION!

The current functions are protected by a fuse of 600 volt rating. To avoid damage to the instrument, current sources having open circuit voltages greater than 600 volts DC or peak AC must not be measured.

**NOTE:** When taking current measurements, the meter must be connected in **SERIES** with the circuit, or circuit element under test. Never connect the test leads across a voltage source (in parallel). This can cause damage to the circuit under test or to the meter.

1. Set function switch to the desired AC A range. If you do not know the value of the voltage to be measured, always start with the highest range and reduce the setting as required to obtain a satisfactory reading.
2. Plug the red test lead into the “**A**” input jack and the black lead into the “**COM**” input jack of instrument.
3. Disconnect the power from the circuit to be tested.
4. Connect the test leads to the circuit to be tested.
5. Reapply power to the circuit. The measured voltage will appear on the display of the instrument.
6. Disconnect power to the circuit before removing test leads from the circuit.

Function	Range	Resolution	Accuracy	
μA	400	0.1 μA	±1.0% of reading, ±5 digit	
	4000	1 μA		
mA	40	0.01 mA		
	4000	0.001 A		
A	10	0.01		

**NOTE:** “μA” and “mA” ranges are protected by a 2 amp, 600 volt fuse  
“A” range is protected by a 15 amp, 600 volt fuse

### Measuring Resistance (ohms, continuity)



#### CAUTION!

Turn off power and discharge all capacitors on circuit to be tested before attempting in-circuit resistance measurements. Failure to do so may end up in equipment or instrument damage.

The resistance measuring circuit applies a known value of constant current through the unknown resistance and then measures the voltage developed across it. Therefore, remove all power to the circuit under test when making resistance measurements. If any voltage is present in the test circuit, an erroneous reading will result. The meter may be damaged if voltage excess of 600 V AC is present.

**NOTE:** When measuring critical low ohm values, touch tips of test leads together and record the reading. Subtract this reading from any additional measurement to obtain the most accurate value.

1. Set the function switch to the desired “Ω” position.
2. Insert the black test lead into the “**COM**” input jack and the red test lead into the “**VΩHz**” input jack.
3. Connect the test leads to the circuit to be measured.
4. The measured resistance will appear on the display.

Function	Range	Resolution	Accuracy
Ω	400	0.1 Ω	±0.5% of reading, ±10 digit
	4 K	1 Ω	±0.5% of reading, ±3 digit
	40 K	10 Ω	
	400 K	0.1 Ω	
	4 M	1 KΩ	
	40 M	10 KΩ	±1.0% of reading, ±10 digit

## Audible Continuity Buzzer

1. Set the function switch to the “**••**”)” position.
2. Insert the black test lead into the “**COM**” input jack and the red test lead into the “**VΩHz**” input jack.
3. Connect the test leads to the circuit to be tested.
4. The meter will emit a continuous tone for resistances of less than 100 ohms.

## Diode Test

1. Set the function switch to the “**→+**” position.
2. Insert the black test lead into the “**COM**” input jack and the red test lead into the “**VΩHz**” input jack.
3. Touch the red test lead to the Anode (+ side, non-banded end) and the black test lead to the Cathode (- side, banded end).
4. If the diode is good, the reading should indicate 0.3 to 0.8 on the LCD.
5. Reverse the red and black leads on the diode. If the LCD reads “**OFL**” (the overload sign), the diode is good.

**NOTE:** A defective diode will read “**OFL**” (the overload sign) or “**0.00**” no matter how the test leads are connected.

## Microwave Diodes

Most microwave diodes cannot be tested by a DMM with a diode test function. This is because the meter does not supply enough power to turn these diodes on. UEi offers an accessory test lead (model ATL60) that boosts the power output so that microwave diodes can be adequately tested.

## Measuring Frequency

1. Set the function switch to the “**Hz**” position.
2. Insert the black test lead into the “**COM**” input jack and the red test lead into the “**VΩHz**” input jack.
3. Connect the test leads to the circuit to be measured.
4. The meter will display the frequency measured.

<b>Hz</b>	20 KHz	1 Hz	±0.2% of reading, ±2 digits
	200 KHz	10 Hz	(2,000 counts)

Maximum Input: 500 DC V RMS

## Measuring Temperature

1. Set the function switch to the “**°C**” position.
2. Plug a K-type thermocouple probe (not included, consult distributor for proper model for application) into the socket on the instrument, observing the proper polarity.
3. Turn on the meter.  
**NOTE:** This instrument automatically defaults to the Centigrade (°C) scale. To measure in Fahrenheit (°F), hold down the “**%**” push-button before turning on the meter.
4. The temperature reading appears on the LCD display.

-40° to 2498°F	1°F	±(5.5°F + 1 digit) from -4° to 570°F ±3.0% of reading for all other temperatures
-40° to 1370°C	1°C	±(3.0°C + 1 digit) from -20° to 300°C ±3.0% of reading for all other temperatures

## 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:

- Calibrate your meter annually to ensure it meets original performance specifications
- Keep your meter dry. If it gets wet, wipe dry immediately. Liquids can degrade electronic circuits
- Whenever practical, keep the meter away from dust and dirt that can cause premature wear
- 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

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

Clean the input terminals as follows:

1. Turn the meter off and remove all test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a new swab with alcohol and work the swab around in each terminal.

## To Measure AC or DC Current

1. Turn off power to the circuit and discharge all high-voltage capacitors.
2. Insert the black lead into the “COM” terminal and the red lead into an input terminal appropriate for the measurement range.

Rotary Switch	Input	Ranges
	mAµA	500.00µA, 5000.0µA
	mAµA	50.000mA, 500.00mA
	A	5.0000A, 10.000A

**NOTE:** To avoid blowing the meter’s 440mA fuse, use the mAµA terminal only if you are sure that the current is less than 400mA. It is best to start in the higher range when unsure to take the initial measurement. 400mA is displayed as 0.4000A in the 5.000A range.

3. Open the circuit path to be tested.
4. Touch the red lead to the more positive side of the break and the black lead to the more negative side. (Reverse connections will only display a negative reading for DC current, but will not damage the meter).
5. Turn on the power to the circuit and read the display.
6. After measuring the current, turn off power to the circuit and discharge all high-voltage capacitors.
7. Disconnect the meter and restore the circuit to normal operation.

## Wrong Input Warning Feature

If the display shows “LEAD” or “FUSE”, be sure the meter is set up correctly and test the meter’s fuses as described under **Auto Fuse Detection**. If the rotary switch is not correctly set to one of the current measuring positions, the beeper warns you by making a chirping sound. This warning is intended to stop you from attempting a measurement other than current when the test leads are plugged into a current terminal.

Placing the probes in parallel with a powered circuit when the leads are plugged into a current terminal can damage the circuit you are testing and blow the meter’s fuses. This is due to the fact that in the current range the resistance through the amps terminals is low, and the meter acts like a short to your circuit.

## Auto/Manual Range Operation

Press the “RANGE” push-button momentarily to select manual and the meter will stay in the range it is in when the LCD icon “AUTO” turns off. Press the button momentarily again to step through the ranges. Press and hold the “RANGE” push-button for two seconds or more to resumes auto ranging.

## Auto Power Off

The auto power off feature has two steps. The first step has the meter automatically go to the power saving mode to extend the battery life after approximately 15 minutes with no activity. When the meter enters this mode, the meter beeps warning tones every minute. To turn on the meter, press any button or move the rotary switch to any position. The second step is to automatically turn the meter completely off. This occurs approximately 15 minutes after the meter entered the power saving mode. To turn the meter back on after a complete power off you must rotate the selector to **OFF**, and then to the required range.

You can disable auto power off by using the setup menu. Both the auto off time and the power saving mode beep alert time can be adjusted from the setup menu.

## Maintenance

### Periodic Service



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### Cleaning

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

Clean the input terminals as follows:

1. Turn the meter off and remove all test leads.
2. Shake out any dirt that may be in the terminals.
3. Soak a new swab with alcohol and work the swab around in each terminal.

## Battery and Fuse Replacement

1. Unplug the test leads and remove the rubber boot from the instrument.
2. Remove the screws in the rear of the instrument and separate the front and rear housing.
3. Replace the batteries and/or fuses with the same type and size as the one removed.
4. Snap the front and rear housing back together and reinstall the screws.
5. Reattach the rubber boot.

## Specifications

Operating temperature	32° to 104°F (0° to 40°C)
Storage temperature	-4° to 140°F (-20° to 60°C)
Relative humidity	0 to 80% RH
Battery type	9 V, NEDA 1604, 6F22 or 006P
Battery life	200 hours, alkaline battery
Size (with boot)	21.5 oz
Safety	Meets or exceeds IEC348, CSA C22.2 No. 231, ISA DS82, and UL1244

## Standard Accessories

### Standard

Battery, 9 Volt .....	.AB9
Fuse (2A, 600 V RMS) .....	.AF112
Fuse (15A, 600 V RMS) .....	.AF113
Test Lead Set .....	.ATL140
Rubber Boot .....	.AH180



# DL297T

## Digital Multimeter

### Limited Warranty

The DL297T is warranted to be free from defects in materials and workmanship for a period of five years 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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**www.ueitest.com • Email: info@ueitest.com**

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

