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## Introduction

The DL49 is a hand-held, battery powered, digital multimeter with clamp-on current measuring capability. This instrument is ideal for anyone that needs to make quick, accurate measurements of voltage, resistance, and AC or DC inductive amperage.

### Features include

- UL listed 3111-1
- Six measurement functions
  1. AC inductive amps (to 400 amps)
  2. DC inductive amps (to 400 amps)
  3. AC Volts
  4. DC Volts
  5. Ohms
  6. Continuity (with audible alert)
- Autoranging
- AC amperage peak-hold
- Data hold for volt, ohm, and amperage functions
- Low battery indicator
- Auto continuity
- Auto power off
- Rugged construction
- Surge protection
- Compact size for easy access to tight areas

## 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 25 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. **Clamp:** Used to measure inductive AC and DC current. Opens to 1 1/2" (40 mm).



### CAUTION!

*The clamp uses a high-tension spring to close the jaw. **DO NOT** allow fingers or objects to become pinched in the base as jaw closes.*

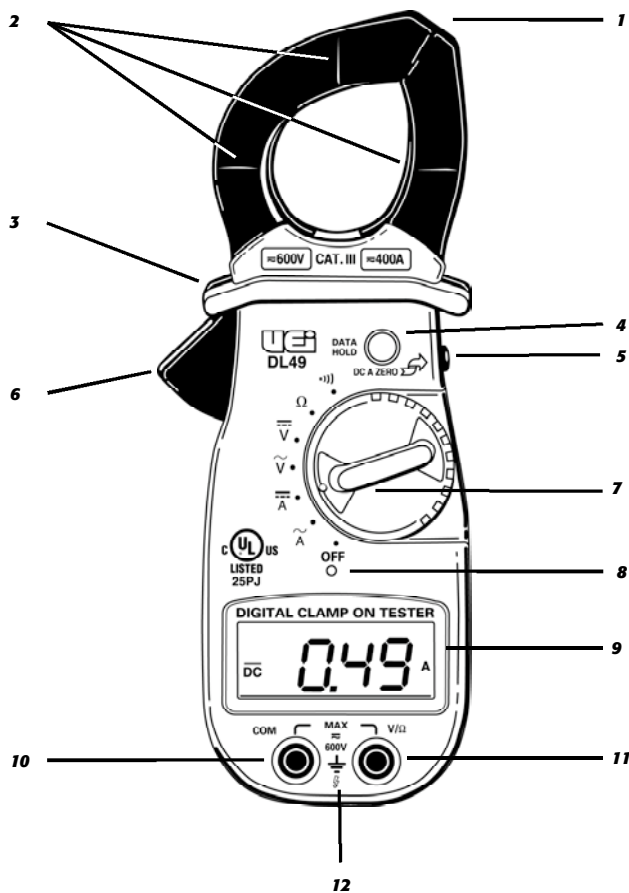
2. **Conductor Alignment Marks:** Used to aid in the visual alignment of a conductor when measuring inductive amperage. Greatest accuracy is achieved when the conductor inside the clamp is centered at the intersection of these marks.
3. **Hand Guard:** Used as a point of reference for the operator's safety.



### WARNING!

*Always keep your hands and fingers behind the hand guards when measuring current on exposed conductors. Contact may result in serious safety.*

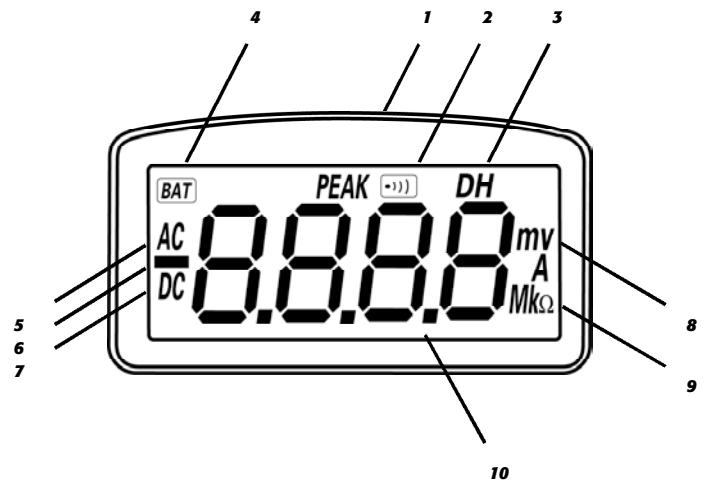
4. **Data Hold Push-button:** Freezes the value displayed on the digital read-out.
  5. **Peak Hold Push-button:** Used to capture the highest AC inductive amp reading and to automatically zero (approximately) the inductive DC amp readings.
  6. **Clamp Lever:** Opens and closes current clamp jaw.
  7. **Rotary Function Switch:** Used to power the meter on and off, or to select one of the available measurement functions.
- NOTE:** Measure inductive AC and DC current using the clamp. Measure volts AC and DC, resistance and continuity at the test lead inputs.
8. **Off Position:** Turns the meter off. Always store your meter in the off position. If the meter will not be used for a month or more, remove the batteries.
  9. **Display:** Communicates function, range, and value information to the user.
  10. **Common Terminal:** The black test lead is plugged into this terminal to supply the ground or "low" reference for all measurements.
  11. **Volt/Ohm ( $\Omega$ ) Terminal:** The red lead is plugged into this terminal. It is used for AC/DC volts, ohms, and continuity measurements.
  12. **Maximum Input Statements:** MAX 600V indicates that a maximum of 600 Volts can be applied between the two terminals of between earth ground and any terminal.



## LCD Display Functional Description

1. **Peak Hold:** Indicates the meter is displaying the maximum inductive AC current value recorded.
2. **Continuity:** Indicates the meter is in the continuity measurement mode and will sound a tone when measuring resistance below approximately 50 ohms.
3. **Data Hold:** Indicates the value displayed is held on screen (the data hold button is pressed).
4. **Low Battery Indicator:** This symbol appears when the battery needs replacement.
 

**NOTE:** A low battery will adversely affect accuracy.
5. **AC:** Indicates that alternating current/voltage is being measured.
6. **Minus:** Indicates the value measured has a negative polarity.
7. **DC:** Indicates that direct current/voltage is being measured.
8. **mVA:** Indicates that millivolts (mV), volts (V), milliamps (mA) or amps (A) is being displayed.
9. **MK $\Omega$ :** Indicates that Megohms, Kilohms, or ohms are being displayed.
10. **Numerical Value:** Displays the total value of the units displayed.



## Operating Instructions

### Auto-Power Off

This instrument automatically shuts off after 30 minutes of inactivity. The meter is considered active when there is a change of at least 10 digits during this period (for example: the meter senses a change from 24.04 volts to 24.14 volts).

### Autorange Resolution

This instrument automatically selects the range that gives you the best resolution for the function and value measured. As the meter seeks the appropriate range, the display may briefly display an overload (OFL) indication or show quickly changing values until it stabilizes.

### Peak Hold

When measuring AC amps you can use the **PEAK HOLD** button on the right side of the instrument to capture the highest measured value. Press and hold until the word **PEAK** appears along the top of the display and only the highest measured value will be displayed on the LCD. Press and hold a second time or change functions to return to real-time measurement.

### Data Hold

The **DATA HOLD** button freezes the reading displayed on the LCD at the moment it is passed. To engage data hold, press the **HOLD** button, located on the face of the instrument. When this function is active, the symbol "**D.H**" appears on the digital display. To cancel data hold, press the data hold button again, or select any other measurement function using the rotary function select switch.

### Rotary Function Select Switch

The rotary function select switch is used to select the measurement mode and to turn the meter on and off.



### CAUTION!

*Set the rotary function select switch to the appropriate setting before connecting the test leads to circuits under test. Observe those safety precautions outline in the beginning of this manual.*

### Measuring Inductive Current

The inductive current measurement mode relies on the induced electromagnetic field that occurs when electricity flows through a conductor. Prepare for measurement by separating a single live conductor from any other phase, neutral or ground conductor. Squeeze the clamp lever, and place the conductor in the open jaws. To attain the most accurate reading, ensure the conductor is centered in the jaws of the clamp, and the jaws are closed tight. The conductor must be able to fit inside the 1 1/4" (32 mm) fully closed jaws.

To measure inductive AC current:

1. Place the function select switch in the AC amp position.
2. Place the clamp jaw around a live conductor (as described above).
3. Allow meter to stabilize - Observe reading.

The maximum limit for this function is 400 amps AC. Too much current will saturate the ferrous material in the clamp, and adversely affect accuracy.



### WARNING!

**DO NOT** attempt to take any unknown voltage or current measurements that may be in excess of this meter's maximum limits. To avoid the risk of electrical shock and instrument discharge, open circuit voltage for the circuit under test must not exceed 600 volts (RMS). Consider using an optional high voltage probe for high power situations.

**NOTE:** For all measurements requiring the use of the meter leads, insert the red lead into the V/ $\Omega$  port and the black lead into the COM port.

### Measuring Voltage



### WARNING!

*Input voltages must not exceed 600 volts. High voltages and currents require greater awareness of physical safety hazards.*

Before connecting the test leads; turn off the 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 an erroneous reading is observed, disconnect power immediately and recheck all settings and connections.

When taking voltage measurements your meter must be connected in parallel to the circuit, or circuit element, under test.

To measure DC or AC volts;

1. Set the rotary function select switch to the desired AC or DC voltage position.
2. Disconnect the power from the circuit to be tested.
3. Connect the test leads to the circuit to be tested.
4. Reapply power to the circuit. The measured voltage will be displayed.
5. If the input to the V/ $\Omega$  port is lower (more negative) than the black COM port, a minus sign (negative polarity) will appear on the left of the display.
6. Disconnect power to the circuit before removing attached test leads from the circuit.

**NOTE:** During continuity or resistance measurements, polarity does not matter.

### Measuring Resistance



### CAUTION!

*Turn off power and discharge all capacitors on the circuit to be tested before attempting "in circuit" resistance measurements. Failure to do so may result in equipment or instrument damage. It is critical to both the welfare of the meter, and the accuracy of the measurement, that you remove all power to the circuit under test when making resistance measurements. If any voltage is present in the test circuit, whether from a conventional power supply, or energy stored in a capacitor, an erroneous reading will result. This meter may be damaged if more than 600 volts are present.*

**NOTE:** When measuring critically low ohm values, touch tips of test leads together and record the test lead resistance value. Subtract this value from the total circuit resistance to obtain the most accurate reading.

For resistance measurements above one megohm the display might take a few seconds to stabilize. This is normal for high resistance readings.

To measure resistance, follow these steps:

1. Set the rotary switch to the resistance function.
2. Turn off power to the circuit under test and ensure there is no residual voltage present from any source.
3. Touch the probes to the test points and read the display. The meter beeps as it seeks the correct range to measure the circuit's resistance. Be sure you have good contact between the test leads and the circuit. Dirt, oil, solder-flux or other foreign matter alters the reading value.

### Measuring Continuity

Use the continuity mode to make quick checks for connection of electrical circuits, such as electrical wiring, switch contacts, relays and audio cables. In the continuity mode, an audible tone sounds when the value measured is approximately  $50\Omega$  or less.

To test for continuity, follow these steps:

1. Set the rotary switch to the continuity function.
2. Place one probe to each side of the circuit to be tested. If the circuit measures approximately  $50\Omega$  or less, the meter will sound a continuous tone.

## 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.

**NOTE:** When servicing the meter, use only the replacement parts specified.

Battery: 9V, NEDA 1604 or IEC 6LR 61

Test lead set: ATL55

### 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 Replacement

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.



#### 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.*

To install a new battery, follow these procedures:

1. Remove the screw from the battery compartment cover on the back (lower half) of the meter and lift the cover (Fig 1).
2. Remove and discard the old battery. Always dispose of old batteries promptly in a manner consistent with local disposal regulations.



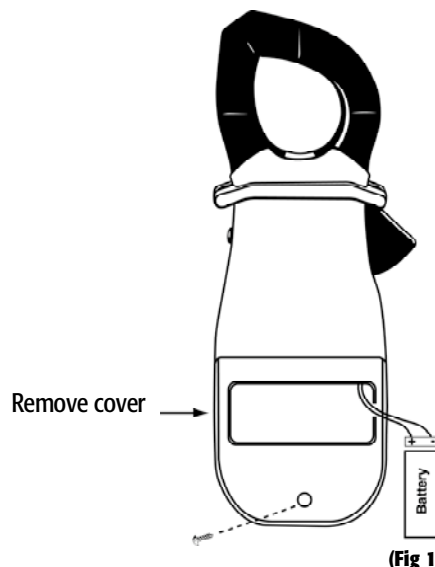
#### WARNING!

*Under **NO** circumstance should you expose batteries to extreme heat or fire as they may explode and cause injury.*

3. Place a fresh 9V battery in the compartment.

**NOTE:** If you do not plan to use the meter for a month or more, remove the battery and store it in an area that won't be damaged by a leaking battery.

4. Reattach the battery compartment cover to the meter and reinstall the screw.



(Fig 1)

## Specifications

### Measurement limits

Frequency	50 - 400 Hz
AC Amperage	400 Amps
DC Amperage	400 Amps
AC Voltage	600 Volts
DC Voltage	600 Volts
Ohms	40 Megohms
Continuity	<50 ohms

### General specifications

Size (H x W x L)	7.68" x 3.06" x 1.79" (195 x 77 x 46 mm)
Operating temperature	32 to 113°F (0 to 45°C)
Storage temperature	-4 to 140°F (-20 to 60°C)
Relative humidity (storage and use)	0% to 80% RH
Weight	13 oz. (370g)
Calibration frequency	Annual
UL listing	3111-1
IEC Listing	1010-1 (CAT III 600 Volts)
Battery	9V Alkaline (NEDA 1604 or 6F22 or 006P)
Battery life	80 hours typical (Alkaline)

### Electrical specifications

Function	Range	Resolution	Accuracy	
Ohms ( $\Omega$ )	400 $\Omega$	0.1 $\Omega$	$\pm(0.9\% + 3 \text{ digits})$	
	4 K $\Omega$	1.0 $\Omega$		
	40 K $\Omega$	10 $\Omega$		
	400 K $\Omega$	100 $\Omega$		
		4 M $\Omega$	1 K $\Omega$	$\pm(1.2\% + 5 \text{ digits})$
		40 M $\Omega$	10 K $\Omega$	
Volts AC (50-400 Hz)	4 V	1 mV	$\pm(1.5\% + 3 \text{ digits})$	
	40 V	10 mV		
	400 V	100 mV		
	600 V	1 V		
Volts DC	4V	1 mV	$\pm(0.9\% + 2 \text{ digits})$	
	40 V	10 mV		
	400 V	100 mV		
	600 V	1 V		
Amps AC (50-400 Hz)	40 A	0.01 A	$\pm(2\% + 5 \text{ digits})$	
	400 A	0.1 A	$\pm(3\% + 10 \text{ digits})$	
Amps DC	40 A	0.01 A	$\pm(2.5\% + 10 \text{ digits})$	
	400 A	0.1 A	$\pm(1.5\% + 5 \text{ digits})$	

## Standard & Optional Accessories

### Standard

Soft carrying case .....	AC259
Test leads .....	ATL55

### Optional

Plug-in line splitter .....	ASL1
Temperature measurement adapter .....	TA2K
Hard carrying case (service kits) .....	AC506
High voltage probe .....	KHV66
Flame safeguard test adapter .....	DLMAT





**DL49**

## **Digital Clamp-On Multimeter**

### **Limited Warranty**

The DL49 is warranted to be free from defects in materials and workmanship for a period of three 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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This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

