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## Introduction

The DL250 Digital Clamp-on is the all-in-one test-tool that's designed to make quick work of HVAC/R service and industrial maintenance. Whether you're measuring flame safeguard current, motor inrush current, run/start capacitors, recording time-stamped temperature highs and lows, or performing general electrical troubleshooting, the DL250 has you covered! It's convenient size, teardrop jaw design and ergonomic controls add speed, comfort and flexibility to your measurement tasks.

### HVAC Trade

- Check current draw in motors and compressors
- Use MIN/MAX recording in the temperature mode to assess efficiency
- Test run/start capacitors
- Confirm low voltage control signals
- Measure flame safeguard device current draw
- Confirm power sources
- Analyze temperature and power data with the aid of the time stamp

### Electrical Trade

- Check for energized circuits
- Balance loads
- Evaluate electrical contacts
- Capture motor in-rush current readings
- Determine peak power demand periods
- Verify line voltage stability
- Monitor motors and other loads for excess heat
- Check motor run/start capacitor values

### Features include:

- 400 Amps AC
- 600 Volts AC and DC
- Resistance to 40 Megohms
- Continuity
- Capacitance to 10,000 microfarads
- Temperature to 750°F (400°C)
- .01  $\mu$ A DC resolution for flame safeguard circuit testing
- Diode check function
- Time-stamped record function
- Auto ranging with manual ranging capability
- MIN/MAX and data hold
- 1 1/3" jaw capacity
- CE and UL listed CAT III
- Three year limited warranty

## 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!**

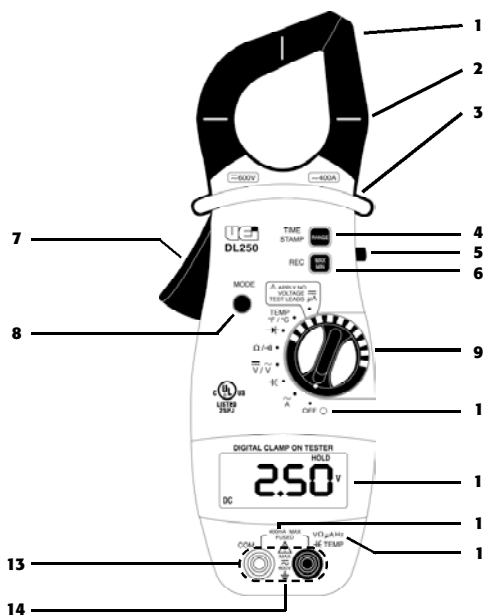
*Exceeding the specified limits of this meter is dangerous and can expose the user to serious or possibly fatal injury.*

- **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



- Clamp:** Used to measure inductive AC current. Opens to 1.25" (32 mm).  
**NOTE:** 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.
- 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.
- Hand Guard:** Used as a point of reference for the operators safety.



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

- Range and Time Stamp Push-button:** Switches meter from auto to manual ranging. Also initiates the time stamp function when used in conjunction with MAX/MIN/Recording.
- Hold Push-button:** Freezes the value displayed on the digital read-out. This function does not work while recording is in progress. Also turns on back light and work area light.
- MAX/MIN Push-button:** Use to cycle through recorded and present values, and the time stamp function.
- Clamp Lever:** Opens and closes current clamp jaw.
- Mode Push-button:** Toggles the color-coded optional functions indicated on the rotary function switch (AC to DC volts, ohms to continuity and degrees centigrade to fahrenheit, frequency to duty cycle).
- Rotary Function Switch:** Used to power the meter on and off, or to select the available measurement functions:
  - Measures inductive AC current using the clamp
  - Measures capacitance at the test lead inputs
  - Measures volts AC or DC Volts at the test lead inputs
  - Measures resistance or continuity at the test lead inputs
  - Measures Hz and Duty Cycle
  - Measures temperature with the K-type thermocouple and adapter plug at the test lead inputs
  - Measures DC microamps using the test lead inputs



**CAUTION!**  
When taking DC current and micro amp measurements, this meter must be connected in **SERIES** with the circuit (or circuit element) under test. **NEVER CONNECT THE TEST LEADS ACROSS A VOLTAGE SOURCE** while the rotary switch is set to the microamps position. This can cause damage to the circuit under test or this meter.

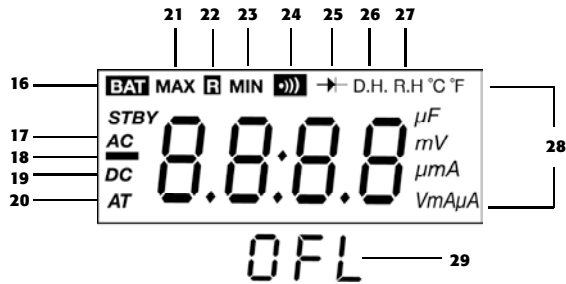
- Off Position:** Turns the meter off. Always store your meter in the off position. If the meter will not be used for a month or more, remove the batteries.
- Display:** Communicates function, range and value information to the user. (See items 16 through 30)
- 400  $\mu$ A MAX FUSED:** Indicates that the DC  $\mu$ A ranges are fuse protected.
- Common Terminal:** The black test lead is plugged into this terminal to supply the ground or "low" reference for all measurements.
- MAX  $\approx$  600V  $\perp$ :** Indicates the maximum voltage potential that can be applied at the terminals.



**WARNING!**  
**DO NOT** Exceed 1000 volts DC or AC-RMS at either the common or multifunctional input ports, as measured from earth ground.

- V  $\Omega$   $\mu$ A  $\rightarrow$   $\leftarrow$  TEMP Terminal:** The red lead is plugged into this terminal. It is used for AC/DC volts, ohms, continuity, microamps, diode, capacitance and temperature measurements.

The following describes the indicators displayed by the LCD.



16. **BAT**: this symbol appears when the battery needs replacement.  
**NOTE:** A low battery will adversely affect accuracy.
17. **AC**: Indicates that alternating current/voltage is being measured.
18. **Minus (-)**: Indicates the value measured has a negative polarity.
19. **DC**: Indicates that direct current/voltage is being measured.
20. **AT**: Indicates the meter is in the autoranging mode.
21. **MAX**: Indicates the meter is displaying the maximum value recorded.
22. **R**: Indicates the meter is currently recording the maximum and minimum values.
23. **MIN**: Indicates the meter is displaying the minimum value recorded.
24. **⦿**: Indicates the meter is in the continuity measurement mode.
25. **→|**: Indicates the meter is in the diode test mode.
26. **D.H.:** Indicates the value displayed is held on screen (the data hold button is pressed).
27. **R.H.:** Indicates the meter is in the manual ranging mode (the Range button has been pressed).
28. **Function and Units of Measurement:**

Symbol	Function or Value
°C	Degrees Centigrade
°F	Degrees Fahrenheit
μF	Micro Farads
mV	Millivolts
V	Volts
μA	Micro Amps (Test Lead Measurement Ranges)
A	Amps (Inductive Clamp Ranges)
M	Mega (Value x 1,000,000)
K	Kilo (Value x 1,000)
Ω	Ohms (Resistance Value)

29. **OFL**: This symbol appears when the input value exceeds the meters selected range or overall specification.

## Operating Instructions

### Auto Power Off

The 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 the period (i.e., the meter senses a change from 24.04 volts to 24.14 volts)

To disable this function; press and hold the **"MIN/MAX"** or the **"RANGE"** button while turning the meter on. This function will be active in all modes, including RECORD and TIME STAMP, unless it is disabled.

### Auto / Manual Range

This instrument is capable of providing either auto (instrument controlled), or manual (operator controlled) ranging. In the autorange mode, the meter automatically selects the range that gives you the best resolution of the value measured. For example, if you were measuring a 9 volt battery that actually put out 9.6 volts, the meter would automatically display **"9.60"**, although it has the ability to display **"9"** or **"9.6"** for the same battery. The far left, or most significant digit, can only display **"0"** through **"3"**, so **"9.600"** could not be displayed, instead the symbol **"0.FL"** would appear on the display indicating the measured value exceeded the range selected. The meter automatically enters the autoranging mode when it is first turned on, or if a new function is selected using the rotary dial. In the autoranging mode, the symbol **"AT"** appears on the display.

Although the autoranging mode is easy to use, there are times that you may prefer the manual ranging mode. For example, suppose you were measuring a series of connectors you know had either 24 or 120 volts AC on them. If your goal was to see which terminal had what voltage applied, the task would go faster and easier if you set the meter to hold the 400 volt range. To select manual range control, press the **"RANGE"** push-button for approximately 1/2 second. As you release the button, the symbol **"R.H"** appears at the top of the display, and an audible tone sounds to alert you that the meter has changed ranges or modes. Each subsequent time the RANGE button is pressed, the range increases one step, and a tone sounds until it reaches its highest range. The next press of the range hold button will return the meter to its lowest range.

### Recording MIN/MAX

After selecting the mode and range you will be using, you can enable the MIN/MAX recording function. This function allows you meter to store the highest and lowest readings obtained in the following modes:

- AC Amps
- AC and DC Volts
- Ohms
- Temperature
- DC microamps

You may recall and cycle through the high and low readings or view the measurement currently being make while you are in the record mode. Pressing the **"MIN/MAX"** button locks the meter in the range it was in at that moment and begins the recording precess. Be sure you are in a range that can display the minimum and maximum values you are monitoring (you may prefer to select this range manually). Each time a new high or low value is recorded, an audible beep sounds.

When the **"MIN/MAX"** button is pressed a second time, the symbol **"MAX"** appears at the top of the display, while the maximum recorded value is displayed. When the **"MIN/MAX"** button is pressed a third time, the **"MIN"** symbol appears at the top of the display, while the minimum recorded values are displayed. If a new high or low value is recorded while you are viewing the **"MIN"** or **"MAX"**, that value will be displayed. Pressing the button again will return you to monitoring real-time reading. Cycling through these modes will not effect the values in memory. To exit the record mode, press and hold the **"MIN/MAX"** button for two seconds. The meter will return to the autoranging mode.

### Time Stamp

The time stamp feature makes unattended monitoring simple. This function you to display the hour and minute that a high and low value was recorded, within a 24-hour period.

The first step in using the time stamp is to begin recording the dat you wish to time stamp, as prescribed in the "recording MIN/MAX" section. Press the **"TIME STAMP"** button to start the counter. Four zeros, (00:00) like those on a digital stop watch, appear on the LCD. The times indicated for the minimum an maximum recorded values are relative to when the time stamp feature was engaged. To view the time that a value reached its maximum, press the **"MIN/MAX"** button until MAX appears on the LCD, then press the **"TIME STAMP"** button. The elapsed time, in hours and minutes, will now be displayed. Similarly, if you wish to view the time that the minimum value was recorded, press the **"MIN/MAX"** button until MIN appears on the LCD, then press the **"TIME STAMP"** button. To view the total time that has elapsed from initiating the time stamp, cycle the **"MIN/MAX"** button until neither MAX, nor MIN appears on the LCD, then press the **"TIME STAMP"** button.

Example: A local company is analyzing its peak power requirements. You have been asked to provide them with the specific time, and the values, of the highest and lowest power demands. To accomplish this task:

1. Set the rotary function switch to measure AC amperage (using the inductive clamp).
2. Press the **"MIN/MAX"** button (to record values).
3. Press the **"TIME STAMP"** button to begin monitoring time (00:00 appears on the LCD).
4. Note the time of day (i.e., 8:00 AM), and press the **"TIME STAMP"** button to view real-time data.
5. Clamp the meter around the main power feed.
6. Return the next morning and not the values. Hypothetically:
  - A. Press the **"MIN/MAX"** button once; the **"MAX"** symbol appears at the top of the LCD and a value of **"235.4"** is displayed. Now press the **"TIME STAMP"** button; the time stamp value of **"07:20"** is displayed. This means seven hours, 20 minutes after the time stamp was engaged, (in this case 3:20 PM), the highest amperage of that 24 hour period (235.4 amps), was measured.

B. Press the **"TIME STAMP"** button to return the display to the measured values. Press the **"MIN/MAX"** button; the **"MIN"** symbol appears at the top of the LCD and a value of **"088.3"** is displayed. Press the **"TIME STAMP"** button; the time stamp value of **"17:32"** is displayed. This means that 17 hours, 32 minutes after the time stamp was engaged, in this case 1:32 AM in the following morning, the lowest amperage of that 24 hour period (88.3 amps) was measured.

1. The maximum time value that can be recorded is **"23:59."** If 24 hours have not elapsed, you can use the total elapsed time, (displayed when the **"TIME STAMP"** button is pressed while the meter is displaying real-time values in the record mode), to calculate the time of day information.

**To turn off the time stamp:** press and hold the **"TIME STAMP"** button for two seconds, or rotate the rotary function select switch to any other position.

### Hold

The **"HOLD"** button freezes the reading displayed on the LCD at the moment it is pressed. To engage data hold, press the **"HOLD"** button, located on the side of the instrument. When this function is active, the symbol **"D.H"** appears on the digital display. To cancel data hold, press the **"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 primary measurement mode and to turn the meter on and off. While this meter is manufactured with a number of built in fail-safe, the potential to damage the meter, blow a fuse, or sustain serious personal injury due to improper use does exist.



### WARNING!

*Set the rotary function select switch to the appropriate setting before connecting test leads, or applying power to circuits under test.*



### CAUTION!

*When taking DC current measurements, this meter must be connected in SERIES with the circuit (or circuit element) under test. Never connect the test leads across a voltage source while the rotary switch is set to the microamps position. This can cause damage to the circuit under test or this meter.*

### Measuring Inductive Current

To measure inductive AC current, place the meter in the AC amp position as shown in the controls and indicators section of this manual. 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. Zero the meter by pressing the **"DATA HOLD"** button on the side of the of the meter for two seconds. Squeeze the 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 1.25" (32 mm) fully open jaws.

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.

*This meter is designed for measuring current and voltage in commercial, residential, and light industrial applications. To avoid the risk of electrical shock and instrument damage, input voltages must not exceed 600 volts DC or AC (RMS). Some industrial applications exceed the limitations of this meter. Dangerous power surges may occur on industrial power lines. If the maximum measurement value is unknown or is likely to exceed the rated limit of this meter, **DO NOT** attempt to make that measurement with this meter. Consider using an optional high voltage probe for high power situations. Use caution when connecting the current clamp on uninsulated conductors.*

### Measuring Voltage



**WARNING!**  
*To avoid the risk of electrical shock and instrument damage, input voltages must not exceed 600 volts DC or AC (RMS). **DO NOT** attempt to take any unknown voltage measurements that may be in excess of these values.*

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

To improve the accuracy of DC voltage measurements taken in the presence of AC voltages, (such as measuring the DC offset voltage of an amplifier in the presence of an AC signal), measure the AC voltage first. Note the AC voltage range and select a DC voltage range that is the same or higher than the AC voltage accuracy by preventing the input protection circuits from being activated.

To measure DC or AC volts:

1. Set the rotary function switch to the “**V**” position, and select DC or AC using the red “**MODE**” button. If you are in the manual ranging mode, and you do not know the maximum value of the voltage to be measured, start at the highest range and reduce the setting as required to obtain a satisfactory reading.
2. Plug the red lead into the meter's multifunction terminal on the right, and the black lead into the meter's COM terminal on the left.
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 be displayed.
6. If the input to the red multifunction terminal is lower (more negative) than the black COM input terminal, a minus polarity sign will appear on the left of the display.
7. Disconnect power to the circuit before removing the test leads from the circuit.

### Measuring Three-Phase AC Volts



**WARNING!**  
*This meter is primarily designed to measure residential, commercial and light industrial AC voltage. When measuring 3-phase circuits, line-to-line, the value of the voltage is actually higher than the rated line-to-ground voltage at any one phase. Exceeding the maximum AC (RMS) rating of this meter is dangerous and could result in serious or fatal injury.*

To find the RMS voltage, line-to-line, on a 3-phase power source, multiply the rated line-to-ground voltage by the square root of 3 (approx. 1.732).

For example, if you connect this meter to a 480 volt, 3-phase, power source (i.e. 480 volts line-to-ground), the total available voltage, line-to-line, is about 832 volts AC (480 x 1.732). Severe damage to the instrument or serious personal injury may result by attempting to measure this voltage.

### 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. The resistance measuring circuit applies a small, known value of constant current through the unknown resistance. It then uses the voltage developed across the measured circuit to calculate resistance. It is therefore 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 reading. Subtract this value from the total circuit resistance to obtain the most accurate value.

When measuring large resistance values, the reading may be unstable due to environmentally induced electrical noise.

If this occurs, connect the resistor directly to the input terminals of the meter in place of the test leads. It may also be possible to use an electrical shield on the resistor that is connected to the same ground plane as the “**COM**” input terminal to obtain a stable reading.

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



**CAUTION!**  
*This meter has a circuit to protect the resistance ranges from up to 600 volts. however, to prevent accidentally exceeding the protection circuits rating and to ensure a correct measurement, **NEVER CONNECT THE TEST LEADS TO A SOURCE OF VOLTAGE** when the rotary switch is set to ohms, continuity or diode test functions.*

The voltage or current applied during resistance measurements could damage some devices. Typically, the voltages applied in the resistance ranges vary from 3 volts in the lowest range to 0.5 volts in the highest range. Current will typically vary from 800  $\mu\text{A}$  at the lowest range to 30  $\mu\text{A}$  at the highest range.

To measure resistance:

1. Insert the test leads into the meter, and turn off the power to the circuit under test. Voltage across the circuit, from any source, will cause an erroneous reading.
2. Set the rotary switch to the resistance/continuity function. The meter defaults to the resistance measurement mode.
3. Touch the test 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.

**NOTE:** During continuity or resistance measurements, polarity does not matter. It may be preferable to use the manual range mode to test some circuits that are susceptible to damage at low voltages/currents.

### Measuring Continuity

Use this mode to make quick checks for continuity or electrical circuits, such as wiring, speaker cables, connections, switches or relays. 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 ohms/continuity function.
2. Press the red **"MODE"** button to bring the  $\rightarrow$ ) symbol up on the top of the display, indicating that the continuity mode has been selected. The range is preset to the  $400\Omega$  scale and can not be revised.
3. Place one probe to each side of the circuit to be tested. If approximately  $50\Omega$  or less resistance is in the circuit, the meter sounds a continuous tone.

### Testing Diodes

The diode test function allows you to check diodes, transistors and other semiconductor devices for opens, shorts and normal operation.



**DO NOT** connect the test leads to a source of voltage when the diode test function is selected.

Diodes, and other P/N junction devices, allow current to flow easily in one direction and prevent current flow in the other direction. When a diode is forward biased, it allows current to flow. When it is reverse biased, it prevents current flow.

Your meter is designed to apply enough voltage, in the forward biased direction, to allow current flow. All diodes use up or "drop" a small amount of the supplied voltage when they are forward biased. When they are reverse biased they drop nearly all of the supplied voltage. The voltage drop is normally around 0.4 V for germanium diodes and 0.6 V for silicon diodes. When the diode is reverse biased, the meter should indicate the over-range symbol (OFL).

To determine the condition of semiconductor devices:

1. Insert the test leads into the meter (red to the multifunction port on the right, and black to the common port on the left).
2. Select the diode test function on the rotary function switch.
3. Connect the red test lead to the anode side of the diode, and the black to the other. There is normally a printed black band around the anode of a diode.
4. Note the displayed value.
5. Reverse the red and black test leads. Again, note the displayed value.
6. If the digital reading in the first (forward biased) direction indicates some measurable value, and the reading in the reverse biased direction shows an over-range (OFL) the diode is good.
7. If the displayed value is low, or all zeros, in both directions, the diode is probably shorted.
8. If the display indicated an overload (OFL) in both directions, the diode is probably open. Some diodes, such as those used in microwave ovens, require a higher biasing voltage than this meter supplies. UEI has high-power diode test lead adapter sets accessories available.

### Measuring Temperature

Using the K-type thermocouple adapter and the thermocouple, this meter will display temperatures from  $40^\circ$  to  $750^\circ\text{F}$ .

To measure temperature:

1. Obtain the K-type thermocouple adapter and the thermocouple from the accessories provided.  
**NOTE:** A wide variety of optional temperature probes are available from UEI.
2. Insert the adapter into the meter, observing polarity.
3. Insert the temperature probe into the adapter. Again, observe polarity.
4. Place the rotary function switch in the **"TEMP"** position.
5. Select either the Fahrenheit ( $^\circ\text{F}$ ) scale or the Centigrade ( $^\circ\text{C}$ ) scale using the red **"MODE"** button.
6. If necessary, prepare a surface to place the hot temperature probe, once the measurement is made.
7. Using the precautions the task warrants, place your temperature probe, or thermocouple in position to measure the appropriate surface, liquid or gas (probes are available for any of these), and make your measurement.

## Measuring Capacitance

This meter measures capacitors, such as those used as motor-run-start capacitors, ranging in value from .001 to 10,000 microfarads ( $\mu\text{f}$ ).



### WARNING!

*Capacitors should be completely discharged prior to testing.*

Some electronic devices use capacitors in circuits that are designed to increase voltage. By design, a capacitor stores energy. If a capacitor has been charged at greater than 600 volts, your meter may be damaged by attempting to measure it. Larger capacitors may store enough energy to cause injury if they are discharged through the body. Use a conductive device to dissipate the charge on capacitors. Large capacitors should be "bled" by using a resistive load between terminals to slowly eliminate the charge. Smaller capacitors may be directly shorted using a metallic object.

To measure capacitance:

1. Discharge the capacitor to be tested as prescribed above.
2. Isolate the capacitor by lifting at least one of its two legs away from the circuit.
3. Insert the test leads into the meter (red to the multifunction port on the right, and black to the common port on the left).
4. Select the capacitance  $\text{--}(\text{C})$ .
5. Connect the red test lead to one side of the capacitor, and the black to the other.
6. Note the displayed value. In the autoranging mode, it takes approximately 10 seconds to settle on a value for a capacitor. In the manual ranging mode, measurements are considerably faster.

## Measuring DC Microamps

The DC microamp position has been incorporated in this meter to permit flame safeguard testing, as well as other low current DC measurements. DC current of 0.1 microamps ( $\mu\text{A}$ ) to 400  $\mu\text{A}$  can be measured.



### CAUTION!

*The current functions are protected by a 250 volt rated fuse. To avoid damage to the instrument, do not measure current sources having open circuit voltages greater than 250 volts DC or AC.*

**NOTE:** When taking current measurements, this meter must be connected in series with the circuit (or circuit element) under test. **NEVER CONNECT THE TEST LEADS ACROSS A VOLTAGE SOURCE** while the rotary switch is set to the microamps position. This can cause damage to the circuit under test or this meter.

To measure current, you must break the circuit under test and make the meter part of the circuit. Two connection points are created when a circuit is broken. On one side is the power source and the other is the load.

A minus sign will be displayed if the current is flowing opposite to the connection polarity.

To measure AC or DC current flow (in amps):

1. Ensure power is off to the circuit to be tested.
2. Insert the test leads into the meter (red to the multifunction port on the right, and black to the common port on the left).
3. Set the rotary switch to the DC microamps (test leads) position.
4. You may manually select either the 40 or 400  $\mu\text{A}$  range, or leave it in the autoranging mode.
5. Touch the leads together and press the "HOLD" button on the side of the meter for a minimum of two seconds to zero the meter.
6. Break the circuit as described earlier and connect the meter leads to the appropriate points. Some gas furnace models have special adapters for flame safeguard testing.
7. Apply power to the circuit.
8. Note your measurement value.
9. Disconnect power to the circuit. **Do not remove the leads from the circuit until power is disconnected.**

## Maintenance

### 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.
3. Whenever practical, keep the meter away from dust and dirt, which can cause premature wear and collect on internal components.
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*

*Fuse: Fuse 500 milliamp, 250 V, f500mA*

*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.



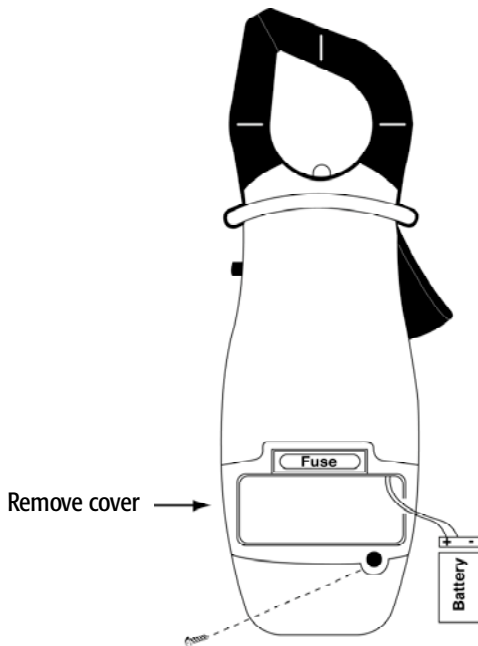
### WARNING!

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)

## Fuse Replacement

The DC  $\mu$ A position is protected by a 400 mA fuse. If this fuse blows the meter will display all zeros (example, 00.00 mA) on the LCD when the DC  $\mu$ A function is selected, regardless of input.



### WARNING!

To avoid the potential of electric shock or personal injury, disconnect the test probes from any potential power source before removing the fuse. Replace the blown fuse with the fuse specified for this meter only.

To replace a blown fuse, follow these procedures:

1. Turn off power to the circuit under test.
2. Turn off the meter.
3. Disconnect the test leads from the circuit or component under test.
4. Open the battery/fuse compartment cover. The fuse is visible above the battery above the battery compartment (Fig 1).
5. Pull the fuse from the fuse holder.
6. Check the fuse by confirming that there is no continuity. The ohms and continuity functions will work with the fuse out. Do not attempt to make circuit measurements with the battery cover off. Live voltages may be present at the fuse holder.
7. If necessary, insert a new fuse, or replace the fuse that tested good.
8. Reattach the battery compartment cover.

## Specifications

### Measurement limits

AC Amps	0.3 A to 400 A
DC Milliamps	0.01 $\mu$ A to 400 $\mu$ A
AC Voltage	1 mV to 600 V
DC Voltage	1 mV to 600 V
Resistance	0.1 $\Omega$ to 400 $\Omega$
Capacitance	0.001 $\mu$ f to 10,000 $\mu$ f
Temperature	-40° to 750°F (-40° to 400°C) (500°F with thermocouple provided)
Continuity	Tone sounds at approximately 50 $\Omega$ or less

Maximum voltage between any terminal and earth ground	600 V DC or AC RMS
Digital display	4000 Count - Updates 4 times per second
Storage temperature	-4° to 140°F (-20° to 60°)
Operating temperature	32° to 113°F (0° to 45°C)
Altitude	= or < 6560' (2000 M)
Relative humidity	0% to 80% at 32° to 95°F (0° to 35°C) 0% to 70% at 95° to 113°F (35° to 45°C)
Battery type	9V, NEDA, 1604 or 6LR 61
Battery life	80 hours (alkaline)
Maximum conductor size	1.25" (32 mm) up to 750 MCM
Maximum jaw opening	1.25" (32 mm)
Size (H x W x L, in mm)	235 x 86.5 x 45
Weight (approximate)	.95 lbs (430 g)
Vibration and shock	Designed to MIL-T 28800 for a class II instrument
Case protection	IEC 529, IP 30
Safety standards	Designed to UL 3111 (overvoltage category III) CSA C 22.2 no 1010-1, and both IEC 1010-2-032, and the EMC directive

### Standard & Optional Accessories

#### Standard

Test leads .....	ATL55
Instruction manual .....	DL250-MAN
Temperature probe connection adapter .....	ATT70
Thermocouple .....	ATT29

#### Optional

Flame safeguard test kit .....	ATLFSG
Microwave diode booster test lead .....	ATL60
Plug-in line splitter .....	ALS1
Hard carrying case (service kits) .....	AC506
Digital tachometer adapter .....	DPM2K

The specifications listed in the following table are based on an instrument operating in an ambient temperature of between 65 and 90°F, at a relative humidity of less than 80%, and within one year of calibration.

The "accuracy" column indicates the percent of possible error based on the reading displayed, plus an additional allowance for error based on the value of the least significant digits of the selected range. This is stated as ( $\pm X\% + X$  dgts).

AC readings displayed on this meter are average responding, True-RMS indicating. They are based on a true sinusoidal waveform.

Function	Range	Resolution	Accuracy	Overload
AC Amps (50 Hz to 400 Hz)	40 A	0.01 A	3.0% $\pm 20$ dgts	400 A continuous
	400 A	0.1 A	2.0% $\pm 5$ dgts	
DC Low Amps	40 $\mu$ A	0.01 $\mu$ A	1.0% $\pm 5$ dgts	400 $\mu$ A/250 V
	400 $\mu$ A	0.1 $\mu$ A	1.5% $\pm 2$ dgts	
DC Volts	4 V	1 mV	0.9% $\pm 2$ dgts	600 V RMS
	40 V	10 mV		
	400 V	100 mV		
	600 V	1 V		
AC Volts (50 Hz to 400 Hz)	4 V	1 mV	0.9% $\pm 3$ dgts	
	40 V	10 mV		
	400 V	100 mV		
	600 V	1 V		
Ohms	400 $\Omega$	100 $\Omega$	0.9% $\pm 3$ dgts	600 V
	4K $\Omega$	1 $\Omega$		
	40K $\Omega$	10 $\Omega$		
	400K $\Omega$	100 $\Omega$		
	4 $\Omega$	1 $\Omega$		
Capacitance	40 $\Omega$	10 $\Omega$	1.5% $\pm 5$ dgts	
	1 $\mu$ F	0.001 $\mu$ F		
	10 $\mu$ F	0.01 $\mu$ F		
	100 $\mu$ F	0.1 $\mu$ F		
	1000 $\mu$ F	1 $\mu$ F		
Temperature	10000 $\mu$ F	1 $\mu$ F	15% $\pm 100$ dgts	600 V
Temperature	-40° to 15°F	0.1°F	5% $\pm 5$ °F	30 V AC or 60 V DC
	15° to 750°F	0.1°F	1% $\pm 3$ °F	
Continuity	Open circuit test voltage		<2.7 V	600 V
	Threshold: Approx:		<50 $\Omega$	
Diode check	Open circuit test voltage		<3.3 V	600 V
	Max test current		3.0 mA	



# **DL250**

## **Digital Clamp-On Multimeter**

### **Limited Warranty**

The DL250 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:

**1-800-547-5740 • FAX: (503) 643-6322**

**Service: (800) 308-7709**

**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.