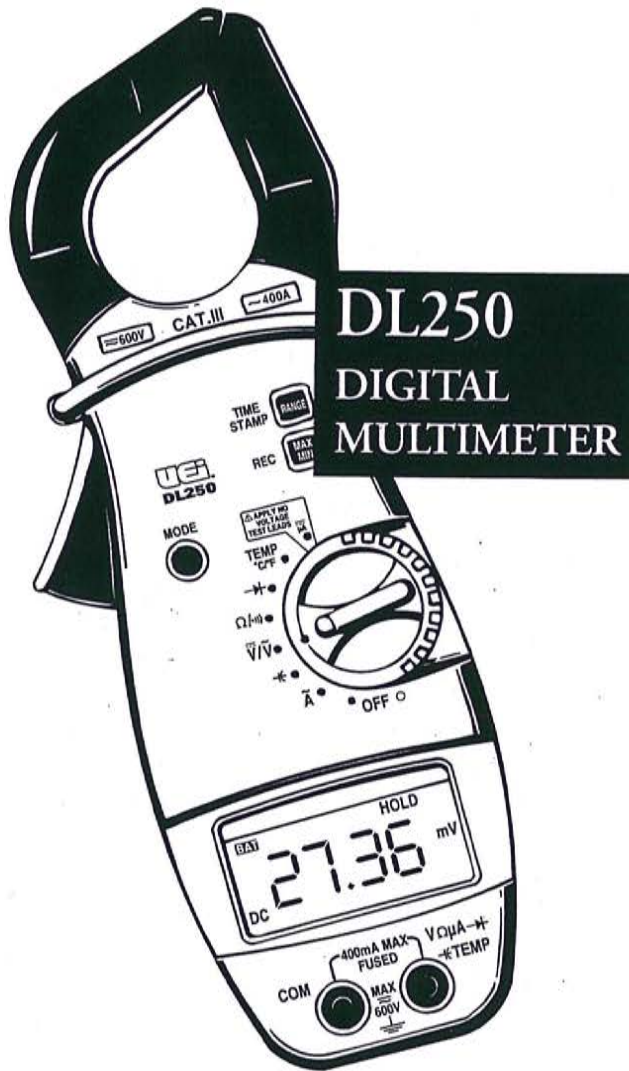


INSTRUCTION MANUAL



Uei®

TABLE OF CONTENTS

DL250 Introduction	1
Description	2
Listings	2
Features	3
Application Overview	
HVAC Trade	4
Electrical Trade	4
Safety	5
International Symbols	5
Safety Tips	6
Controls and Indicators	
DL250 Controls and Indicators	7
Operating Instructions	13
Auto-Power Off	13
Auto/Manual Range Operation	14
Recording MAX/MIN	15
Time Stamp Operation	17
Hold	20
Rotary Function Select Switch	20
Measuring Inductive Current	21
Measuring Capacitance	22
Measuring Voltage	23
Measuring Resistance	24
Measuring Continuity	25
Testing Diodes	26
Measuring Temperature	27
Measuring DC microamps	28
Maintenance	29
Service	30
Cleaning	31
Battery Replacement	32

TABLE OF CONTENTS (CONT.)

Fuse Replacement	33
Specifications	34
Measurement Limits	35
General Specifications	
Specification Table	36
Warranty	37
Warranty Information	37
Related Products	37
Available Accessories	37
Ordering Information	37

INTRODUCTION

DESCRIPTION

The DL250 is a hand-held, battery powered, digital multimeter with clamp-on current measuring capability. This instrument is ideal for tradesmen who need to make quick, accurate measurements of voltage, resistance, temperature, capacitance, low current DC or high current AC amperage.

LISTINGS

This instrument is designed and tested in accordance with:
IEC Publication 1010-2-032 (1994-12)
(Overvoltage category III); the safety requirements for hand-held current clamps for electrical measurements and tests, the EMC directive, and other safety standards.

FEATURES

The DL250 is ideally suited for the HVAC and electrical maintenance professionals. This instrument features:

- Autoranging measurements with manual ranging capability
- MAX/MIN/Record mode with time stamp
- Data hold
- Nine measurement functions
 1. AC inductive amps
 2. AC volts
 3. DC volts
 4. Ohms (600 volt input protection)
 5. Continuity
 6. Diode check
 7. Temperature ($^{\circ}\text{C}$ or $^{\circ}\text{F}$) using K-type thermocouples
 8. Capacitance
 9. DC μA
- Auto power-off (defeatable)
- Surge protection
- Double alerting over-range protection

APPLICATION OVERVIEW

The convenience of clamp-on current measurement, coupled with the wide range of functions and features, makes this instrument an excellent choice for HVAC and electrical technicians. The potential applications are far too numerous to list them all, but here are a few possibilities:

HVAC Trade

- Check current draw in motors and compressors
- Use MAX/MIN/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









SAFETY RULES

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!

Higher 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.

INTERNATIONAL SYMBOLS

	Dangerous Voltage		Ground
	AC-Alternating Current		See Explanation
	DC-Direct Current		Double Insulation (Protection Class II)
	Either DC or AC		Fuse

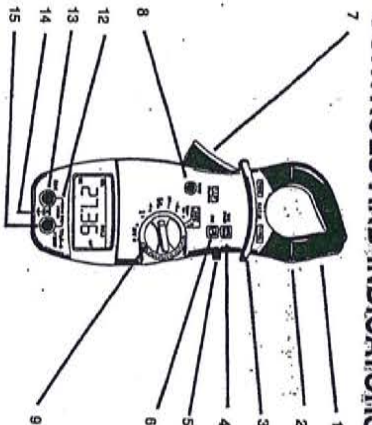
SAFETY TIPS

This meter was designed for use by professionals who know the hazards associated with their trade. Exceeding the specified limits of this meter is dangerous and can expose the user to serious or possibly fatal injury. To ensure safe and appropriate use, please observe the following safety guidelines:

- Do not attempt to measure any voltage that exceeds 600 volts DC or AC-RMS
- 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. Turn it in for repair at a qualified repair facility
- 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
- Keep your fingers away from the test lead metal probe contacts when making measurements. Always grip the leads behind the finger 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.

6

CONTROLS AND INDICATORS



1. **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.

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 injury.

7

CONTROLS AND INDICATORS

(CONT)

4. **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.
5. **Hold Push-button:** Freezes the value displayed on the digital read-out. This function does not work while recording is in progress.
6. **MAX/MIN Push-button:** Use to cycle through recorded and present values, and enables the time stamp function.
7. **Clamp Lever:** Opens and closes current clamp jaw.
8. **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).

8

CONTROLS AND INDICATORS

(CONT)

9. **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 at the test lead inputs
 - Measures resistance or continuity at the test lead inputs
 - Measures diode voltage drop, using the test lead inputs
 - Measures temperature with the temp. K-type thermocouple and adapter plug at the test lead inputs
 - Measures DC microamps using the test lead inputs

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.

9

CONTROLS AND INDICATORS

(CONT.)

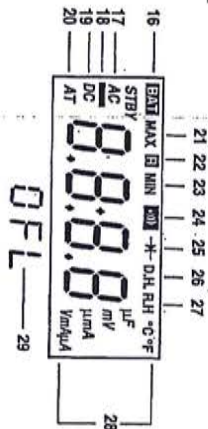
10. **Off Position:** Turns the meter off. Always store your meter in the off position. If the meter will not be used for a month or more, remove the batteries.
 11. **Display:** Communicates function, range and value information to the user.
 12. **400 μ A MAX FUSED:** Indicates that the DC μ A ranges are fuse protected.
 13. **Common Terminal:** The black test lead is plugged into this terminal to supply the ground or "low" reference for all measurements.
 14. **MAX \approx 600V $\frac{1}{2}$:** Indicates the maximum voltage potential that can be applied at the terminals.
- ⚠ WARNING!**
- Do Not Exceed 600 volts DC or AC-RMS at either the common or multifunctional input ports, as measured from earth ground.
15. **V Ω μ A \rightarrow \leftarrow TEMP**
The red lead is plugged into this port. It is used for AC/DC volts, ohms, continuity, microamps, diode, capacitance and temperature measurements.

10

CONTROLS AND INDICATORS

(CONT.)

The following describes the indicators displayed by the LCD.



16. **BATT** 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. **B** Indicates the meter is currently recording the maximum and minimum values.
23. **MIN:** Indicates the meter is currently displaying the minimum value recorded.

11

CONTROLS AND INDICATORS

(CONT)

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. O.F.L.: This symbol appears when the input value exceeds the meters selected range or overall specification.

12

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

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

13

AUTO/MANUAL RANGE OPERATION

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 "AR" 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 knew had either 24 or 120 volts AC on them. If your goal was to see which terminal had what voltage applied,

OPERATING INSTRUCTIONS AUTO/MANUAL RANGE

OPERATION (cont.)

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 MAX/MIN

After selecting the mode and range you will be using, you can enable the MAX/MIN recording function. This function allows the 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 made while you are in the record mode. Pressing the MAX/MIN button locks the meter in the range it was

OPERATING INSTRUCTIONS

RECORDING MAX/MIN (CONT)

in at that moment and begins the recording process. Be sure you are in a range that can display the maximum and minimum 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 MAX/MIN 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 MAX/MIN 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 "MAX" or "MIN", that value will be displayed. Pressing the button again will return you to monitoring real-time readings. Cycling through these modes will not effect the values in memory. To exit the record mode, press and hold the MAX/MIN button for two seconds. The meter will return to the autoranging mode.

OPERATING INSTRUCTIONS

TIME STAMP OPERATION

The time stamp feature makes unattended monitoring simple. This function allows 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 data you wish to time stamp, as prescribed in the "recording MAX/MIN" 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 and 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 MAX/MIN 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 MAX/MIN 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 MAX/MIN button until neither MAX, nor MIN appears on the LCD, then press the TIME STAMP button.

OPERATING INSTRUCTIONS

TIME STAMP OPERATION (CONT.)

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 MAX/MIN 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 note the values. Hypothetically:
 - a. Press the MAX/MIN 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.

18

OPERATING INSTRUCTIONS

TIME STAMP OPERATION (CONT.)

- b. Press the TIME STAMP button to return the display to the measured values. Press the MAX/MIN 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.
7. 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.

19

OPERATING INSTRUCTIONS

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 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 primary measurement mode and to turn the meter on and off. While this meter is manufactured with a number of built-in fail-safes, 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.

OPERATING INSTRUCTIONS

ROTARY FUNCTION SELECT SWITCH (CONT.)

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 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

OPERATING INSTRUCTIONS

MEASURING INDUCTIVE CURRENT (CONT.)

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.

22

OPERATING INSTRUCTIONS

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 range. This method improves the DC voltage accuracy by preventing the input protection circuits from being activated.

23

OPERATING INSTRUCTIONS

MEASURING VOLTAGE (CONT.)

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.

OPERATING INSTRUCTIONS

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.

OPERATING INSTRUCTIONS 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.

26

OPERATING INSTRUCTIONS MEASURING RESISTANCE (CONT.)

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 μ A at the lowest range to 30 μ A at the highest range.

27

OPERATING INSTRUCTIONS

MEASURING RESISTANCE

(CONT.)

To measure resistance, follow these steps:

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.

OPERATING INSTRUCTIONS

MEASURING CONTINUITY

Use this mode to make quick checks for continuity of 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 Ω 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  symbol up on the top of the display, indicating that the continuity mode has been selected. The range is preset to the 400 Ω scale and can not be revised.
3. Place one probe to each side of the circuit to be tested. If approximately 50 Ω or less resistance is in the circuit, the meter sounds a continuous tone.

OPERATING INSTRUCTIONS TESTING DIODES

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

⚠ CAUTION!

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 0.4V for germanium diodes and 0.6V for silicon diodes. When the diode is reverse biased, the meter should indicate the over-range symbol (OFL).

OPERATING INSTRUCTIONS TESTING DIODES (CONT.)

Determine the condition of semiconductor devices as follows:

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. See UET's catalog #144 to purchase an economical high-power diode test lead adapter set if necessary.

OPERATING INSTRUCTIONS MEASURING TEMPERATURE

Using the K-type thermocouple adapter and the thermocouple, this meter will display temperatures from 40° to 750°F.

To make temperature measurements, follow these steps:

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 (°F) scale or the Centigrade (°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.

32

OPERATING INSTRUCTIONS MEASURING CAPACITANCE

This meter measures capacitors, such as those used as motor-run-start capacitors, ranging in value from .001 to 10,000 microfarads (μf).

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 make capacitance measurements, follow these steps:

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.

33

OPERATING INSTRUCTION

MEASURING CAPACITANCE (CONT.)

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 ← position on the rotary function switch.
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 auto-ranging 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 .01 microamps (μA) to 400 μA 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.

OPERATING INSTRUCTION

MEASURING DC MICROAMPS (CONT.)

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 function select 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.

OPERATING INSTRUCTION

MEASURING DC MICROAMPS

(CONT.)

To measure AC or DC current flow, (in amps), follow these steps:

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 μA range, or leave it in the autorange 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.

36

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 which 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 often contain minerals that can corrode 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 by industry professionals, it can be damaged by severe impacts. Use reasonable caution when using and storing the meter.

37

MAINTENANCE

SERVICE (CONT.)

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

AB10	Battery, 9V, NEDA 1604 or IEC 6LR 61
1500mA	Fuse 500 milliamper, 250V
ATL55	Test Lead Set

CLEANING

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 fresh replacement batteries of the specified size and type. Immediately remove old or weak batteries from the meter and dispose of them in accordance with your local disposal regulations. They 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

MAINTENANCE

BATTERY REPLACEMENT (CONT.)

To install a new battery follow these procedures:

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

WARNING!

Under no circumstances 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.
4. 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.
5. Reattach the battery compartment cover to the meter and reinstall the screws.

FUSE REPLACEMENT

The DC μA position is protected by a 400mA fuse. If this fuse blows the meter will display all zeros (example-00.00 mA) on the LCD when the DC μA 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, perform the following 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 in this compartment.
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.

40

SPECIFICATIONS

Measurement Limits

AC Amps	0.3A to 400A
DC milliAmps	0.01 μA to 400 μA
AC Voltage	1mV to 600V
DC Voltage	1mV to 600V
Resistance	0.1 Ω to 40M Ω
Capacitance	0.001 μf to 10,000 μf
Temperature	-40 $^{\circ}\text{F}$ to 750 $^{\circ}\text{F}$ (-40 $^{\circ}\text{C}$ to 400 $^{\circ}\text{C}$) (500 $^{\circ}\text{F}$ with thermocouple provided)
Continuity	Tone sounds at approximately 50 Ω or less

41

GENERAL SPECIFICATIONS

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°C)
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)
Temperature Coefficient	0.1 X (Specified Accuracy) / °C When Ambient Temperature is <64° or >82°F <18° or >28°C
Battery Type	9V, NEDA, 1604 or 6LR 61
Battery Life (Typical)	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, IP30
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

42

SPECIFICATION TABLE

The specifications listed in the following table on page 44 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 (+/- X% + X dgts). AC readings displayed on this meter are average responding, True-RMS indicating. They are based on a true sinusoidal waveform.

43

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 meter 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. 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 for a service charge. Return the unit postage paid and insured to:

UEI Service Department

(503) 644-8723

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

**UEI
8030 SW Meadows Blvd #7
Beaverton OR 97008**

FUNCTION	RANGE	RESOLUTION	ACCURACY	OVERLOAD
AC Amperes	40 A	0.01 A	3.0% ± 20 digits	400A conditions
50 Hz to 400 Hz	400 A	0.01 A	2.0% ± 5 digits	400 µA/250V
DC	40 µA	0.01 µA	1.0% ± 5 digits	
Low Amperes	400 µA	0.1 µA	1.5% ± 2 digits	500V RMS
DC Volts	1 V	1mV	0.3% ± 2 digits	
40 V	10mV			
400 V	100mV			
600 V	1 V			
AC Volts	1 V	1 mV	1.5% ± 3 digits	
50 Hz to 400 Hz	40 V	10 mV		
400 V	100 mV			
600 V	1 V			
Ohms	400Ω	100mΩ	0.5% ± 3 digits	600V
400Ω	1Ω			
400KΩ	100Ω			
400KΩ	1000Ω			
4MΩ	1KΩ		1.2% ± 3 digits	
40MΩ	10KΩ		1.5% ± 5 digits	
Capacitance	1 µF	0.001 µF	1.7% ± 5 digits	600V
10 µF	0.01 µF			
100 µF	0.1 µF		2.5% ± 15 digits	
10000 µF	1 µF		15% ± 100 digits	30V AC or 60V DC
Temperature	-40 to 157°F	0.1°F	5% ± 5°F	
15 to 75°F	0.1°F		1% ± 3°F	
Continuity	Open circuit test voltage		<27V	600V
Threshold Alarm			<50Ω	
Diode Check	Open-circuit test voltage:		<3.1V	600V
Max test current:			3.0 mA	

STANDARD ACCESSORIES

- Test Lead Set ATL55
- Instruction Manual DL250-MAN
- Temperature Probe Connection Adapter ATT70
- Thermocouple ATT29

OPTIONAL ACCESSORIES

- Flame Safeguard Test Kit ATLFSG
- Microwave Diode Booster Test Lead ATL60
- Line Splitter for current measurements ALS1
- Carbon Monoxide Adapter ACCO100/150
- Professional Service Hard Case ACS06
- Digital Tachometer Adapter DPM2K

To receive a FREE catalog of
our complete line of
diagnostic equipment,
call our UEI sales office at
(503) 644-8723.

Find more test instrument
information on the
internet at
www.ueitest.com
or email
info@ueitest.com.



Copyright © 1998 Universal Enterprises, Inc. DL250-MAN 7/98