USER'S MANUAL

Clamp on Multimeter - Compact Design
True RMS AC/DC

DCL-650

CIRCUIT-TEST ELECTRONICS
www.circuittest.com

International Safety Symbols

This symbol, adjacent to another symbol or terminal, indicates the user must refer to the manual for further information.

This symbol, adjacent to a terminal, indicates that, under normal use, hazardous voltages may be present.

Double insulation

SAFETY NOTES

- Do not exceed the maximum allowable input range of any function.
- Do not apply voltage to meter when resistance function is selected.
- Set function switch OFF when the meter is not in use.

WARNINGS

- Set function switch to the appropriate position before measuring.
- When measuring volts do not switch to current/resistance modes.
- When changing ranges using the selector switch always disconnect the test leads from the circuit under test.
- Do not exceed the maximum rated input limits.

CAUTIONS

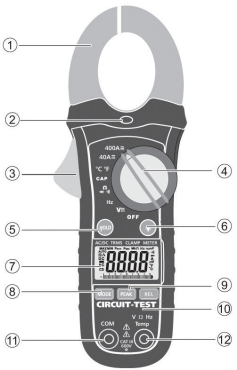
Improper use of this meter can cause damage, shock, injury or death. Read and understand this user manual before operating the meter.

- Always remove the test leads before replacing the battery.
- Inspect the condition of the test leads and the meter for any damage before operating the meter.
- Use great care when making measurements if the voltages are greater than 25VAC rms or 35VDC. These voltages are considered a shock hazard.
- Remove the battery if the meter is to be stored for long periods.
- Always discharge capacitors and remove power from the device under test before performing Diode, Resistance or Continuity tests.
- Voltage checks on electrical outlets can be difficult and misleading because of the uncertainty of connection to the recessed electrical contacts. Other means should be used to ensure that the terminals are not "live".
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Input Limits	
Function	**Maximum Input**
A	400A DC/AC
V DC, V AC	600V DC/AC
Frequency, Resistance, Diode, Continuity, Capacitance Test	250V DC/AC
Temperature (°C/°F)	250V DC/ AC

Meter Description

1. Current clamp
2. Non-contact AC voltage indicator light
3. Clamp trigger
4. Rotary Function switch
5. Data Hold button
6. Back Light button
7. LCD display
8. MODE select button
9. PEAK button
10. Relative button
11. COM input jack
12. V Ω CAP TEMP Hz jack



AC	Alternating current
DC	Direct currrent
AUTO	Autoranging
△	Relative
⊣⊢	Diode test
•))	Continuity test
⊡	Data Hold
MAX	Maximum reading
MIN	Minimum reading
°C,°F	Celsius, Fahrenheit (temperature)
µ,m, n,M,k	Units of measure: micro, milli, nano, mega, kilo
A	Amperes (current)
V	Volts (voltage)
F	Farad (capacitance)
Hz	Frequency
%	Duty ratio
⊏+⊐	Low Battery
Ω	Ohms
$\mathbf{P_{MAX}}$	Peak Maximum
$\mathbf{P_{MIN}}$	Peak Minimum

Specifications

Function	Range & Resolution	Accuracy (% of reading)
AC Current (50/60Hz)	40.00 AAC	± (2.5% + 8 digits)
	400.0 AAC	± (2.8% + 5 digits)
DC Current	40.00 ADC	± (2.5% + 5 digits)
	400.0 ADC	± (2.8% + 5 digits)
DC Voltage	400.0 mVDC	± (0.8% + 2 digits)
	4.000 mVDC	± (1.5% + 2 digits)
	40.00 VDC	
	400.0 VDC	
	600.0 VDC	± (2% + 2 digits)
AC Voltage (50-60Hz)	400.0 mVAC	± (1% + 10 digits)
	4.000 VAC	
	40.00 VAC	
	400.0 VAC	± (1.5% + 5 digits)
	600.0 VAC	± (2.0% + 5 digits)
Resistance	400.0 Ω	± (1.0% + 4 digits)
	4.000 KΩ	± (1.5% + 2 digits)
	40.00 KΩ	
	400.0 KΩ	
	4.000 MΩ	± (2.5% + 3 digits)
	40.00 MΩ	± (3.5% + 5 digits)
Capacitance	40.00nF	± (5.0% + 20 digits)
	400.0nF	± (3% + 5 digits)
	4.000μF	
	40.00μF	
	400.0μF	± (4.0% + 10 digits)
	4mF	± (5.0% + 10 digits)
Frequency	10-10kHz Sensitivity:100V(<50Hz); 50V(50 to 400Hz;15V (401Hz to 100kHz)	± (1.5% + 2 digits)

Function	Range & Resolution	Accuracy (% of reading)
Temp (type-K) (probe accuracy not included)	-20.0 to 760.0°C	± (3% + 5°C)
	-4.0 to 1400.0°F	± (3% + 9°F)

Clamp size	Opening 30mm (1.2") approx.
Diode Test	Test current of 0.3mA typical; Open circuit voltage <3V DC typical.
Continuity Check	Threshold <50Ω; Test current < 0.5mA
Low Battery Indicator	" ⊏÷+⊐ " is displayed
Over range Indicator	"OL" is displayed
Measurement Rate	2 per second, nominal
Input Impedance	10MΩ (VDC and VAC)
Display	4000 counts LCD
AC Current	50-60Hz (TRMS AAC)
AC Voltage bandwidth	50-60Hz (TRMS VAC)
Operating Temperature	5 to 40°C (41 to 104°F)
Storage Temperature	-20 to 60°C (-4 to 140°F)
Operating Humidity	Max 80% up to 31°C (87°F) decreasing linearly to 50% at 40°C (104°F)
Storage Humidity	<80%
Operating Altitude	2000 meters (7000ft.) max.
Battery	One 9V Battery
Auto OFF	approx. 30 minutes
Dimensions / Weight	197x70x40mm / 183g
Safety / Approvals	This meter is UL and CUL approved and conforms to IEC61010-1 for Overvoltage Category CAT III 600V

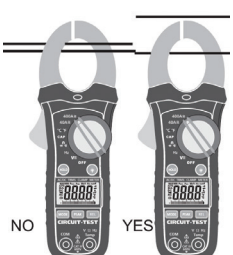
Operation

NOTES: Read and understand all **warning** and **caution** statements in this operation manual before using this meter. Set the function select switch to the OFF position when the meter is not in use.

AC/DC Current Measurements

WARNING: Ensure that the test leads are disconnected from the meter before making current clamp measurements.

1. Set the Function switch to the 400 $\tilde{\underline{\underline{A}}}$, 40$\tilde{\underline{\underline{A}}}$ range.
2. Select AC or DC with the **MODE** button.
3. If the range of the measured is not known, select the higher range first then move to the lower range if necessary.
4. Press the trigger to open jaw. Fully enclose one conductor to be measured.
5. In DCA mode, to ensure the reading is correct, please press REL button to clear the reading on LCD before measurement. The clamp Meter LCD will display the reading.



AC/DC Voltage Measurements

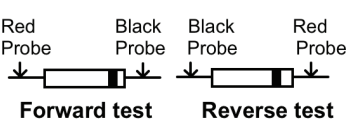
1. Insert the black test lead into the negative **COM** terminal and the red test lead into the positive **V** terminal.
2. Set the function switch to $\tilde{\underline{\underline{V}}}$ position.
3. Select AC or DC with the **MODE** button.
4. Connect the test leads in parallel to the circuit under test.
5. Read the voltage measurement on the LCD display.

Resistance Measurements

1. Insert the black test lead into the negative **COM** terminal and the red test lead into the positive terminal.
2. Set the function switch to the **Ω** position.
3. Touch the test probe tips across the circuit or component under test. It is best to disconnect one side of the device under test so the rest of the circuit will not interfere with the resistance reading.
4. For Resistance tests, read the resistance on the LCD display.

Diode and Continuity Measurements

1. Insert the black test lead banana plug into the negative **COM** jack and the red test lead banana plug into the positive diode jack.
2. Turn the function switch to the **Ω** position.
3. Press the **MODE** button until " " appears in the display.
4. Touch the test probes to the diode under test. Forward voltage will indicate 0.4V to 0.7V. Reverse voltage will indicate "**OL**". Shorted devices will indicate near 0mV and an open device will indicate "**OL**" in both polarities.



5. Press **MODE** button to display .
6. For Continuity tests, if resistance is < 50Ω, tone will sound.

Capacitance Measurements

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

1. Set the rotary function switch to the ⊣⊢ position.
2. Insert the black test lead banana plug into the negative **COM** jack. Insert the red test lead banana plug into the positive **V** jack.
3. Touch the test leads to the capacitor to be tested.
4. Read the capacitance value in the display

Frequency Measurements

1. Set the rotary function switch to **Hz** position.
2. Insert the black lead banana plug into the negative **COM** jack and the red test lead banana plug into the positive **V** jack
3. Touch the test probe tips to the circuit under test.
4. Read the frequency on the display.

Temperature Measurements

WARNING: To avoid electric shock, disconnect both test probes from any source of voltage before making a temperature measurement.

1. Set the function switch to °C / °F.
2. Insert the Temperature Probe into the negative **COM** and the **V** jacks, making sure to observe the correct polarity.
3. Touch the Temperature Probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
4. Read the temperature in the display. The digital reading will indicate the proper decimal point and value.

WARNING: To avoid electric shock, be sure the thermocouple has been removed before changing to another measurement function

Non-Contact AC Voltage Measurements

WARNING: Risk of Electrocution. Before use, always test the Voltage Detector on a known live circuit to verify proper operation

1. Touch the probe tip to the hot conductor or insert into the hot side of the electrical outlet.
2. If AC voltage is present, the detector light will illuminate.

NOTE: The conductors in electrical cord sets are often twisted. For best results, rub the probe tip along a length of the cord to assure placing the tip in close proximity to the live conductor.

NOTE: The detector is designed with high sensitivity. Static electricity or other sources of energy may randomly trip the sensor. This is normal operation

MODE Button

To select DC/ACV, OHM/Diode/Continuity, °C / °F

Data Hold Button

To freeze the LCD meter reading, press the data hold button. While data hold is active, the "H" display icon appears on the LCD. Press the data hold button again to return to normal operation.

REL Button

For DCA and Capacitance Zero & Offset adjustment.

Peak Hold

The Peak Hold function captures the peak AC voltage or current. The meter can capture negative or positive peaks as fast as 1 millisecond in duration.

1. Turn the function switch to the A or V position.
2. Use the MODE button to select AC
3. Allow time for the display to stabilize.
4. Press and Hold the PEAK button until “CAL” appears in the display. This procedure will zero the range selected.
5. Press the PEAK button, Pmax will display.
6. The display will update each time a higher positive peak occurs.
7. Press the PEAK button again, Pmin will display. The display will now update and indicate the lowest negative peak.
8. To return to normal operation, press and hold the PEAK button until the Pmin or Pmax indicator switches off.

NOTE: If the Function switch position is changed after a calibration the Peak Hold calibration must be repeated for the new function selected.

Battery Replacement

1. Remove the two rear Phillips head screw
2. Open the battery compartment
3. Replace the 9V battery observing the correct polarity
4. Re-assemble the meter

Limited Warranty

Circuit-Test Electronics warrants to the original purchaser that this product be free of defect in material or workmanship for a period of 2 years from the date of purchase.

Any product which has been subjected to misuse or accidental damage is excluded from the warranty. Except as stated above, Circuit-Test Electronics makes no promises or warranties either expressed or implied including warranties of merchantability or the fitness for any particular purpose.