

860N

3000 AUTO RANGE DIGITAL DUAL DISPLAY AC/DC CLAMP MULTIMETER OPERATION MANUAL

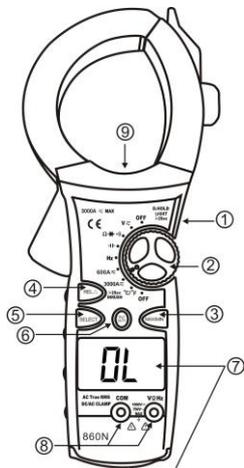
This LCD Auto Range & Auto Power off Digital AC/DC clamp multimeter is a portable, 3000-digit multimeter. It is ideally suited for field, laboratory, shop and home applications.

1. SAFETY INFORMATION

The following safety information must be observed to insure maximum personal safety during the operation of this meter.

- 1) When measuring voltage ensure that instrument is not switched to the current range, resistance range, diode and continuity range, capacitance range or temperature range.
- 2) Use extreme care when measuring voltage above 50V, especially from sources where high energy is existed.
- 3) Avoid making connections to "live" circuits whenever possible.
- 4) Before making resistance measurements, diode or continuity test, capacitance test or temperature test, ensure that the circuit under test is de-energized.
- 5) Always ensure that the correct function and range is selected.
- 6) Extreme care should be taken when using the instrument to conjunction with a current transformer connected to the terminals if an open circuit occurs.
- 7) Ensure that the test leads and probes are in good condition with no damage to the insulation.
- 8) Take care not to exceed the over-load limits as given in the specifications.
- 9) Before opening the cover of the battery cabinet to replace batteries, disconnect the test leads from any external circuit, set the selector switch to "OFF" position.
- 10) Keep the fingers after the protection ring when measuring through the instrument lead.
- 11) Change the battery when the symbol "BAT" appears to avoid incorrect data.

2. Panel Layout



- 1) D.HOLD/ Back Light key: In any range, push the key, the present display value will be locked and the "H" symbol will appear, push it again to exit HOL and the "H" symbol disappear. Press "D.HOLD" button more than 2 seconds, the back light will light, press it more than 2 seconds again, the back light will light off.
- 2) Rotary Switch: use this switch to select functions and ranges.
- 3) MAX/MIN key: Press, measurement function will follow the order of the maximum → minimum → largest smallest difference conversion cycle, long press to restore the normal status.
- 4) REL key: Push the key, the present display value will be stored in memory, then the new display value is the difference between input value and stored data. In Hz/Duty measurement, it can not work.
- 5) SELECT key: This key work on the "CAP/Ω" range only. Push the key to choose resistance, diode or continuity test.
- 6) Hz/DUTY key: In Hz range, push the key, you can measure the duty, push again, go back to Hz measurement. In voltage range, push it, you can measure Hz and duty, but the measurement range will be smaller, and the auto range mode

will be changed to manual range mode.

- 7) LCD Display: LCD Dual Display, facilitates reads the data.
- 8) V Ω+ Input Jack, COM/T- Input Jack
- 9) Clamp Light easy for test the electric current in hidden place.

2. SPECIFICATIONS

2.1 GENERAL SPECIFICATIONS

- Display: 3 3/4 digit LCD with a max. reading of 3999.
 Range control: Auto range control.
 Polarity: Automatic negative polarity indication.
 Zero adjustment: Automatic.
 Overrange indication: Only the "OL" display.
 Low battery: The "BAT" is display when the battery voltage is below 7.2V.
 Auto Power Off: 30 minutes after stopping the switch or no push button, the meter automatically enter to power off mode. Push button or run switch, auto power off disable.
 Safety Standards: The meter is up to the standards of IEC1010 Double Insulation, Pollution Degree 2, Overvoltage Category III.
 Clamp opening size: 65mm.
 Operating Environment: Temperature 32~104° F(0~40°C), humidity <80%RH.
 Storage Environment: Temperature -4~140° F(-20~60°C), humidity <90%RH.
 Power supply: 9V Zinc-carbon battery.
 Dimension: 275(H)×120(W)×32(D)mm.
 Weight: Approx. 562g (including batteries).

2.2 ELECTRICAL SPECIFICATIONS

Accuracies are ±(% of reading + number in last digit) at 23±5°C, ≤70%RH.

2.2.1 DC Voltage

Range	Accuracy	Resolution
600mV	1.0% of rdg+5digits	0.1mV
6V		1mV
60V		10mV
600V		100mV
1000V	1.5% of rdg+5 digits	1V

Overload protection: 1000V DC/750Vrms AC

Impedance: 10MΩ, More than 100MΩ on 400mV scale

2.2.2 AC Voltage(RMS)

Range	Accuracy	Resolution	Frequency
600mV	3.0% of rdg+15 digits	0.1mV	40~100Hz
6V		1mV	
60V	1.5% of rdg+5 digits	10mV	40~400Hz
600V		100mV	
750V	2.5% of rdg+5 digits	1V	40~100Hz

Average sensing, calibrated to rms of sine wave

Overload protection: 1000V DC/750Vrms AC

Impedance: 10MΩ

2.2.3 DC Current

Range	Accuracy	Resolution	Frequency
200A	3.0% of rdg+10 digits	0.1A	-
3000A	0~1000	3.5% of rdg+20 digits	
	1000~2000	5.5% of rdg+20 digits	
	2000~3000	6.5% of rdg+40 digits	

Overload protection: 3000Arms within 60 seconds

2.2.4 AC Current

Range	Accuracy	Resolution	Frequency
200A	3.0% of rdg+12 digits	0.1A	50~60Hz
3000A	0~1000	3.5% of rdg+12 digits	
	1000~2000	5.5% of rdg+22 digits	
	2000~3000	6.5% of rdg+42 digits	

Average sensing, calibrated to rms of sine wave

Overload protection: 3000Arms within 60 seconds

2.2.5 Resistance

Range	Accuracy	Resolution
600Ω	1.0% of rdg+8 digits	0.1Ω
6kΩ		1Ω
60kΩ		10Ω
400kΩ		100Ω
6MΩ		1kΩ
60MΩ	2.5% of rdg+15 digits	10kΩ

Overload protection: 250V DC/250Vrms AC

2.2.6 Capacitance

Range	Accuracy	Resolution
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9.999nF	2.5% of rdg+15 digits	1PF
99.99nF		10PF
999.9nF	2.5% of rdg+10 digits	100PF
9.999 μ F		1nF
99.99 μ F		10nF
999.9 μ F	3.0% of rdg+20 digits	100nF
9.999mF	5.0% of rdg+25digits	1 μ F
99.99mF		10 μ F

Overload protection: 250V DC/250Vrms AC

2.2.7 Frequency AND Duty

Range	Accuracy	Resolution	Sensitivity
9.999Hz	0.5% of rdg+15 digits	0.001Hz	MIN of input voltage:0.1V~1.5V AC
99.99Hz		0.01Hz	
999.9Hz		0.1Hz	
9.999kHz		1Hz	
99.99kHz		10Hz	
999.9kHz		100Hz	
9.999MHz		1kHz	

Duty cycle: 1%~99% Accuracy: ± 0.5

Overload protection: 250V DC/250Vrms AC

2.2.8 Temperature(NiCr-NiSi sensor)

Range	Accuracy		Resolution
$^{\circ}$ C	-20~1000 $^{\circ}$ C	2.0% of rdg+3 digits	1 $^{\circ}$ C
$^{\circ}$ F	-4~1832 $^{\circ}$ F	2.5% of rdg+5 digits	

Overload protection: 36V DC/36Vrms AC

2.2.9 Diode and Audible continuity test

Range	Description	Test condition
	Display read approx. Forward voltage of diode.	Forward DC current approx. 1.0mA Reversed DC voltage approx. 3.0V
	Built-in buzzer sounds if resistance is less than 50 Ω approx.	Open circuit voltage approx. 1.0V

Overload protection: 250V DC/250Vrms AC

3. MEASURING INSTRUCTION

3.1 DC/AC Voltage

- 1) Connect the black test lead to "T-COM" socket and red test lead to the "T+V Ω Hz" socket.
- 2) Set the Rotary switch to "V" position Push the SELECT key to desired DC /AC test
- 3) connect the probes across the source or load under measurement.
- 4) Read the result from the LCD panel.

3.2 Resistance, Diode and Audible continuity Measurement

- 1) Connect the black test lead to "T-COM" socket and red test lead to the "T+V Ω Hz" socket.
- 2) Set the Rotary switch to desired " Ω " position, the present function is resistance measurement, if it is other function, push the SELECT Key to select .Diode and Audible continuity
- 3) Push "SELECT" to select diode test.
- 4) Connect the black and red test probe to the cathode (-) and anode (+) ends of diode to be tested respectively, read the forward voltage drop (junction) value from the display. If reverse connected the probes to diode, display shows over-load.
- 5) Push "SELECT" to select Audible continuity test.
- 6) Connect the probes across circuit to be tested, the beeper sounds continuously if the resistance is less than approx. 50 Ω
- 7) Connect the probes across circuit to be tested.
- 8) Read the result from the LCD panel.

Caution: Ensure that the circuit to be tested is "dead".

Max.input over-load: 250V rms<10sec

3.3 Capacitance Measurement

- 1) Connect the black test lead to "T-COM" socket and red test lead to the "T+V Ω Hz" socket.
- 2) Set the Rotary switch to desired "CAP" position.
- 3) Connect the probes to the capacitance to be tested.
- 4) Read the result from the LCD panel.

Caution:

- a) Capacitors should be discharged before being tested.

b) When testing large capacitance, it will take longer time before the final indication(For 1 μ F~99.99mF range, it will take about 4~7 seconds).

c) When testing small capacitance ($\leq 1\mu$ F), to assure the measurement accuracy, first press "REL", then go on measuring.

Max.input over-load: 250V rms<10sec

3.4 Frequency Measurement

- 1) Connect the black test lead to "T-COM" socket and red test lead to the "T+V Ω Hz" socket.
- 2)Set the "Hz/Duty" key to desired Hz/Duty test
- 3) connect the probes across the source or load under measurement.
- 4) Read the result from the LCD panel.

3.5 Temperature Measurement

- 1) Set the Rotary switch to " $^{\circ}$ C/ $^{\circ}$ F" position.
- 2) Connect the black test lead of the sensor to "T-COM" socket and the red test lead to the "T+" socket.
- 3) Put the sensor probe into the temperature field under measurement.
- 4) Read the result from the LCD panel.

Max.input over-load: 250V rms<10sec

A. The temperature function shows the random number at ordinary times, must insert the thermocouple in temperature test hole while examining temperature.

B. This meter inclosure WRNM-010 type contact thermocouple limit temperature is 250 $^{\circ}$ C(300 $^{\circ}$ C shortly);

C. Please don't change the thermocouple at will, otherwise we can't guarantee to measure accuracy;

Please don't importing the voltage in the temperature function.

D. Please use special probe for test high temperature.

3.6 DC/AC Current Measurement

- 1) Set the Rotary switch to desired "600A $\overline{\sim}$ " or "3000A $\overline{\sim}$ " position.
- 2) Set the SELECT key to desired DC or AC test
- 3) Press the "REL" Key, the display show "0", ACA auto Zero.
- 4) Open the clamp by pressing the jaw-opening handle and insert the cable to be measured into the jaw.
- 5) Close the clamp and get the reading from the LCD panel.

Note: Before this measurement, disconnect the test lead with the meter for safety.

4. CARE AND MAINTENANCE

4.1 CARING FOR YOUR MULTIMETER

Your Digital Multimeter is an example of superior design and craftsmanship. The following suggestions will help you care for the multimeter so you can enjoy it for years.

- 1) Keep the multimeter dry. If it gets wet, wipe it dry immediately. Liquids can contain minerals that can corrode electronic circuits.
- 2) Use and store the multimeter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries and distort or melt plastic parts.
- 3) Handle the multimeter gently and carefully. Dropping it can damage the circuit boards and cause and can accuse the multimeter to work improperly.
- 4) When take current measurement, keep the cable at the center of the clamp will get more accurate test result.
- 5) Keep the multimeter away from dust and dirt, which can cause premature wear of parts.
- 6) Wipe the mutimeter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the multimeter.
- 7) Use only fresh batteries of the required size and type. Always remove old or weak batteries. They can leak chemicals that destroy electronic circuits.
- 8) Please take out the battery when not using for a long time.

4.2 9Volt battery replacement

- 1) Ensure the instrument is not connected to any external circuit. Set the Rotary switch to "OFF" position and remove the test leads from the terminals.
- 2) Open the cover of the battery cabinet by a screwdriver.
- 3) Replace the old batteries with the same type batteries.
- 4) Close the battery cabinet cover and fasten the screw.



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