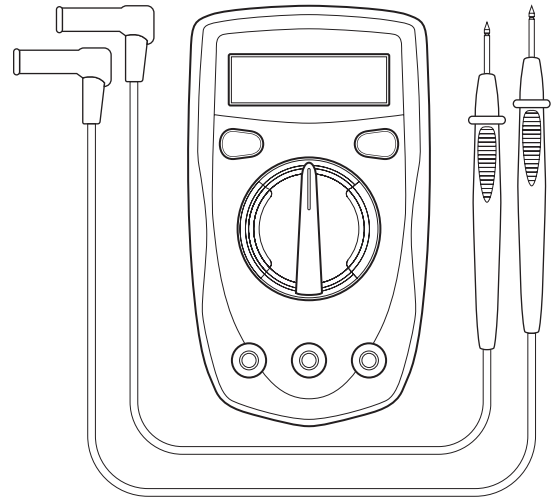


Digital Multimeter

Model No.: MSR-R500



Questions or Concerns?

Please contact us Mon-Fri 9:00 AM - 6:00 PM PST
at (855) 686-3835 or email support@etekcity.com

visit www.etekcity.com for more products.

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Safe and Proper Usage

Thank you for purchasing the Etekcity® MSR-R500 Digital Multimeter. Measure DC and AC voltage, current, diode and audible continuity, and resistance with the convenience of one single tool with built-in overload protection.

WARNING: TO AVOID THE RISK OF ELECTRIC SHOCK OR THE DAMAGE OF THE MULTIMETER OR OTHER EQUIPMENT, DO NOT CONNECT TO ANY INPUT TERMINALS OF THE MULTIMETER THAT MAY EXCEED 500V.

Read all the instructions provided in this manual. Failure to comply with the instructions in the manual and/or use of the device in ways other than the ones mentioned in the manual may result in serious injury, fire, and/or electrical shock. The person responsible for this equipment must ensure that all users understand the directions and adhere to them.

This meter complies with standard IEC61010: in pollution degree 2, overvoltage category (CAT I 600V, CAT II 300V) and double insulation.











CAT I: Signal level, special equipment or parts of equipment, telecommunications, electronic, etc.

CAT II: Local level, appliance, PORTABLE EQUIPMENT etc., with smaller transient overvoltages than CAT III.

Safety Operating Procedures

- Be sure to read, understand and comply with all the instructions in this manual
- Make sure the test leads are in a safe state. Keep equipment out of humidity or moist environments.
- **DO NOT** use the meter if it is damaged or the case (or part of the case) is removed. Look for cracks or missing plastic. Check the insulation around the connectors before use.
- **DO NOT** use the equipment in wet environments.
- Remove the test probes from the item of measurement before changing the settings or measurement functions on the multimeter.
- **DO NOT** apply the multimeter to voltages that may exceed 500V.
- **DO NOT** measure voltages when the meter is set to measure resistance (Ω).
- Always use the fuses of the correct type as specified within the instructions to avoid any injury, electrical shock, or risk of fire.
- **DO NOT** operate the meter around explosive gas, vapor, or dust.
- When operating the test probes, keep your fingers behind the finger guards.
- When making electrical connections, connect the common test lead (black) before connecting the live test lead (red). When disconnecting, disconnect the live test lead (red) before disconnecting the common test lead (black).
- Always remove the test leads before replacing the battery within the multimeter or opening the battery compartment.
- Inspect the condition of the test leads and the multimeter for any damage before operating the meter. Repair or replace any damage before use.
- Verify the meter's operation by measuring a known voltage before and after using the meter.

- **DO NOT** change the settings on the rotary switch while the test leads are measuring a source of power.
- Use great care when making measurements if the voltages are greater than 25VAC rms or 35VDC. These voltages are considered to be a shock hazard.
- **DO NOT** operate the meter with the battery cover removed or the case open.
- **DO NOT** remove the cover or open the case of the meter without first removing it from the main power source.
- **DO NOT** allow children to operate this device.
- USE a 9V DC battery when replacing the battery within the device.
- Make sure to insert the battery under the correct polarity indicated in the device.
- **DO NOT** use leaking batteries.
- **DO NOT** dispose old batteries in fire.
- Expired or damaged batteries can cause cauterization on contact with skin. Always therefore, use suitable hand gloves for protection in such cases.
- Disconnect circuit power and discharge all high voltage capacitors before testing resistance, continuity, diodes, or capacitance.
- Before measuring current, check the meter's fuses and turn off power to the circuit before connecting the meter to the circuit.
- In the case the device is going to be unused for an extended period of time, remove the battery before storage.

	AC or DC		Low Battery
	AC Current		Diode
	DC Current		Fuse
	Earth Ground		Continuity Test
	Double Insulated		Warning

Meter Diagram

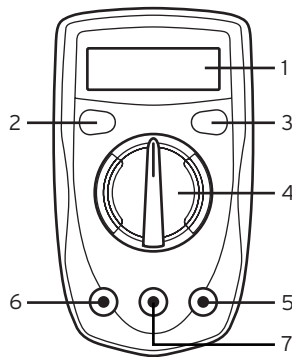


Figure 1

1. LCD Display
2. HOLD Button
3. Backlight Button
4. Rotary Switch
5. COM Terminal
6. 10A Terminal
7. Other Terminals

Button Functions

Button	Operation
HOLD	<ul style="list-style-type: none"> • Press once to lock measurement results (An 'H' symbol will appear on the display) • Press once more to unlock results
BACKLIGHT	<ul style="list-style-type: none"> • Press once to turn on the display backlight • Press once more to turn off backlight

General Specifications

Maximum Voltage (Including transient overvoltage) Between any Terminals & Grounding	500V rms
Fused Protection for VΩmA Input Terminal	315mA, 250V fast type, ϕ 5x20mm
10A Terminal	Un-fused
Range	Manual Ranging
Maximum Display	1999
Measurement Speed	Updates 2 ~ 3 times/second
Temperature	Operating: 0°C ~ 40°C (32°F ~ 104°F) Storage: -10°C ~ 50°C (14°F ~ 122°F)
Relative Humidity	75% at 0°C ~ 30°C < 50% at 31°C ~ 40°C
Altitude	Operating: <2,000m Storage: <10,000m
Accuracy	(a% reading + b digits) Guaranteed for 1 year

Battery Type: 1 x 9V Battery NEDA 1604 / 6F22 / 006P
Overload Display: 1
Dimensions: 130 x 73.5 x 35mm
Weight: ~156g

DC Voltage

Range	Resolution	Accuracy	Overload Protection
200mV	100 μ V	\pm (0.5%+2)	250V DC or AC
2000mV	1mV		500V DC or AC
20V	10mV		
200V	100mV	\pm (0.8%+2)	500V DC or AC
500V	1V		

Input impedance: 10M Ω

AC Voltage

Range	Resolution	Accuracy	Overload Protection
200V	100mV	\pm (1.2%+10)	500V DC or AC
500V	1V		

- Input impedance: approx. 5M Ω
- Displays effective value of sine wave (mean value response)
- Frequency response 40Hz ~ 400Hz

DC Current

Range	Resolution	Accuracy	Overload Protection
200μA	0.1μA	-----	315mA, 250V fast type fuse: 5x20mm
2000μA	1μA	± (1%+2)	
20mA	10μA		
200mA	100μA	± (1.2%+2)	Un-Fused
10A	10mA	± (2%+5)	

At 10A Range: for continuous measurement ≤ 10 seconds and interval not less than 15 minutes

Resistance

Range	Resolution	Accuracy	Overload Protection
200Ω	0.1Ω	± (0.8%+5)	250V DC or AC
2000Ω	1Ω		
20KΩ	10Ω	± (0.8%+2)	
200KΩ	100Ω		
20MΩ	10KΩ	± (1%+5)	
200MΩ	100KΩ	± [5%(reading-10)+10]	

Diodes and Continuity Measurement

Range	Resolution	Remark	Overload Protection
→	1mV	Display approximate forward voltage drop: 0.5v ~ 0.8v	250V DC or AC
•••)	1Ω	Buzzer beeps at < 70W	

Square Wave Output

Range	Illustration
□ OUT	Approx. output 50Hz square wave signal. As a simple signal source with 47KΩ resistance output.

- No overload protection
- Make sure voltage output of calibrated equipment level is less than 10V to avoid damages to the meter

DC Voltage Measurement

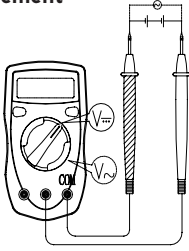


Figure 2

DC Voltage Ranges: 200mV, 2000mV, 20V, 200V, 500V

Input Impedance: 5Ω

1. Plug the red test lead into the VΩmA terminal, then plug the black test lead into the COM terminal.
2. Set the rotary switch to the appropriate measurement in V= range.
3. Connect the test leads to the object of measurement. Hold them in place until the results on the display stabilize.
4. When measurement is completed, disconnect the test leads from the object of measurement.

NOTE

- If the value of voltage is unknown, use the maximum measurement position (500V) and reduce the range until proper readings are obtained.
- The LCD will display "1" if there is an overload within the selected range. Select a higher range to obtain a correct reading.
- If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).

AC Voltage Measurement

(See Figure 2)

AC Voltage Ranges: 200V, 500V

Input Impedance: 5Ω

1. Plug the red test lead into the VΩmA terminal, then plug the black test lead into the COM terminal.
2. Set the rotary switch to the appropriate measurement in V~ range.
3. Connect the test leads to the object of measurement. Hold them in place until the results on the display stabilize. The displayed measured value is the value of sine wave (mean value response).
4. When measurement is completed, disconnect the test leads from the object of measurement.

NOTE

- If the value of voltage is unknown, use the maximum measurement position (500V) and reduce the range until proper readings are obtained.
- The LCD will display "1" if there is an overload within the selected range. Select a higher range to obtain a correct reading.
- If the circuit impedance is less than or equal to 10kΩ, the error is negligible (0.1% or less).

DC Current Measurement

⚠ WARNING

Never attempt an in-circuit current measurement where the voltage between the terminals and ground is greater than 60V. If the fuse burns out during measurement, this may cause harm to the user and/or damage to the device. Use proper terminals, functions, and range for measurement. When the testing leads are connected to the current terminals, do not parallel them across any circuit.

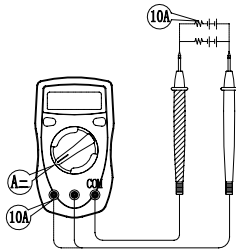


Figure 3

DC Current Ranges: 2000 μ A, 20mA, 200mA, 10A

1. Turn off the power to the circuit and discharge all high-voltage capacitors.
2. Plug the red test lead into the V Ω mA or 10A terminal, then plug the black test lead into the COM terminal.
3. Set the rotary switch to the appropriate measurement in A range.
4. Break the current path to be tested.
5. Connect the red test lead to the most positive side of the break and the black test lead to the most negative side of the break.
6. Turn on the circuit power.
7. When measurement is completed, disconnect the test leads from the object of measurement.

NOTE

If the value of voltage is unknown, use the maximum measurement position (10A) and reduce the range until proper readings are obtained.

Resistance Measurement

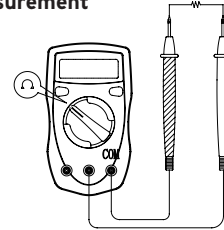


Figure 4

Resistance Ranges: 200 Ω , 2000 Ω , 20k Ω , 200k Ω , 20M Ω , 200M Ω

1. Plug the red test lead into the V Ω mA terminal, then plug the black test lead into the COM terminal.
2. Set the rotary switch to the appropriate measurement in Ω range.
3. Connect the test leads to the object of measurement, the measured value will appear on the display.
4. When measurement is completed, disconnect the test leads from the object of measurement.

NOTE

- The test leads can add 0.1 Ω to 0.3 Ω of error to the resistance measurement. To obtain precise readings in low-resistance measurement (200 Ω), short-circuit the input terminals beforehand and record the reading obtained (reading X). This is the additional resistance from the test lead. Then use the equation:
 $Measured\ resistance\ value\ (Y) - (X) = resistance\ result$
- For high-resistance measurements (>1M Ω), it may take a few seconds for the reading result to stabilize.

Diode Measurement

⚠ WARNING

To avoid damage to the meter and/or the object of measurement, disconnect the circuit power and discharge all the high-voltage capacitors before diodes.

Test to check diodes, transistors, and other semiconductor devices. The diode test sends a current through the semiconductor junction, then measures the voltage drop across the junction. A good silicon junction drops between 0.5V and 0.8V.

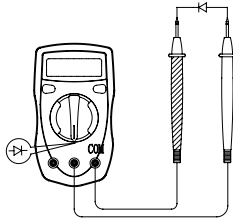


Figure 5

1. Plug the red test lead into the V Ω mA terminal, then plug the black test lead into the COM terminal.
2. Set the rotary switch to the \rightarrow setting.
3. For forward voltage drop readings on any semiconductor component, place the red test lead on the component's anode and place the black test lead on the component's cathode. Hold them in place until the results on the display stabilize.
4. When measurement is completed, disconnect the test leads from the object of measurement.

NOTE

- In a circuit, a good diode should still produce a forward voltage drop reading of 0.5V to 0.8V; however, the reverse voltage drop reading can vary depending on the resistance of other pathways between the probe tips.
- The LCD will display "1" if the open-circuit is incorrectly connected.
- The unit of diode is volt (V), displaying the positive-connection voltage-drop value.

Continuity Measurement

1. Plug the red test lead into the V Ω mA terminal, then plug the black test lead into the COM terminal.
2. Set the rotary switch to the \rightarrow setting.
3. Connect the test leads across with the object of measurement.
4. The buzzer will sound if the resistance of the circuit is under 70 Ω .

NOTE

The LCD will display "1" if the circuit is open.

Square Wave Output

⚠ WARNING

To avoid damage to the meter and/or the object of measurement, do not allow output terminals (red test lead) to surpass 10V.

1. Plug the red test lead into the V Ω mA terminal, then plug the black test lead into the COM terminal.
2. Set the rotary switch to the \sim OUT setting.
3. Connect the test leads across with the object of measurement. Hold them in place until the results on the display stabilize.
4. When measurement is completed, disconnect the test leads from the object of measurement.

NOTE

- The frequency is approximately 50Hz.
- When loaded to 1M Ω , the output scope will be higher than 3Vpp.

Maintenance

⚠ WARNING

- To avoid false readings, possible electrical shock and/or personal injury, replace the battery as soon as the low battery indicator appears on the display.
- To avoid electrical shock, arc blast, personal injury, and/or damage to the meter, use the specified fused ONLY in accordance with the following procedure.

Battery and Fuse Replacement

1. Disconnect the test leads from the input terminals of the meter.
2. Turn OFF the meter
3. Using a screwdriver, unscrew the battery compartment located on the bottom of the meter. Slide off the battery compartment cover.
4. Remove the used batteries from the battery compartment.
5. Remove the fuse by gently prying one end loose, then take the fuse out from its bracket.
6. Replace the battery with a new 9V battery.
7. Install replacement fuses with the identical type and specification: 315mA, 250V fast type, ϕ 5x20mm (make sure the fuse is fixed firmly in the bracket).
8. Re-apply the compartment cover and reinstall the screw firmly.