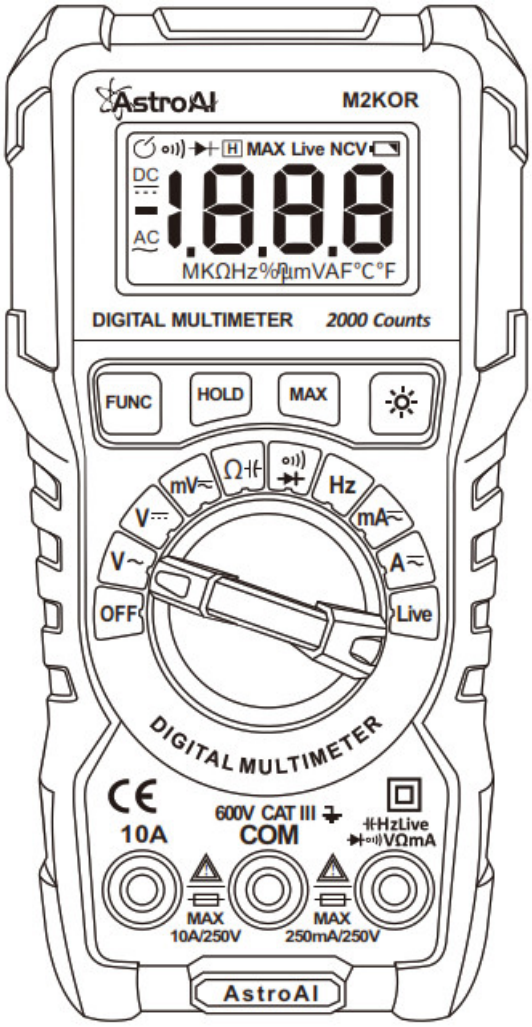
AstroAI M2KOR Digital Multimeter User Manual

Digital Multimeter
User Manual



Thank you for purchasing the True RMS 2000 Count Digital Multimeter from AstroAI. The AstroAI True RMS Digital A multimeter is designed to be safely and accurately used in schools, laboratories, factories, and other social/industrial fields. This user manual provides all safety information, operation instruction, specifications, and maintenance for the meter. This instrument performs AC/DC Voltage, AC/DC Current, Resistance, Capacitance, Diode Testing, Continuity Testing, and Frequency Testing. Thank you again for choosing AstroAI, if you have any questions or concerns regarding your product, please contact us at **support@astroai.com**.

NOTE: Fully read and comprehend this manual before using this Digital Multimeter.

SAFETY INFORMATION: This instrument is designed in accordance with the IEC61010-1 for the safety requirements of electronic test instruments. The instrument is designed and manufactured in strict compliance with the IEC61010-1 CAT.III 600V overpressure safety standard and pollution level 2.

Contents

WARNING

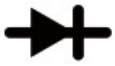
To avoid possible electric shocks or personal injury, and to avoid possible damage to the Meter or to the equipment being tested, adhere to the following rules:

- Use the Meter strictly in accordance with this manual, otherwise, the protection function provided by the Meter may be damaged or weakened.
- Please be especially careful when measuring over 60V DC, 30V AC RMS or 42V peak value, there is a danger of an electric shock.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and grounding.
- Check whether the Meter is working normally by measuring the known voltage, do not use it if the readings are incorrect or the Meter is damaged.
- Before using the meter, please check whether there are cracks or damage to the plastic parts of the meter

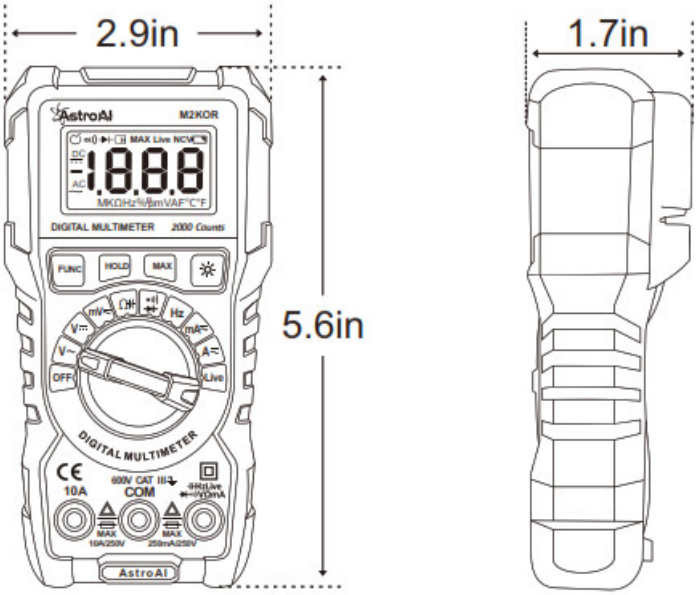
casing. Do not use the Meter if all or part of the exterior casing is damaged.

- Before using the Meter, please check whether the test leads are cracked or damaged. Please replace the test leads of the same model and the same electrical specifications if the leads are damaged.
- Use the Meter according to the measurement category, voltage or current rating specified on the meter or manual.
- Comply with local and national safety regulations. Wear personal protective equipment (such as approved rubber gloves, masks, and flame-retardant clothing, etc.) to prevent injury from electric shocks and arcs when hazardous live conductors are exposed.
- Replace the battery as soon as the low-battery indicator appears to avoid measurement errors.
- Do not use the Meter around explosive gas or steam; or humid environments.
- When using the test leads, keep your fingers behind the finger guards.
- When measuring, connect the neutral wire or ground wire first, and then connect the live wire; when disconnecting, disconnect the live wire first, and then disconnect the neutral wire and the ground wire.
- Before opening the case or battery cover, remove the test leads from the Meter first. Do not use the Meter when it is disassembled or the battery cover is opened.
- The Meter can only be used with the equipped test leads to meet the requirements of safety standards. If the test leads are damaged and need to be replaced, replace only the same model and the same electrical specifications.

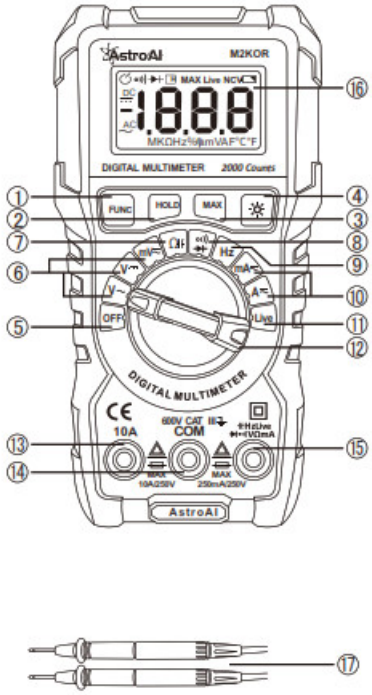
ELECTRICAL SYMBOLS

~	AC (Alternating Current)		Low Battery Symbol
⎓	DC (Direct Current)		Audible Continuity Test
≂	AC and DC		Diode Test
	Capacitance Test		Earth Ground
Ω	Resistance Test	**Hz**	Frequency
	Double Insulation		Warning
mV/V	Voltage	**mA/A**	Current
Live	Live Wire Detection	CE	Compliant with EU Standards

SIZE



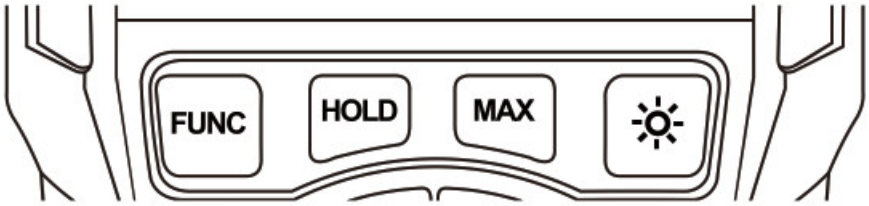
MULTIMETER DIAGRAM



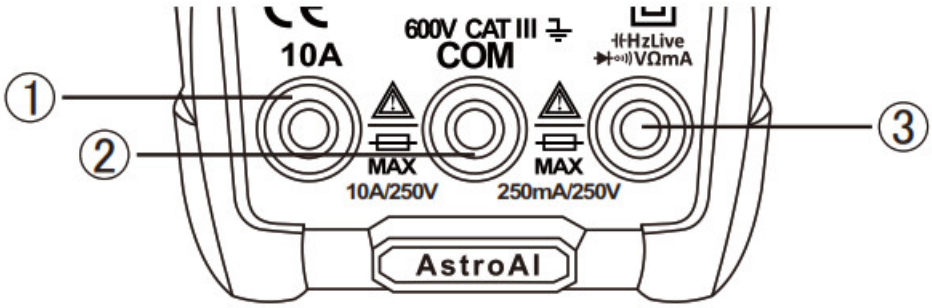
1. FUNC Button 2. HOLD Button 3. MAX Button 4. Backlight Button 5. OFF 6. AC/DC Voltage Test 7. Capacitance/Resistance 8. Continuity Test/Diode Test	9. Frequency Test 10. AC/DC Current Test 11. Live Wire Detection 12. Rotary Switch 13. 10A Terminal 14. Com Terminal 15. HzLive VΩmA Terminal 16. LCD Screen 17. Test Leads

GETTING TO KNOW YOUR DEVICE

BUTTON FUNCTIONS



Button	Function
FUNC	Use the FUNC button to further select the function if there are multiple functions in one rotary setting. **NOTE:** Pay special attention to make sure the selected setting is correct before perf orming any tests.
HOLD	Press the HOLD button to hold or cancel the data. Press this button while performin g a test to hold (freeze) the reading for recording, then the screen will keep the reading when the hold function is activated. Press the HOLD button ag ain to turn off this function. **NOTE**: The screen will display when the data hold function is activated.
MAX	Press the MAX button to turn on/off the maximum value record. You can use this fu nction when you need to record the maximum value in the measurement scale. Firs t, you need to connect the multimeter to the circuit, and then press the MAX button (please do not remove the test lead during this measurement) to turn on the maximum value function, then the LCD display will show the maximum value of all t he measured data; Press the MAX button again to turn off this function. **NOTE:** The screen will display when the maximum value function is turned on.
☼	Press the button to turn on/off the screen's backlight. Press the button to turn on th e backlight, the reading can be seen clearly in a dim environment; press this button again to turn off the backlight.



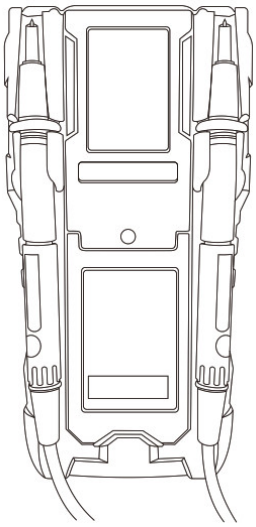
1.	Plug the red test lead into 10 A terminal when using this A ⎓ function.
2.	Plug the black test lead into the COM terminal.
3.	Plug the red test lead into the HzLive VΩmA terminal when you need to use functions o ther than. A ⎓

AUTO SHUT OFF

- Rotating the rotary switch from the OFF button to any gear will turn on the power. After 15 minutes of standby, the Meter will automatically turn off. To turn it on again, just rotate the range switch or press the button.

TEST LEADS HOLDER

The test leads can be fixed on the back of the Meter (as shown in the figure), and the test leads holder can facilitate the storage and next use.



OPERATION INSTRUCTIONS

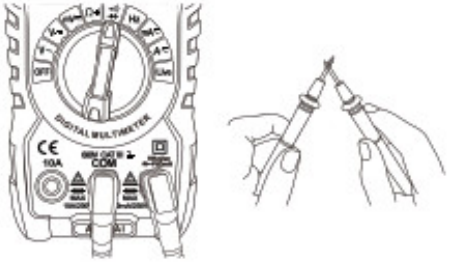
NOTE:

- To avoid damage to the Meter, do not measure voltage exceeding 600V.
- Pay special attention to safety when measuring high voltage to avoid electric shock or personal injury.
- Before using the Meter to test a known voltage or current, confirm that the Meter functions work properly.

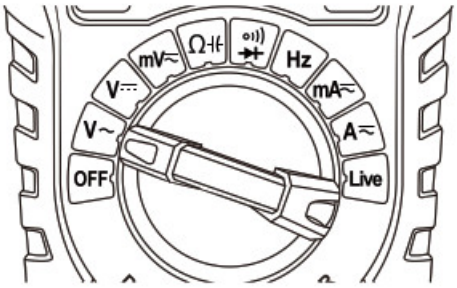
MEASURING AC/DC VOLTAGE

MEASURING AC VOLTAGE

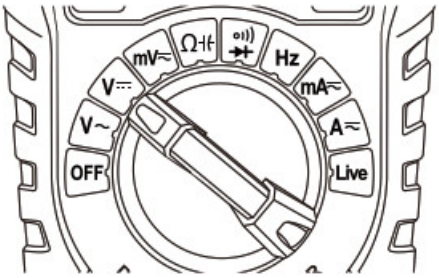
- Insert the red test lead into the HzLive VΩmA terminal and the black test lead into the “COM” terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.



- Turn the rotary dial to the“V ~” setting. The screen will display indicating that the measurement function is AC~ voltage.



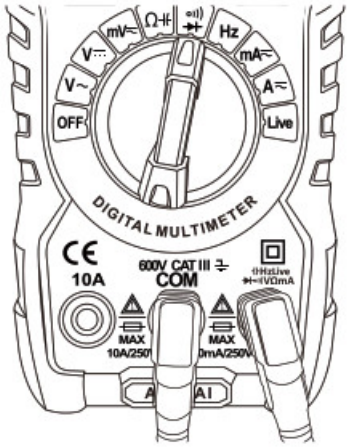
- Turn the rotary dial to the “V ~ ” setting. The screen will display indicating that the measurement function is DC ⎓ voltage.

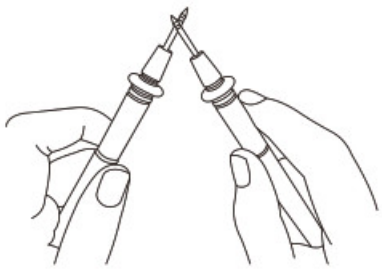


- Connect the test leads to the circuit under test (connect the leads in parallel to the power supply or circuit under test) to measure.
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

MEASURING AC/DC mV VOLTAGE

- Insert the red test lead into the HzLive VΩmA terminal and the black test lead into the “COM” terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.

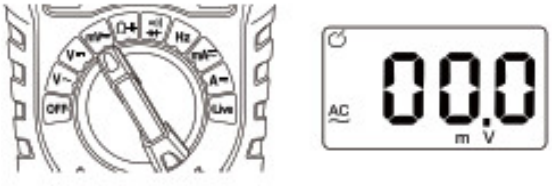




- Turn the rotary dial to the “mV ≂ ” setting. The screen will display DC ⎓ indicating that the measurement function is mV voltage.

- Press the FUNC button to switch to the AC ~ mA voltage test. The screen will display indicating that the

measurement function is AC voltage.



- Connect the test leads to the circuit under test (connect the leads in parallel to the power supply or circuit under test) to measure.

  NOTE: If the reading is negative when measuring the DC voltage, it means that the positive and negative poles of the test leads are reversed, please change the test leads.
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

VOLTAGE TIPS
HOW TO FIND A LIVE WIRE IN A SOCKET:

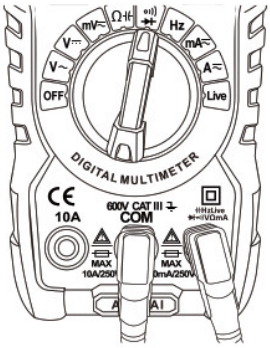
- Switch to the voltage test set.
- Connect the black test lead to the grounded wire or jack. Connect the red test lead to one of the jacks to be measured.
- Check both jacks. One should have a reading and the other should remain at or near zero. The live wire will have the reading.

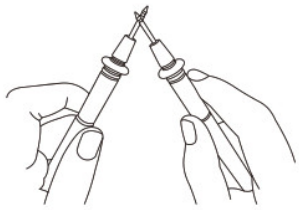
VOLTAGE NOTES

- Choose the V setting to measure the unknown voltage first, and then select the appropriate range according to the voltage.
- To avoid damage to the meter, do not measure voltage exceeding 600V DC or 600V AC CATIII.
- Pay special attention to the voltage setting of the Multimeter. The LCD screen will indicate whether the setting is in AC. Use the “Select” button to choose the correct setting.
- If the AC setting is used to measure DC and vice versa, an overflow symbol will be displayed. Performing this has the potential to damage the Meter or any components you are attempting to test.
- When measuring voltage, the result will fluctuate depending on the power supply. Generally speaking, the result will fluctuate ±10V, which is NOT an inaccurate result.

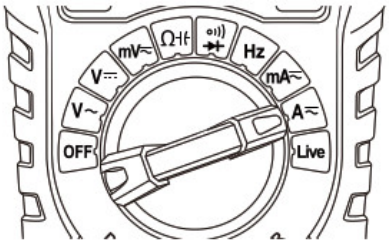
MEASURING AC/DC CURRENT

- Disconnect the power supply of the circuit under test.
- Insert the red test lead into the terminal and the black test lead into the “COM” terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.

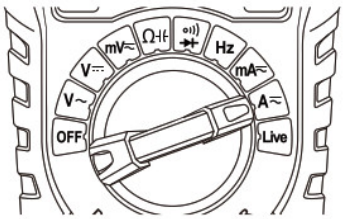




- Insert the black test lead into the “COM” terminal and the red test lead into the 10A terminal.
  NOTE: The red test lead must be inserted into the 10A terminal when using the A ⎓ function, otherwise the Meter may burn out.
- Turn the rotary dial to the “ A ⎓ ” setting. The screen will display indicating that the measurement function is DC ⎓ current.



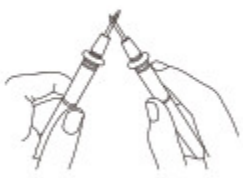
- Press the FUNC button to switch AC ~ current test. The screen will display indicating that the measurement function is AC current.



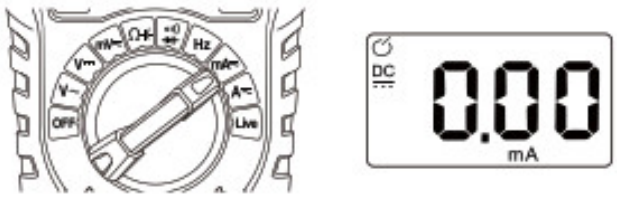
- Connect the Meter to the circuit under test in series, and then turn on the power supply of the circuit.
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

MEASURING AC/DC mA CURRENT

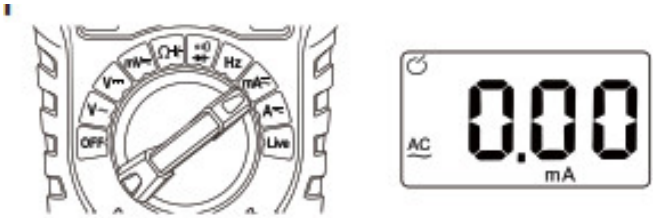
- Disconnect the power supply of the circuit under test.
- Insert the red test lead into the terminal and the black test lead into the “COM” terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.

- Turn the rotary dial to the“ mV ⎓ ” setting. The screen will display indicating that the measurement function is DC ⎓ current.



- Press the FUNC button to switch AC mA current test. The screen will display indicating that the measurement function is AC~ current.



- Connect the Meter to the circuit under test in series, and then turn on the power supply of the circuit.
  NOTE: If the reading is negative when measuring the DC current, it means that the positive and negative poles of the test leads are reversed, please change the test leads.
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

AUTOMOTIVE PARASITIC BATTERY DRAIN

- Check if the battery voltage and power generation are within normal range. The battery voltage is generally around 12.7V and the power generation is around 14V.
- Turn off all electrical accessories inside and outside the car and close the doors.
- Remove the negative electrode of the battery. Set the Multimeter to the maximum current level and connect the Meter in series to the battery. Connect the red test lead to the negative line and the black test lead to the battery terminal.
- Adjust the Meter, if necessary, to a lower range.
- Wait for about 30 minutes; after all the modules of the vehicle enter the sleep state, read the accurate static discharge current. The discharge current is generally 0.02A (20mA), however, this can vary depending on the vehicle.
  Generally, it is normal to not exceed 50mA.
- If the drain is larger than 50mA, begin checking fuses individually for which circuit is carrying the excess load. If a removed fuse reduces the battery draw to below 50mA, it can be determined the corresponding circuit is drawing the excess discharge.

CURRENT NOTES

- Choose the A⎓ setting to measure first when you are not sure whether to choose the mA ⎓ setting or setting, then decide whether to select for mA ⎓ measurement.
- If you insert the red test lead into the 10A jack, be sure to insert the test lead back into the jack after the test to avoid forgetting to switch the jack for the next operation and thus burning the Multimeter.
- When testing a high current, for safety reasons, each measurement time should be less than 10 seconds, and the interval time between tests should be greater than 15 minutes.
- When testing the current, there must be a load in the circuit.

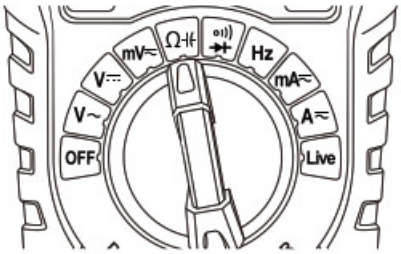
Do not connect the multimeter in series with the circuit without a load to measure; doing so can potentially damage the Meter.

- Do not apply a current exceeding the Meter's range to avoid damaging the Meter.

MEASURING RESISTANCE

- Insert the red test lead into the terminal and the HzLiveVΩmA black test lead into the "COM" terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.

- Turn the rotary dial to the"Ω ⊣⊢ " setting. The screen will display "Ω" indicating that the measurement function is resistance.



- Connect the test leads to both ends of the circuit or resistor under test (connect the leads to the resistance under test in parallel).
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

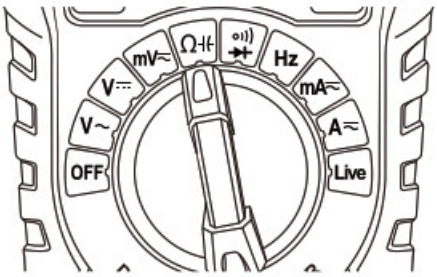
RESISTANCE NOTES

- Do not change the resistance while taking measurements. Doing so may damage the Meter and affect the test results.
- Do not test parallel circuits. The accuracy of the measurement will be affected, and the results may not be accurate.
- Do not directly measure the internal resistance of micrometers, galvanometers, batteries, and other instruments.

MEASURING CAPACITANCE

- Insert the red test lead into the HzLiveVΩmA terminal and the black test lead into the "COM" terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.

- Turn the rotary dial to the "Ω" setting. Press the FUNC button to switch to the capacitance test. The screen will display "F" indicating that the measurement function is capacitance.



- Connect the test leads to both ends of the circuit or resistor under test (connect the leads to the resistance under test in parallel).
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

CAPACITANCE TIPS

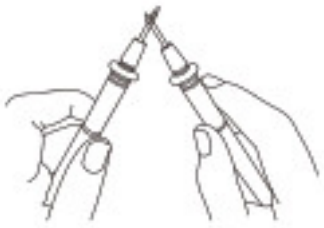
- If the measured value is significantly different from the value marked on the capacitor, the capacitor is damaged.

CAPACITANCE NOTES

- Before measuring the capacitor, discharge the capacitor to avoid damage to the Meter. Do so by connecting the capacitor to a high-powered resistor.
- Discharge the capacitor after measurement to avoid any potential safety hazards.
- If the capacitance is large, it may take a long time for the reading to stabilize.

CONTINUITY TEST

- Insert the red test lead into the terminal and the black test lead into the "COM" terminal.
- Turn the rotary dial to the setting. The screen will display indicating that the measurement function is continuity. Touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.



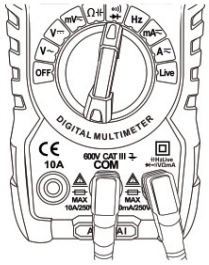
- Connect the test leads to both ends of the circuit or resistance under test (parallel). If the resistance of the circuit or resistance under test is connected and less than 50Ω, the buzzer will emit a beep and the measured resistance value will be displayed on the LCD display.

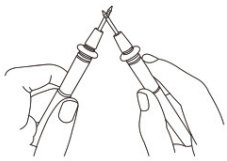
- If the circuit or resistance under test is disconnected, or the resistance value is greater than 50Ω, the LCD display will display" OL".

- Turn the rotary switch to the OFF position to turn off the Meter.

DIODE TEST

- Insert the red test lead into the HzLive VΩmA terminal and the black test lead into the "COM" terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if
  the test leads are normal.





- Turn the rotary dial to the" " setting. Press the FUNC button to switch the diode test. The screen will display" "indicating that the measurement unction is a diode.

- Connect the red test lead to the anode of the diode under test and the black test leads to the cathode of the diode.
  NOTE: Usually the anode of the diode is the longer end.
- The LCD screen will display the approximate voltage drop reading of the diode. If the test leads are connected

reversely, “OL” will be displayed on the LCD screen. Please replace the test leads to measure again.

- Turn the rotary switch to the OFF position to turn off the Meter.

DIODE TEST TIPS

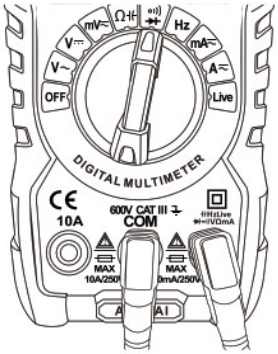
- Is the diode functioning correctly: If the red test lead is connected to the positive pole of the diode and the black lead is connected to the negative, then the diode should be in a forward conduction state, and the displayed value is the forward voltage drop.
- Normal diode forward pressure drops: the general silicon tube is 0.5- 0.7 V, germanium tube is 0.15-0.3V.
- If “000 “is displayed, the diode is broken. You can also verify that the red test lead is connected to the negative pole of the tested diode and the black test rod is connected to the positive pole. The diode should display OL.

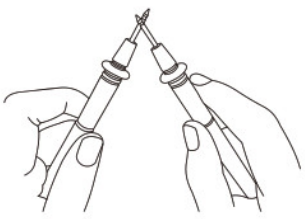
POLARITY JUDGMENT METHOD

- Switch the Multimeter to the Resistance setting.
- Connect the two test leads to the two electrodes of the diode.
- Measure one result, then swap the positions of the test leads, then measure the second result.
- The larger result is the reverse resistance and the smaller result is the forward resistance. The smaller resistance is when the black test lead is connected to the positive end of the diode and the red lead is connected to the negative end.

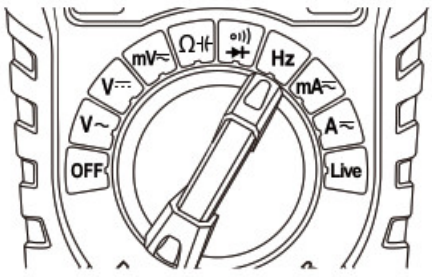
FREQUENCY TEST

- Insert the red test lead into the HzLive VΩmA terminal and the black test lead into the “COM” terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if
  the test leads are normal.





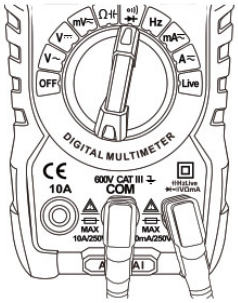
- Turn the rotary dial to the “Hz” setting. The screen will display “Hz” indicating that the measurement function is frequency.

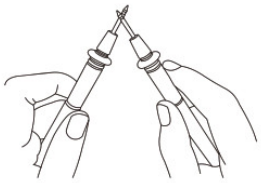


- Connect the test leads in parallel to both ends of the tested power supply or circuit.
- After the reading stabilizes, record the reading from the LCD screen.
- Turn the rotary switch to the OFF position to turn off the Meter.

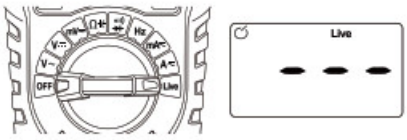
LIVE WIRE DETECTION

- Insert the red test lead into the HzLive VΩmA terminal and the black test lead into the “COM” terminal.
- Turn the rotary dial to the continuity test, touch the red test lead and the black test lead to check whether they are normal. The buzzer will beep if the test leads are normal.





- Turn the rotary dial to the “Live” setting. The screen will display “Live” indicating that the measurement function is a live wire.



- Remove the black test lead. Touch the point to be measured with the tip of the red test lead.
- When the meter senses a weak AC signal, the LCD screen will display “–L”, and the buzzer emits a slow beep; When the meter senses a strong AC signal, the LCD screen will display “–H”, and the buzzer will emit a quick beep.

MAINTENANCE

CLEANING THE METER

If there is dust or humidity in the terminals, it may produce erroneous measurements. Please clean the Meter as follows:

- Turn off the power to the Meter and remove the test leads.
- Turn the meter over and shake out the dust accumulated in the input jack, wipe the case with a damp cloth or mild detergent. Wipe the contacts in each terminal with a clean cotton swab dampened in alcohol.

REPLACING THE BATTERY AND FUSE

BATTERY REPLACEMENT:

- Turn off the Meter and remove the test leads.
- Unscrew the screws fixing the battery cover with a screwdriver, and remove the battery cover.
- Remove the old battery and replace it with a new battery of the same specification.
- Put the battery cover back to its original position and fix the battery cover with the removed screws.
- Battery Type: NEDA1604/6F22–9V Batteries

REPLACING FUSE:

- Turn off the Meter and remove the test leads.
- Unscrew the screws fixing the battery cover with a screwdriver, and remove the battery cover and the battery.
- Remove the insulating sleeve and screws on the back cover of the Meter.
- Remove the blown fuses and replace them with new fuses of the same specification, and make sure that the fuses are loaded into the fuse clip and clamped tightly.
- Put the insulation cover, the battery and the battery cover back, and lock the cover with screws.
- The specifications of fuses:
  Fuse 1: F250mA/250V fuse; Size:φ5*20mm
  Fuse 2: F10A/250V fuse; Size:φ5*20mm

SPECIFICATIONS

Digital Display	2000,3 1/2
Sampling Speed	3 Times/Second

LCD Dimensions	39X22mm
Range Selection	Auto or Manual
Polarity Indication	“-” Automatically Displayed
Overload Indication	“OL” Displayed
Low Battery Indication	a displayed when battery voltage is lower than normal
Work Environment	32°F-104°F (0°C-40°C;<80% RH,<10°C Non-condensing)
Storage Temperature	14°F-122°F (-10°C-6°C;<70% RH, Remove the Battery)
Power	NEDA1604 or 6F22, 9V Battery
Weight	Approximately 211g
Dimensions	5.6×2.9×1.7in
Safety/ Compliance	CAT.III 600V; Pollution Level: 2; Altitude <2000m

DETAILED SPECIFICATION

PRECISION INDEX

Reference Conditions:Ambient Temperature :18°C to 28°C,
Relative Humidity: ≤ 80%,Accuracy: (%rdg + dgts)
The accuracy is applicable within one year after calibration.

DC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	±(0.5% rdg +5 dgts)
2V	0.001V	
20V	0.01V	
200V	0.1V	
600V	1V	

- Input Impedance: 10MΩ
- Overload Protection: 600V
- Maximum Measuring Voltage: 600V

AC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	±(1.0% rdg +5 dgts)
2V	0.001V	
20V	0.01V	
200V	0.1V	
600V	1V	

- Input Impedance: 10MΩ
- Overload Protection: 600V
- Maximum Measuring Voltage: 600V
- Frequency Range: 40Hz ~ 1kHz
- Response: True RMS

DC CURRENT

Range	Resolution	Accuracy
20mA	0.01mA	±(1.2% rdg +5 dgts)
200mA	0.1 mA	
10A	0.01A	

- Overload Protection: mA: F250mA/250V fuse 10A: F10A/250V fuse
- When large currents are measured, the continuous measurement time should not exceed 15 seconds.

AC CURRENT

Range	Resolution	Accuracy
20mA	0.01mA	±(1.5% rdg +5 dgts)
200mA	0.1mA	
10A	0.01A	

- Overload Protection: mA: F250mA/250V fuse 10A: F10A/250V fuse
- When large currents are measured, the continuous measurement time should not exceed 15 seconds.
- Frequency Range: 40Hz ~ 1kHz
- Response: True RMS

RESISTANCE

Range	Resolution	Accuracy
2000	0.10	± (1.0% rdg +5 dgts)
2k0	0.001k0	
20k0	0.01k0	
200k0	0.1 k4	
2M0	0.001 MO	
20M0	0.01 MO	

- Overload Protection: 250v

CAPACITANCE

Range	Resolution	Accuracy
2nF	0.001 nF	± (4.0% rdg +5 dgts)
20nF	0.01 nF	
200nF	0.1 nF	
2pF	0.001 pF	
20pF	0.01 pF	
200pF	0.1 pF	
2mF	0.001 mF	

- Overload Protection: 250v

FREQUENCY

Range	Resolution	Accuracy
2Hz	0.001Hz	± (1 .0% rdg +3 dgts)
20Hz	0.01 Hz	
200Hz	0.1Hz	
2kHz	0.001 kHz	
20kHz	0.01 kHz	
200kHz	0.1 kHz	
2MHz	0.001MHz	

- Overload Protection: 250v

CONTINUITY TEST

	The buzzer inside the Meter will beep if the res istance <50Ω.	Open Circuit Voltage: approximately2V Overload Protection: 250V

DIODE TEST

	The approximate diode forward voltage value will be displayed.	Reverse DC Voltage: approximately 2.0V Overload Protection:250V

INCLUDED INBOX

- 1 x Owner's Manual
- 1 x Pair of Test Leads
- 1 x AstroAI 2000 Counts Multimeter

HOW TO DISPOSE OF THE METER

If you at some point intend to dispose of this product, please keep in mind that many of its components consist of valuable materials, which can be ecycled. Please do not discard it in the garbage bin, but check with your local authorities for recycling facilities in your area.
2 Year Warranty Limited Warranty from AstroAI Each AstroAI Digital Multimeter will be free from defects in material and workmanship. This warranty does not cover fuses, disposable batteries, and damage from neglect, misuse, contamination, alteration, accident, or abnormal conditions of peration or handling, including overvoltage failures caused by use outside the Multimeter's specified rating, or normal wear and tear of mechanical components. This warranty covers the original purchaser only and is not transferable.
If this product is defective, please contact AstroAI Customer Support at **support@astroai.com**

Web:.astroai.com
E-mail:support@astroai.com

Documents / Resources

	AstroAI M2KOR Digital Multimeter [pdf] User Manual M2KOR, Digital Multimeter

References

- AstroAI: Focus on automotive and household tools by innovation