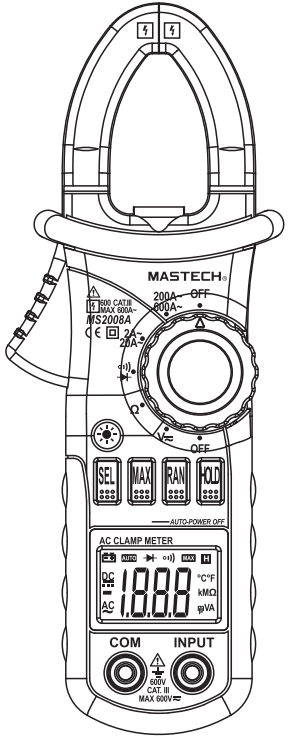
MASTECH®

MS2008A

AC DIGITAL CLAMP METER



CAT.III 600V

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1. SAFETY INFORMATION

⚠ WARNING

BE EXTREMELY CAREFUL WHEN USING THIS METER. Improper use of this device can result in electric shock or destruction of the meter. Take all normal safety precautions and follow the safeguards suggested in this manual.
To exploit full functionality of the meter and ensure safe operation, please read carefully and follow the directions in this manual.

This meter has been designed according to IEC-61010 concerning electronic measuring instruments with an overvoltage category CAT III 600V and pollution degree of 2.
Follow all safety and operating instructions to ensure safe use of the meter.

1.1 PRELIMINARY

1.1.1 When using the meter, the user must observe all normal safety rules concerning:
- General protection against electric shock
- Protection of the meter against misuse

1.1.2 When the meter is delivered, check whether it has been damaged in transit.
1.1.3 After being stored under harsh conditions, the meter should be checked and confirmed for any damages that may have occurred.
1.1.4 Test leads must be kept in good condition. Before using, check whether the insulation on test leads has been damaged and any wire has been exposed.
1.1.5 Use the test leads supplied to ensure operational safety. If required, they must be replaced with test leads of the same model or class.

1.2 DURING USE

1.2.1 Do not take measurements that exceed the protection limit values indicated in the specifications.
1.2.2 Do not touch the metal tips of the test leads when the meter is connected to the circuit being measured.
1.2.3 Keep your fingers behind the probe barriers when taking measurements with an effective voltage above 60V DC or 30V rms AC.

1.2.4 Do not take voltage measurements if the value between the terminals and earth ground exceeds 600V.
1.2.5 Select the highest range if the value to be measured is unknown.
1.2.6 Disconnect the test leads from the circuit under test before turning the rotary selector to change functions.
1.2.7 Do not measure the resistance, diode or continuity of live circuits.
1.2.8 Do not connect the meter to any voltage source while the rotary selector is in the current, resistance, diode or continuity range.
1.2.9 Do not use the meter near explosive gases, steam or dirt.
1.2.10 Stop using the meter if any abnormalities or faults are observed.
1.2.11 Do not use the meter unless its rear case and battery cover is securely fastened in its original position.
1.2.12 Do not store or use the meter in areas exposed to direct sunlight, at high temperatures or with high relative humidity.

1.3 SYMBOLS

Caution,risk of danger (Important safety information;refer to the operation manual.)

Application around and removal from HAZARDOUS LIVE conductors is permitted.

Double insulation(Protection class II)

CAT III Overvoltage (Installation) category III, Pollution Degree 2 per IEC1010-1 refers to the level of Impulse Withstand Voltage protection provided.

Conforms to European Union Directive

Earth (ground) terminal

1.4 MAINTENANCE

1. Do not attempt to remove the rear case to adjust or repair the meter. Such actions should only be performed by a technician who fully understands the meter and the danger involved.
2. Before opening the case and battery cover of the meter, always disconnect the test leads from all sources of electric current.
3. To avoid any electric shock caused by incorrect readings, replace the batteries immediately when the "⊟+" symbol appears on the display.

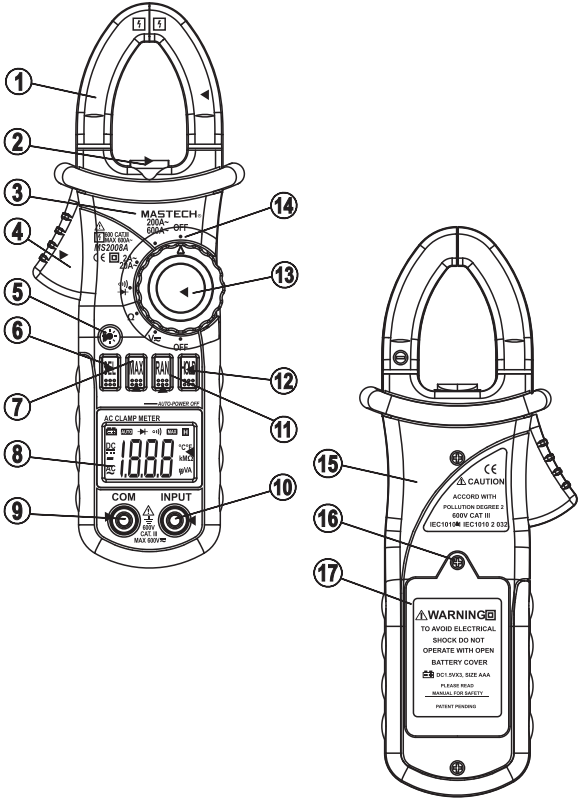
4. Use a damp cloth and mild detergent to clean the meter; do not use abrasives or solvents.
5. Turn the rotary selector to OFF position to switch off the power when the meter is not in use.
6. Remove the batteries to avoid damage to the meter if it will not be used for a long time.

2. DESCRIPTION

- This meter is a portable professional measuring instrument with an LCD with backlight for easy reading. The 'single-hand operation' design of the range switch makes measurement simple and easy. Overload protection and low battery indication are provided. It is an ideal multi-function Instrument with lots of practical applications for professional, workshop, school, hobby and home use.
- The meter can perform measurements of AC current, AC/DC voltage, resistance, continuity and diodes.
- Both auto-range and manual ranges are available.
- This meter is equipped with a reading hold function.
- This meter is equipped with a maximum measured value function.
- This meter has an auto power off feature.

2.1 NAMES OF COMPONENTS

① Current Clamp
② Clamp Work Light
③ Panel
④ Trigger
⑤ Back Light Button (☼)
⑥ Function Switch Button (SEL)
⑦ MAX Button (MAX)
⑧ Liquid Crystal Display (LCD)
⑨ COM Jack
⑩ Input Jack
⑪ Range Button (RAN)
⑫ Reading Hold Button (HOLD)
⑬ Rotary selector
⑭ OFF - power switch
⑮ Rear Case
⑯ Battery Cover Screw
⑰ Battery Cover



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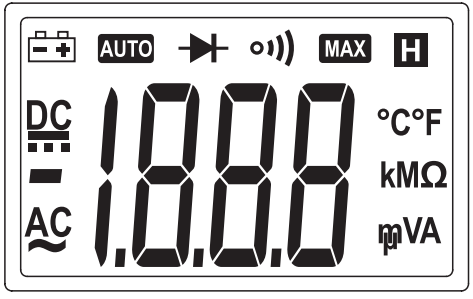
2.2 SWITCH, BUTTONS AND INPUT JACKS

☼ Button - Turns backlight on/off
SEL Button - Switches between functions
MAX Button - Displays maximum measured value
RAN Button - Switches to manual range.
HOLD Button - For holding the reading on the display
INPUT Jack - Positive input connection for measuring voltage, resistance, diode and continuity.
COM Jack - Common input connection for voltage, resistance, diode and continuity measurements.
OFF Position - For turning off the power.
Rotary Selector - For selecting functions and ranges.
Clamp - For measuring current

2.3 LCD (Liquid-crystal display)



AC	Alternating current
DC	Direct current
⊣◁	Diode test
)))	Continuity buzzer
AUTO	Auto range mode
MANU	Manual range mode
MAX	Maximum value
▭+	Low battery
H	Data hold
mV,V	Millivolts, Volts (Voltage)
A	Amperes (Current)
Ω,kΩ,MΩ	Ohms, Kilohms, Megaohms (Resistance)

3. SPECIFICATIONS

Calibration is required once a year, to be carried out at a temperature between 18°C and 28 °C (64°F to 82°F) and relative humidity below 75%.

3.1 GENERAL SPECIFICATIONS

1. Auto range and manual range options are available.
2. Overrange protection is provided for all ranges.
3. Maximum voltage between terminals and earth ground: 600V DC or rms AC
4. Operating altitude: max. 2000 meters (7000 ft.)
5. Display: LCD
6. Maximum display value: 1999 digits
7. Polarity indication: '-' for negative polarity.
8. Overrange indication: '0L' or '-0L'
9. Sampling Time: approx. 0.4 second per sample
10. Unit indication: function and unit.
11. Auto power off time: 15 min.
12. Operating power : 1.5V×3 AAA batteries
13. Low battery indication: ' ▭+ 'on LCD
14. Temperature factor: < 0.1×Accuracy /°C
15. Operating temperature: 0°C to 40°C（32°F to 104°F）
16. Storage temperature: -10°C to 50°C（10°F to 122°F）
17. Dimensions: 208×78×35mm
1.8 Weight: approximate 340g（including batteries）

3.2 ELECTRICAL SPECIFICATIONS

Ambient temperature: 23±5°C Relative humidity: < 75%

3.2.1 AC Current

Range	Resolution	Accuracy
2A	0.001A	±(3.5% of rdg + 20 digits)≤0.5A ±(3.0% of rdg + 10 digits)
20A	0.01A	±(3.0% of rdg + 10 digits)
200A	0.1A	±(2.5% of rdg + 10 digits)
600A	1A	±(1.5% of rdg + 5 digits)

Max. input current: 600A
Frequency range: 50 to 60Hz
Response: average, calibrated in rms of sine wave

3.2.2 AC Voltage

Range	Resolution	Accuracy
2V	0.001V	±(1.0% of rdg + 5 digits)
20V	0.01V	
200V	0.1V	
600V	1V	±(1.2% of rdg + 5 digits)

Input impedance: 10MΩ
Overload protection: 200mV range: 250V DC or rms AC,
2V-600V ranges: 600V DC or 600V rms AC.
Max. input voltage: 600V rms AC
Frequency range: 40 to 200Hz
Response: average, calibrated in rms of sine wave

NOTE:
At small voltage ranges, unsteady readings will appear before the test leads contact the circuit; this is normal because the meter is highly sensitive. When the test leads contact the circuit, the true reading will be shown.

3.2.3 DC Voltage

Range	Resolution	Accuracy
200mV	0.1mV	±(0.8% of rdg + 2 digits)
2V	0.001V	
20V	0.01V	
200V	0.1V	
600V	1V	±(1.0% of rdg + 2 digits)

Input impedance: 10MΩ
Overload protection: 200mV range: 250V DC or rms AC
2V-600V ranges: 600V DC or 600V rms AC.
Max. input voltage: 600V DC

NOTE:
At small voltage ranges, unsteady readings will appear before the test leads contact the circuit; this is normal because the meter is highly sensitive. When the test leads contact the circuit, the true reading will be shown.

3.2.4 Resistance

Range	Resolution	Accuracy
200Ω	0.1Ω	±(1.2% of rdg + 2 digits)
2kΩ	0.001kΩ	
20kΩ	0.01kΩ	
200kΩ	0.1kΩ	
2MΩ	0.001MΩ	
20MΩ	0.01MΩ	±(2.0% of rdg + 5 digits)

Open circuit voltage: 0.25V
Overload protection: 250V DC or rms AC

3.2.5 Diode

Range	Resolution	Function
	0.001V	Displays approximate forward voltage of diode

Forward DC current ~ 1mA
Reversed DC voltage ~ 1.5V
Overload protection: 250V DC or rms AC

3.2.6 Continuity

Range	Resolution	Function
	0.1Ω	Built-in buzzer will sound if resistance is less than 50Ω

Open circuit voltage ~ 0.45V
Overload protection: 250V DC or rms AC

4. OPERATION INSTRUCTIONS

4.1 HOLD READINGS

1. Press the "**HOLD**" button to hold the current reading on the display.
2. Press the "**HOLD**" button again to release the hold.

4.2 SWITCHING RANGES

1. The meter's default range is "AUTO" for current, voltage, resistance, capacitance and frequency modes.
2. Press the "**RAN**" button for manual range mode. Each press of the button will increase the range and will return to the lowest range if the button is pressed at the highest range.
3. Hold down the "**RAN**" button for 2 seconds to return the meter to auto range.

4.3 MAXIMUM VALVE

1. In voltage and current modes press the "**MAX**" button to display the maximum measured value.
2. Press the "**MAX**" button again to return the meter to normal

4.4 SWITCHING FUNCTIONS

1. Press the "**SEL**" button to switch between AC and DC measurements in voltage mode.
2. Press the "**SEL**" button to switch between diode and continuity modes.

4.5 BACK LIGHT AND CLAMP LIGHT

1. Hold the '☼' button to turn on the back light. The light will remain on for 15 seconds before automatically turning off.
2. To manually turn off the back light, hold down the '☼' button.
3. While in current mode, turning on the back light will also turn on the clamp light.

NOTE:
LEDs, which require a large working current, are the source of the back light. Although the meter is equipped with a timer that will turn off the back light after 15 seconds, frequent use of the back light will shorten the life of the batteries. Therefore, do not use the back light unless necessary.

When the battery voltage is ≤3.6V, the "🔋" symbol (low battery) will appear on the display. When the back light is on, even if the batter is ≥3.6V, the "🔋" may appear because of the back light's large working current which will cause the voltage to drop. (The accuracy of the measurement cannot be assured when the "🔋" symbol appears.) If so, you need not replace the batteries. The batteries will be good until the "🔋" symbol appears when the back light is not being used.

4.6 AUTO POWER OFF

1. If the meter is not used for a period of 15 minutes, the meter will power itself off.
2. Turn the rotary selector or press any button to resume operation of the meter.
3. To disable the auto power off feature, hold down the "**HOLD**" button as you power on the meter.

4.7 PREPARAING FOR MEASUREMENT

1. Switch on the power by turning the rotary selector. If the battery voltage is less than 3.6V, the "🔋" symbol will appear and the batteries should be replaced.
2. The "⚠" symbol shows that the input voltage or current should not exceed the specified value in order to protect the internal circuitry from damage.
3. Turn the rotary selector to the required function and range to be measured. Choose the highest range when the value to be measured is unknown.
4. Connect the common test lead first and then the charged test leads when making connection. Remove the charged test lead first when disconnecting.

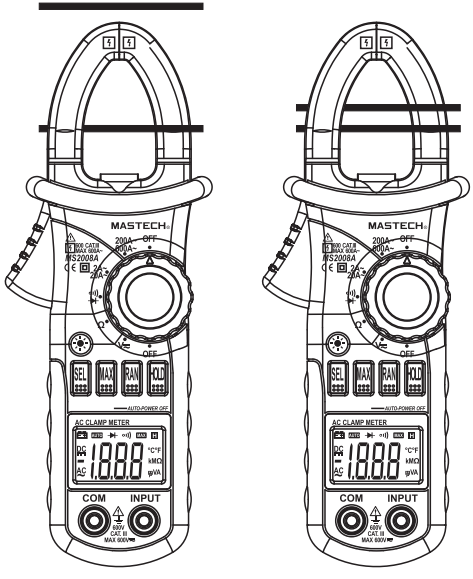
4.8 MEASURING AC CURRENT

⚠ WARNING
Beware of Electrocution.
Ensure that the test leads are disconnected from the meter before making current measurements.

1. Set the rotary selector to the appropriate **A~** position.
2. If need be, press the "**RAN**" button to choose manual range mode.
3. Press the trigger to open jaw and fully enclose only one conductor.
4. Read the current value on the display.

NOTE:

1) Do not enclose more than one conductor in the jaw.
2) For optimum results, center the conductor inside the clamp.
3) In manual range mode, when 'OL' is shown on the display it means the measurement has exceeded the range. A higher range should be selected.
4) In manual range mode, when the scale to be measured is unknown, set the range to the highest setting.
5) "⚠"means the maximum input current is 600A rms AC.



Correct Incorrect

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4.9 MEASURING AC VOLTAGE

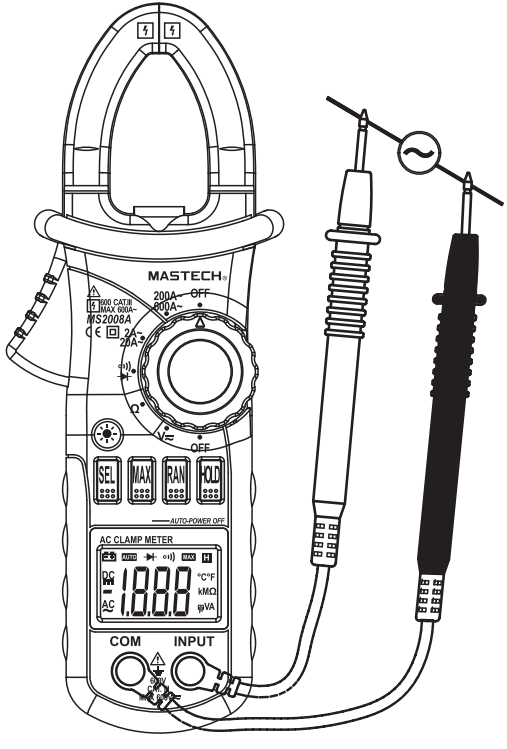
⚠ WARNING

Beware of Electrocution.
Pay special attention to avoid electric shock when measuring high voltages.
Do not measure voltages that may exceed 600V rms AC.

1. Plug the black test lead into the **COM** jack and the red test lead into the **INPUT** jack.
2. Set the rotary selector to the **V≂** position. The meter's default mode is AC voltage.
3. If necessary, press the "**RAN**" button to choose manual range mode.
4. Connect the test leads to the voltage source or load terminals for measurement.
5. Read the voltage value on the display.

NOTE:

1) At small voltage ranges, unsteady readings may appear before the test leads contact the circuit. This is normal because the meter is highly sensitive. When the test leads contact the circuit, the true reading will be shown.
2) In manual range mode, when 'OL' is shown on the display it means the measurement has exceeded the range. A higher range should be selected.
3) In manual range mode, when the value to be measured is unknown beforehand, select the highest range first and lower the range accordingly.
4) "⚠" means the maximum input voltage is 600V rms AC.



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4.10 MEASURING DC VOLTAGE

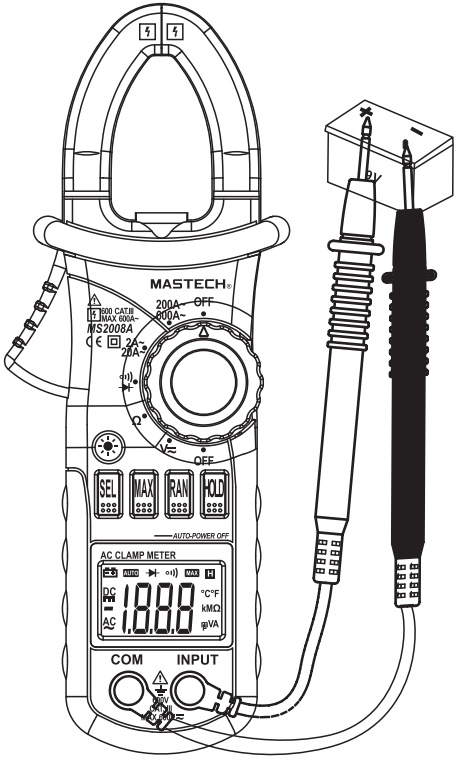
⚠ WARNING

Beware of Electrocution.
Pay special attention to avoid electric shock when measuring high voltages.
Do not measure voltages that may exceed 600V DC.

1. Plug the black test lead into the **COM** jack and the red test lead into the **INPUT** jack.
2. Set the rotary selector to the **V⎓** position.
3. Press the "**SEL**" button to switch to DCV measurement.
4. Connect the test leads to the voltage source or load terminals for measurement.
5. Read the voltage value on the display. The polarity symbol denotes the polarity of the red test lead.

NOTE:

1) At small voltage ranges, unsteady readings will appear before the test leads contact the circuit. This is normal because the meter is highly sensitive. When the test leads contact the circuit, the true reading will be shown.
2) In manual range mode, when 'OL' or '-OL' is shown on the display it means the measurement has exceeded the range. A higher range should be selected.
3) In manual range mode, when the scale to be measured is unknown beforehand, select the highest range first and lower the range accordingly.
4) "⚠" means the maximum input voltage is 600V DC.



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4.11 MEASURING RESISTANCE

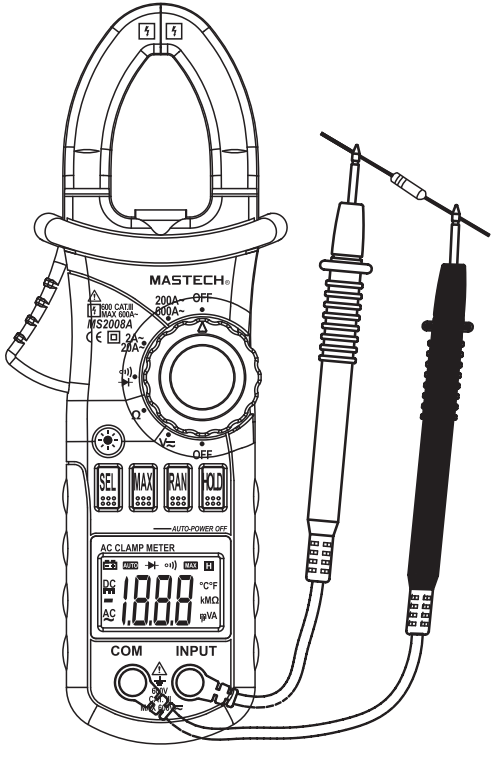
⚠ WARNING

Eware of Electrocution.
When measuring in-circuit resistance, make sure that the power of the circuit under test has been turned off and that all capacitors have been fully discharged.

1. Plug the black test lead into the **COM** jack and the red test lead into the **INPUT** jack.
2. Set the rotary selector to the **Ω** position.
3. If need be, press the "**RAN**" button to choose manual range mode.
4. Connect the test leads to the ends of the resistor or circuit for measurement.
5. Read the resistance value on the display.

NOTE:

1) In manual range mode, when 'OL' or '-OL' is shown on the display it means the measurement has exceeded the range. A higher range should be selected.
2) When the input is open, 'OL' will appear on the display to indicate that the range has been exceeded.
3) For measuring resistances above 1MΩ, it may take a few seconds to get a steady reading. This is normal for high resistance measurements.



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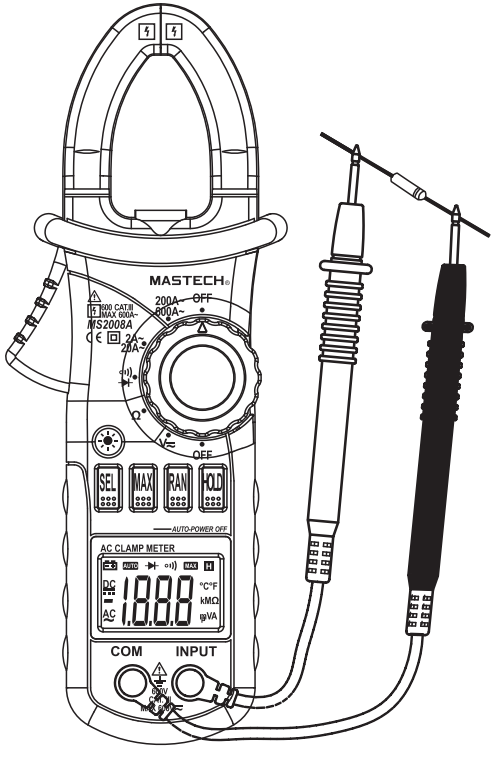
4.12 TESTING DIODES

1. Plug the black test lead into the COM jack and the red test lead into the INPUT jack.
2. Set the rotary selector to the position.
3. Connect the red test lead to the anode (+) and the black test lead to the cathode (-) of the diode.
4. Read the voltage drop value on the display.

NOTE:

1) The meter will show the approximate forward voltage drop of the diode.
2) When the test leads have been reversed or open, 'OL' will appear on the display.



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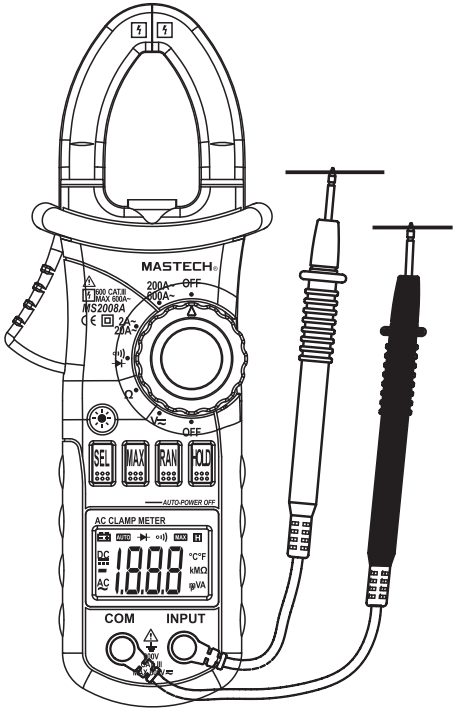
4.13 TESTING CONTINUITY

⚠ WARNING

Beware of Electrocution.
Make sure that the power of the circuit has been turned off and the capacitors have been fully discharged before testing the continuity of a circuit.

1. Plug the black test lead into the COM jack and the red test lead into the INPUT jack.
2. Set the rotary selector to the position.
3. Press the "**SEL**" button to switch to continuity test.
4. Connect the test leads to the two ends of the circuit for measurement.
5. If the resistance of the circuit being tested is less than 50Ω, the built-in buzzer will sound.
6. Read the resistance value on the display.

NOTE:
If the test leads are open or the resistance of the circuit is over 200Ω, "OL" will appear on the display.



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5. MAINTENANCE

5.1 REPLACING THE BATTERIES

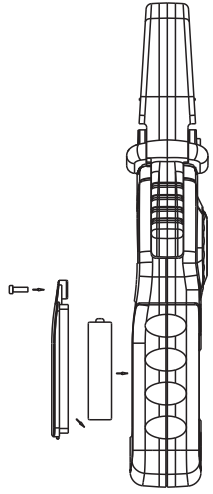
⚠ WARNING

To avoid electric shock, make sure that the test leads have been clearly move away from the circuit under measurement before opening the battery cover.

1. If the symbol "⊟+" appears, it means that the batteries should be replaced.
2. Loosen the screw of the battery cover and remove it.
3. Replace the used batteries with new ones.
4. Return the battery cover and tighten the screw.

NOTE:

Do not reverse the polarity of the batteries.



5.2 REPLACING TEST LEADS

⚠ WARNING

Replacement test leads should be in good working condition with the same or equivalent rating: 1000V 10A.

If the insulation layer on the test leads have been damaged, you should replace the leads, e.g. the wire inside is exposed.

6. ACCESSORIES

1)	Test Leads: Rated 1000V 10A	1 pair (set)
2)	Operating Manual	1 copy
3)	1.5V AAA Battery	3 pieces