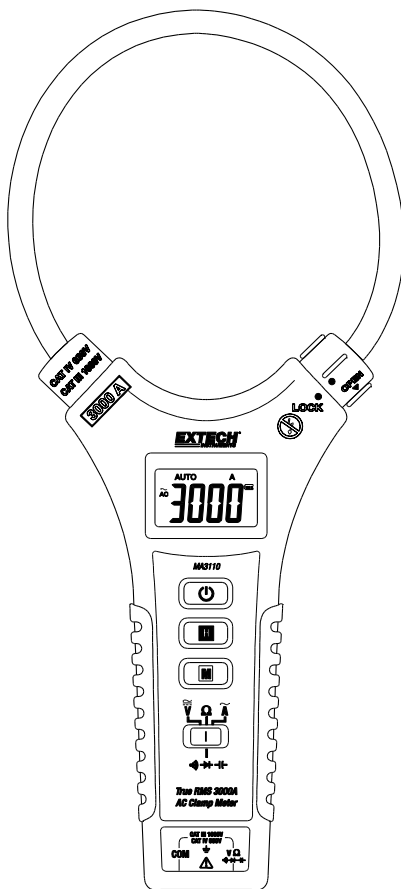


# 3000A TRUE RMS AC Flexible Clamp Meter

## Model MA3110



Additional User Manual Translations available at [www.extech.com](http://www.extech.com)

## Introduction

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Thank you for choosing the Extech Model MA3110 Flexible AC Clamp meter with automatic ranging, data hold, and auto power OFF. The MA3110 is a professional CAT III 1000V instrument that measures up to 3000A AC RMS. The MA3110 also measures DC and AC Voltage, Resistance, Capacitance, Diode, and Continuity (beeper). This device is shipped fully tested and calibrated and, with proper use, will provide years of reliable service. Please visit our website ([www.extech.com](http://www.extech.com)) to check for the latest version of this User Guide, Product Updates, Product Registration, and Customer Support.

## Features

- 600A and 3000A AC True RMS Current Measurement ranges
- AC (True RMS) and DC Voltage Measurements
- Automatic ranging
- Meets IEC61010-1, 3<sup>rd</sup> Edition (2010) CAT III 1000V Safety requirements.
- Resistance, Capacitance, Diode, and Continuity Beeper
- Data Hold feature freezes displayed reading
- 6000 count large scale LCD display
- Convenient Flexible Clamp with locking mechanism
- 8mm (0.3") coil diameter for measuring in tight spaces
- Coil length 300mm (11.8")
- Auto Power OFF after 15 minutes of inactivity
- Overload Protection for most ranges
- Durable, long-lasting components, enclosed in strong, lightweight ABS-plastic housing.

## Safety Information

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To ensure the safe operation and service of the meter, follow these instructions closely. Failure to observe warnings can result in severe injury.

### Precautions and Preparations for Measurements

- Ensure that the batteries are connected in the correct polarity and placed in the battery compartment (rear) correctly.
- Place the red and black test leads into the proper input terminals before making measurements.
- Remove the test leads from the circuit under test when changing the measurement ranges.
- Do not exceed the maximum rated voltage and current on the meter input terminals.
- Remove the battery if the meter is to be stored for long periods
- Replace the test leads only with ones rated for CAT III 1000V or better.
- The meter has an automatic power OFF (APO) utility that switches the meter OFF after 15 minutes of inactivity. Press any key to wake the meter. To disable this feature, press and hold the M (mode) button while switching the meter ON.



### Warnings

Warnings identify hazardous conditions and actions that could cause BODILY HARM or DEATH.

- Individual protective equipment should be used if HAZARDOUS LIVE parts in the installation where measurements are to be carried out could be accessible.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.
- Verify the meter operation by measuring a known current. If in doubt, have the meter serviced.
- Do not apply more than the rated voltage/current as marked on the meter.
- To avoid false readings that can lead to electric shock and injury, replace battery as soon as the low battery indicator appears.
- Do not use the meter in or around explosive gas or vapor.
- Do not use a flexible current sensor if the inner copper wire of the flexible cord is visible.
- De-energize the installation under test or wear suitable protective clothing when placing or removing the flexible current probe from a test setup.
- Do not apply/remove the flexible current probe to/from UNINSULATED HAZARDOUS LIVE conductors that may cause electric shock, electric burn, or arc flash.



## CAUTIONS

CAUTIONS identify conditions and actions that could cause DAMAGE to the meter or equipment under test. Do not expose the meter to extremes in temperature or high humidity.

### Safety Symbols that are typically marked on meters and instructions

	Caution: Do not apply voltage or current to the input terminals or clamp that exceeds the specified ranges
	Caution: Risk of electric shock!
	Equipment protected by double or reinforced insulation
	Conforms to EU directives
	Do not discard this product in household trash.
	AC measurement
	Earth ground

### PER IEC1010 OVERVOLTAGE INSTALLATION CATEGORY

#### OVERVOLTAGE CATEGORY I

Equipment of OVERVOLTAGE CATEGORY I is equipment for connection to circuits in which measures are taken to limit the transient over-voltages to an appropriate low level.

Note – Examples include protected electronic circuits.

#### OVERVOLTAGE CATEGORY II

Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation.

Note – Examples include household, office, and laboratory appliances.

#### OVERVOLTAGE CATEGORY III

Equipment of OVERVOLTAGE CATEGORY III is equipment in fixed installations.

Note – Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

#### OVERVOLTAGE CATEGORY IV

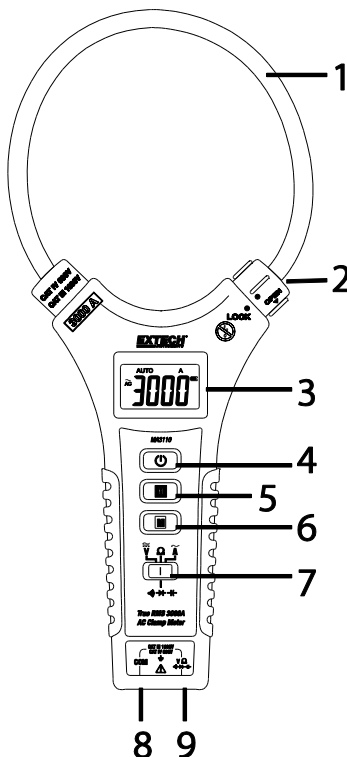
Equipment of OVERVOLTAGE CATEGORY IV is for use at the origin of the installation.

Note – Examples include electricity meters and primary over-current protection equipment.




# Description

## Meter Description

1. Flexible Current Clamp
2. Clamp Lock Mechanism
3. 6000-count LCD Display
4. Power button
5. Data Hold Button
6. MODE (M) Button
7. Function Switch
8. COM (-) test lead input terminal
9. Positive (+) test lead terminal




## Display Icons

H	Data Hold
AUTO	Automatic Range mode
AC	Alternating Current
DC	Direct Current
	Low battery icon (flashing when measurements cannot be expected to be in-specification)
	Continuity alert (beeper)
V	Unit for Voltage measurements
A	Unit for Current measurements
$\Omega$ , K $\Omega$ , M $\Omega$	Units for Resistance measurements
nF, $\mu$ F	Units for Capacitance measurements
	Diode measurements
OL	'Overload' for over range measurements (voltage, current and resistance)
-	Minus symbol (negative) when the measurement value is negative


## Operation

**NOTES:** Read and understand all **Warning** and **Caution** statements in this operation manual prior to using this meter.

### Meter Power

The meter is powered by two (2) 1.5V 'AAA' batteries. The battery compartment is located on the back of the meter. Press the Power button  to switch the device ON or OFF.

### Low battery indication

When the low battery icon appears () the batteries should be replaced immediately, although in-specification measurements can still be made temporarily. When the low battery icon begins blinking, in-specification measurements are no longer supported and batteries must be replaced before further measurements can be made. Refer to the battery replacement procedure in the maintenance section.

### Automatic Power OFF

The meter switches OFF automatically after a 15-minute period of inactivity. To disable the Auto Power OFF feature:

- With the meter power OFF, press and hold the Mode (M) button while powering the meter ON.
- The APO feature is now disabled and the meter will not shut off automatically.
- Note that the next time the meter is powered up, the Auto Power OFF function will be enabled again and the user will have to repeat the Auto Power OFF disable instructions to disable this function when desired.


### Data Hold

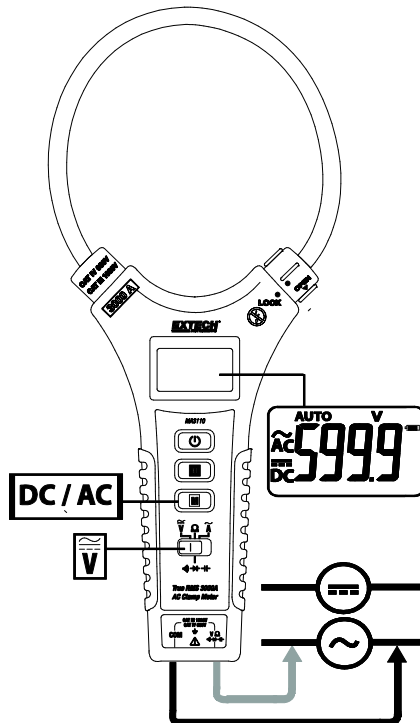
Press the **H** (HOLD) button with the meter ON to freeze the displayed reading. The **H** icon will appear along with the held reading. Press the **H** (HOLD) button again to release the HOLD feature. The **H** icon will switch OFF and the meter will show real time readings.

## DC and AC Voltage Measurements

**⚠ WARNING:** Use the test lead probe covers for CAT IV 600V installations. Do not measure voltages greater than 1000V.

**⚠ CAUTION:** When connecting the test leads to the circuit or device under test, connect the black lead before the red; when removing the test leads, remove the red before the black lead.

1. Connect the black test lead into the COM terminal.
2. Connect the red test lead into the 'V' terminal.
3. Power the meter using the power button .
4. Put the function switch to the 'V' position.
5. The display will show the 'AUTO' icon (Auto Range mode).
6. Press the M (MODE) button to select AC or DC voltage.
7. Press the test leads across the circuit under test and read the voltage on the display.
8. In the Auto Range mode, the meter will automatically select the optimal range. AC voltage measurements are True RMS readings.



## AC Current Measurements

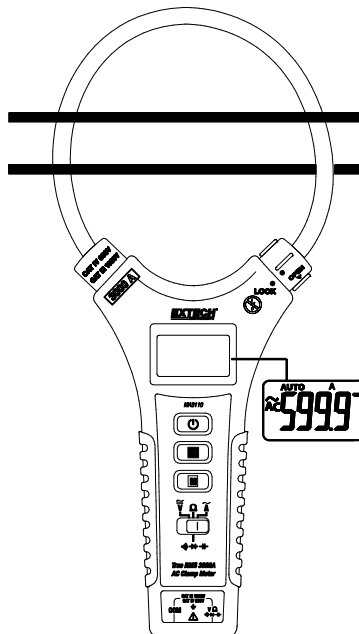
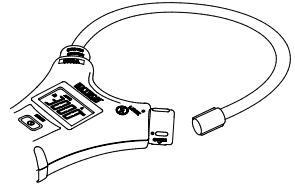


**WARNING:** Ensure that power to the device under test is OFF before starting this procedure. Switch power to the device under test ON only after the clamp has been safely attached to the device under test.



**CAUTION:** Do not move fingers above the LCD at any time during a test.

1. Switch the meter OFF and switch OFF power to the device under test.
2. Switch the meter ON and select 'A' with the function switch. The display will show the automatic range icon (AUTO).
3. Turn the knurled clamp lock mechanism counter-clockwise to release the flexible clamp.
4. Fully enclose only one conductor of the device under test with the flexible clamp probe (see accompanying diagrams). Do not attempt to measure current higher than the specified current limit.
5. Re-lock the clamp turning the clamp lock clockwise.
6. Switch power to the device under test ON. Never move fingers above the LCD when running a test.
7. Read the current value in the display. The meter will automatically select the appropriate range (600.0A and 3000A).




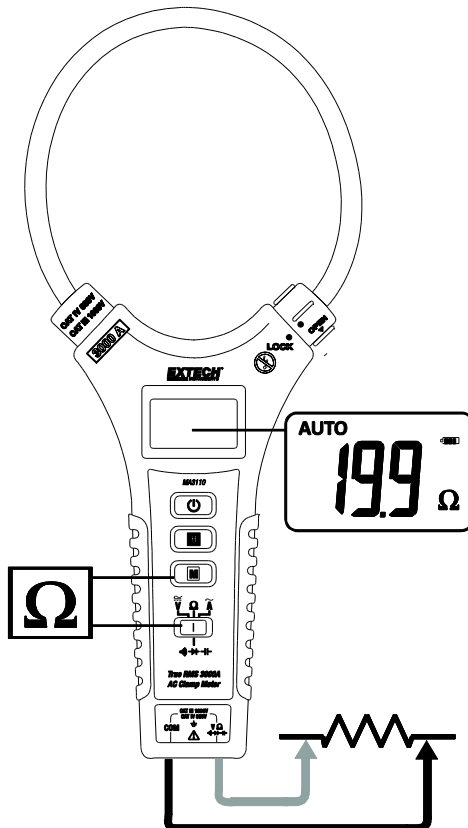


## Resistance Measurements





**CAUTION:** Disconnect power to the circuit or device under test when making resistance measurements

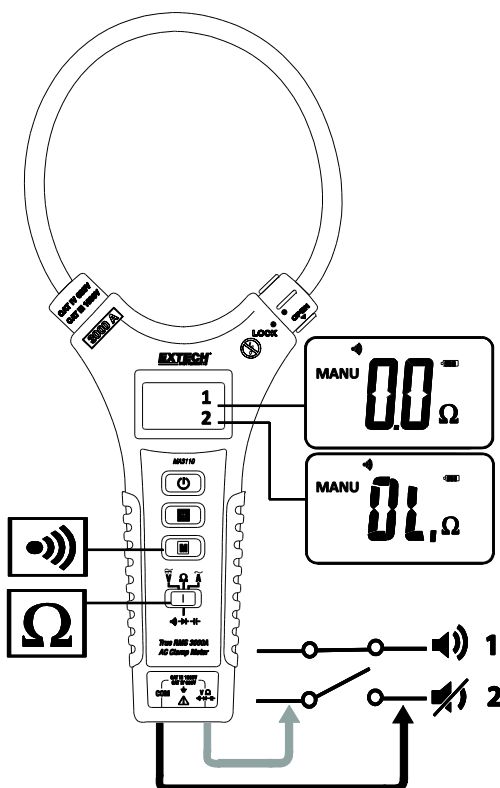
1. Connect the black test lead into the COM terminal.
2. Connect the red test lead into the ' $\Omega$ ' terminal.
3. Power the meter using the power button .
4. Put the function switch to the ' $\Omega$ ' position.
5. The display will show the 'AUTO' icon (Auto Range mode).
6. Press the M (Mode) button to select resistance  $\Omega$  mode.
7. Press the test leads across the circuit under test and read the resistance on the display.
8. In the Auto Range mode, the meter will automatically select the optimal range.



## Continuity Measurements

**CAUTION:** Disconnect power to the circuit or device under test when making continuity measurements

1. Connect the black test lead into the COM terminal.
2. Connect the red test lead into the 'ohms' terminal.
3. Power the meter using the power button .
4. Put the function switch to the 'ohms' position.
5. The display will show the 'AUTO' icon (Auto Range mode).
6. Press the M (Mode) button to select continuity mode.
7. The display will show "MANU" icon (Manual Range mode).
8. Press the test leads across the circuit under test. The meter will beep and the display will show the continuity symbol  when the resistance is < 20 ohms.

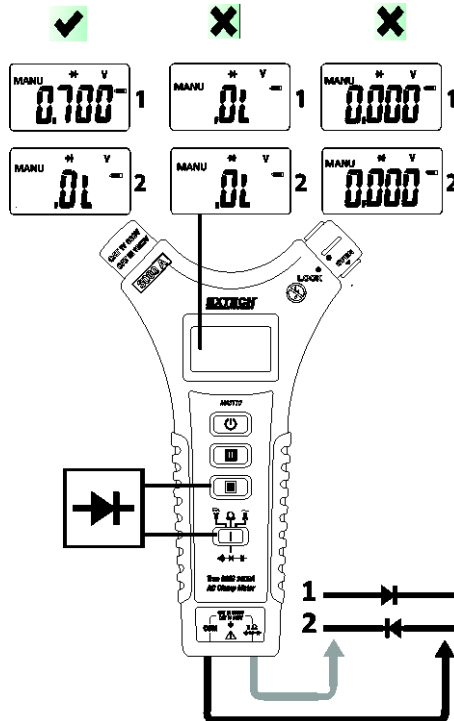


## Diode Measurements



**CAUTION:** Disconnect power to the circuit or device under test when making diode measurements



1. Connect the black test lead into the COM terminal.
2. Connect the red test lead into the ' $\Omega$ ' terminal.
3. Power the meter using the power button
4. Put the function switch to the ' $\Omega$ ' position.
5. The display will show the 'AUTO' icon (Auto Range mode).
6. Press the M (Mode) button to select diode mode. The display will show the manual mode symbol (MANU).
7. When connected as shown in test position 1 a forward current flow is established and the approximate diode forward voltage (VF) value is displayed. If the diode under test is defective '0.000' (short circuit) or 'OL' (open circuit) will display.
8. When connected as shown in test position 2 a reverse polarity check is made. If the diode under test is good, 'OL' will be displayed. If the diode is defective '0.000' or other values will be displayed. Proper diode testing should include both polarity measurements.

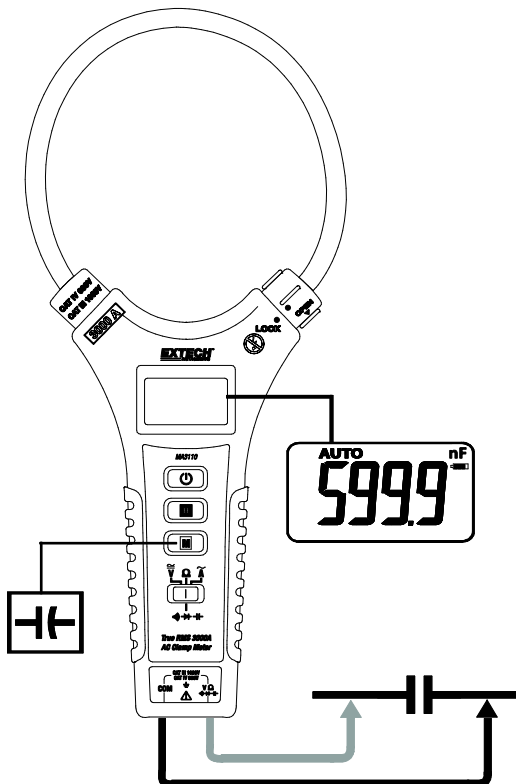


## Capacitance Measurements



**CAUTION:** Discharge the capacitor under test before taking any capacitance measurements

1. Connect the black test lead into the COM terminal.
2. Connect the red test lead into the ' $\Omega$ ' terminal.
3. Power the meter using the power button .
4. Put the function switch to the ' $\Omega$ ' position.
5. The display will show the 'AUTO' icon (Auto Range mode).
6. Press the M (Mode) button to select the capacitance  mode.
7. Press the test leads across the circuit under test and read the capacitance on the display.
8. In the Auto Range mode, the meter will automatically select the optimal range.



# Maintenance

**WARNING:** To avoid electrical shock, disconnect the meter from any circuit and turn OFF the meter before opening the case. Do not operate the meter with an open case.

## Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. If the meter is not to be used for 60 days or more, remove the batteries and store them separately.

## Battery Replacement

**⚠ CAUTION:** Remove the meter from the conductor under test and switch the meter OFF before opening the battery compartment.

1. Remove the screw that secures the rear battery compartment.
2. Remove the battery compartment cover.
3. Replace the 2 ‘AAA’ 1.5V batteries observing correct polarity.
4. Re-attach the battery compartment cover.
5. Secure the battery compartment with the screw.



Never dispose of used batteries or rechargeable batteries in household waste. As consumers, users are legally required to take used batteries to appropriate collection sites, the retail store where the batteries were purchased, or wherever batteries are sold.

**Disposal:** Do not dispose of this instrument in household waste. The user is obligated to take end-of-life devices to a designated collection point for the disposal of electrical and electronic equipment.

# Specifications

Function	Range	Resolution	Accuracy
DC Voltage	6V	0.001V	±(0.8% + 5 digits)
	60V	0.01V	
	600V	0.1V	
	1000V	1V	
	Input impedance: 10MΩ; Overload protection: ± 1000V DC and AC		
AC Voltage	6V	0.001V	± (1.0% + 8 digits) (50/60Hz) True rms
	60V	0.01V	
	600V	0.1V	
	1000V	1V	
	Input impedance: 10M ohms; Overload protection: ± 1000V DC and AC		

AC Current	600.0A	0.1 A	±(1.0% + 8 digits)
	3000 A	1 A	±(1.0% + 10 digits)
	True rms AC measurements Linearity: ± 0.2% of reading from 10% to 100% of range Conductor position sensitivity: ± (2.0% +15dgts) with the measured conductor a distance from the center > 25mm (1") External field influence: An increase of ± 1.5% of range max. The recommended distance for conductors from the clamp probe sides is > 200mm. Accuracy is specified for measurements made with the conductor at the center of the clamp field. Frequency bandwidth for AC Current Measurements: 50/60Hz		
Resistance	600 Ω	0.1 Ω*	±(1.0% + 5 digits)
	6K Ω	0.001K Ω*	±(1.5% + 5 digits)
	60K Ω	0.01K Ω*	
	600K Ω	0.1K Ω*	
	6M Ω	0.001M Ω*	
	60M Ω	0.01M Ω*	±(3.0% + 5 digits)
	Overload protection: ± 350 V DC & AC *This is the resolution when measuring a fixed resistance < 90% of the range. The resolution decreases by a factor of 10 when the measured resistance is > 90% of the range.		
Capacitance	6nF	0.001 nF	±(3.0% + 10 digits)
	60nF	0.01 nF	
	600nF	0.1 nF	
	6uF	0.001 uF	
	60uF	0.01 uF	
	600uF	0.1 uF	
	Overload Protection: ± 30 V DC & AC (Always discharge capacitors before testing)		
Continuity	Visual and audible beeper alert when resistance is < 20 Ω		
Diode	Short/Open, Good/Defective tests		

*Specifications tested under environmental conditions of RF field strength < 3V/M and frequency < 30MHz*

## GENERAL SPECIFICATIONS

<b>Clamp</b>	Flexible type with locking mechanism 8mm (0.3") coil diameter 300mm (11.8") flexible cable length
<b>Display</b>	6000 count LCD with multi-function indicators 33.5 x 18.7mm (1.3 x 0.7") display size Auto range 600.0A and 3000A AC
<b>Sampling rate</b>	0.5 to 1 second
<b>Low Battery indication</b>	Low voltage display alerts
<b>Over-range indication</b>	'OL' display
<b>AC bandwidth</b>	50/60Hz (sine wave)
<b>AC response</b>	True RMS
<b>Operating Temperature and Humidity</b>	0~50°C (32~122°F); 80%RH maximum
<b>Battery</b>	Two "AAA" 1.5V batteries
<b>Battery consumption</b>	21.1mA approximately
<b>Auto power OFF</b>	After approx. 15 minutes of inactivity
<b>Dimensions (W x H x D)</b>	290 x 135 x 27.8 mm (11.4 x 5.3 x 1.09")
<b>Weight</b>	208g (0.46 lbs.) without battery
<b>Safety Standards</b>	IEC61010-1, 3 <sup>rd</sup> Edition (2010); Pollution degree 2; Altitude 2000m (6562') maximum; Indoor use only
<b>Voltage/Category Rating</b>	1000V CAT III, 600V CAT IV
<b>Current Rating</b>	3000A
<b>Probes</b>	Listed IEC61010-031 Probes Only

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