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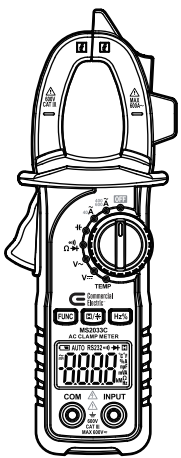
Retain this manual for future use.

Commercial Electric™

Item # 1001 490 633
Model # MS2033C

USE AND CARE GUIDE

AC DIGITAL CLAMP METER



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THANK YOU

We appreciate the trust and confidence you have placed in Commercial Electric through the purchase of this clamp meter. We strive to continually create quality products designed to enhance your home. Visit us online to see our full line of products available for your home improvement needs. Thank you for choosing Commercial Electric!

Table of Contents

Safety Information

Please read this manual carefully and pay attention to related safe working standards before using this meter. Protection provided by the instrument will be impaired if used in a manner not specified by the manufacturer.

SAFETY SYMBOLS

Symbol	Definition
	Indicates important safety information, refer to the operating manual.
	Caution, possibility of electric shock.
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION.
 Intertek	This product CONFORMS TO UL STD 61010-1, 61010-2-032 and 61010-2-033.
AC	Alternating current (AC).
DC	Direct current (DC).
CAT III	Applicable to test and measure circuits connected to the distribution part of the building's low-voltage MAINS installation. Example: fixed equipment switch boards, circuit breakers, wiring (including cables, bus bars, junction boxes, switches, sockets, output terminals on devices for industrial use and other equipment). The product meets with the requirements of 600V CAT III and pollution degree 2.

Safety Information (continued)

	Earth (ground) terminal.
	Application around and removal from UNINSULATED HAZARDOUS LIVE conductors is permitted.

PRECAUTIONS


WARNING: This manual contains information and warnings necessary for safe operation and maintenance of the meter. It is recommended that you read and understand this instruction manual thoroughly prior to using the meter. Failure to understand these instructions and to comply with the warnings and instructions contained herein can result in serious injury or damage.


WARNING: Full compliance with safety standards can be guaranteed only with test leads supplied.


WARNING: Ensure the meter works properly by testing a known voltage first. If not working properly, have the meter serviced before using.


WARNING: Do not use the meter or test leads if they look damaged.


WARNING: Do not measure by exceeding the indication value stated in each measuring range.


WARNING: Failure to follow safety guidelines may prevent the meter's built in protection from working properly.


WARNING: Use caution when working with voltages above 60VDC or 30V AC rms. Such voltages pose a shock hazard.


WARNING: Make sure to use the correct input jack, function, and range when measuring.


WARNING: Do not use the meter in explosive gas, vapor, or dusty environments.


WARNING: Connect the common test lead first, then the hot lead. Disconnect in reverse order.


WARNING: Turn off power and discharge capacitors before measuring resistance, diodes, or continuity.


WARNING: Before opening the case, always disconnect test leads from all energized circuits.


WARNING: Do not touch input jacks during measurement to avoid electric shock.


CAUTION: Use extreme caution when checking electrical circuits. To avoid damage to the meter, do not exceed the m limits of the input values shown in the technical specifi cation tables.


CAUTION: Before changing functions, disconnect the test leads from the circuit under test.

Safety Information (continued)

WARNING: To avoid damage or incorrect readings, check for AC voltage present before making DC voltage measurements.

CAUTION: Keep your fingers behind the probe barriers while measuring.

FCC Compliance Statement

WARNING: CHANGES OR MODIFICATIONS TO THIS UNIT NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

WARNING: THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED,INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

NOTE:THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS B DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES. THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE IN A RESIDENTIAL INSTALLATION. THIS EQUIPMENT GENERATES USES AND CAN RADIATE RADIO FREQUENCY ENERGYAND, IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTIONS, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS. HOWEVER, THERE IS NO GUARANTEE THAT INTERFERENCE WILL NOT OCCUR IN A PARTICULAR INSTALLATION. IF THIS EQUIPMENT DOES CAUSE HARMFUL INTERFERENCE TO RADIO OR TELEVISION RECEPTION, WHICH CAN BE DETERMINED BY TURNING THE EQUIPMENT OFF AND ON, THE USER IS ENCOURAGED TO TRY TO CORRECT THEINTERFERENCE BY ONE OR MORE OF THE FOLLOWING MEASURES:

- -REORIENT OR RELOCATE THE RECEIVING ANTENNA.
- -INCREASE THE SEPARATION BETWEEN THE EQUIPMENT AND RECEIVER.
- -CONNECT THE EQUIPMENT INTO AN OUTLET ON A CIRCUIT DIFFERENT FROM THAT TO WHICH THE RECEIVER IS CONNECTED.
- -CONSULT THE DEALER OR AN EXPERIENCED RADIO/TV TECHNICIAN FOR HELP.

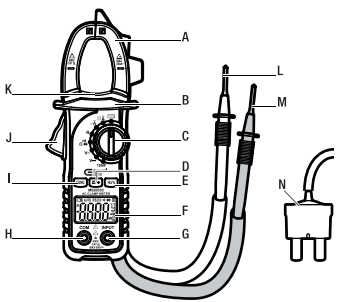
Warranty

WARRANTY: 12 months

For one year from the date of purchase, this product is warranted against any defects in material or workmanship. This warranty is void if this product is ever used while providing commercial services or if rented to another person. Contact the Customer Service Team at 1-877-527-0313 or visit www.homedepot.com.

Pre-Operation

PACKAGE CONTENTS



Part	Name	Description
A	Current clamp head	Measures AC current.
B	Safety barrier	Helps keep hands from touching conductors while measuring current.
C	Rotary switch	Used to select function and range.
D	Backlight/Hold button	Hold this button to turn on the backlight. The worklight turns on as well when the rotary switch is in one of the current positions. Hold down the button again to turn off the backlight. Press this button to keep the current reading on the display. The "H" symbol appears on the display. Press this button again to return this display to normal.

Pre-Operation(continued)

E	Frequency/Duty Cycle button	Press this button while in voltage mode to switch to frequency mode. Press this button again to switch to duty cycle mode. Press this button a third time to return to voltage mode.
F	Display	Displays the measured reading.
G	Input jack	Connection for the live (red) test lead for voltage, resistance, capacitance, diodes and continuity.
H	COM jack	Connection for the common (black) test lead.
I	FUNC button	Press “FUNC” to switch between functions in the multi-function position.
J	Clamp trigger	Hold the trigger to open the clamp head.
K	Worklight	Press the button to light the test environment.
L	Red test probe	Connects to the input jack.
M	Black test probe	Connects to the COM jack.
N	K-type thermocouple	Connects ot the COM jack and the input jack for temperature measurement.

AUTOMATIC POWER OFF FUNCTION

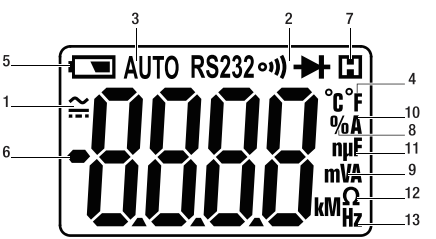
If the meter is idle for 30 minutes after turning it on, the meter automatically powers off to save the battery. To turn the meter back on, press the FUNC button.

LCD DISPLAY DEFINITIONS

Part	Symbol	Definition
1	~, ⎓	Alternating current, Direct current
2	•))), ▶|	Diode, continuity
3	AUTO	Automatic measuring range
4	°C °F	Celsius/Fahrenheit

Pre-Operation(continued)

5	▭	Low battery
6	⬬	Polarity indicator (negative)
7	H	Reading hold state
8	%	Percentage (duty ratio)
9	mV, V	Millivolt, Volt (voltage)
10	A	Amperes (current)
11	nF, µF, mF	Nanofarad, Microfarad, Millifarad
12	Ω, kΩ, MΩ	Ohm, Kilohm, Megohm (resistance)
13	Hz, kHz	Hertz (frequency)



PRODUCT SPECIFICATIONS

Component	Specification
Safety Rating	CAT III 600V
Maximum voltage between terminals and earth (ground)	600V DC or AC rms
Altitude	Up to 2000 meters
Battery	3 x 1.5V AAA batteries
Temperature coefficient	0.1 accuracy/°C (<18°C or >28°C)
Display	4,000 counts
Polarity indication	“–“ displayed for negative polarity

Pre-Operation(continued)

Exceeding measuring range display	Display shows “0L”
Sampling rate	Approximately 3 times per second
Operating environment	0°C to 40°C, 80% relative humidity
Storage temperature	-10°C - 60°C, 70% relative humidity (battery removed)
Size	198 x 79 x 38 mm
Weight	Approximately 220 g (with battery)
Maximum jaw opening	26 mm

AC CURRENT SPECIFICATIONS

Measuring Range	Resolution	Accuracy
40A	0.01A	±(2.5% of rdg + 5 digits)
400A	0.1A	
600A	1A	

Additional Specifications:

- ☐ Frequency Range: 50Hz~60Hz
- ☐ Maximum Input Current: up to 120% of full scale for no more than 60 seconds
- ☐ Response: Average; calibrated to rms sine wave

TEMPERATURE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
-4~1832°F	1°F	±(3.0% of rdg + 5°F)

DC VOLTAGE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
4V	1mV	±(0.8% of rdg + 3 digits)
40V	10mV	
400V	0.1V	
600V	1V	

Pre-Operation (continued)

Additional Specifications:

- ☐ Input Impedance: 10MΩ
- ☐ Overload Protection: 600V DC or AC rms
- ☐ Maximum Input Voltage: 600V DC

AC VOLTAGE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
4V	1mV	±(1.0% of rdg + 5 digits)
40V	10mV	
400V	0.1V	
600V	1V	

Additional Specifications:

- ☐ Input Impedance: 10MΩ
- ☐ Overload Protection: 600V DC or AC rms
- ☐ Maximum Input Voltage: 600V AC
- ☐ Frequency Range: 40 – 400Hz
- ☐ Response: Average; calibrated to rms sine wave

FREQUENCY SPECIFICATIONS

Measuring Range	Resolution	Accuracy
50Hz	0.01Hz	±(1.0% of rdg + 5 digits)
500Hz	0.1Hz	±(1.0% of rdg + 5 digits)
5kHz	1Hz	
10kHz	0.01kHz	

Additional Specifications:

- ☐ Measuring Scope: 10~100kHz
- ☐ Input Signal Range: ≥0.2V AC (rms) (input current will increase when the frequency to be measured increases)
- ☐ Overload Protection: 600V DC or AC rms

Pre-Operation (continued)

DUTY CYCLE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
0.1-99.9%	0.1%	±2.0%

RESISTANCE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
400Ω	0.1Ω	±(1.0% of rdg +5 digits)
4KΩ	1Ω	
40KΩ	10Ω	
400KΩ	0.1KΩ	
4MΩ	1KΩ	
40MΩ	10KΩ	±(2.0% of rdg +5 digits)

Additional Specifications:

☐ Open Circuit Voltage: 0.4V

☐ Overload Protection: 250V DC or AC (rms)

CIRCUIT CONTINUITY TEST

Measuring Range	Resolution	Accuracy
	0.1Ω	If the resistance of the circuit to be measured is less than 50Ω, the meter's built-in buzzer may sound.

Additional Specifications:

☐ Open Circuit Voltage: Approximately 0.4V

☐ Overload Protection: 250V DC or AC (rms)

Pre-Operation (continued)

CAPACITANCE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
5.0nF	0.001nF	±(4.0% of rdg +5 digits)
50nF	0.01nF	±(3.0% of rdg +3 digits)
500nF	0.1nF	
5.0µF	1nF	
50µF	0.01 µF	
100µF	0.1 µF	

Additional Specifications:

☐ Overload Protection: 250V DC or AC (rms)

DIODE TEST

Measuring Range	Resolution	Accuracy
	0.001V	Displays the approximate diode forward voltage value.

Additional Specifications:

☐ Forward DC current is about 1mA

☐ Backward DC voltage is about 1.5V

☐ Overload Protection: 250V DC or AC (rms)

Operation

BEFORE YOU TAKE A MEASUREMENT

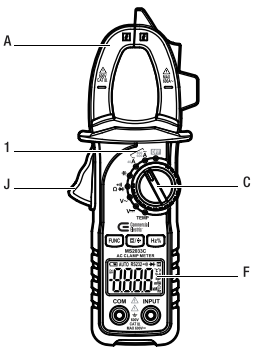
CAUTION: If the current under measurement is higher than the selected value for a long period, overheating may take place, compromising the safety and operation of the inner circuits.

CAUTION: When connecting the lines, first connect the common (COM) test line, then connect the charged test line. When removing the lines, remove the charged test line first.

1 Completing a Current Measurement

WARNING: If the current range is not previously known, set the range to the highest range and adjust down as necessary.

WARNING: When measuring bare wires, use extra caution to avoid electric shock.



☐ Move the rotary switch (C) to the A position (1) and choose the appropriate measuring range.

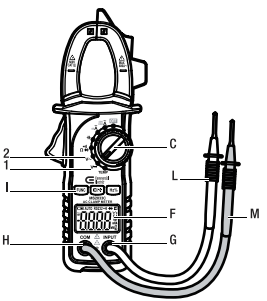
☐ Hold the trigger (J) to open the clamp head (A), and clip one lead of the measurement circuit to be tested in the clamp (A). Connect the lead at the center of the clamp to ensure an accurate reading. Ensure you only clamp one conductor as multiple conductors with different directions will cancel out readings.

☐ Read the displayed value on the LCD display (F).

2 Completing a Voltage Measurement

WARNING: Do not attempt to take any voltage measurement that exceeds 600V AC or DC in order to avoid electrical shock and/or damage to the meter.

CAUTION: Use caution when measuring high voltages to avoid electrical shock or damage.

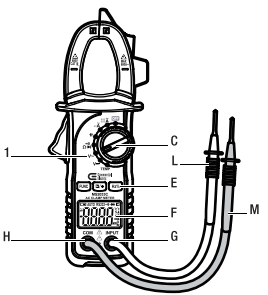


☐ Insert the black test probe (M) into the COM jack (H) and the red test probe (L) into the INPUT jack (G).

☐ Move the rotary switch (C) to DC voltage position (1) or AC voltage position (2).

☐ Connect the test probes (L and M) with the voltage source or both ends of the load in parallel for measurement and read the voltage on the display (F).

3 Completing Frequency and Duty Cycle Measurements



- ☐ Insert the black test probe (M) into the COM jack (H) and the red test probe (L) into the INPUT jack (G).
- ☐ Move the rotary switch (C) to the V~ position (1).
- ☐ While in voltage mode, press the Hz/% button (E) to switch to frequency measuring mode. Connect the test leads (L and M) across the circuit to be measured.
- ☐ Press the Hz/% button (E) again to switch to duty cycle mode. Connect the test leads (L and M) across the circuit to be measured.
- ☐ Read the reading on the display (F).
- ☐ Press the Hz/% button (E) to return to voltage mode.

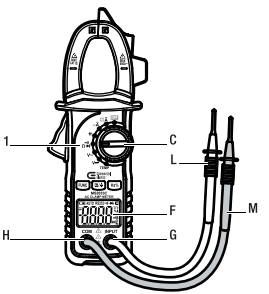
4 Completing a Resistance Test

WARNING: To avoid injury or damage to the meter, make sure to turn off all power and discharge all capacitors before measuring resistance.

NOTE: Sometimes the resistor value and measured resistance differ. This is due to the meter's output test current that goes through all possible paths between leads.

NOTE: When the input end is open, the LCD shows "OL" outrange state.

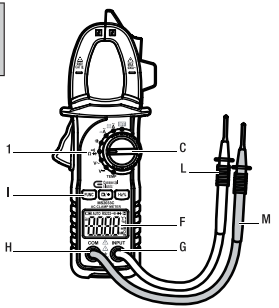
NOTE: For low resistance measurements, short the test leads and record the resistance displayed. Then connect to the circuit and subtract the recorded resistance from the measurement for the most accurate results.



- ☐ Insert the black test probe (M) into the COM jack (H) and the red test probe (L) into the INPUT jack (G).
- ☐ Move the rotary switch (C) to the resistance position (1).
- ☐ Connect the test probes (L and M) to both ends of the resistor or circuit to be tested for measurement and read the reading on the display (F).

5 Completing a Diode Test

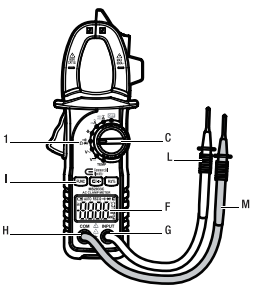
WARNING: To avoid injury or damage to the meter, make sure to turn off all power and discharge all capacitors before measuring diode.



- ☐ Insert the black test probe (M) into the COM jack (H) and the red test probe (L) into the INPUT jack (G).
- ☐ Move the rotary switch (C) to the diode position (1).
- ☐ Press the FUNC button (I) to switch to diode measuring mode.
- ☐ Connect the red test probe (L) and black test probe (M) across the circuit to be measured.
- ☐ Read the measured forward biased voltage drop on the display (F). If the leads are reversed, only “1” is displayed.

6 Completing a Circuit Continuity Test

WARNING: To avoid injury or damage to the meter, make sure to turn off all power and discharge all capacitors before measuring continuity.

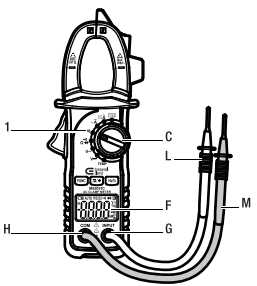


- ☐ Insert the black test probe (M) into the COM jack (H) and the red test probe (L) into the INPUT jack (G).
- ☐ Move the rotary switch (C) to the continuity position (1).
- ☐ Press the FUNC button (I) twice to switch to continuity mode.
- ☐ Connect the red test probe (L) and black test probe (M) across the circuit to be measured. If the resistance of the circuit to be measured is less than 50Ω, the meter’s built-in buzzer may sound.
- ☐ Read the resistance value on the display (F).

Operation (continued)

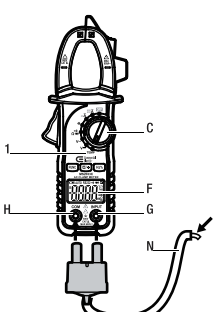
7 Completing a Capacitance Measurement

WARNING: Electric shock hazard. To avoid electric shock, before measuring capacitance, discharge the capacitance completely.



- ☐ Insert the black test probe (M) into the COM jack (H) and the red test probe (L) into the INPUT jack (G).
- ☐ Move the rotary switch (C) to the capacitance position (1).
- ☐ Connect the red test probe (L) and black test probe (M) across the circuit to be measured.
- ☐ Read the capacitance value on the display (F).

8 Completing a Temperature Measurement



- ☐ Move the rotary switch (C) to the TEMP position (1). The display will show the current ambient temperature.
- ☐ Connect the positive of the type-k thermocouple (N) to INPUT jack (G) and the negative to COM jack (H).
- ☐ Touch the tip of the thermocouple (N) to the object to be tested.
- ☐ Read the measured temperature value on the display (F).

Maintenance

WARNING: Before you open the meter, always disconnect it from all sources of electric current and make sure you are not charged with static electricity, which may destroy the internal components.

WARNING: Any adjustment, maintenance, or repair work carried out on the meter while it is live should be carried out by a qualified electrician.

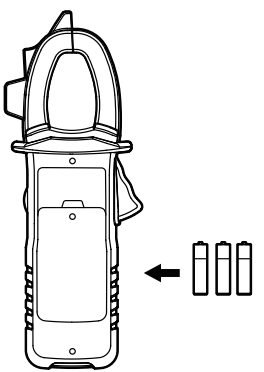
WARNING: When you open the meter, remember that some internal capacitors can retain a dangerous voltage level even after the instrument is switched off.

CAUTION: If the meter is not going to be used for a long time, take out the battery and do not store the meter in a high temperature or high humidity environment.

BATTERY REPLACEMENT

IMPORTANT: Change the battery when the battery symbol appears on the LCD in order to avoid incorrect data.

WARNING: Do not mix old and new batteries. Do not mix alkaline, standard (carbon-zinc), or rechargeable (ni-cad, ni-mih, etc) batteries.



- ☐ Turn the meter off by turning the rotary switch (C) to the OFF position.
- ☐ Disconnect the black and red test leads (L and M) and/or any connectors from the terminals on the meter.
- ☐ Use a screwdriver to unscrew and remove the battery cover located on the back of the meter.
- ☐ Remove the used batteries and replace with three new AAA 1.5V batteries.
- ☐ Reattach the battery cover and secure with the screws.

Maintenance(continued)

TEST LEAD REPLACEMENT

Replace test leads if they become damaged or worn.

⚠ WARNING: Use test leads that meet EN 61010-031 standard and rated CAT III 600V or better.

Care and Cleaning

- ☐ Do not use abrasives or solvents to clean the meter. Use a damp cloth and mild detergent only. Dirty or wet input jacks can affect readings.
- ☐ Use a cotton swab with a cleaner/lubricant (such as WD-40) to clean the jacks. Use a new swab for each jack to prevent cross-contamination.