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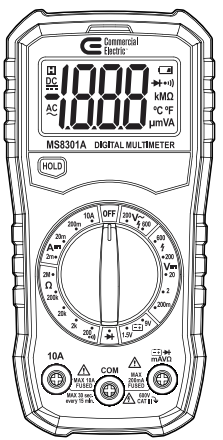
Retain this manual for future use.

Commercial Electric™

Item # 1001 418 355
Model # MS8301A

USE AND CARE GUIDE

DIGITAL MULTIMETER



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THANK YOU

We appreciate the trust and confidence you have placed in Commercial Electric through the purchase of this digital multimeter. 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.

Symbol	Definition
	Indicates important safety information
	Caution, possibility of electric shock.
AC	Alternating current (AC).
DC	Direct current (DC).
	The fuse must be replaced with the rating specified in this manual.
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION.
Intertek	Conforms to UL STD. 61010-1, 61010-2-030 and 61010-031.
	PROTECTIVE CONDUCTOR TERMINAL.
CAT III	(MEASUREMENT CATEGORY III) is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.

Safety Information (continued)

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: Before taking measurements of voltage with the probe, make sure there is no electronic element connected to the test socket of the transistor.

WARNING: Measure a known voltage with the meter to verify that the meter is working properly. If the meter is working abnormally, stop using immediately. A protective device may be damaged. If there is any doubt, have the meter inspected by a qualified technician.

WARNING: When the meter is linked to measurement circuits, do not touch unused terminals.

WARNING: When making connections, connect the common test lead before connecting the live test lead. When disconnecting, disconnect the live test lead before disconnecting the common test lead.

WARNING: Disconnect power to the circuits and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.

WARNING: Do not measure voltages above 600V in Category III installations.

WARNING: Do not operate the meter with the case (or part of the case) removed.

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

WARNING: Never perform resistance or continuity measurements on live circuits.

WARNING: Do not operate the meter around explosive gas, vapor or dust.

CAUTION: When the range of the value to be measured is unknown, check that the range initially set on the meter is the highest possible setting.

CAUTION: When repairing televisions or carrying out measurements on power-switching circuits, remember that high-amplitude voltage pulses at the test points can damage the meter. Use of a TV filter will attenuate any such pulses.

Safety Information (continued)

CAUTION: When the instrument is measuring, do not touch the input terminal not in use.

CAUTION: Before turning the function/range switch, make sure the probe is open with the circuit being measured.

CAUTION: To avoid damage to the meter, do not exceed the maximum limits of the input values shown in the Specification tables.

NOTE: Keep your fingers behind the protection guards while measuring.

FCC Compliance Statement

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

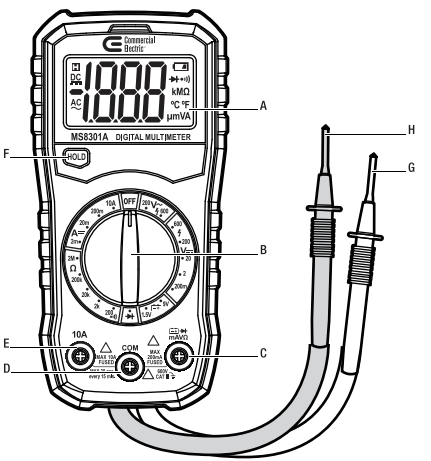
WARRANTY: 12 months

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

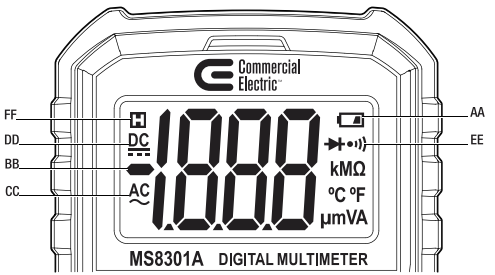
Product Description



Part	Description	Quantity
A	LCD display	1
B	Function and range switch	1
C	VΩmA jack	1
D	COM jack	1
E	10A jack	1
F	Data hold button	1
G	Red test lead	1
H	Black test lead	1

Pre-Operation (continued)

LCD Display Definitions



LCD Term	Description
AA	Low battery indicator
BB	Negative reading indicator
CC	AC voltage or current indicator
DD	DC voltage or current indicator
EE	Diode and continuity test mode
FF	Data hold mode

PRODUCT SPECIFICATIONS

Component	Specification
Environmental conditions	600V CAT III
Altitude	Up to 2000 meters
Battery	2 x AAA 1.5 V batteries
Fuse protection	F1:FF 10A H 600V F2:FF 400mA H 600V

Pre-Operation (continued)

Component	Specification
Accuracy	Accuracy is specified for a period of one year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity up to 80%. Accuracy specifications take the form of: ± (% of reading + number of least significant digits).
Display	2000 counts
Low voltage indication	on the display
Over range indication	LCD displays "OL"
Polarity indication	" – " displayed for negative polarity
Operating environment	0°C - 40°C (32°F - 104°F), <80% relative humidity
Storage temperature	-10°C - 50°C (14°F - 122°F), <70% relative humidity, battery removed
Size	150 x 74 x 48 mm
Weight	Approximately 220 g (battery included)

DC VOLTAGE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
200mV	100µV	±(0.5% of rdg ±3 digits)
2V	1mV	
20V	10mV	
200V	100mV	
600V	1V	±(0.8% of rdg ±5 digits)

Additional Specifications:

- ☐ Overload Protection: 200mV range: 250V DC or RMS AC
- ☐ Remaining ranges: 600V DC or RMS AC

AC VOLTAGE SPECIFICATIONS

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Pre-Operation (continued)

Measuring Range	Resolution	Accuracy
200V	100mV	±(1.0% of rdg ± 10 digits)
600V	1V	±(1.2% of rdg ± 10 digits)

Additional Specifications:

- ☐ Overload Protection: 600V DC or RMS AC
- ☐ Frequency Range: 40 - 400Hz
- ☐ Display Response: Average response (calibrated in rms of sine wave)

DC CURRENT SPECIFICATIONS

Measuring Range	Resolution	Accuracy
2mA	1uA	±(1.0% of rdg + 3 digits)
20mA	10uA	±(1.0% of rdg + 5 digits)
200mA	100uA	±(1.5% of rdg + 5 digits)
10A	10mA	±(3.0% of rdg + 10 digits)

Additional Specifications:

- ☐ Overload Protection: F1:FF 10A H 600V, F2:FF 400 mA H 600V, when measured current is greater than 2A, the continuous measurement time cannot be more than 2 minutes. Disconnect the current and wait 10 minutes before you take another measurement.

RESISTANCE SPECIFICATIONS

Measuring Range	Resolution	Accuracy
200Ω	0.1Ω	±(1.2% of rdg + 5 digits)
2kΩ	1Ω	±(0.8% of rdg + 2 digits)
20kΩ	10Ω	
200kΩ	100Ω	
2MΩ	1kΩ	±(1.0% of rdg + 5 digits)

Additional Specifications:

- ☐ Maximum Open Circuit Voltage: 2.4V
- ☐ Overload Protection: 250V DC or RMS AC

Pre-Operation (continued)

DIODE AND CIRCUIT ON-OFF SPECIFICATIONS

Measuring Range	Description
	Displays the approximate diode positive voltage.
	When the on-resistance is smaller than (70±30)Ω, the built-in buzzer sounds.

Additional Specifications:

- ☐ Overload Protection: 250V DC or RMS AC

BATTERY VOLTAGE SPECIFICATIONS

Position	Resolution	Load Impedance
1.5V	0.001V	47Ω
9V	0.01V	300Ω

Additional Specifications:

- ☐ Overload Protection: F2:FF 400mA H 600V

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.

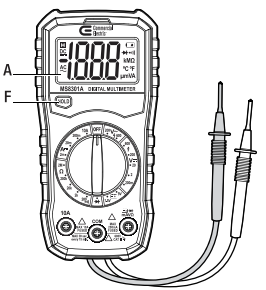
IMPORTANT: Before you take a measurement, turn the function/ range switch to the desired range.

CAUTION: Check the batteries before use. If the batteries are low, the battery symbol appears on the LCD display. Replace the batteries if the low battery symbol appears on the LCD display.

1 Using Data Hold Mode

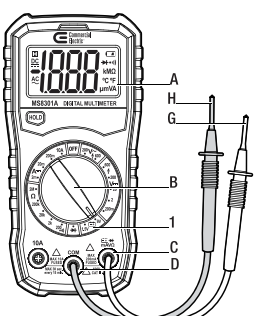
Data Hold mode causes the meter to stop updating the LCD display (A). To enter and exit Data Hold mode:

- ☐ Press the Hold button (F). This fixes the LCD display (A) on the current value and an H is displayed.
- ☐ Press the Hold button (F) again to return the meter to normal mode.



2 Completing a battery voltage measurement

- ☐ Connect the black (H) and red (G) test leads to the COM (D) and VΩmA (C) jacks respectively.
- ☐ Turn the switch (B) to the battery range (1) and connect the leads to the battery or load that you wish to measure.
- ☐ Read the value on the LCD display (A) if the connection with correct polarity.
- ☐ LCD (A) displays 0.00V if the connection with wrong polarity.

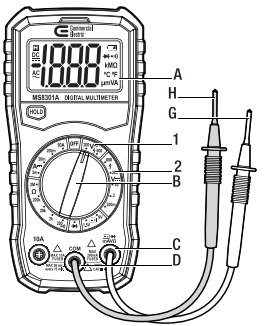


3 Completing an AC or DC Voltage Measurement

WARNING: If you do not know the measured voltage range in advance, set the function/ range switch to the maximum range and gradually turn to smaller ranges until the resolution is satisfactory.

WARNING: If the display shows "OL", this indicates an overrange measurement. Set the switch to a higher range.

WARNING: Do not measure voltages above 600V to avoid damage to the internal circuits.

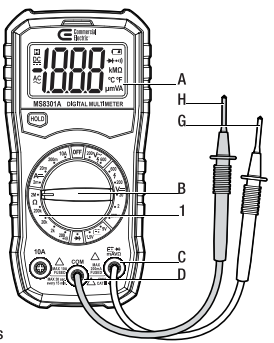


- ☐ Set the switch (B) to the proper AC (1) or DC (2) voltage range.
- ☐ Connect the black (H) and red (G) test leads to the COM (D) and VΩmA (C) jacks respectively.
- ☐ Connect the test leads (H and G) to the circuit being measured.
- ☐ Read the value on the LCD display (A). The polarity of the red test lead (G) connection will be indicated when making a DCV measurement.

4 Completing a Resistance Measurement

WARNING: If the resistor being measured is greater than the maximum value of the selected range, the display will show "OL". Select a higher range. It normally takes a few seconds for the reading to get stable when measuring a resistor larger than 1MΩ.

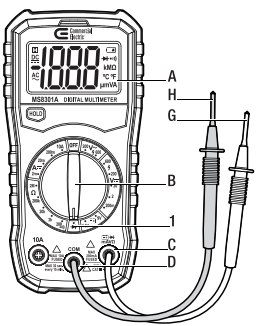
WARNING: When measuring an online resistor, de-energize the circuit being measured and discharge all capacitors.



- ☐ Set the switch (B) to the proper Ohm range (1) (Ω).
- ☐ Connect the black (H) and red (G) test leads to the COM (D) and VΩmA (C) jacks respectively.
- ☐ Connect the test leads (H and G) to the circuit being measured and read the value on the LCD display (A).

5 Performing a Diode Test

CAUTION: To avoid electrical shock and/or damage to the meter, disconnect the circuit power and discharge all high-voltage capacitors before testing diodes.



- ☐ Set the switch (B) to the diode range (1).
- ☐ Connect the black (H) and red (G) test leads to the COM (D) and VΩmA (C) jacks respectively.
- ☐ Connect the red test lead (G) to the positive pole of the diode being measured and connect the black test lead (H) to the negative pole. Read the approximate forward voltage drops of the diode on the LCD display (A).

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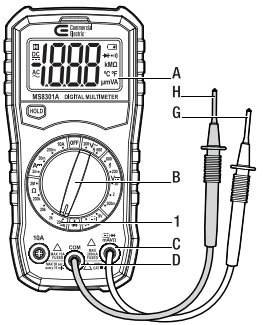
6 Completing a Continuity Measurement

CAUTION: To avoid electrical shock and/or damage to the meter, disconnect the circuit power and discharge all high-voltage capacitors before testing continuity.



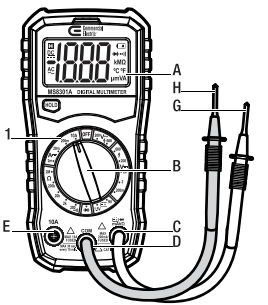
- ☐ Set the rotary switch (B) to the continuity range (1).
- ☐ Connect the black (H) and red (G) test leads to the COM (D) and VΩmA(C) jacks respectively.
- ☐ Connect the leads in parallel with two points of the circuit being measured. If the resistance between the two points is less than 100Ω, the built-in buzzer will sound. This indicates the continuity between the two points.

7 Performing a DC Current Measurement

WARNING: If you do not know the measured current range in advance, set the function/ range switch to the maximum range. Then gradually turn to a smaller range until you reach a satisfactory range.

WARNING: If the display shows "OL", this indicates an overrange measurement. Set the switch to a higher range.

WARNING: The Warning symbol beside the probe indicates the maximum input current is 200mA or 10A, depending on the inserted jack. An overcurrent will blow the fuse.



- ☐ Turn off the power of the measured circuit. Discharge all the high-voltage capacitors.
- ☐ Set the switch (B) to the proper range (1).
- ☐ Connect the black test lead (H) to the COM terminal (D) and the red test lead (G) to the VΩmA jack (C) for a maximum of 200mA. For a maximum of 10A, move the red test lead (G) to the 10A jack (E).
- ☐ Break the circuit path to be tested. Connect the black test lead (H) to the negative side of the break.
- ☐ Connect the red test lead (G) to the positive side of the break.
- ☐ Turn on the power of the measured circuit, and then read the LCD display (A).
- ☐ Turn off the power of the measured circuit and discharge all the high-voltage capacitors.
- ☐ Remove the test leads and recover the measured circuit.

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Maintenance

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

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

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: 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.

REPLACING THE BATTERY AND FUSE

WARNING: To prevent electrical hazard or shock, turn off the meter and disconnect the test leads and any input signals before removing the battery cover.

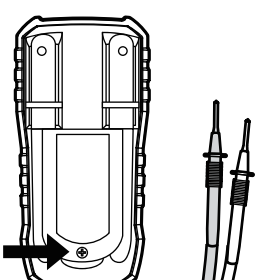
WARNING: Do not use this meter until the rear cover is placed back on the meter and the screws are tightened.

WARNING: Change the battery when the battery symbol appears on the LCD in order to avoid incorrect data, which could lead to electric shock or personal injury.

WARNING: Only use the specified batteries and fuses for replacement. See the Product Specifications section of this manual for more information.

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

- ☐ Ensure the meter is off.
- ☐ Disconnect the black and red test leads 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. If you are replacing the fuse, unscrew the screws on the four corners of back of the meter.
- ☐ Remove the used batteries or damaged fuse.



Maintenance (continued)

- ☐ Replace with two AAA 1.5V batteries or F1:FF 10A H 600V; F2:FF 400 mA H 600V.
- ☐ Reattach the battery cover or whole back and secure with the screws.

TEST LEAD REPLACEMENT

If the insulation on the leads is damaged, replace the test leads. Replacement test leads must meet the manufacturer's specifications (EN 61010-031 standard, 600V CAT III 10A, or better).

Care and Cleaning

- ☐ Periodically wipe the case with a damp cloth and mild detergent.
- ☐ Do not use abrasives or solvents.
- ☐ Dirt or moisture in the terminals can affect readings.