

Owner's Manual & Safety Instructions

Save This Manual Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

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AMESTM

I N S T R U M E N T S

64019

ELECTRICIAN/HVAC TRMS DIGITAL MULTIMETER



Visit our website at: <http://www.harborfreight.com>
Email our technical support at: productsupport@harborfreight.com

When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-888-866-5797 as soon as possible.

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⚠ WARNING

**Read this material before using this product.
Failure to do so can result in serious injury.
SAVE THIS MANUAL.**

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WARNING SYMBOLS AND DEFINITIONS

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Addresses practices not related to personal injury.

IMPORTANT SAFETY INFORMATION

Safety Warnings and Precautions

⚠ WARNING

Read all safety warnings and all instructions.

Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

1. Electrical shock can cause death or injury! NEVER TOUCH exposed conductors of electricity.
2. **Test cable voltages with care.**
3. Inspect the Multimeter before use. In addition to a general inspection, look specifically for:
 - a. Pay special attention to the insulation protecting the connectors.
 - b. Check the leads for exposed metal, damaged insulation, and continuity.
 - c. Replace damaged test lead immediately, before use.
4. Do not use the Multimeter if:
 - a. Either of the test leads are damaged in any way.
 - b. Test leads are dirty or have residue on them.
 - c. The battery is low.
 - d. Near any explosive gasses or fumes.
 - e. Any abnormal operation is detected.
(If in doubt about the condition of the Meter, have it serviced before use.)
 - f. The battery cover is open.
5. Power this Meter using only the battery(ies) referenced in the Specifications Chart.
6. Use caution when working near voltages above 30 VAC rms, 42 VAC peak, or 60 VDC. Voltages this high present a risk of electric shock.
7. Disconnect the circuit's power before connecting the Meter in series, when measuring current.
8. Connect the common (COM) test lead first and disconnect it last.
9. Hold the probes with fingers behind guards.
10. Avoid electrical shock. Use extreme caution when working near uninsulated conductors or bus bars. Prevent body contact with grounded surfaces such as pipes, radiators, ranges, and cabinet enclosures when testing voltages.
11. Observe work area conditions. Do not test voltages in damp or wet locations. Don't expose to rain. Keep work area clean and well lit.
12. Keep children away. Children must never be allowed in the work area.
13. Stay alert. Watch what you are doing, use common sense. Do not operate any meter when you are tired.
14. Do not operate meter if under the influence of alcohol or drugs. Read warning labels on prescriptions to determine if your judgment or reflexes are impaired while taking drugs. If there is any doubt, do not operate the meter.

15. People with pacemakers should consult their physician(s) before use. Electromagnetic fields in close proximity to heart pacemaker could cause pacemaker interference or pacemaker failure.
16. Do not test voltage on circuits higher than 1000 volts.
17. Do not test current on circuits higher than 10 amps.

18. Dress properly. Protective, electrically nonconductive clothes and nonskid footwear are recommended when working.
19. Wear ANSI-approved safety goggles during use.
20. Only use accessories intended for use with this meter.
21. Avoid damaging meter. Use only as specified in this manual.

22. Prior to testing resistance, diodes, or continuity; disconnect all power to the circuit and discharge all high-voltage capacitors.
23. Performance of this meter may vary depending on battery condition.

24. Use the proper settings, terminals, techniques, and range for the tests performed. Start with the range stated in the instructions.
25. Do not apply voltage to the Test Leads when the Multimeter is in the Ohms testing setting. Damage can occur to the Meter.
26. Do not switch between testing modes with the multimeter connected to a circuit.
27. Do not use the meter at a setting marked as blank on the scale.
28. Have the Multimeter calibrated by a qualified technician every year to maintain accurate results.
29. Do not disassemble charger; take it to a qualified technician when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
30. The warnings, cautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.



SAVE THESE INSTRUCTIONS.

Specifications

DC Voltage	Ranges: 660mV / 6.6V / 66V / 660V / 1000V
DC Voltage Accuracy	(@660mV) $\pm 0.8\%$ of rdg + 3D (@6.6V - 660V) $\pm 0.5\%$ of rdg + 5D (@1000V) $\pm 0.8\%$ of rdg + 3D
DC Current	Ranges: 660 μ A / 6600 μ A / 66mA / 660mA / 10A
DC Current Accuracy	(@660 μ A - 660mA) $\pm 1.0\%$ of rdg + 5D (@10A) $\pm 2.0\%$ of rdg + 5D
AC Voltage	Ranges: 660mV / 6.6V / 66V / 660V / 1000V Frequency Range: (@660mV) 40-60Hz; (@6.6V - 1000V) 40-400Hz
AC Voltage Accuracy	(@660mV) $\pm 1.5\%$ of rdg + 5D (@6.6V - 66V) $\pm 1.2\%$ of rdg + 5D (@660V - 1000V) $\pm 1.0\%$ of rdg + 3D
AC Current	Ranges: 660 μ A / 6600 μ A / 66mA / 660mA / 10A Frequency Range: 40-400Hz
AC Current Accuracy	(@660 μ A - 660mA) $\pm 1.5\%$ of rdg + 5D (@10A) $\pm 3.0\%$ of rdg + 5D
Resistance	Ranges: 660 Ω / 6.6k Ω / 66k Ω / 660k Ω / 6.6M Ω / 66M Ω
Resistance Accuracy	(@660 Ω - 6.6M Ω) $\pm 0.8\%$ of rdg + 5D (@66M Ω) $\pm 1.5\%$ of rdg + 5D
Capacitance	Ranges: 6.6nF / 66nF / 660nF / 6.6 μ F / 66 μ F / 660 μ F / 6.6mF / 66mF
Capacitance Accuracy	(@6.6nF) $\pm 4.0\%$ of rdg + 5D (@66nF - 660 μ F) $\pm 3.0\%$ of rdg + 3D (@6.6mF - 66mF) $\pm 4.0\%$ of rdg + 5D
Diode	Forward DC Current: ~1mA Reverse DC Voltage: ~3.2V
Continuity	Meter beeps at $< 50\Omega$
Frequency	Hz% Mode: 66Hz - 10kHz Voltage Mode: 66Hz - 66MHz
Frequency Accuracy	Voltage Mode: $\pm 1.5\%$ of rdg + 5D Hz% Mode: $\pm 1.5\%$ of rdg + 5D
Temperature	Range: 32°F - 1832°F (0°C - 1000°C)
Temperature Accuracy	(@32°F - 1832°F) $\pm 1.0\%$ of rdg + 3D
Low Impedance (Lo-Z)	Ranges: 660mV / 6.6V / 66V / 660V / 1000V
Lo-Z Accuracy	(@660mV) $\pm 1.5\%$ of rdg + 5D (@6.6V - 66V) $\pm 1.2\%$ of rdg + 5D (@660V - 1000V) $\pm 1.0\%$ of rdg + 3D
Duty Cycle	1%-99%
Duty Cycle Accuracy	$\pm 2.0\%$
Operating Temperature	Range: 32°F - 104°F (0°C - 40°C)
Display	LCD
Battery	9V (Included)

SAFETY

SETUP

OPERATION

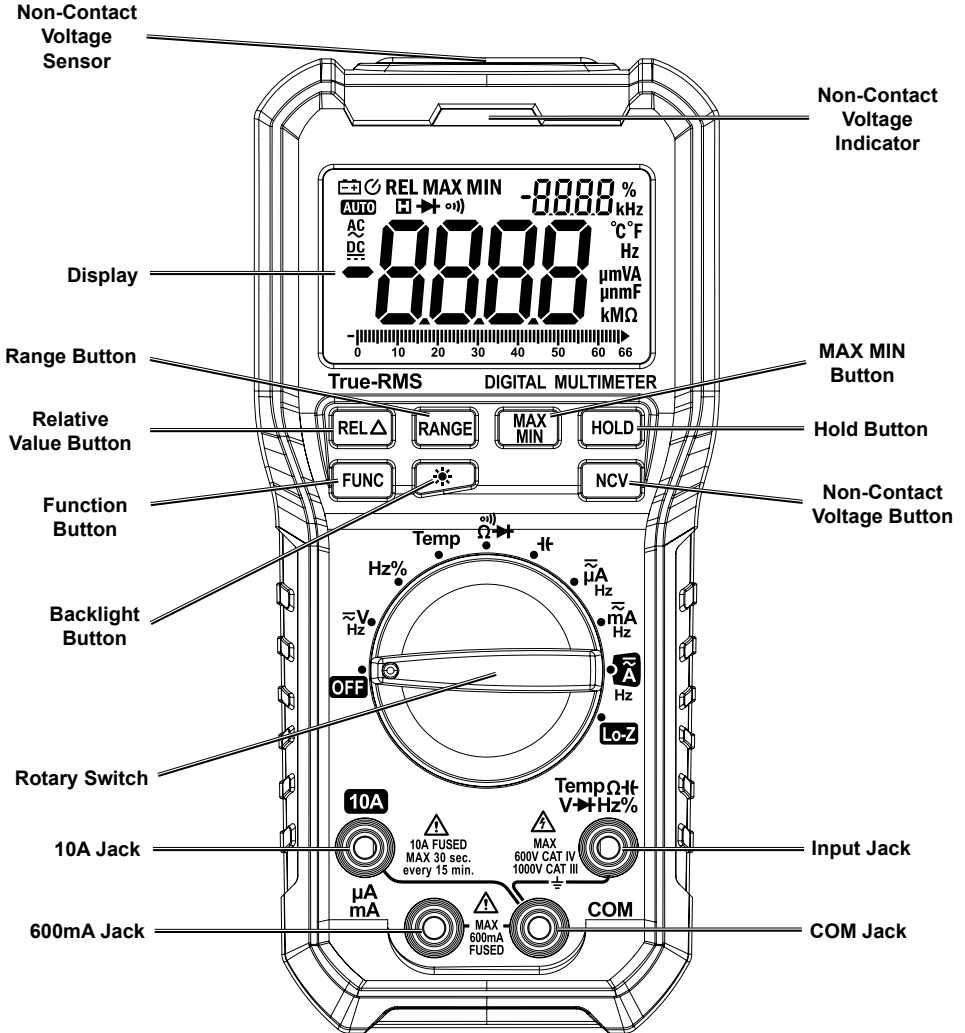
MAINTENANCE

Setup - Before Use:



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

Functions



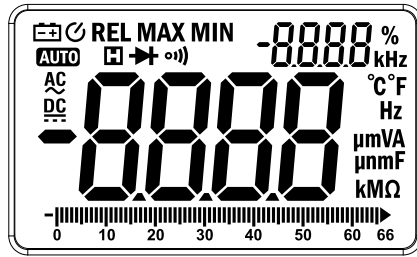
SAFETY

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Display



Symbol	Description
<u>AC</u>	Alternating current
<u>DC</u>	Direct current
[Battery]	Indicates that display data is being held
[Power Off]	Auto Power-Off
AUTO	Auto range mode
••)	Continuity
▶	Diode test
REL	Relative measurement mode
MAX	The maximum value is being measured
MIN	The minimum value is being measured
[Battery]	Battery low
%	Percent (Duty cycle)
°C/°F	Celsius/Fahrenheit
Ω, kΩ, MΩ	Ohms, Kiloohms, Megaohms (Resistance)
nF, μF, mF	Nanofarad, Microfarad, Millifarad (Capacitance f)
mV, V	Millivolts, Volts (Voltage)
A	Amperes (Current)
Hz, kHz	Hertz, KiloHertz (Frequency)
[Bar Graph]	Bar graph

SAFETY

SETUP

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Operating Instructions



Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

Electrical shock can cause death or injury! **NEVER TOUCH** exposed conductors of electricity.

General Operating Instructions

REL Δ

1. Press the **REL Δ** button once to enter relative measurement mode and store a reference value.
2. Take additional measurements to display difference between measured value and reference value.
3. Press **REL Δ** button a second time to return to normal measuring mode.
Note: Relative measurement mode can only be used in manual range mode.
Note: Relative measurement mode cannot be used in **Hz%** mode.

Manual Range


The Meter's default range is **AUTO** in voltage, current, resistance, and capacitance modes. To select manual range, press **RANGE**. Each press of the button increases the range. Hold the **RANGE** button to return to auto-range.

Maximum and Minimum Value Measurements



1. Press the **MAX MIN** button one time to measure the maximum value at any range.
2. Press the **MAX MIN** button two times to measure the minimum value at any range.
3. Read measured minimum or maximum value at the top right of the Display.
4. Hold the **MAX MIN** button for one or more seconds to return to normal mode.
Note: The Meter is automatically set to manual range mode when measuring minimum or maximum value.
Note: Minimum and maximum value mode cannot be used while in **Hz%** mode.

Data Hold

The data hold function keeps the current reading on the Display. To activate data hold:

1. Press the **HOLD** button and the reading will be held on the Display. The  symbol appears.
2. Press **HOLD** again to release the hold.

Backlight

1. Press the  button to turn on the Display backlight for 60 seconds.
2. Press the  button a second time to turn the Display backlight off.

Note: Frequent use of the backlight shortens the life of the batteries. Only use the backlight when necessary.

NCV (Non-Contact Voltage)

1. Turn Rotary Switch to any position.
2. Hold the **NCV** button and move the Non-Contact Voltage Sensor close to the unshielded conductor. If detected voltage is >110V AC, Meter will beep and the Non-Contact Voltage Indicator will flash.

WARNING! Even if no indication is given, voltage may still be present. Do not rely solely on NCV detection to determine the presence of voltage.

Auto Power-Off

If the Meter is not used for approximately 15 minutes, it automatically turns itself off to conserve battery power. To turn the Meter back on after auto-off, press any button. To disable Auto Power-Off, hold the **FUNC** button while powering the Meter on.

Bar Graph

The bar graph updates 10 times faster than the digital display. This can be used for monitoring changes in measurements at a higher sampling rate. The bar graph indicates polarity (-) and overload (►).

Measurement Operation

Note: Remove plugs from ends of Test Leads (included) before connecting to Meter.

Note: Test Lead probes have removable covers for overvoltage protection. With covers in place, Test Leads are rated for use with CAT IV circuits. Exposed probes are rated for use with CAT II circuits.

AC/DC Voltage Measurement

Measure AC conductors carrying up to 1000 VAC, 40-400 Hz.

Measure DC conductors carrying up to 1000 VDC.

WARNING! Use caution when working near voltages above 30 VAC rms, 42 VAC peak, or 60 VDC. Voltages this high present a risk of electric shock.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn Rotary Switch to the \tilde{V} Hz position.
3. Press **FUNC** button to choose between AC and DC voltage.

4. Carefully touch exposed conductors with tips of probes.
5. Read measured voltage on the Display. For AC voltage, frequency is shown at the top right.
 - Use the **Lo-Z** switch position on Meter when readings are suspect (ghost or stray voltages may be present), or when testing for the presence of voltage. Follow instructions for “**Low Impedance Measurement**” on page 14.
6. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

Frequency/Duty Cycle Measurement

Measure frequency up to 66MHz.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn the Rotary Switch to the **Hz%** position.
3. Connect the Test Leads across the circuit to be measured.

4. Read measured frequency in the center of the Display. Duty cycle is shown at the top right.
5. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

Temperature Measurement

Measure temperature from 32°F to 1832°F (0°C to 1000°C).

1. Connect red end of Thermocouple (included) to the **Input** Jack and the black end to the **COM** Jack.
2. Turn Rotary Switch to the **Temp** position. The Display will show the current ambient temperature.
3. Press **FUNC** to switch between Celsius and Fahrenheit.
4. Touch the tip of the Thermocouple to the object to be tested.
5. Read measured temperature on the Display.

WARNING! To prevent electric shock, remove Thermocouple before switching between testing modes.

Resistance Measurement

Measure circuit resistance up to 66M Ohms.

WARNING! To prevent electric shock, turn off all power and fully discharge capacitors on the circuit under test before measuring.

Note: When measuring Ohms, start with the lowest range if the resistance is unknown.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn the Rotary Switch to the Ω position.
3. Carefully touch exposed conductors with tips of probes.
4. Read measured resistance on the Display.

5. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

Note: Sometimes the resistor value and measured resistance differ. This is due to the Meter's output test current going through all possible paths between leads.

Note: For resistance measurements above 1M Ω , allow a few seconds to get a steady reading.

Note: When leads are disconnected or measurement is out of range, **OL** is displayed.

Continuity Measurement

Test continuity between two points of a circuit.

WARNING! To prevent electric shock, turn off all power and fully discharge capacitors on the circuit under test before measuring.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn the Rotary Switch to the $\Omega \rightarrow$ position.
3. Press **FUNC** until $\bullet \rightarrow$ is displayed.

4. Connect the test leads across the circuit to be measured.
5. Read measured resistance on the Display. If the measured resistance is less than 50Ω , Meter will beep.
6. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

Note: If Test Leads are open or the resistance of the circuit is out of range, **OL** is displayed.

Diode Measurement

Test voltage drop in diodes.

WARNING! To prevent electric shock, turn off all power and fully discharge capacitors on the circuit under test before measuring.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn the Rotary Switch to the $\Omega \rightarrow$ position.
3. Press **FUNC** until \rightarrow is displayed.

4. Connect red probe to diode's anode and black probe to its cathode.
5. Read measured forward-biased voltage drop on the Display.

Note: If the test leads are reversed or open, **OL** is displayed.

6. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

Capacitance Measurements

Measure capacitance up to 66mF.

WARNING! Turn off all power and fully discharge capacitors on the circuit under test before measuring.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn the Rotary Switch to the **1f** position.
3. Carefully touch capacitor leads with tips of probes.
4. Read measured capacitance on the Display.
5. When testing is complete, turn Rotary Switch to **OFF**, remove and store capacitor and Meter.

Current Measurement

Measure AC and DC conductors carrying up to 10 amperes.

Note: Amperage is always tested in series with circuit under test.

Note: When using manual range mode, always start with the highest range if the amperage is unknown.

1. Turn the Rotary Switch to the $\tilde{m}A_{Hz}$, $\tilde{\mu}A_{Hz}$ or \tilde{A}_{Hz} position, depending on the amperage of the conductor under test.
2. Always start with the highest range if the amperage is unknown.
3. Plug black test lead into **COM** Jack. If amperage is < 600mA, plug red test lead into **μAmA** Jack. If amperage is > 600mA, plug red test lead into **10A** Jack.
4. Connect the Test Leads across the circuit to be measured.
5. Read measurement. For AC current, frequency is shown at the top right. Switch to lower ranges, as necessary, to get the most accurate reading.
6. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

Note: If the Display shows **OL** while in manual range mode, the measurement has exceeded the selected range. A higher range should be selected.

Low Impedance Measurement

Eliminate ghost voltages.

1. Plug black Test Lead into black **COM** Jack. Plug red Test Lead into **Input** Jack.
2. Turn Rotary Switch to **Lo-Z** position.
3. Carefully touch exposed conductors with tips of probes.
4. Read measurement.
5. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

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Maintenance and Servicing




Procedures not specifically explained in this manual must be performed only by a qualified technician.

Cleaning, Maintenance, and Lubrication

1. Wipe unit with a dry, lint-free cloth. Do not use solvents or abrasives.
2. Remove battery if not in use for long periods.
3. Store unit in a dry location.
4. Other than the battery and fuses, there are no replaceable parts on this unit. **Repairs should be done by a qualified technician.**

Battery/Fuse Replacement

If the  sign appears on the Display, the battery should be replaced.

1. Remove Test Leads from the Meter.
2. Turn the unit over.
3. Replace battery.
 - a. Remove screw on battery cover.
 - b. Remove battery cover carefully.
 - c. Pull batteries out of unit and replace with the same.
4. Replace fuse.
 - a. Remove screw on battery cover.
 - b. Remove battery cover carefully.
 - c. Remove screw on fuse cover.
 - d. Remove fuse cover carefully.
 - e. Pull fuse(s) out and replace with new fuse(s) of the same type and rating.
5. Replace cover(s) and retighten screw(s).

Note: Do not reverse the polarity of the battery.

Calibration

Have the Meter calibrated by a qualified technician every year.

Limited 90 Day Warranty

Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Record Serial Number Here:

Note: If product has no serial number, record month and year of purchase instead.

