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 Date 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. 25i

CEN-TECH

9 FUNCTION
DIGITAL MULTIMETER WITH AUDIBLE CONTINUITY



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59410

When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-800-444-3353 as soon as possible.

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No portion of this manual or any artwork contained herein may be reproduced in any shape or form without the express written consent of Harbor Freight Tools. Diagrams within this manual may not be drawn proportionally. Due to continuing improvements, actual product may differ slightly from the product described herein. Tools required for assembly and service may not be included.

⚠WARNING

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

SAFETY

SETUP

OPERATION

MAINTENANCE

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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.
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE CAUTION	Addresses practices not related to personal injury.

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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 Meter 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 Meter if:
   a. The test lead is 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.)
   f. The battery cover is open.
   g. Power this Meter using only the battery(ies) referenced in the Specifications Chart.
5. 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.
6. Disconnect the circuit's power before connecting the Meter in series, when measuring current.
7. Connect the common (COM) test lead first and disconnect it last.
8. Hold the probes with fingers behind guards.
9. 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.
10. 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.
11. Do not install old and new batteries together. Do not install alkaline, carbon-zinc or rechargeable batteries together. Position batteries in proper polarity. Do not use swollen or leaking batteries.
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 600 volts. This type of testing should only be done by a qualified electrician.
17. Store idle equipment. When not in use, Meter must be stored in a dry location to decrease exposure to moisture. Lock up Meter and keep out of reach of children.
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. 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.
22. Avoid damaging Meter. Use only as specified in this manual.
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 Meter is in the Ohms testing setting. Damage can occur to the Meter.
26. Do not switch between testing modes with the Meter connected to a circuit.
27. Prior to testing capacitors, resistance, diodes, or continuity; disconnect all power to the circuit and discharge all high-voltage capacitors.
28. Have the Meter calibrated by a qualified technician every year. A Meter that is not calibrated yearly may not yield accurate results.



SAVE THESE INSTRUCTIONS.

Specifications

Function	Range	Resolution	Accuracy
AC Voltage	600V	0.1V	±(1.2% + 3 digits)
DC Voltage	600mV	0.1mV	±(0.7% + 3 digits)
	6000mV	1mV	±(0.5% + 2 digits)
	60V	0.01V	±(0.7% + 3 digits)
	600V	0.1V	±(0.7% + 3 digits)
DC Current	600uA, 60mA, 600mA	0.1µA, 0.01mA, 0.1mA	±(1.0% + 3 digits)
	10A	0.01A	±(1.2% + 5 digits)
Resistance	600Ω	0.1Ω	±(1.0% + 2 digits)
	6000Ω, 60KΩ, 600KΩ	1Ω, 0.01kΩ, 0.1kΩ	±(0.8% + 2 digits)
	60MΩ	0.01MΩ	±(2.0% + 5 digits)
Capacitance	9.999nF	0.001nF	±(4.0% + 10 digits)
	99.99nF, 999.9nF	0.01nF, 0.1nF	±(4.0% + 5 digits)
	9.999µF, 99.99µF, 999.9µF	0.001µF, 0.01µF, 0.1µF	±(4.0% + 5 digits)
	9.999mF	0.001mF	± 10%

Sampling Rate	~3 times/second
Storage Temperature	Range: 14°F to 122°F
Operating Temperature	Range: 32° - 104°F
Relative Humidity	< 75% at 32°-86°F < 50% at 86°-104°F
Operating Altitude	7000ft. (2000meters) maximum
Fuse Types	FF 10A 600V FF 0.6A 600V
Battery	2x AAA batteries (included)

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



Display



Symbol	Description
APO	Auto Power Off
⚡	Dangerous Voltage Levels
⊡	Data Hold Mode
DC	Direct Current
▬	Minus Sign
AC	Alternating Current
NCV	Non Contact Voltage
⊣◀	Diode Test
•))	Audible Continuity
Good Low Bad	Battery Measurement
▙	Low Battery
6000 Count LCD Display	0 to 5999 measurement Reading
mV, V	Millivolts, Volts (Voltage)
µA, mA, A	MicroAmperes, MilliAmperes, Amperes (Current)
nF, uF, mF, F	Nanofarads, Microfarads, Millifarads, Farads (Capacitance) ⫫
Ω, kΩ, MΩ	Ohms, Kiloohms, Megaohms (Resistance)
Δ	Relative

Record Date Code Here:

Note: If product has no Date Code, record month and year of purchase instead.

Refer to UPC 193175573469

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

Data Hold/Select Button

1. To freeze meter reading, press the **Hold/Select** button. The **HOLD** display icon appears on the LCD.
2. Press the **Hold/Select** Button again to return to normal operation.

Relative Button

In Capacitance Mode, press the **REL** Button to zero out the Multimeter prior to touching Probes to Capacitor.

Backlight Button

Press the **BACKLIGHT** button to turn on the Backlight, press the button again to turn Backlight off.

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

Auto Power Off

If Meter is not used for approximately 15 minutes, it will automatically turn itself off to conserve battery power. To turn Meter back on after auto off, press any button or turn the Rotary Dial. To disable Auto Power Off, hold the Hold/Select Button when turning the Multimeter on, the APO screen display will disappear.

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 III circuits. Exposed probes are rated for use with CAT II circuits.

Note: Insert Test Lead into Test Lead Clip to allow for easier two hand operation.

Buzzer Notification:

1. Input voltage >600V (AC/DC), buzzer will continuously beep indicating measurement range is at limit.
2. Input current >10A (AC/DC), buzzer will continuously beep indicating measurement range is at limit.
3. The buzzer will sound five times continuously 1 minute before Auto Power Off.

AC Voltage Measurement

Measure AC conductors carrying up to 600 VAC, 40Hz-400Hz.

WARNING! TO PREVENT SERIOUS INJURY: 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 Dial to the V~ position.
3. Carefully touch exposed conductors with tips of probes.
4. Read measured voltage on the Display.
5. When testing is complete, turn Rotary Dial to **OFF**, remove Test Leads and store with Meter.

Note: If voltage is too high, Display will read **OL.**

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DC Voltage Measurement

Measure DC conductors carrying up to 600 VDC.

WARNING! TO PREVENT SERIOUS INJURY: 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.

Note: If Voltage is unknown, move dial to the maximum range (600) and adjust downward according to the readings.

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
2. Turn Rotary Dial to V⎓ position.
3. Carefully touch exposed conductors with tips of probes.
4. Read measured voltage on the Display.
5. When testing is complete, turn Rotary Dial to **OFF**, remove Test Leads and store with Meter.

Note: If voltage is too high, Display will read **OL.**

Resistance Measurement

WARNING! TO PREVENT SERIOUS INJURY: 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 Rotary Dial to **Ω** position.
3. Carefully touch exposed conductors with tips of probes.
4. Read measured resistance on the Display. If reading on display shows **OL**, move dial to next higher range, until a value is displayed.
5. When testing is complete, turn Rotary Dial to **OFF**, remove Test Leads and store with Meter.

Note: When measuring a resistor that is connected in a circuit or PCB, the measured value may not be accurate. This is due to the Meter's output test current going through all possible paths between leads.

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.

Continuity Measurement

Test continuity between two points of a circuit.

WARNING! TO PREVENT SERIOUS INJURY: 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 Rotary Dial to position.
3. Connect test leads across circuit to be measured.
4. Read measured resistance on the Display. If measured resistance is less than 30Ω Meter will beep; if the circuit is open, the display will indicate "**OL**".
5. When testing is complete, turn Rotary Dial to **OFF**, remove Test Leads and store with Meter.

Diode Measurement

Test voltage drop in diodes.

WARNING! TO PREVENT SERIOUS INJURY: 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 Rotary Dial to position. Press HOLD/SELECT button so is displayed on screen.
3. Connect red probe to diode's anode (+) and black probe to its cathode (-).
4. Read measured forward-biased voltage drop on the Display.

Note: If the leads are reversed, or the diode has a voltage drop greater than the meter's limit of 2.1 volts, **OL** is displayed.

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

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Capacitance Measurement

Measure capacitors to indicate the amount of energy they can store.

1. Press the **REL** Button to zero out the Multimeter prior to touching Probes to Capacitor.

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

2. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
3. Turn Rotary Dial to 10mF position.
4. Read measured capacitance value on Display.

Note: 10mF capacitors can take up to 10 seconds for the reading to appear on the display. The smaller the capacitor, the faster the reading will display.

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

DC Current Measurement

Measure DC conductors carrying up to 10 amperes.

WARNING! TO PREVENT SERIOUS INJURY: To avoid electric shock, use only one hand to hold Meter when measuring current.

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

1. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack if current is under 600mA, or **10A** Jack if current is over 600mA.

Note: If unsure of the current, start with the **10A** Jack.

2. Turn Rotary Dial to 600m A position. Start with highest range if amperage is unknown.
3. Read measured current on the Display. Turn Rotary Dial to lower ranges, as necessary, to get the most accurate reading.
4. When testing is complete, turn Rotary Dial to **OFF,** remove Test Leads and store with Meter.

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Battery Measurement

Note: Only measure 1.5V or 9V batteries. Measuring batteries over 9V can damage the meter.

1. Turn the Rotary Dial to 1.5V / 9V position.
2. Plug black test lead into **COM** Jack. Plug red test lead into **Input** Jack.
3. Connect red probe to battery's anode (+) and black probe to its cathode (-).

Reading is displayed:

Good = Normal status

- Low = Low power
- Bad = Need replacement

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

NCV (Non-Contact Voltage)

1. Turn Rotary Dial to **NCV** position.
2. Move Multimeter close to the unshielded conductor.
3. Intensity of electric field will be indicated by dashes --- on the LCD screen.

Note: More dashes on the display and higher buzzer frequencies indicate a higher electric field.

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

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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 batteries if not in use for long periods.
3. Store unit in a dry location.
4. Other than the batteries, there are no replaceable parts on this unit. **Repairs should be done by a qualified technician.**

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Battery Replacement

If the ▭ symbol appears on the LCD display, the battery should be replaced.

1. Remove Test Leads from the Meter.
2. Turn the Meter over.
3. Remove the protective case.
4. Remove screw on battery cover.
5. Remove battery cover carefully.
6. Pull batteries out of unit and replace with the same.
7. Replace cover and screw.

Fuse Replacement

1. Remove Test Leads from the Meter.
2. Turn the Meter over.
3. Remove the protective case.
4. Remove the two screws from bottom of back cover.
5. Remove back cover carefully.
6. Carefully remove fuses one at a time. Gently pry one end loose and remove from its bracket. Make note of the rating.
7. Replace with new fuses of the same type and rating.
8. Reattach back cover and two screws.
9. Replace the protective case.

Calibration

Have the Meter calibrated by a qualified technician every year to maintain accuracy.

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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.

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