

# 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.

17th

# AMES<sup>TM</sup>

I N S T R U M E N T S

64020

## 400A AC DIGITAL CLAMP METER



Visit our website at: <http://www.harborfreight.com>  
Email our technical support at: [productsupport@harborfreight.com](mailto: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.** Only use one hand when securing the clamp around cable.
3. Inspect the Meter before use. In addition to a general inspection:
  - a. Check the insulation protecting the connectors.
  - b. Check the Test Leads for exposed metal, damaged insulation, and continuity.
  - c. Replace damaged test lead immediately, before use.
4. Do not use the Meter 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 600 volts.
17. Do not test current on circuits higher than 400A.
18. Use as intended only.

19. Prior to testing resistance, diodes, or continuity; disconnect all power to the circuit and discharge all high-voltage capacitors.
20. Dress properly. Protective, electrically nonconductive clothes and nonskid footwear are recommended when working.
21. Wear ANSI-approved safety goggles during use.

22. Only use accessories intended for use with this Meter.
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. Do not use the Meter at a setting marked as blank on the scale.
28. Prior to testing capacitors, resistance, diodes, or continuity; disconnect all power to the circuit and discharge all high-voltage capacitors.
29. Have the Meter calibrated by a qualified technician every year.
30. Do not disassemble Meter; take it to a qualified technician when service or repair is required.
31. 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: 400mV / 4V / 40V / 400V / 600V
DC Voltage Accuracy	(@ 400mV) $\pm 1.0\%$ of rdg + 8D (@ 4V) $\pm 0.8\%$ of rdg + 1D (@ 40V, 400V) $\pm 0.8\%$ of rdg + 3D (@ 600V) $\pm 1.0\%$ of rdg + 3D
AC Voltage	Ranges: 4V / 40V / 400V / 600V Frequency Range: 40Hz - 400Hz
AC Voltage Accuracy	(@ 4V, 40V, 400V) $\pm 1.2\%$ of rdg + 5D (@ 600V) $\pm 1.5\%$ of rdg + 5D
AC Current	Ranges: 4A / 40A / 400A Frequency Range: 50Hz - 60Hz
AC Current Accuracy	(@ 4A) $\pm 2.5\%$ of rdg + 30D (@ 40A) $\pm 2.5\%$ of rdg + 5D (@ 400A) $\pm 1.8\%$ of rdg + 9D
Resistance	Ranges: 400 $\Omega$ / 4k $\Omega$ / 40k $\Omega$ / 400k $\Omega$ / 4M $\Omega$ / 40M $\Omega$
Resistance Accuracy	(@ 400 $\Omega$ ) $\pm 1.2\%$ of rdg + 2D (@ 4k $\Omega$ , 40k $\Omega$ , 400k $\Omega$ ) $\pm 1.0\%$ of rdg + 2D (@ 4M $\Omega$ ) $\pm 1.2\%$ of rdg + 3D (@ 40M $\Omega$ ) $\pm 2.0\%$ of rdg + 5D
Diode	Forward DC Current: $\sim 1\text{mA}$ Reverse DC Voltage: 1.5V
Continuity	Meter beeps at $< 30\Omega$
Capacitance	Ranges: 50nF / 500nF / 5 $\mu\text{F}$ / 50 $\mu\text{F}$ / 100 $\mu\text{F}$
Capacitance Accuracy	(@ 50nF) $\pm 4.0\%$ of rdg + 25D (@ 500nF, 5 $\mu\text{F}$ , 50 $\mu\text{F}$ , 100 $\mu\text{F}$ ) $\pm 4.0\%$ of rdg + 5D
Frequency	Range: 10Hz - 1MHz
Frequency Accuracy	$\pm 0.1\%$ of rdg + 4D
Sampling Rate	$\sim 3$ times/second
Operating Temperature	Range: 32° - 86°F
Operating Humidity	32° - 86°F $\leq 80\%$ RH 87° - 104°F $\leq 75\%$ RH 105° - 122°F $\leq 45\%$ RH
Jaw Opening	30mm
Display	LCD
Battery	3 AAA (included)

SAFETY

SETUP

OPERATION

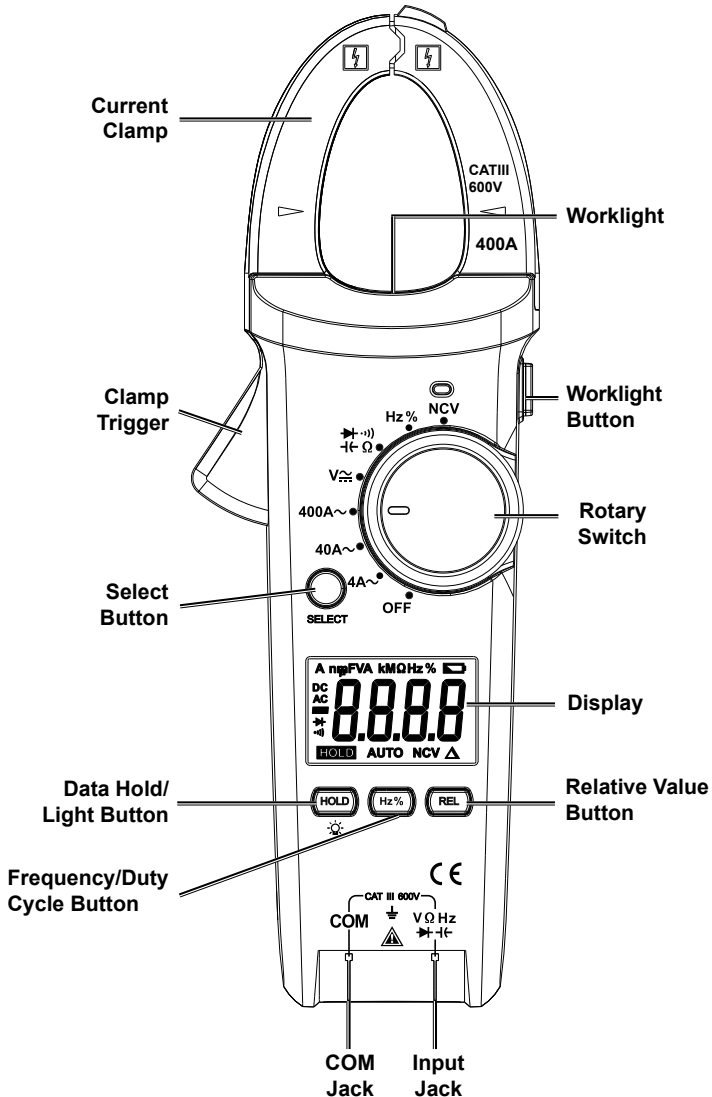
MAINTENANCE

# Setup - Before Use:

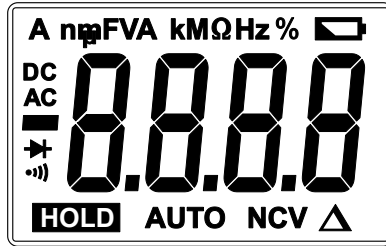


Read the **ENTIRE IMPORTANT SAFETY INFORMATION** section at the beginning of this manual including all text under subheadings therein before set up or use of this product.

## Functions



# Display



Symbol	Description
$\mu\text{A}$ , mA, A	Amps (Current)
nF, uF, mF	Farads (Capacitance) $\text{--}\text{  }\text{--}$
V, mV	Volts (Voltage)
$\Omega$ , k $\Omega$ , M $\Omega$	ohms (Resistance)
Hz, kHz	Hertz (Frequency)
%	Duty Cycle
	Low Battery
DC	Direct Current
AC	Alternating Current
	Diode
	Continuity
<b>HOLD</b>	Data Hold
AUTO	Auto-Range
NCV	Non-Contact Voltage Sensor
	Relative Value

# 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 Operation

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### Data Hold Button

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- Keep current reading on display.
1. Press **HOLD** button to keep current reading. **HOLD** will appear on Display.
  2. Press **HOLD** button to release hold.

### Hz% Button

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Switch between frequency and duty cycle measurements. **See page 12.**

### REL Button

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Show difference between two readings in AC Current and AC/DC Voltage. **See page 9.**

Zero out Test Lead resistance to obtain accurate low resistance reading. **See page 11.**

Zero out initial capacitance reading. **See page 11.**

### Backlight

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1. Press and hold **HOLD** button until Backlight turns on.  
**Note:** **HOLD** will appear on Display.
2. Press **HOLD** button again to release hold.
3. When finished, press and hold **HOLD** button until Backlight turns off.
4. Press **HOLD** button again to release hold.  
**Note:** Frequent use of backlight will shorten battery life.

### Worklight

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1. Press Worklight button to turn on Worklight.
2. Press Worklight button again to turn off Worklight.

### Auto Power Off

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Meter will automatically turn off after 30 minutes of non-use. To conserve battery power, turn Meter off after use.



# 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 Current Measurement

Measure AC conductors carrying up to 400 amperes.

**WARNING!** To prevent electric shock, test conductor voltages with care. Only use one hand when securing clamp around conductor.

**WARNING!** Remove Test Leads before taking measurements with Current Clamp.

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

**Note:** To measure 2- and 3-wire power cords, use an AC Line Splitter (not included) and follow its instructions.

1. Turn Rotary Switch to **4A~**, **40A~** or **400A~** position. Start with highest range if amperage is unknown.
2. Using one hand, press Trigger to open Clamp Jaws. Position Clamp Jaws around conductor to be tested.

3. Center conductor between arrows in Clamp Jaws, as shown.



4. Read measurement. Switch to lower ranges, as necessary, to get most accurate reading.
5. To compare difference between two readings, press **REL** button to store current reading. Take second measurement, reading will be difference between first and second reading.
6. When testing is complete, turn Rotary Switch to **OFF**, and store Meter.



## AC/DC Voltage Measurement

Measure AC conductors carrying up to 600 VAC, 50-60 Hz.

Measure DC conductors carrying up to 600 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 black **COM** Jack.  
Plug red Test Lead into red Input Jack.
2. Turn Rotary Switch to **V $\approx$**  position.
3. Press **SELECT** button to choose between **AC** and **DC**.

4. Carefully touch exposed conductors with tips of probes.
5. Read measurement.
6. To compare difference between two readings, press **REL** button to store current reading. Take second measurement, reading will be difference between first and second reading.

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

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

## Diode Measurement

Test voltage drop in diodes. Open circuit voltage is 1.5V.

**WARNING!** To prevent electric shock, disconnect all power to circuit and discharge all high-voltage capacitors before measuring.

1. Plug black Test Lead into black **COM** Jack.  
Plug red Test Lead into red Input Jack.
2. Turn Rotary Switch to **V $\rightarrow$  $\Omega$**  position.

3. Press **SELECT** Button until **V $\rightarrow$**  is displayed.
4. Connect red probe to diode's anode and black probe to its cathode.
5. Approximate forward voltage drop of diode will be displayed in mV.

**Note:** If circuit is open or diode polarity is reversed, display will read **OL**.

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



## Continuity Measurement

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Test continuity between two points of a circuit.

**WARNING!** To prevent electric shock, disconnect all power to circuit and discharge all high-voltage capacitors before measuring.

1. Plug black Test Lead into black **COM** Jack.  
Plug red Test Lead into red Input Jack.
2. Turn Rotary Switch to  $\rightarrow \Omega$  position.

3. Press **SELECT** button until  $\bullet \Omega$  is displayed.
4. Short Test Leads together, meter should beep continuously.
5. Connect Test Leads to two points of circuit. If resistance value is less than  $30\Omega$ , Meter will beep continuously.
6. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.

## Capacitance Measurement

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Measure capacitance up to  $100\mu\text{F}$ .

**WARNING!** To prevent electric shock, disconnect all power to circuit and discharge all high-voltage capacitors before measuring.

**Note:** It may take up to 30 seconds for reading to stabilize.

1. Plug black Test Lead into black **COM** Jack.  
Plug red Test Lead into red Input Jack.
2. Turn Rotary Switch to  $\rightarrow \text{nF}$  position.

3. Press **SELECT** button until **n F** appears.
4. Press **REL** button to zero out reading as necessary.
5. Carefully touch capacitor leads with tips of probes.
6. Read measurement.

**Note:** If capacitor is short circuited or capacitance is too high, display will read **OL**.

7. When testing is complete, turn Rotary Switch to **OFF**, remove and store capacitor and Meter.



## Resistance Measurement

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Measure circuit resistance up to 40M $\Omega$ .

**WARNING!** To prevent electric shock, disconnect all power to circuit and discharge all high-voltage capacitors before measuring.

**Note:** When measuring ohms, start with lowest range if resistance is unknown.

**Note:** When measuring above 1M $\Omega$ , it may take a few seconds for reading to stabilize.

1. Plug black Test Lead into black **COM** Jack.  
Plug red Test Lead into red Input Jack.
2. Turn Rotary Switch to  $\frac{\Omega}{\text{M}}$  position.

3. Press **SELECT** button until **M $\Omega$**  is displayed.

**Note:** For low resistance measurements, short Test Leads together. If there is resistance present, press **REL** button to zero out resistance for most accurate reading.

4. Carefully touch exposed conductors with tips of probes.
5. Read measurement.

**Note:** If resistance value is too high, display will read **OL**.

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

## Frequency/Duty Cycle Measurement

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Measure frequency up to 1MHz.

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

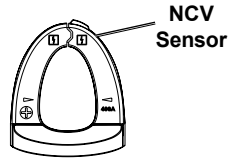
4. Read measurement.
5. Press **Hz%** button to switch to Duty Cycle.
6. Read measurement.
7. When testing is complete, turn Rotary Switch to **OFF**, remove Test Leads and store with Meter.



## NCV - Non-Contact AC Voltage Sensing

Detect AC voltage above 90V AC  
from distance of  $\leq 10\text{mm}$ .

1. Turn Rotary Switch to **NCV** position.
2. Place NCV Sensor within 10mm of unshielded conductor.
3. NCV light will come on and Meter will beep to indicate presence of voltage.



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

SAFETY

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OPERATION

MAINTENANCE

**AMES**  
I N S T R U M E N T S

# Maintenance and Servicing



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


## Cleaning, Maintenance, and Lubrication

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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 battery(ies), there are no replaceable parts on this Meter. **Repairs should be done by a qualified technician.**

## Battery Replacement

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When  symbol appears on display, replace battery(ies).

1. Remove Test Leads from Meter.
2. Turn Meter over.
3. Remove screw and battery cover.
4. Remove battery(ies) and replace with same.
5. Replace cover and screw.

# Calibration

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Have Meter calibrated by a qualified technician every year.

**Record Serial Number Here:** \_\_\_\_\_

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

SAFETY

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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.

