

**1 YEAR**  
WARRANTY



# **Ω OMEGA®** **User's Guide**

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## **HHM380** **Auto Ranging 80 Amp AC/DC** **Clamp Meter With NCV Detector**



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## INTRODUCTION

Thank you for purchasing the HHM380 80 Amp AC/DC Clamp Meter with NCV Detector. Please read this user's manual carefully and thoroughly before using the instrument.

The HHM380 is a 4000 count (3-3/4 digit) clamp meter with three attributes that make it particularly suitable for automotive and factory MRO applications. The first two are 0.1 mV and 1 mA resolutions on its narrowest AC/DC voltage and current measurement ranges. These premium specs enable troubleshooters to quickly isolate short and open circuits within wiring bundles and check the performance of process control system elements—such as 4-20mA current loops and 0-10V instrumentation outputs, panel instruments, motors, motor drives, relays and solenoids—without having to cut any wiring. The third attribute is a feature: a clamp jaw sized to tightly enclose a standard battery cable.

The HHM380, which meets the ETL CAT III 600V safety standard, also sports many features and specifications typically found only on more-expensive clamp meters. They include a Non-Contact Voltage (NCV) detector,  $\pm 1\%$  or better measurement accuracy on all AC and DC voltage ranges, and the ability to measure surface temperature using any “K” type thermocouple.

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## KEY FEATURES

- 11 functions, 38 ranges
- Measures AC/DC current, AC/DC voltage, resistance, capacitance, frequency (through the clamp or test leads) and duty cycle
- Also measures temperature from  $-4^{\circ}$  to  $1832^{\circ}\text{F}$  ( $-20^{\circ}$  to  $1000^{\circ}\text{C}$ ) using included “K” type thermocouple
- Uses beeper to verify integrity of diodes and check circuits for continuity
- 0.1 mV and 1 mA resolutions on narrowest AC/DC voltage and current ranges: 0 to 400mV and 0 to 4A
- Meets ETL CAT III 600V safety standard
- 110VAC Non-Contact Voltage (NCV) detector with audible and visual alerts
- Backlit 4000-count LCD with 0.5 in. (13mm) high digits
- Auto (default) or manual ranging, DC current and capacitance
- Relative measurements for DC voltage
- Data **HOLD** button
- Bright LED work light
- 15-minute Auto Power Off (APO) function (can be disabled)
- 3-year limited warranty

## WHAT'S IN THE BLISTER PACK


The meter is supplied in a blister pack with a cavity in the rear for a soft black nylon carrying pouch. Inside the pouch are a set of double-insulated test leads with screw-on alligator clips, a “K” type thermocouple probe and plug adaptor, 3 “AAA” batteries and this user’s manual.

## PRODUCT OVERVIEW

Fig. 1 shows the labels and positions of the controls, indicators and physical structures of the HHM380 Fig. 2 shows all possible indications on the LCD. Familiarize yourself with the functions and meanings of these controls, indicators and connectors before moving on to the Setup Instructions and Operating Instructions.


### Fig. 1. The controls, indicators and physical structures of the HHM380


1. Clamp jaw
2. NCV indicator (flashing red LED)
3. Function buttons:

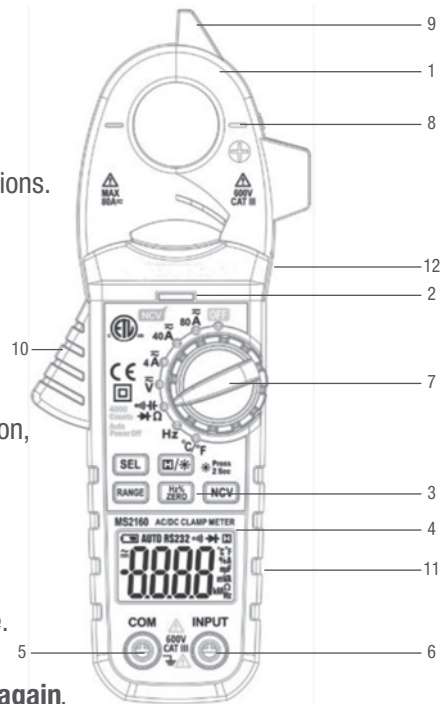
**SEL:** With rotary function switch in any voltage or current position, toggles between AC and DC measurement. With switch in  position, briefly pressing **SEL** button selects (in the following order):

- 1) resistance measurement (default),
- 2) capacitance measurement,
- 3) continuity check mode or 4) diode integrity check mode.

Also used to disable Auto Power Off (APO) function.

: **Pressed briefly**, “freezes” the readout. **Pressed briefly again**, releases the hold. Pressed and held for >2 seconds, turns backlight and work light on simultaneously for 15 seconds.

**RANGE:** Pressed and held with rotary function switch in **V** or  position, exits default Auto Ranging mode and enters Manual ranging mode in narrowest full-scale range for currently selected parameter (voltage, resistance or capacitance). Each subsequent brief button press switches to next-widest range. Pressing and holding **RANGE** button in Manual Ranging mode resumes operation in Auto Ranging mode.



Hz%  
ZERO :

- A. **Pressed briefly** with meter measuring DC voltage, DC current or capacitance, enters Relative Measurement mode and exits Auto Ranging mode. Pressed briefly again, exits Relative Measurement mode and re-enters Auto Ranging mode.
- B. **Pressed briefly** with meter measuring AC current or AC voltage, switches to Frequency Measurement mode. Pressed briefly in Frequency Measurement mode, switches to Duty Cycle Measurement mode. Pressed briefly again, returns meter to AC current or voltage measurement.
- C. **Pressed briefly** with rotary function switch in **Hz** position, toggles between frequency and duty cycle measurement.

**NCV: Pressed and held**, activates Non-contact Voltage (NCV) detector.

- 4. LCD
- 5. **COM** jack
- 6. **INPUT** jack
- 7. Rotary function switch
- 8. Clamp jaw centering mark
- 9. NCV sensor/wiring bundle spreader
- 10. Clamp jaw release
- 11. Battery compartment (on back)
- 12. White LED work light (on back)




Fig. 2. All possible display indications

## SAFETY INSTRUCTIONS













**To avoid possible electric shock or personal injury, and to avoid damaging the meter or the equipment under test:**

- Before using the meter, inspect the case. Do not use the meter if it is damaged. Look for cracks or missing plastic. Pay particular attention to the insulation around the connectors.
- **⚠WARNING** Inspect the test leads for damaged insulation or exposed metal. Check the test leads for continuity. Replace damaged test leads before using the meter.
- Verify the meter's operation by measuring a known voltage. Do not use the meter if it operates abnormally. Protection may be impaired. When in doubt, have the meter serviced.
- **⚠WARNING** Do not apply more than the rated voltage, as marked on the meter, between the terminals or between any terminal and ground.

- **⚠WARNING** Do not measure voltage with the rotary function switch pointing to the resistance (ohms), current, capacitance or temperature positions. Never measure current with the switch pointing to the resistance (ohms), capacitance or temperature positions.
- Use caution when working with voltages above 42VAC<sub>RMS</sub>, or 60VDC. These voltages pose a shock hazard.
- Use the proper terminals, function, and range for all measurements.
- **⚠WARNING** Do not operate the meter around explosive gas, vapor, or dust.
- **⚠WARNING** When using the probes, keep your fingers behind the finger guards. Do not touch the metal probes of the test leads when making a measurement.
- When making connections, connect the black (–) test lead before connecting the red (+) test lead; when disconnecting, disconnect the red (+) test lead before disconnecting the black (–) test lead.
- Disconnect circuit power and discharge all high-voltage capacitors before measuring/testing resistance, continuity, diodes, or capacitance.
- For all DC functions in both auto and manual ranging mode, to avoid the risk of shock due to possible improper reading verify the presence of any AC voltages by first using the AC function. Then select a DC voltage range equal to or greater than the AC range
- Before measuring current, turn off power to the circuit before connecting the meter.
- Use only three “AAA” batteries, properly installed in the battery compartment, to power the meter. Do not use rechargeable batteries.
- Replace the batteries as soon as the low battery indicator  appears. Operated with weak batteries, the meter might produce false readings that could lead to electric shock and personal injury.
- Remove the test leads from the meter before opening the meter case or battery compartment.

## ***Electrical Symbols Used On the Meter and In This Manual***

Symbol	Description	Symbol	Description
	AC (Alternating Current)		Fuse
	DC (Direct Current)		Double Insulated
	Caution, risk of electric shock. Hazardous voltage.		Risk of danger. Important information. Refer to the manual.
	Battery (Low battery) when shown on display		Earth ground
	Diode		Continuity Beeper



AC or DC



AC/DC

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Application and removal from hazardous live conductors permitted

**CAT III**

For measurements made on building equipment such as distribution panel, feeders and short branch circuits, and on lighting systems in large buildings.

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## SETUP INSTRUCTIONS

### **INSTALL BATTERIES**

The battery compartment of the HHM380 is located at the back of the meter.

To open the compartment, use a small Phillips-head screwdriver to remove the single screw securing the battery compartment cover. Be careful not to lose the small screw. Put the screw and the cover to the side.

Install the three supplied “AAA” batteries in the battery compartment. Use the polarity marks stencil inside the compartment as a guide.

Replace the battery compartment cover and secure it with the Phillips-head screw.

---

## OPERATING INSTRUCTIONS

### **GENERAL INSTRUCTIONS**

The HHM380 provides several functions that can be applied to measurements and displays of multiple parameters.

**Ranging Options.** By default, the meter automatically chooses the measurement range that maximizes the resolution of its voltage, resistance and capacitance measurements. The term **AUTO**—in reverse type on the top line of the LCD—indicates operation in Auto Ranging mode.

To switch to Manual Ranging mode for voltage, resistance and capacitance measurement, press the **RANGE** button once. This will make **AUTO** disappear and cause the meter to enter the narrowest full-scale range available for that parameter (see the Specifications section on pages 13 through 15 for a list of the ranges available for all parameters).

Once the meter is in manual ranging mode, each subsequent press of the **RANGE** button widens the full-scale range by an order of magnitude (a factor of 10). For example, pressing the **RANGE** button with the meter operating in the 0 to 400 $\mu$ F full-scale manual range widens the full-scale range to 0 to 40 $\mu$ F (improving measurement resolution in the process). The next press of the button further widens the range to 0 to 4 $\mu$ F. When the widest full-scale range has been reached, the next press of the **RANGE** button switches back to the narrowest range. Pressing and holding the **RANGE** button with the meter operating in Manual Ranging mode resumes operation in Auto Ranging mode.



**Holding readings.** Pressing the **□/✱** button “freezes” the value on the display and causes a reverse-type “H” (**□**) to appear on the LCD. Pressing the **□/✱** button again releases the hold and removes the **□**.

**Making Relative Measurements.** Pressing the **Hz%  
ZERO** button during measurement of a current, voltage resistance or capacitance freezes the value measured and displayed at that moment on the LCD. The term **ΔZERO** appears at the upper right of the LCD to indicate operation in this special mode. In **REL** mode, the readout indicates the difference (Delta) between ongoing measurements and the frozen value. REL mode is useful for tracking changes in dynamic processes or deviations from baseline readings.

When the **Hz%  
ZERO** button is pressed, the meter automatically exits Auto Ranging mode and enters Manual Ranging mode using the full-scale range in effect at that moment.

To exit **REL** mode and resume operation in “normal” display mode, press the **Hz%  
ZERO** button again. This will cause **ΔZERO** to disappear and resume measurement of the selected parameter in Auto Ranging mode.

**Disabling Auto Power Off (APO).** By default, the meter automatically powers itself off if no front-panel button is pressed within any span of 15 minutes. As a convenience, the meter will sound five beeps one minute before the APO function is set to activate. When the meter powers off, it will sound one long beep.

Once the APO function has powered the meter off, you cannot “wake up” the meter simply by turning the rotary function switch to a different position. You must either rotate the switch to the **OFF** position and then to another position, or press a button—any button.

**To disable the APO function,** you must power on the meter in a special way—by pressing and holding the **SEL** button while turning the rotary function switch to a position other than **OFF**. Doing so will cause the term **off** to appear on the LCD until you release the **SEL** button.

Once the meter powers on, there is no indication that the APO function is disabled. So if you forget that you have disabled APO and leave the meter unattended, it will remain powered on until its batteries discharge (typically, several days later).

### **Turning On the Backlight and Work Light**

Pressing and holding the **Hz%  
ZERO** button for at least 2 seconds turns on the LCD’s backlight and white LED work light for 15 seconds, making troubleshooting easier and measurements easier to read in dark spaces.

You can extinguish the backlight and work light before the end of the 15-second period by pressing and holding the **Hz%  
ZERO** button again.

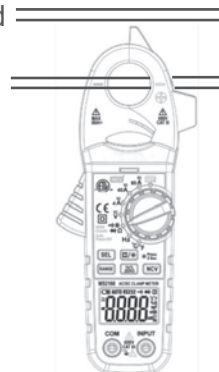
## MEASURING AC OR DC CURRENT



Warning

Before making current measurements, make certain that all test leads are disconnected from the meter terminals.

- (1) Set the rotary function switch to the **80A**, **40A** or **4A** position, depending on the magnitude of current you expect to encounter. Because DC current measurement is the meter's default, the **DC** icon will appear on the left side of the LCD. To switch to AC current measurement, press the **SEL** button to change the icon to **AC**. Before measuring DC current, press the **Hz%**/**ZERO** button to reset the DC current measurement baseline to **0A**.
- (2) Squeezing the clamp jaw release to open the jaw, place it around the conductor whose current you wish to measure. Be sure to enclose only one conductor (see figure at right). Enclosing both conductors of a pair will produce a reading of 0.
- (3) Read the measured value from the display.



Notes:

- A. The HHM301 Flex Clamp Adapter makes it possible to enclose a thick or hard-to-reach conductor, a bundle of conductors, or a busbar carrying up to 3000A. The accessory uses induction to convert current readings to millivolt values that can be displayed by the HHM380. For more information or to order, visit [www.omega.com](http://www.omega.com) and enter "HHM301" in the SEARCH box.

## MEASURING AC OR DC VOLTAGE



Warning

Do not measure voltage higher than 600V<sub>RMS</sub>.

- (1) Set the rotary function switch to the **V** position. By default, when the switch is set to this position the meter will measure DC voltage, and the **DC** icon will appear on the left side of the LCD. To switch to AC current measurement, press the **SEL** button to change the icon to **AC**.
- (2) Plug the red and black test leads into the red **INPUT** and black **COM** jacks.
- (3) Touch the black test lead to the lower-potential point of the circuit under test, and the red test lead to the higher-potential point.
- (4) Read the measured voltage on the display. If the test leads are reversed, a minus sign will appear at the left of the displayed value.

## Using the Non-contact Voltage Detector

The NCV function provides a safe (non-contact) way to check whether a line, cable or AC outlet is “hot” (energized). At the tip of the clamp jaw (Fig. 1, Callout 9) is an NCV sensor that can detect from a short distance the electromagnetic field created by AC voltage. If voltage is detected, the meter produces audible and visual alarms (a beeping sound, and a flashing red light).


NCV detectors cannot detect DC voltages, such as those present in automotive electrical systems. In addition, the HHM380 typically cannot detect 120VAC from a distance of more than 1 in. (25mm), and never through a wall, metal conduit or cable shield.

To prepare to use the NCV detector, power on the HHM380 by setting the rotary function switch to any position other than **OFF**. Then press and hold the yellow **NCV** button directly below the switch while moving the top of the clamp jaw very close to the outlet, wire or conductor you suspect is energized. If the circuit is “live”, the beeper will sound repeatedly and the red LED just below the OMEGA logo (Fig. 1, Callout 2) will flash in synchronism.

## MEASURING RESISTANCE



To avoid electrical shock or damage to the meter when measuring resistance or continuity in a circuit, make sure the power to the circuit is turned off and all capacitors are discharged.

- (1) Turn the rotary function switch to the  position. By default, when the switch is initially set to this position with the test leads not plugged in the meter will automatically enter Autoranging mode and display **O.L** (indicating an open circuit) on the LCD.
- (2) Plug the red and black test leads into the red **INPUT** and black **COM** jacks.
- (3) Measure the resistance by touching the tips of the leads to the desired test points of the circuit or to the terminals of a component, as shown at right.
- (4) Read the measured resistance on the display. If the measured resistance value is greater than  $40M\Omega$ , **O.L** will appear on the primary readout.





## CHECKING FOR CONTINUITY





Warning

Turn off power to the circuit and discharge all capacitors before making continuity measurements.

- (1) Turn the rotary function switch to the  position. Press the **SEL** button twice to select the continuity check function. If test leads are not plugged into the meter's front-panel jacks, the display will show **OL**, with the icon of a continuity beeper () above it.
- (2) Plug the red and black test leads into the red **INPUT** and black **COM** jacks.
- (3) Touch the test leads to any two points of a circuit. The resistance between those two points will be shown on the LCD. If the resistance is  $<50\Omega$ , the beeper will sound continuously. If there is no continuity (an open circuit or a resistance greater than  $600\Omega$  between the two points), **OL** will appear on the LCD.

## CHECKING THE INTEGRITY OF A DIODE

- (1) Turn the function switch to the  position. Press the **SEL** button three times to select the diode check function. If test leads are not plugged into the meter's front-panel jacks, the primary readout will show **OL**, with the icon of a diode () above it.
- (2) Plug the red and black test leads into the red **INPUT** and black **COM** jacks.
- (3) Connect the red test lead to the anode (positive terminal) of the diode to be tested, and the black test lead to its cathode (negative terminal).
- (4) Read the forward bias voltage value on the display. A silicon diode typically has a forward bias voltage of 0.7V. A germanium diode typically has a forward bias voltage of 0.3V. A 0V reading in both directions indicates a shorted diode. An **OL** reading indicates an open diode or reversed test leads. If the leads are connected correctly, the diode is defective and should be replaced.




## MEASURING CAPACITANCE



Warning

To avoid possible damage to the meter or other equipment, turn off the power source and discharge all high-voltage capacitors.

- (1) Disconnect the capacitor from power.
- (2) Short the capacitor's terminals to discharge it.

- (3) Disconnect any resistors between the terminals of the capacitor.
- (4) Turn the function switch to the  position. Press the **SEL** button once to select the capacitance measurement function. If test leads are not plugged into the meter's front-panel jacks, the primary readout will show **0.000 nF**.
- (5) Plug the red and black test leads into the red **INPUT** and black **COM** jacks.
- (6) Connect the test leads to the terminals of the capacitor.
- (7) Read the measured capacitance on the display.

## **MEASURING FREQUENCY AND DUTY CYCLE**

Frequency measurements can be made with the rotary function switch in the **Hz** or **V** position, or in any of the three current measurement positions. The most-accurate reading over the widest range are made with the switch in the **Hz** position, with the input voltage or current provided by the test leads.

**To measure frequency** in this mode:

- (1) Turn the rotary function switch to the **Hz** position.
- (2) Plug the red and black test leads into the red **INPUT** and black **COM** jacks.
- (3) Connect the test leads to the voltage source or between loads.
- (4) Read the measured frequency on the LCD.

To measure duty cycle with the switch in the **Hz** position, press the **Hz%** **ZERO** button. % will replace **Hz** at the right of the measured value.

With the rotary function switch in the **Hz** position, the meter can measure frequencies from 10Hz to 10MHz with an accuracy of  $\pm(0.5\%$  of the reading + 3 digits). For inputs at frequencies below 10Hz, the primary readout will show **00.00 Hz**. For inputs at frequencies above 10 MHz, the accuracy of duty cycle measurements is not guaranteed.

Frequency measurements can be made with the rotary function switch in any of the three current measurement positions **80A**, **40A** or **4A** position, with input provided by current sensed by the clamp jaw) or the **V** position (with input provided by the test leads). In both cases:

- The measured frequency is displayed on the LCD.
- Measurement accuracy is limited to  $\pm(1.5\%$  of the reading + 3 digits).
- The measurement range is limited to 40Hz to 10kHz.

With the rotary function switch in the **Hz** position, the meter can measure the frequency of AC currents with an amplitude greater than  $2V_{RMS}$ . With the rotary function switch in the **80A**, **40A** or **4A** position, the meter can measure the frequency of AC currents with an amplitude greater than  $4A_{RMS}$ . With the switch in the **V** position, the meter can measure the frequency of AC currents with an amplitude greater than  $600mV_{RMS}$ .

## MEASURING TEMPERATURE

To measure the temperature of a solid, liquid or gas:

- (1) Turn the rotary function switch to the **°C/°F** position. The HHM380's default temperature measurement unit is °C. To switch to °F, press the **SEL** button.
- (2) Plug the included "K" thermocouple adaptor into the red **INPUT** and black **COM** jacks. Make sure to insert the + (positive) plug of the adaptor into the red jack and the **COM** plug into the black jack.
- (3) Plug the included "K" type thermocouple (or a different "K" type thermocouple) into the adaptor. Make sure to insert the slightly wider blade of the thermocouple into the – (negative) slot of the adaptor.
- (4) To measure a surface temperature, firmly attach the tip of the thermocouple to the surface. To measure the temperature of a liquid or gas (including ambient air), make the tip of thermocouple is within the fluid.
- (5) Read the measured temperature on the LCD.

---

## SPECIFICATIONS

Parameter or Feature/Function	Specification
AC/DC current measurement ranges	0 to 4A/40A/80A
AC/DC current measurement accuracy/max resolution	$\pm(2.5\%$ of reading + 5 digits)/1mA
AC voltage measurement ranges	0 to 400mV/4V/40V/400V/600V
AC voltage measurement accuracy/max resolution	$\pm(1\%$ of reading + 3 digits)/100 $\mu$ V
DC voltage measurement ranges	0 to 400mV/4V/40V/400V/600V
DC voltage measurement accuracy/max resolution	$\pm(0.8\%$ of reading + 3 digits)/100 $\mu$ V
Resistance measurement ranges	0 to 400 $\Omega$ /4k $\Omega$ /40k $\Omega$ /400k $\Omega$ / 4M $\Omega$ /40M $\Omega$

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Resistance measurement accuracy/max resolution	$\pm(0.8\%$ of reading + 3 digits) in all ranges except 0 to 40M $\Omega$ ; $\pm(1.2\%$ of reading + 3 digits) in 0 to 40M $\Omega$ range/0.1 $\Omega$
Frequency measurement ranges in <b>H</b> z mode	10Hz to 100Hz/1kHz/10kHz/100kHz/1MHz/10MHz
Frequency measurement accuracy/max resolution in <b>H</b> z mode	$\pm(0.5\%$ of reading + 5 digits)/0.001Hz
Frequency measurement ranges through clamp jaw and with switch in <b>V</b> position	40Hz to 100Hz/1kHz/10kHz
Frequency measurement accuracy/max resolution through clamp jaw and with switch in <b>V</b> position	$\pm(1.5\%$ of reading + 5 digits)/0.01Hz
Capacitance measurement ranges	0 to 4nF/40nF/400nF/4 $\mu$ F/40 $\mu$ F/400 $\mu$ F/4mF/40mF
Capacitance measurement accuracy/max resolution	$\pm(4\%$ of reading+ 3 digits)/0.001nF
Continuity threshold	$\leq 50\Omega$
Diode integrity open circuit voltage	2.5V
Duty cycle measurement range	0.5 to 99.5%
Duty cycle measurement accuracy	$\pm 3\%$
Temperature measurement range	-4° to 1832°F (-20° to 1000°C)
Temperature measurement accuracy (excluding thermocouple)	$\pm(3\%$ of reading + 3 digits)
Overload protection level in resistance, continuity, diode integrity and capacitance modes	250VAC/DC <sub>RMS</sub>
Input impedance	10M $\Omega$
Sampling time	<300msec
Safety rating	CAT III 600V
Clamp jaw opening	0.95 in. (24mm)
Display digits (maximum count)	3-3/4 (4000)
Auto power off trigger	15 minutes of front-panel inactivity
Operating temperature	14° to 122°F (-10° to 50°C)

Storage temperature	-4° to 140°F (-20° to 60°C)
Maximum altitude	6562 ft. (2000m)
Power source	Three “AAA” batteries
Dimensions	8.19 x 3.07 x 1.38 in. (208×78×35mm)
Weight (including batteries)	7.6 oz. (215g)


Note: Accuracy values are guaranteed for 1 year after factory calibration at an operating temperature between 64° and 82°F (18° and 28°C) @ <80% RH. All accuracy specifications must be derated (increased) by 5.5% for each degree F of operating temperature outside this range.

For example, an accuracy specification of  $\pm 3\%$  between 64°F and 82°F would be derated to:

- **$\pm 3.165\%$**  ( $\pm 3\% + (3\% \times 5.5\% \times 1)$ ) **for operation at 63°F and 83°F** (one degree outside the range)
- **$\pm 3.33\%$**  ( $\pm 3\% + (3\% \times 5.5\% \times 2)$ ) **for operation at 62°F and 84°F** (two degrees outside the range)
- **$\pm 3.495\%$**  ( $\pm 3\% + (3\% \times 5.5\% \times 3)$ ) **or operation at 61°F and 85°F** (three degrees outside the range), etc.

---

## OPERATING & MAINTENANCE TIP

When the  icon appears at the upper left of the LCD, it's time to replace the three “AAA” batteries that power the meter (although measurements will remain valid for several hours after the icon first appears). To replace the batteries, follow the instructions on p. 7.

Do not operate the HHM380 in the presence of a flammable or explosive gas or near an arc welder or induction heater.

After subjecting the meter to a large change in ambient temperature, wait at least 30 minutes before making measurements to guarantee the accuracy of readings.

Remove the batteries when storing the meter or when you do not expect to use it for an extended period of time (months rather than weeks).

Do not disassemble the HHM380 or immerse it in water.



## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

## RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

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