ΩΞ OMEGA®

HOLD	FLOW
	15.7
	CMM
AREA	1.2 FT²

MODE

UNIT   AREA

SET

DISP   HOLD

Anemometer
HHF-309

HHF-309
Mini Anemometer-Psychrometer
With CFM/CMM And Enthalpy

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ΩΞ OMEGA®

MINI ANEMOMETER-PSYCHROMETER WITH CFM/CMM & ENTHALPY

USER'S MANUAL

HHF-309

Please read this manual carefully and thoroughly before using this product.

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INTRODUCTION

Thank you for purchasing OMEGA's HHF-309 Mini Anemometer-Psychrometer with CFM/CMM & Enthalpy.
Please read this user's manual carefully and thoroughly before using the product.

The HHF-309 is a one-piece vane anemometer-psychrometer that can measure all parameters needed to install, test or fine-tune the performance of an HVAC/R system.

KEY FEATURES

- Measures:
    - ○ Ambient temperature
    - ○ Dew Point and Wet Bulb temperatures
    - ○ Wind Chill Index (WCI)
    - ○ Relative humidity (RH)
    - ○ Air speed
    - ○ Airflow volume
    - ○ Enthalpy
- All temperatures displayable in °F (default) or °C
- Five available air speed units: ft./min, mph, m/sec, km/hr, knots
- Airflow volume and Enthalpy readings available in Imperial or metric units
- Min, Max and Avg session values for air speed and airflow volume
- Large backlit dual readout LCD
- 5-minute Auto Power Off
- Small and light enough for one-handed operation
- Includes vane and sensor cap with wrist strap
- Tripod mount
- CE and RoHS approved
- 1 year limited warranty

WHAT'S IN THE PACKAGE

The meter comes in a blister pack with a "CR2032" button cell pre-installed in the battery compartment. A hard copy of this user's manual is inside the blister card.

PRODUCT OVERVIEW

Fig. 1 below shows all controls, indicators and physical structures of the unit, as well as the location of the battery compartment.

Fig. 2 shows all possible indications on the unit's LCD.

Fig. 1. The controls, indicators and physical structures of the HHF-309

A. Vane and sensor
   protection cap

B. Vane

C. Temperature-humidity
   sensor

D. LCD

E. Keypad

F. Battery compartment

G. Wrist strap

H. Threaded tripod
   mounting hole

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A. Low battery icon

B. Upper readout

C. Air speed mode indicator

D. Airflow volume mode indicator

E. RH mode indicator

F. Enthalpy mode indicator

G. Air speed units

H. RH unit

I. Enthalpy units

J. Area units

K. Lower readout

L. Area entry mode indicator

M. Dew Point mode indicator

N. Wet Bulb mode indicator

O. Wind Chill Index mode indicator

P. Airflow volume multiplier

Q. Airflow volume units

R. Air speed, airflow volume session value indicators

S. Measurement HOLD indicator
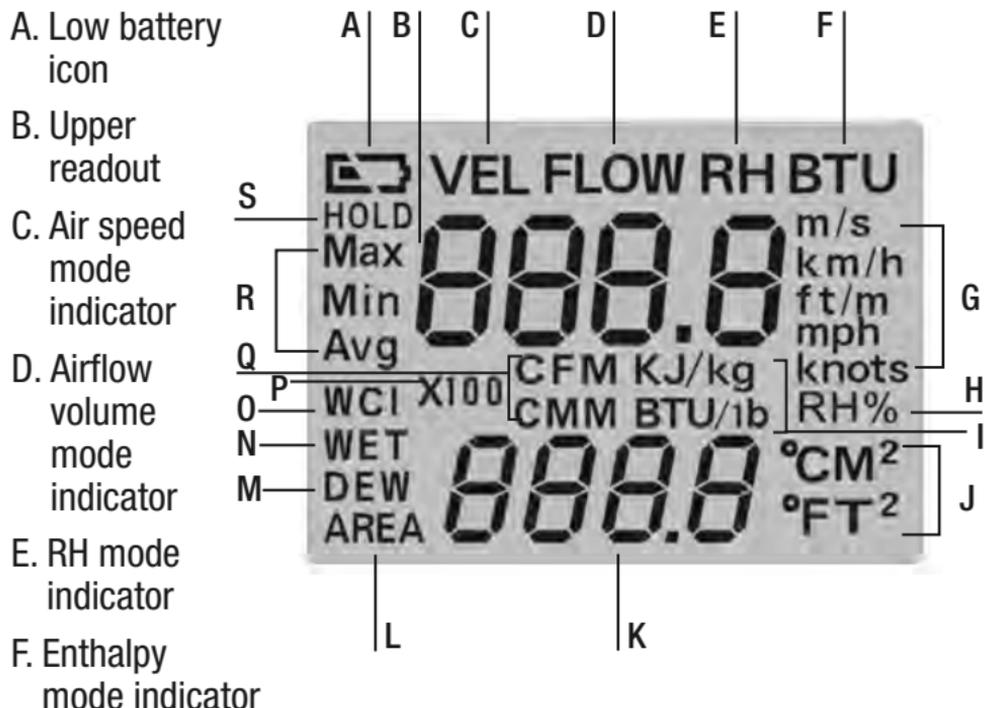
Fig. 2.
All possible display indications

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SETUP INSTRUCTIONS
ACTIVATE BATTERY

1. Turn the meter over and use your thumbs or a coin to turn the battery compartment cover on the back (Fig. 1, Callout F) clockwise 30 degrees, in the direction marked **OPEN**.
2. Pull and discard the tab under the pre-installed battery.
3. Replace the battery compartment cover and turn it counterclockwise 30 degrees until it snaps shut.

Complete Setup by carefully removing the plastic film protecting the LCD.

OPERATING INSTRUCTIONS

To power on the HHF-309, press the red ⏻ button. The LCD will illuminate with the backlight on and show all possible display indications for 2 seconds. The unit will then automatically enter the measurement mode in which it was operating when it powered off. The backlight will turn off after 15 seconds if no front-panel button is pressed during that period. Pressing any button begins another 15 seconds of backlight.

To power off the HHF-309, press and hold the ⏻ button for at least 2 seconds.

To change measurement mode, start by pressing the **MODE** button. This will cause the icon of the current mode to begin flashing on the top line. Then press the **SET** button one to three times, until the icon of the mode you want begins flashing on the top line.

The figure below shows the four measurement modes in their sequence of selection using the **SET** button.

VEL ▶ **FLOW** ▶ **RH** ▶ **BTU**
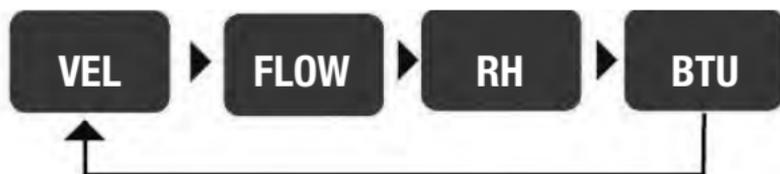
When the icon of the mode you want appears, flashing, on the top line, press the **MODE** button once to stop it from flashing. Doing this will cause one or more measurement unit icons below to begin flashing. Press the **MODE** button again to stop those icons from flashing. This causes the meter to enter real-time measurement mode for the chosen parameter (air/wind speed, airflow volume, RH or enthalpy).

To hold any pair of measurements ("freeze" the readouts), press the **HOLD** button. To release the hold and resume displaying real-time values, press the button again. This function is very useful for making measurements in low light or when the source of air or wind is above your head, below your knees, or around a corner. You can make a measurement, hold it, and then read the display up to 5 minutes later after positioning the LCD at eye level.

Why do you have only 5 minutes? To extend battery life, the HHF-309 automatically powers itself off following any 5-minute period in which no front-panel button is pressed.

MEASURING AIR SPEED AND TEMPERATURES

To make an air speed measurement, unsnap the vane and sensor protection cap (Fig. 1, Callout A) and let it hang from the unit by the wrist strap. Turn the vane at the top of the unit perpendicular to the source of air or wind. It makes no difference whether the front of back of the vane faces the flow. The measured air speed value will appear on the upper readout. Allow a few seconds for the reading to stabilize.

The HHF-309's factory default air speed measurement unit is feet/minute (**ft/m**). **To change the air speed unit**, begin by pressing the **UNIT** button. This will cause **ft/m** to begin flashing on the right side of the upper readout. Then, within 15 seconds (before the backlight extinguishes), press the **SET** button. This will change the flashing **ft/m** term to **mph**, also flashing. Press the **SET** button again and **mph** will turn to **knots**. Press it again to change knots to **m/s**.

Press the **SET** button as many times as necessary until the air speed unit you prefer appears, flashing, on the right side of the upper readout. To save this unit, press the **UNIT** button. The figure at right shows the five available air speed units in their selection sequence.
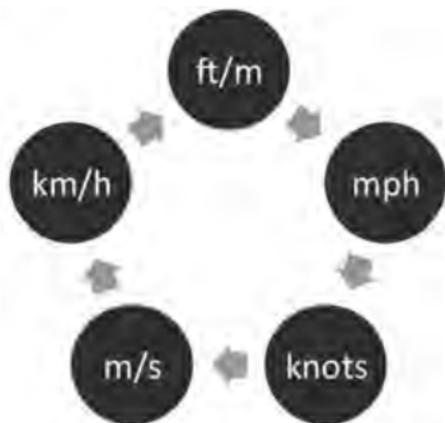
When you press the **UNIT** button to save your preferred air speed unit, **°F**—the HHF-309's factory default temperature measurement unit—will begin flashing on the right side of the lower readout. To keep **°F** as the temperature measurement unit, begin by pressing the **UNIT** button. This will cause **°F** to stop flashing and the meter to resume displaying real-time air speed and temperature measurements. To change the temperature unit to **°C**, press the **SET** button, followed by the **UNIT** button to save the selection.

The HHF-309 will "remember" the air speed and temperature units (as well as its operating mode and other selected units and parameters) in use each time it powers off and will resume operating in that mode and with those units upon restart. So if you always use ft/m and °F for air speed and temperature measurements, you need not perform any of the above steps. And if you always use the same air speed and temperature units (other than ft/m and °F), you need only perform the above procedure once. Unlike many instruments, changing the battery does not reset all units to their factory default.

As mentioned earlier, the HHF-309 automatically begins measuring and displaying ambient temperature upon startup. **To display other temperatures whose calculation includes the effect of wind speed or humidity** (Wind Chill Index, or Wet Bulb and Dew Point temperatures, respectively), begin by pressing the

MODE button with the me er operating in air speed mode (with **VEL** appearing on the top line of the LCD). This will cause **VEL** to begin flashing. Then press the **MODE** button again. On meters that have come fresh from the factory, this will cause the three terms **WCI**, **WET** and **DEW** to appear, flashing, on the left side of the LCD. Within 15 seconds (before the backlight turns off), press the **SET** button as many times as necessary until the temperature you want appears by itself, flashing, on the left side. Note that the temperature on the lower readout changes with each press of the **SET** button. To save the temperature you want, press the **MODE** button while its abbreviated term (**WCI**, **WET** or **DEW**) is flashing.

As with air speed units, the type of temperature you select and save becomes the display default until you change it.

When operating in Wind Chill Index mode, make sure the vane is perpendicular to the wind direction.

MEASURING AIRFLOW VOLUME

To enter airflow volume measurement mode, begin by pressing the **MODE** button with the meter operating in air speed mode (with **VEL** appearing on the top line of the LCD). This will cause **VEL** to begin flashing. Then press the **SET** button. This will cause the flashing term **FLOW** to replace the flashing term **VEL** on the top line of the LCD. To stop **FLOW** from flashing, press the **MODE** button.

Note that the term **AREA** now appears at the left of the lower readout. To calculate airflow volume, the HHF-309 must "know" the area of the grille or duct through which air is passing. Before entering that area, you should enter your preference for using the metric or Imperial unit for airflow volume—cubic meters/minute (CMM) or cubic feet/minute (CFM), respectively.

To change **CMM** to **CFM**, begin by pressing the **UNIT** button. This will cause **CMM** to begin flashing. Then press the **SET** button, followed by the **UNIT** button to save the selection.

You can now measure the area of your grille and duct and enter it into the HHF-309. The meter can accept any area from 0.1 ft^2 to 99.9 ft^2. Users of metric units must convert their cm^2 measurements to ft^2 before entering them.

To begin, press the **AREA** button. This will cause the left (most significant) digit on the lower readout to begin flashing. Press the **SET** button as many times as necessary until the left digit matches the left digit of your grille or duct area. Then press the **AREA** button to save that digit. This will cause the second digit from the left to begin flashing. Again, press the **SET** button as many times as necessary until the second digit from the left on the display matches the second digit from the left of your grille or duct area. Press the **AREA** button to save that digit. Repeat the process for the right (least significant) digit. To return to any digit to change its value, press the **AREA** button once, twice or three times.

To measure the volume of air exiting a grille or duct, remove the vane and sensor protection cap and enter airflow volume mode (with **FLOW** appearing on the top line of the LCD). Turn the vane at the top of the unit perpendicular to the source of air or wind. It makes no difference whether the front of back of the vane faces the flow. Allow a few seconds for the reading to stabilize.

For airflow volumes less than 9999 CFM or CMM, the value on the upper readout represents a true measurement. For airflow volumes between 10,000 and 99,999 CFM or CMM, the indication **X10** below and to the left of the upper readout is a reminder to multiply the value shown by 10 for a true measurement. For airflow volumes above 99,999 CFM, the indication **X100** is a reminder to multiply the value shown by 100 for a true measurement.

### *DISPLAYING MIN/MAX/AVG AIR SPEEDS AND AIRFLOW VOLUMES*

The HHF-309 keeps track of the maximum and minimum (fastest and slowest) and average air speed and airflow volume values

recorded over a measurement "session"—the period of time during which you measure speeds at multiple locations and/or speeds of multiple devices. The session begins when you power on the HHF-309; it typically ends 5 minutes after you finish making measurements with the activation of the APO function.

The value of being able to quickly determine the fastest and slowest fans of a group, or the average of a group of fans, should be obvious.

To display the maximum, minimum or average air speed during a measurement session, briefly press the **DISP** button as many times as necessary until the label of the desired value (**Max**, **Min** or **Avg**) appears at the left of the LCD (Fig. 2, Callout R). The figure at right shows the three available session parameters in their selection sequence relative to real-time measurement mode.
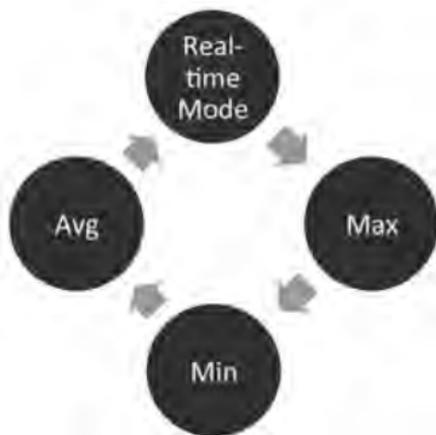
MEASURING RELATIVE HUMIDITY (RH)

To enter RH mode, press the **SET** button with **FLOW** flashing on the top line of the LCD. This will change the flashing term to **RH**. To stop **RH** from flashing, press the **MODE** button.

The HHF-309 will now display real-time RH values on the upper readout and the current Wind Chill Index or Dew Point or Wet Bulb temperature on the lower readout. To change the unit of temperature measurement to or from °F or °C, press the **SET** button, followed by the **UNIT** button to save the selection. To leave the unit unchanged, press the **UNIT** button.

MEASURING ENTHALPY

Enthalpy is a measure of the amount of energy needed to change the state of a substance from a solid to a liquid or from a liquid to a gas. The most common application for the HHF-309's enthalpy-calculating algorithm is measuring the enthalpy of vaporization of air in an HVAC/R system duct.

To enter Enthalpy mode, press the **SET** button with **RH** flashing on the top line of the LCD. This will change the flashing term to **BTU**. To stop **BTU** from flashing, press the **MODE** button.

You can now enter your preference for using the metric or Imperial unit for Enthalpy—kiloJoules per kilogram (**KJ/kg**) or British thermal units per pound (**BTU/lb**), respectively. To change **KJ/kg** to **BTU/lb**, begin by pressing the **UNIT** button. This will cause **KJ/kg** to begin flashing. Then press the **SET** button, followed by the **UNIT** button to save the selection.

Selecting the Enthalpy unit will cause the default temperature unit at the right of the lower readout to begin flashing. To change the unit, press the **SET** button, followed by the **UNIT** button to save the selection. To leave the unit unchanged, press the **UNIT** button.

To make an Enthalpy measurement, remove the vane and sensor protection cap and enter Enthalpy mode (with **BTU** appearing on the top line of the LCD). Turn the vane at the top of the unit perpendicular to the source of air or wind. It makes no difference whether the front of back of the vane faces the flow. The measured Enthalpy value will appear on the upper readout. Allow a few seconds for the reading to stabilize.

SPECIFICATIONS

Air Speed Measurement Range:
   80 to 5910 ft./min (0.4 to 30 m/s)
Air Speed Measurement Accuracy:
   ±(3% of full-scale value + 40 ft./min (0.2 m/s))

Air Speed Measurement Resolutions: 1 ft./min (0.1 m/s)

Temperature Measurement Range: 32° to 122°F (0° to 50°C)

Temperature Measurement Accuracy:
±1.8°F (1°C) from 68° to 104°F (20° to 40°C);
±3.6°F (2°C) elsewhere in range

Temperature Measurement Resolution: 0.1°

Airflow Volume Measurement Range:
0 to 591,000 CFM (0 to 16,740 CMM)

Relative Humidity (RH) Measurement Range: 0 to 100%

RH Measurement Accuracy:
±3% from 20 to 80%RH; ±5% elsewhere

Dew Point Measurement Range: -67° to 122°F (-55° to 50°C)

Wet Bulb Measurement Range: -31° to 122°F (-35° to 50°C)

Enthalpy Measurement Range: -8 to 318 Btu/lb. (-19 to 740kJ/kg)

Response Time:<2 seconds for air speed

Display Size: 1.34 x 0.94 in. (34 x 24mm)

Auto Power Off Trigger: 5 minutes of front-panel inactivity

Backlight Duration: 15 seconds (without front-panel activity)

Current Consumption: <3 mA with backlight off,
<10 mA with backlight on

Operating Temperature: 32° to 122°F (0° to 50°C) @ <85%RH

Storage Temperature (without battery):
-22° to 140°F (-30° to 60°C) @ <85%RH

Dimensions: 5.83 x 2.08 x 0.87 in. (148 x 53 x 22mm)

Weight (without battery): 2.86 oz. (81g)

Power Source: (1) "CR2032" battery (pre-installed)

MAINTENANCE TIPS

When the ▬▭ icon appears in the upper left corner of the LCD, it's time to change the anemometer's "CR2032" battery (although measurements will remain valid for several hours after the icon first appears). To change the battery, follow the Setup Instructions on p. 6. Install the new battery so the side with the text and + marking faces up.

Remove the battery if you do not expect to use the HHF-309 for an extended period of time (months or years).

Replace the vane and sensor protection cap (Fig. 1, Callout A) following each measurement session.

Do not drop or disassemble the unit or immerse it in water.

Do not operate the HHF-309:

- Near a magnet
- Near equipment like arc welders and induction heaters that generate an electromagnetic field
- In environments full of water vapor, dust or static electricity

To clean the housing or LCD, use a dry or damp cloth. Avoid using chemical cleaners.

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.

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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:	FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED,	1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product under warranty, and	2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.	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.

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