



# MINI ANEMOMETER- PSYCHROMETER WITH CFM/CMM & ENTHALPY

## USER'S MANUAL



# DAF3009

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

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## INTRODUCTION

Thank you for purchasing General Tools & Instruments' DAF3009 Mini Anemometer-Psychrometer with CFM/CMM & Enthalpy. Please read this user's manual carefully and thoroughly before using the product.

The DAF3009 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.

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## 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

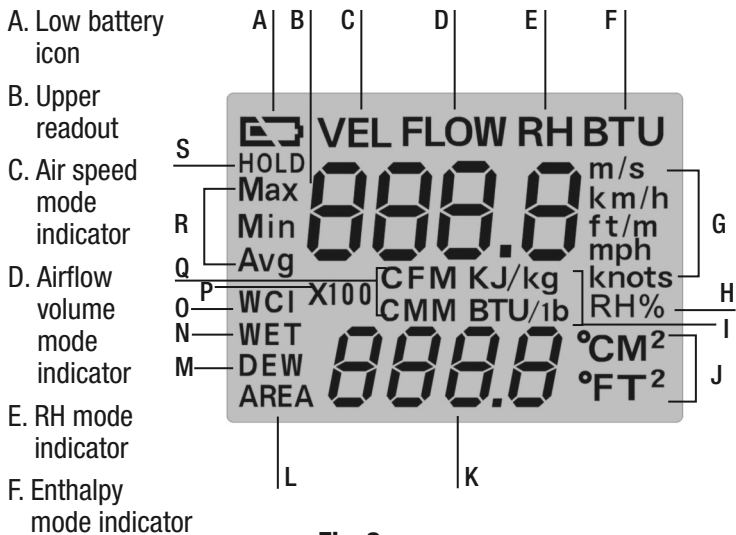
Fig. 1 below shows all controls, indicators and physical structures of the unit, as well as the location of the battery compartment.

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

**Fig. 1. The controls, indicators and physical structures of the DAF3009**

- 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





**Fig. 2.**  
**All possible display indications**

- 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

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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.

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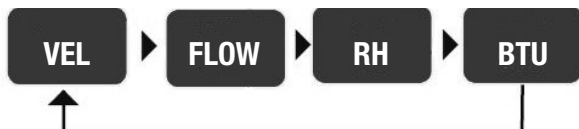
## OPERATING INSTRUCTIONS

**To power on** the DAF3009, 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 DAF3009, 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.



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.

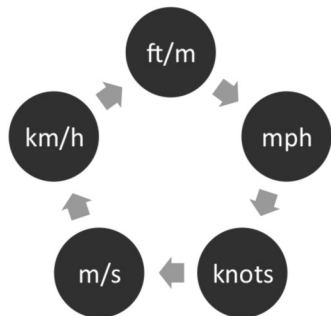
Why do you have only 5 minutes? To extend battery life, the DAF3009 automatically powers itself off following any 5-minute period in which no front-panel button is pressed.

## ***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 or 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 DAF3009’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 DAF3009’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 DAF3009 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 DAF3009 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 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 **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 DAF3009 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 DAF3009. The meter can accept any area from 0.1 ft<sup>2</sup> to 99.9 ft<sup>2</sup>. Users of metric units must convert their cm<sup>2</sup> measurements to ft<sup>2</sup> 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 or 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***

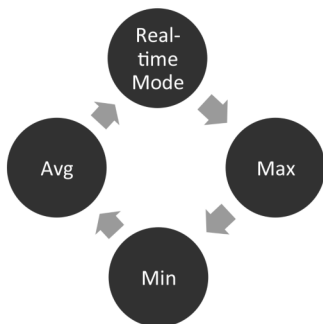
The DAF3009 keeps track of the maximum and minimum (fastest and slowest) and average air speed and airflow volume values

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 DAF3009; 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 DAF3009 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 DAF3009'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 or 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.

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## 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)

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## 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 DAF3009 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 DAF3009:

- 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.

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## WARRANTY INFORMATION

General Tools & Instruments' (General's) DAF3009 Mini Anemometer-Psychrometer with CFM/CMM and Enthalpy is warranted to the original purchaser to be free from defects in material and workmanship for a period of one year. Subject to certain restrictions, General will repair or replace this instrument if, after examination, the company determines it to be defective in material or workmanship. The warranty period begins on the date of purchase. You are encouraged to register your product online.

General will extend your warranty an additional 60 days if you register at [www.generaltools.com/ProductRegistry](http://www.generaltools.com/ProductRegistry).

This limited warranty does not apply to damages that General determines to be from an attempted repair by non-authorized personnel or misuse, alterations, normal wear and tear, or accidental damage. The defective unit must be returned to General Tools & Instruments or to a General-authorized service center, freight prepaid and insured.

Acceptance of the exclusive repair and replacement remedies described herein is a condition of the contract for purchase of this product. In no event shall General be liable for any incidental, special, consequential or punitive damages, or for any cost, attorneys' fees, expenses, or losses alleged to be a consequence of any damage due to failure of, or defect in any product including, but not limited to, any claims for loss of profits.

Register now at [www.generaltools.com/ProductRegistry](http://www.generaltools.com/ProductRegistry) to receive a 60-day extension to your warranty.

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## **RETURN FOR REPAIR POLICY**

Every effort has been made to provide you with a reliable product of superior quality. However, in the event your instrument requires repair, please contact our Customer Service to obtain an RGA (Return Goods Authorization) number before forwarding the unit via prepaid freight to the attention of our Service Center at this address:

General Tools & Instruments

80 White Street New York, NY 10013 212-431-6100

Remember to include a copy of your proof of purchase, your return address, and your phone number and/or e-mail address.



## **Specialty Tools & Instruments**

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DAF3009 User's Manual

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