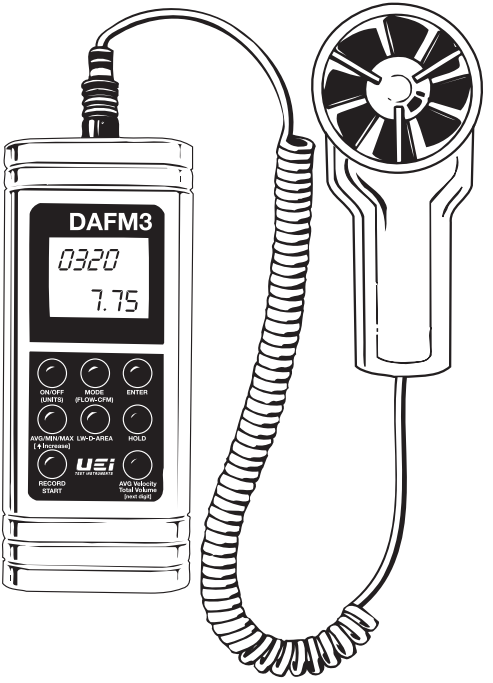
TEST iNSTRUMENTS™

INSTRUCTION MANUAL

DAFM3

Digital Air Flow Meter



1-800-547-5740 • Fax: (503) 643-6322
www.ueitest.com • email: info@ueitest.com

TABLE OF CONTENTS

Introduction

The DAFM3 Anemometer/Psychrometer meter is designed with 6 HVAC/R must have parameters in one instrument. These are included in a portable battery operated instrument for measuring Humidity, Air temp., Dew Point, Wet Bulb, Air Velocity and Air Volume. The sensor is built into the remote fan and is specially protected by a twist cap. While in operation, open the cap for accurate temperature and humidity readings.

Features include

- Measures Air Velocity, Temperature and Humidity
- Calculate Wet Bulb, Dew Point, and Air Volume (CFM, CMM)
- Protective twist cap for temperature/humidity sensor
- 8-Point Average for Air Velocity
- 30 Second Average for Air Volume
- Total Volume from multiple outlets
- Large LCD digital display
- Professional remote vane
- English/Metric scales
- Low battery indication
- Fast response
- Microprocessor circuitry for reliability
- Auto Power Off selectable
- Powered by 1 "9V" battery

Material Supplied

- DAFM3 Anemometer/Psychrometer Meter
- Remote Vane
- Batteries (1)9V
- User manual
- Hard carrying case

Safety Notes

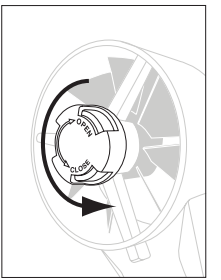
Before using this meter, read all safety information carefully. In this manual the word **"WARNING"** is used to indicate conditions or actions that may pose physical hazards to the user. The word **"CAUTION"** is used to indicate conditions or actions that may damage this instrument.

CAUTION!

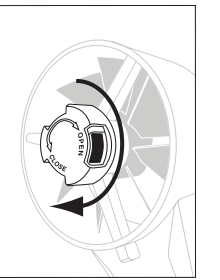
Objects striking the fan may damage meter.

IMPORTANT NOTE:

1. Rotate the protective cover in the center of the fan to open before measurement to ensure the measured data is correct.



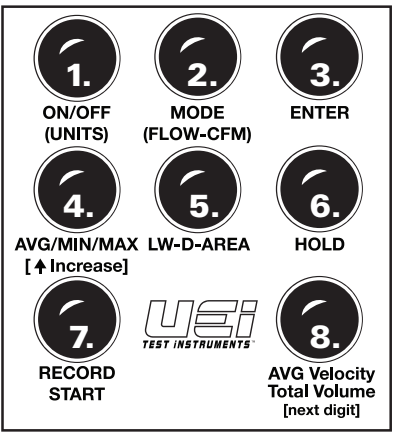
CLOSED



OPEN

2. The fan and meter are sold as a kit and are calibrated to each other. Please don't connect the fan with another DAFM3 or other similar anemo-psychrometers because the characteristic of each fan is different.

Controls and Indicators



1. **ON/OFF:** Turns ON the meter with auto-sleep mode. Turns OFF the meter at any mode.
   NOTE: *When the meter is OFF, press more than four seconds to enter "**UNITS**" selection.*

2. **MODE:** Press to select different modes (Temp, DP, WB, RH, Velocity). Press and hold until beep to select "**VOLUME**" function.

3. **ENTER:** To confirm the setting and calibration.
   NOTE: *Also used to recall values stored in memory for multi-point average.*

4. **MIN/MAX/AVG and UP:** Press to view Minimum, Maximum, and Average value.
   - To increase digit during setup for volume.

5. **LW-D-AREA:** Press to scroll through options for entering area. *Length/Width (LW) for open rectangular duct, Diameter (D) for open round ductwork, and Area (A) to enter the specified grill free area (Ak) information.*

6. **HOLD:** Press to hold the current reading, then press this key again to unlock the held reading.

7. **REC/START:** In velocity mode, pressing this key to store the current velocity reading into memory.
   - To start measuring volume without waiting to finish countdown in "**Volume**" mode.

8. **AVG Velocity/Total Volume [next digit]:** Press to display average of stored velocity in standard mode, total volume in CFM mode. Press a second time to return.

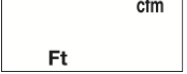
Operating Instructions

Disable Auto Power Off

With the meter off, press and hold "**MIN/MAX**" then press and hold "**ON/OFF**"" until the meter beeps.

Selecting the units

This function is unique, as it requires the process be started with the instrument off. If you notice the On/Off button has (Units) below. This is a "Press and Hold" function. Press this until a beep is heard, and you will see one of the screens shown below. You can scroll through these options while displayed by pressing the "Up" button (This is the function on the AVG/MIN/MAX. button illustrated with the upward facing arrow).



Select the scales desired and then press the "Enter" key. This will enter the basic measurement mode.

Basic Measurement

When you first turn the unit on the air velocity is the default value displayed on the LCD. To review the other basic parameters, press the "**MODE**" key. Each parameter will be displayed in turn.

Basic Measurement (continued)

Parameters Measured will cycle through the following in order

- Air Velocity
- Dry Bulb Temperature
- Dew Point Temperature (DP)
- Wet Bulb Temperature (WB)
- Relative Humidity (RH%)

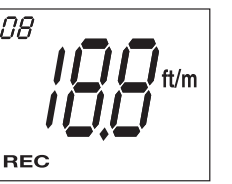
MIN/MAX/AVG

All modes will capture the average (AVG), minimum (MIN) and maximum (MAX) value since the meter was powered on. Select AVG/MIN/MAX by pressing this button. Pressing "**MODE**" while displaying "**MIN/MAX**" or "**AVG**" will scroll through available readings. Each mode will also provide a choice of MIN/MAX or AVG.

Velocity with Average

The DAFM3 has the ability to capture up to eight values for velocity, and then display the minimum, maximum and average of these readings.
The maximum number of records is 8 points.

1. Store readings while in the measurement mode by pressing "**RECORD**" (up to 8 points of data).
2. Press "AVG Velocity" to view results.
   NOTE: "REC H" will display in the lower left of the display.
3. Press "**MIN/MAX/AVG**" to cycle through the calculated values.



Measuring Air Flow (volume) with the UEi DAFM3

Air speed is the rate at which the airflow is moving past a specific point. It is typically measured in feet per minute in our use, but can be one of many different scales. Aircraft measure in knots, and weather forecasters will use miles per hour as examples.

Measuring Air Flow (continued)

Air volume is measured to determine the total amount of air going through an area in a given amount of time. We are typically looking for cubic feet per minute (CFM) as it relates to heating or cooling equipment. To determine this, you must either direct all of the air through a known area, or use an instrument to measure velocity that can calculate the CFM from the known area.

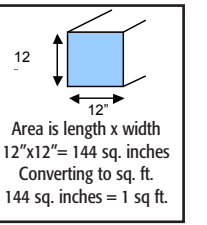
To understand we can compare to something more common. Consider a small stream compared to a large river. A river has a huge area, but the water may be moving at a low speed, while a stream may have a higher velocity, but not be very big. If measuring the velocity of the water only the stream would have a higher number. Some large rivers move quite slowly, but due to their size move a tremendous volume of water. If we think about all of the small steams flowing into a river, we could arrive at the volume of the river by adding all of the small streams velocity times their area (volume). Also, if we knew the area that the river was occupying, we could determine the volume by measuring the average speed of the water flow and multiplying by the rivers area. This would then give us the total volume of water flowing past a specific point.

Free Area (Ak value for a grill)

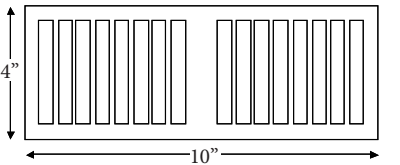
Grills or registers all have an area associated with all of the openings. Grill manufactures refer to this as free area or effective area. They perform extensive testing to determine the total area that is open to air flow, and is effectively free for the air to flow through. Without this number it is difficult to determine airflow by measuring velocity, but it can be estimated for comparison purposes.

What exactly is free area, and how does it relate to airflow and registers or grills? In open ductwork the free area is simply the open area of the duct. For a rectangular grill this is determined by length times width. A 12" by12" rectangular duct that is open has an area of 144 square inches (length x width). If we want this in square feet we can divide the result by 144 (144 square inches in each square foot). In this example the free area is one square foot.

A register example is 4" by 10". The area of this in square inches is 4 x 10 = 40 square inches. Next convert that to square feet dividing by 144 results in 0.278 square feet. This would give the total area if it were open, but because the grill covers a portion of this we need to estimate the amount of area that is really open.



Below is an example of the steps needed to determine this area:



On a grill, the overall dimensions are not open, or "Free Area." Entering dimensions on this would cause a large error. For best results use the Ak specification from grill manufacturer.

If needed an estimation may be used for comparison

First calculate the total free area of the grill, then take a percentage of that to enter into the instrument.

On this 4x10 grill, we had calculated the total area At 0.278 square feet. If we estimate only 70% of the area is truly open, the are would be 0.278 x 0.70 = 0.195 sq. feet

One estimation method would be to measure the area of the louvers and use length x width. There will still be errors using this approach, but in comparison analysis the error will be small.

Entering Information into the DAFM3

The first thing to notice is the keypad labels have two different items under most buttons. The top line is the activity that occurs on a short press of the button. The second (in brackets) line is the activity that occurs on a long press. This is key to understanding how to navigate through the DAFM3 during use.

Advanced Measurement Mode (Volume)

The DAFM3 can calculate the air volume, and display the result after taking a 30 second average. The DAFM3 only measures the velocity of the airflow, so entering an area into the meter is critical. This is also one of the most involved portions of the DAFM3 operation.

Note: If the Enter key is pressed when trying to advance to "D" (Diameter) or "AREA" by accident, the only method to recover is to power the meter off and then back on.

Selecting the method to enter area

Use the following guide to determine the proper method;

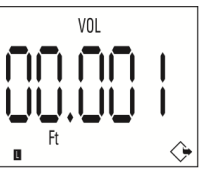
1. LW (Length and Width) – Use for open square duct
2. D (Diameter) – Use for open round duct
3. AREA (Free Area) – Use when measuring at a grill.

For best results obtain the Ak or effective area from the grill manufacture. If this is not available, estimate based on the information listed earlier in this guide.

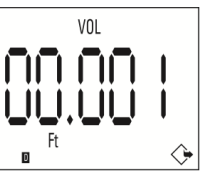
To access the desired mode for entering area first enter volume mode by pressing and holding the MODE button until it beeps. Next scroll through the options by pressing the "LW-D-Area" button. Icons in the lower left will indicate you what method of area is currently selected.

The steps are as follows;

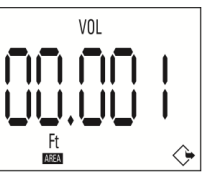
1. Press and hold "MODE" to change to the volume (CFM) mode. The below screen should appear. (This is the first screen for the LW dimensions) Note the "L" in the lower left corner indicating Length is expected.



2. Press "LW-D-Area" to advance to the diameter dimension entrance screen. The icon in the lower left will now be a "D" to indicate this is now expecting Diameter.



3. Press "LW-D-Area" to advance to the area dimension entrance screen. The icon in the lower left will now be "AREA" to indicate this is now expecting Free Area.

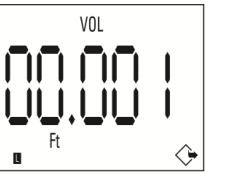


Note: If when trying to advance from LW or D to AREA the "ENTER" key is pressed it will accept the displayed value in advance to the 20-second countdown. If this is done in error turn the meter off and start the process at the beginning.

Entering Area

Length/Width

After you decide if you will be using LW (Length and Width for an open square duct) D (Diameter for open round duct), or AREA (Effective area of a grill – Ak value) you will need to enter the area. The procedure below is for the LW entrance mode, but is the same for all three methods.

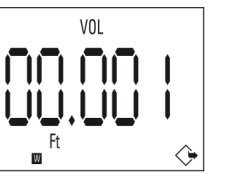


To enter the volume mode, press and hold MODE until the unit beeps. The previous screen will be appear.

This screen is used to enter length (note small "L" in the lower left corner).

Changing Value Displayed:

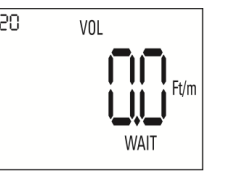
One digit will be flashing. Change this digit by pressing the Min/Max button (the small triangle indicates increase or up). When the digit is as desired, press the lower right button (Next Dgt) to move the flashing digit one position left. You can repeatedly press this to cycle through all of the digits if you have incorrectly entered a value.



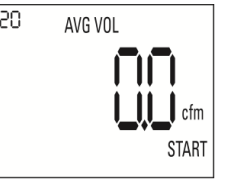
After the length is entered, press "Enter" briefly. This will accept the value displayed, and move to the Width screen. The screen is very similar to the length screen, but has a "W" in the lower left.

Enter the Width in the same manner as you entered the length using the "Min/Max – Up" and "Next Dgt" buttons. When complete you will press "Enter" briefly to accept this value.

The meter will now enter a 20 second countdown, allowing you time to position the air vane in front of the opening to be measured. The screen shown here will be displayed.
Note: If you wish to skip this wait period, press the "Record/Start" key.



After the 20 second countdown, the meter will enter a 30 second average sample period. The immediate air volume is displayed as measurements are made, with the meter displaying an average at the end of the 3 0 seconds. During the sample time, the following screen will be displayed.



After the sample is complete, the meter will display the average volume from your test area. To continue on to the next register, press "ENTER" briefly, then move to the proper entrance method by pressing the "LW-D-Area" button. The value last entered will be saved to reduce the time required to measure air volume on multiple outlets that have the same characteristics.

Diameter – Enter diameter using the inch scale, or divide diameter by 12 to convert inches to feet.

Free Area – Enter value direct from grill engineering data provided by grill manufacture (recommended)

Total Volume – At the end of a test, the "Total Volume" button can be pressed to display a total of all measurements made since entering this mode. The display will show total volume with a number in the upper left corner of the display to indicate the number of air outlets that have been measured and that are being used for a total average volume. To return to the last volume measurement press the "Total Volume" button again.

Low-Battery

Two level battery indication:

Level 1: Battery indicator will flash at level 1. In this situation, the meter will work normally, however users should prepare to replace the batteries.

Level 2: Battery indicator will always display on the LCD. In this level change batteries immediately.

Maintenance

Periodic Service

WARNING!

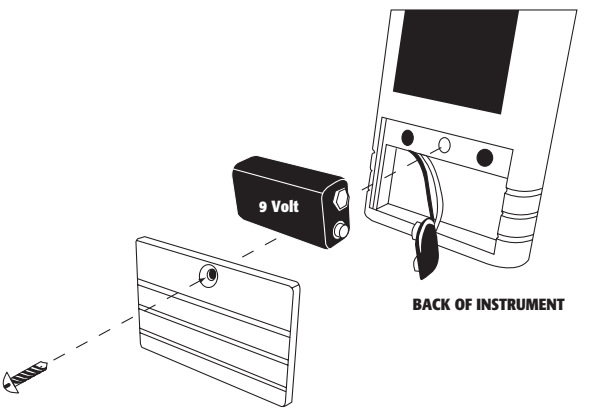
Repair and service of this instrument is to be performed by qualified personnel only. Improper repair or service could result in physical degradation of the meter. This could alter the protection from electrical shock and personal injury this meter provides to the operator. Perform only those maintenance tasks that you are qualified to do.

Cleaning

Periodically clean your meter's case using a damp cloth. **DO NOT** use abrasive, flammable liquids, cleaning solvents, or strong detergents as they may damage the finish, impair safety, or affect the reliability of the structural components.

Battery Replacement

Remove screw from battery compartment cover on back of meter and remove cover. Replace battery with a fresh 9 Volt battery paying attention to polarity position. Replace cover and screw.



Troubleshooting

Power on but no display	Press the power key more than 3 seconds
	Replace the battery and try again
	Remove the battery and wait one minute Reinstall and try again
E1	The probe is not connected or damaged
E2	The value is underflow
E3	The value is overflow
E4	The original data that is relative to this value has an error
E5	Out of meter display range
E6	The value is not calculated completely
E11	Humidity Calibration error

Specifications

Temperature	-4˚ to 140˚F (-20˚ to 60˚C) Accuracy: ±1˚F (+0.6˚C) Resolution: 0.1˚F (0.1˚C)
Relative Humidity	0 to 100% RH Accuracy: ±3% at 10 to 60% RH ±5% at other range Resolution: 0.1%
Dew Point	-90˚ to 158˚F (-68˚ to 70˚C) Accuracy: ±3% at 10 to 60% RH ±5% at other range Resolution : 0.1˚
Wet Bulb Temperature	-7.6˚ to 158˚F (-22˚ to 70˚C) Accuracy: ±3% at 10 to 60% RH ±5% at other range Resolution : 0.1˚
Air Velocity	0.3 to 35 m/s (1 to 114 ft/s) Accuracy: ±5% Resolution : 0.1% m/s
Air Volume	0 to 99999 m^3/s (0 to 99999 cfm) Accuracy: ±5% Resolution: 0.1(0 - 9999.9) or 1 (10000 - 99999)
Power	(1) 9V Alkaline battery or 9V > 200mA adapter
Dimensions	Meter: 175 x 70 x 33 mm Vane: 170 x 77 x 40 mm

Limited Warranty

The DAFM3 is warranted to be free from defects in materials and workmanship for a period of one year from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEi's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEi shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

1-800-547-5740 • FAX: (503) 643-6322
www.ueitest.com • Email: info@ueitest.com

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

PLEASE
RECYCLE