DAVM+

Digital Air Flow/ Volume Meter Plus

- Air Flow/FPM
- Air Volume/CFM
- Temperature°F/°C
- Humidity/5% RH
- Light Level/LUX

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TABLE OF CONTENTS

1. FEATURES

* 5 in 1 professional measuring instrument: Anemometer, Air flow, Hygrometer, Thermometer, and Light meter.

* Multi channel display for relative humidity, temperature, and air velocity measured values at the same time.

* Air velocity measuring units selectable by pressing button on the front panel for five kinds of units.

* Air flow (CFM. CMM) measurement by setting the desired area dimension.

* Low-friction ball bearing mounted wheel design provides high accuracy at high and low air velocity.

* High precision thin-film capacitance humidity sensor with fast response to the humidity changes.

* °F/°C selectable by pressing button on the front panel. Lux/Feet-candle selectable by pressing button on the front panel.

* Standard type K (NiCr-NiAl) thermocouple input jack suitable for all kinds of type K probe.

* Built-in microprocessor circuit assures excellent performance and accuracy.

* Button arrangement allows easy operation. Maximum and minimum value with recall.

* Hold function to freeze the current reading value.

* Lightweight and small size case design are suitable for handling with one hand.

* Wristlet design provides extra protection to the instrument especially for user one hand operation.

2. SPECIFICATIONS

2-1 General Specifications

Display	8 mm LCD display
Measurement	Anemometer, Humidity, Temperature, Light, Air flow (CFM/CMM).
Operating Max. Humidity	80% RH.
Operating Temperature	32 to 122°F (0 to 50°C)
Over Input Display	Indication of "- - - - "
Power Supply	006P DC 9V battery (Heavy duty type)
Power Consumption	Approx. DC 6.2 mA
Weight	5.6 oz (160g)
Dimensio	6.14x2.36x1.29 inch 156 x 60 x 33 mm
Standard Accessory	SCASE Carrying Case
Optional Accessories	TPFG Thermocouple Probe TPFDA Approved Thermocouple TPP Thermocouple Piercing Probe TPS Thermocouple Surface Probe

2-2 Measurement Specifications

Measurement		*Range*	*Resolution*
Air velocity	ft/min	80 to 5,910 ft/min	1 ft/min
	m/s	0.4 to 30.0 m/s	0.1 m/s
	km/h	1.4 to 108.0 km/h	0.1 km/h
	MPH	0.9 to 67.0 mile/h	0.1 MPH
	knots	0.8 to 58.3 knots	0.1 knots
	Temperature	32 to 122 °F	0.1 °F
	(thermister)	0 to 50 °C	0.1 °C

Measurement		*Range*	*Resolution*
Air flow	CFM cube feet/min	1,908,400 CFM	0.001 to 100 CFM
	CMM cube meter/min	54,000 CMM	0.001 to 1 CMM

Measurement		*Range*	*Resolution*
Humidity	% RH	10 to 95 % RH	0.1 % RH
	Temperature	32 to 122 °F	0.1 °F
	(thermister)	0 to 50°C 0.1 °C	

Measurement		*Range*	*Resolution*
Light	Lux	0 to 2,200 Lux	1 Lux
		1,800 to 20,000 Lux	10 Lux
** auto range*	Ft-cd	0 to 204.0 Fc	1 Ft-cd
		170 to 2,000 Fc	1 Ft-cd

Measurement	*Range*	*Resolution*
Temperature (Type K)	-148 to 2,372 °F	0.1 °F
Optional	-100 to 1,300 °C	0.1 °C

Measurement	*Range*	*Accuracy*
Air velocity	80 to 5,910 ft/min 0.4 to 30.0 m/s 1.4 to 108.0 km/h 0.9 to 67.0 mile/h 0.8 to 58.3 knots	≤ 20 m/s : ± 3% F.S. > 20 m/s : ± 4% F.S.
	32 to 122 °F 0 to 50 °C	± 2.5 °F ± 1.2 °C

Remark :
ft/min : feet per minute *MPH : miles per hour*
m/s : meters per second *knots : nautical miles per hour*
km/h : kilometers per hour *Ft-cd : feet candle*

Measurement	*Range*	*Accuracy*
Humidity	10 to 95% RH	*< 70% RH :* ± 4% RH *≥ 70% RH :* : ± (4%rdg+1.2%RH)
	32 to 122 °F 0 to 50 °C	± 2.5 °F ± 1.2 °C

Measurement	*Range*	*Accuracy*
Light	0 to 20,000 Lux 0 to 2,000 Fc	± 5% rdg ± 8 dgt

Measurement	*Range*	*Accuracy*
Temperature (Type K)	-148 to 2,372 °F -100 to 1,300 °C	±(1% rdg + 2°F) ±(1% rdg + 1°C)

Measurement	*Area setting*
CFM	0.01 to 322.92 feet square
CMM	0.001 to 30.000 meter square

3. FRONT PANEL DESCRIPTION

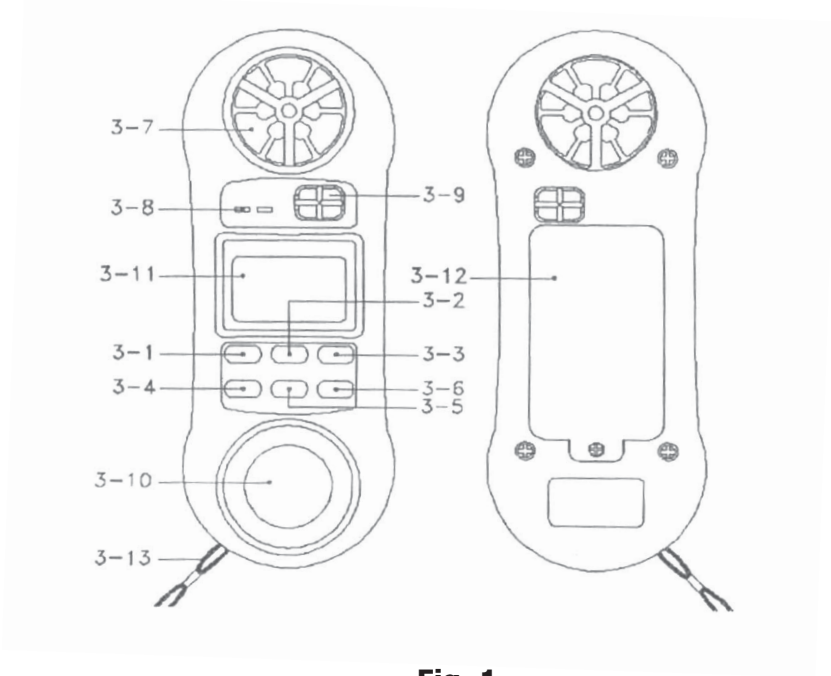

Fig. 1

3-1 ON/ESC Button

3-2 Hold Button

3-3 REC/Enter Button

3-4 Unit/Zero/ ◀
(CFM/CMM) Button.

3-5 °F/°C/ ▲
Lux/Ft-cd

Area-set Button

3-6 Function/ ▼ Button

3-7 Anemometer Sensor

3-8 Thermocouple Input Socket

3-9 Humidity Sensor

3-10 Light Sensor

3-11 LCD display

3-12 Battery Compartment / Cover

3-13 Wristlet

4. MEASURING PROCEDURE

4-1 Air Velocity Measurement

1) Power on the instrument by pressing the " ON Button " (3-1, Fig.1).
2) Select the Anemometer function by pressing " Function Button " (3-6, Fig.1).
3) Press the " Unit/Zero Button " (3-4, Fig.1) to select unit that you want and then face the " Anemometer Sensor " (3-7, Fig.1) to the source of wind.
4) Allow time for the reading to become stable and note the value indicated. From a practical point of view the velocity may fluctuate.

4-2 Temperature Measurement (Thermocouple)

1) Power on the instrument by pressing the " ON Button " (3-1, Fig. 1)..
2) Plug a type K thermocouple probe in the " Thermocouple Input Socket " (3-8, Fig.1).
3) Select the Temperature function by pressing " Function Button " (3-6, Fig.1)
4) Press the " °F/°C Button " (3-5, Fig.1) to select °F or °C unit.
5) Contact the Thermocouple Sensor Head with measuring object and the reading value will be displayed on the LCD display.

Measuring Consideration of Temperature Measurement (Thermocouple)

* Please make sure the polarity is correct when you plug a thermocouple probe in the Temp. input socket.

* The temperature difference between thermocouple probe and thermometer will cause an inaccurate measuring result. Therefore, for the best measuring and accuracy performance, whenever changing a probe or plugging a new probe, thermal equivalent between probe plug and meter's input socket is a necessary condition. Thermal equivalent procedure may take few minutes and apply only when the probe has been exposed to an ambient temperature different from the meter.

4-3 Humidity & Ambient Temperature Measurement

1) Power on the instrument by pressing the " ON Button " (3-1, Fig. 1).
2) Select the Relative Humidity function by pressing " Function Button " (3-6, Fig. 1).
3) At the mean time the reading value of relative humidity and temperature will be displayed on the LCD display.
4) When the meter is applied in a new environment, a few minutes are required to reach a stable condition.

4-4 Light Measurement

1) Power on the instrument by pressing the " ON Button " (3-1, Fig.1).
2) Select the Light Measurement function by pressing the "Function Button" (3-6, Fig. 1) until the light value is displayed. The light display digits are oriented 180° from the other function displays for easy exposure and output reading of the light sensor.
3) Press the " Lux/Ft-cd Button " (3-5, Fig.1) to select measuring unit " Lux " or " Ft-cd ".

Zero Offset Adjustment of Light Function :

* For best results zero the light sensor prior to use in a dark environment. Placing the light sensor end of the meter under a desktop or flat surface so as to block any light can accomplish this. Then press the " Unit/Zero Button " (3-4, fig.1) to set the meter indication to zero.

* Zero point can drift due to environment temperature and battery power change as well as for other reasons. It is recommended that the zero be checked frequently using the above procedure.

* Zero adjustment only can be executed if the measurement Light value $\leq$ 20 Lux.

4-5 AIR FLOW (CFM. CMM) MEASUREMENT

1) Power on the instrument by pressing the " ON Button " (3-1, Fig.1).
2) Select the Air Flow function by pressing " Function Button " (3-6, Fig.1) until the display show unit of CMM or CMM.

* Air flow unit " CFM " or " CMM " can be select by pressing the " CFM/CMM Button " (3-4, Fig.1)
* Area size can be set by pressing the " Area-Set Button " (3-5, Fig.1), then use the

Button (3-5, Fig.1)
Button (3-6, Fig.1)
Button (3-4, Fig.1)
to select the desired area size.

* For the CFM measurement, the area size is " feet square ", the lower display will show " F-2 ".
  For the CMM, the area setting size is from 0.01 to 322.92 feet square.

* For the CFM measurement, the area size is " meter square ", the lower display will show " m-2 ".
  For the CMM, the area setting size is from 0.001 to 30.000 meter square.

4) Use the hand to hold the meter, face the " Anemometer Sensor " (3-7, Fig.1) to the measured wind. In the same time the air flow value (CFM, CMM) will show on the LCD display.

5. OTHER FUNCTIONS

5-1 Hold Function

Pressing the " Hold Button (3-2, Fig.1) " will freeze the current reading value with a "HOLD" symbol on the display.

5-2 Data Record Function

1) The Data Record function records & displays the maximum and minimum reading values. Start the Data Record function by pressing the " REC Button " (3-3, Fig.1) once. There will be a " REC " symbol on the display.

2) With the REC symbol on the display :
(a) Press the " REC Button " (3-3, Fig.1) once and the " Max " symbol along with the maximum value will appear on the display.
(b) Press the " REC Button " again, the " Min " symbol along with the minimum value will appear on the display.
(c) To exit the memory record function, press the " REC Button " continuously for at least 2 seconds. The display will revert to the current reading.
(d) Clear the Max./Min. value recorded by pressing the " Hold Button " (3-2, Fig.1) once. Previous recorded Max./Min. value will be given up and then revert to the REC. function keep on recording.

5-3 Auto Power Off Disable

In order to prolong the battery life, the instrument has "Auto Power Off " function. The meter will switch off automatically if no buttons are pressed for around 10 minutes.

6. BATTERY REPLACEMENT

1) When the LCD display shows "  " symbol, it is necessary to replace the battery. However measure ment may still be made for several hours after the low battery indicator appears.
2) Open the " Battery Compartment / Cover " (3-12, Fig.1) and remove the battery.
3) Install a 9V battery (Alkaline or Heavy duty type) and then reinstate the cover.

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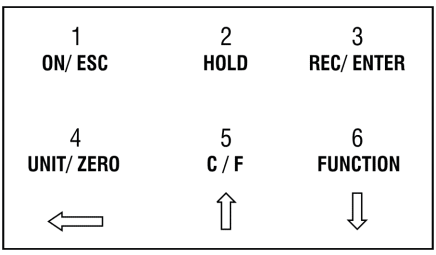
Air Measurement Set-Up



Air Velocity Measurement (fpm, mph, knot, Km/h, M/S)

1. Power on the meter by pressing button **1** (ON)
2. Select meter function by pressing button **6** (Function)
3. Press button **4** (Unit/Zero) to select the unit of measure you want.
4. Face meter into air source (Allow time for reading to stabilize, it may fluctuate some).
5. When measuring, if viewing the meter is difficult, use the hold feature.Press button **2** while measuring and then view reading.
6. Multiple readings should be taken over the face of the area and then averaged to obtain a more accurate measurement.

Air Volume Measurement (cfm, cmm)

1. Power on the meter by pressing button **1** (ON)
2. Select meter function by pressing button **6** (Function) until the display shows CMM or CFM.
3. To change from CMM to CFM or CFM to CMM. Press button 4.

See Chart On Reverse Side.

Area Set

Note:

This input should represent the "Free Area" of the register, grille or diffuser. This data should be entered in square feet. (This is the actual opening area the air has to flow through, not the overall size of the vent) There are many factors that vary the free vs. actual area, but for an approximation a multiplier in the range of .6 to .7 might be used to convert overall area to a free area for input. To get exact free area values contact the vent manufacturer for design specifications.

Example:

- Grille size 6" X 12"
- 1 sq ft=144 sq inches
- Free area multiplier .65
- 6 X 12 X .65=46.8 sq inches
- Now divide by 144 to convert to sq ft=.325 sq ft

Note:

Meter only accepts 2 decimal places so we will use .33 sq ft

4. Area size is set by pressing button **5** (Area-Set).
5. Then use button **5** to increase digit value, button **6** to decrease digit value, or button **4** to select another digit place.

5a. When area selection is completed press **3 to ENTER** the selection.

6. To exit area size, press button 1. The meter is now ready to take an air volume measurement.
7. When measuring if viewing the meter is difficult, use the hold feature. Press button **2** while measuring and then view reading.
8. Multiple readings should be taken over the face of the area and then averaged to obtain a more accurate measurement.

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Free Area Calculation in sq. ft.
Dimensions (H/W) in inches
Note: Free area in this chart is based on 0.65 of face area

Rectangular

H (in)	2	4	5	6	8	9
W (in) 2	0.018	0.036	0.045	0.054	0.072	0.081
4	0.036	0.072	0.090	0.108	0.144	0.163
5	0.045	0.090	0.113	0.135	0.181	0.203
6	0.054	0.108	0.135	0.163	0.217	0.244
8	0.072	0.144	0.181	0.217	0.289	0.325
9	0.081	0.163	0.203	0.244	0.325	0.366
10	0.090	0.181	0.226	0.271	0.361	0.406
12	0.108	0.217	0.271	0.325	0.433	0.488
14	0.126	0.253	0.316	0.379	0.506	0.569
15	0.135	0.271	0.339	0.406	0.542	0.609
16	0.144	0.289	0.361	0.433	0.578	0.650
18	0.163	0.325	0.406	0.488	0.650	0.731
20	0.181	0.361	0.451	0.542	0.722	0.813
21	0.190	0.379	0.474	0.569	0.758	0.853
22	0.199	0.397	0.497	0.596	0.794	0.894
24	0.217	0.433	0.542	0.650	0.867	0.975

Rectangular

H (in)	10	12	14	16	18	20
W (in) 2	0.090	0.108	0.126	0.144	0.163	0.181
4	0.181	0.217	0.253	0.289	0.325	0.361
5	0.226	0.271	0.316	0.361	0.406	0.451
6	0.271	0.325	0.379	0.433	0.488	0.542
8	0.361	0.433	0.506	0.578	0.650	0.722
9	0.406	0.488	0.569	0.650	0.731	0.813
10	0.451	0.542	0.632	0.722	0.813	0.903
12	0.542	0.650	0.758	0.867	0.975	1.083
14	0.632	0.758	0.885	1.011	1.138	1.264
15	0.677	0.813	0.948	1.083	1.219	1.354
16	0.722	0.867	1.011	1.156	1.300	1.444
18	0.813	0.975	1.138	1.300	1.463	1.625
20	0.903	1.083	1.264	1.444	1.625	1.806
21	0.948	1.138	1.327	1.517	1.706	1.896
22	0.993	1.192	1.390	1.589	1.788	1.986
24	1.083	1.300	1.517	1.733	1.950	2.167

Rectangular

H (in)	21	22	24
W (in) 2	0.190	0.199	0.217
4	0.379	0.397	0.433
5	0.474	0.497	0.542
6	0.569	0.596	0.650
8	0.758	0.794	0.867
9	0.853	0.894	0.975
10	0.948	0.993	1.083
12	1.138	1.192	1.300
14	1.327	1.390	1.517
15	1.422	1.490	1.625
16	1.517	1.589	1.733
18	1.706	1.788	1.950
20	1.896	1.986	2.167
21	1.991	2.085	2.275
22	2.085	2.185	2.383
24	2.275	2.383	2.600

Circular

Diameter	sq. ft.
6	0.128
8	0.227
10	0.355
12	0.510
14	0.695
16	0.908
18	1.149

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