

CMM, CFM

Anemometer, Hygrometer Light Meter, Thermometer

Model : LM-8010



Your purchase of this METER marks a step forward for you into the field of precision measurement.

Although this METER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.



OPERATION MANUAL

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1. FEATURES

- * 5 in 1 professional measuring instrument: Anemometer, Air flow, Hygrometer, Thermometer, and Light meter.
- * Tiny bone shape with 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.
- * Low-friction ball bearing mounted wheel design provides high accuracy at high and low air velocity.
- * Exclusive photo diode and color correction filter light sensor, spectrum meets C.I.E. photopic.
- * High precision thin-film capacitance humidity sensor with fast response to the humidity changes.
- * 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.
- * Concise and compact buttons arrangement, easy operation.
- * Memorize the maximum and minimum value with recall.
- * °C/°F selectable by pressing button on the front panel.
- * Lux/Feet-candle selectable by pressing button on the front panel.
- * Air velocity measuring units selectable by pressing button on the front panel for five kinds of units.
- * Air flow (CFM. CMM) measurement can set the desired area dimension.
- * Multi channel display for relative humidity and temperature measured values or air velocity and temperature measured values at the same time.
- * Zero button design makes light meter calibration.
- * Hold function to freeze the current reading value.

2. SPECIFICATIONS

2-1 General Specifications

Display	8 mm LCD display
Measurement	Anemometer, Humidity, Temperature, Light, Air flow (CFM/CMM).
Operating Humidity	Max. 80% RH.
Operating Temperature	0 to 50° C (32 to 122° F)
Over Input Display	Indication of "- - - -"
Power Supply	006P DC 9V battery (Heavy duty type)
Power Consumption	Approx. DC 6.2 mA
Weight	160g (battery included)
Dimension	<i>HWD</i> : 156x60x33 mm 6.14x2.36x1.29 inch
Standard Accessory	Instruction Manual
Optional Accessories	Carrying case. Temperature probe (Please refer to page 9).

2-2 Electrical Specification (23 ± 5°C)

<i>Measurement</i>		<i>Range</i>	<i>Resolution</i>
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 (thermister)	32 to 122 °F 0 to 50 °C	0.1 °F 0.1 °C

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

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

<i>Measurement</i>		<i>Range</i>	<i>Resolution</i>
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 Ft-cd	0.1 Ft-cd
		170 to 1,860 Ft-cd	1 Ft-cd

<i>Measurement</i>		<i>Range</i>	<i>Resolution</i>
Temperature (Type K)		-148 to 2,372 °F	0.1 °F
		-100 to 1,300 °C	0.1 °C

<i>Measurement</i>	<i>Range</i>	<i>Accuracy</i>
Air velocity	80 to 5,910 ft/min	$\leq 20 \text{ m/s} : \pm 3\% \text{ F.S.}$ $> 20 \text{ m/s} : \pm 4\% \text{ F.S.}$
	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	$\pm 2.5 \text{ }^\circ\text{F}$ $\pm 1.2 \text{ }^\circ\text{C}$
	32 to 122 $^\circ\text{F}$	
	0 to 50 $^\circ\text{C}$	
<i>Remark :</i> <i>ft/min : feet per minute MPH : miles per hour</i> <i>m/s : meters per second knots : nautical miles per hour</i> <i>km/h : kilometers per hour Ft-cd : feet candle</i>		

<i>Measurement</i>	<i>Range</i>	<i>Accuracy</i>
Humidity	10 to 95 %RH	$< 70\% \text{ RH} :$ $\pm 4 \text{ \%RH}$ $\geq 70\% \text{ RH} :$ $: \pm (4\% \text{rdg} + 1.2 \text{ \%RH})$
	32 to 122 $^\circ\text{F}$	$\pm 2.5 \text{ }^\circ\text{F}$
	0 to 50 $^\circ\text{C}$	$\pm 1.2 \text{ }^\circ\text{C}$

<i>Measurement</i>	<i>Range</i>	<i>Accureacy</i>
Light	0 to 20,000 Lux	$\pm 5\% \text{ rdg} \quad \pm 8 \text{ dgt}$
	0 to 1,860 Ft-cd	

<i>Measurement</i>	<i>Range</i>	<i>Accuracy</i>
Temperature (Type K)	-148 to 2,372 $^\circ\text{F}$	$\pm (1\% \text{ rdg} + 2^\circ\text{F})$
	-100 to 1,300 $^\circ\text{C}$	$\pm (1\% \text{ rdg} + 1^\circ\text{C})$

<i>Measurement</i>	<i>Area setting</i>
CMM	0.001 to 30.000 meter square
CFM	0.01 to 322.92 feet square

3. FRONT PANEL DESCRIPTION

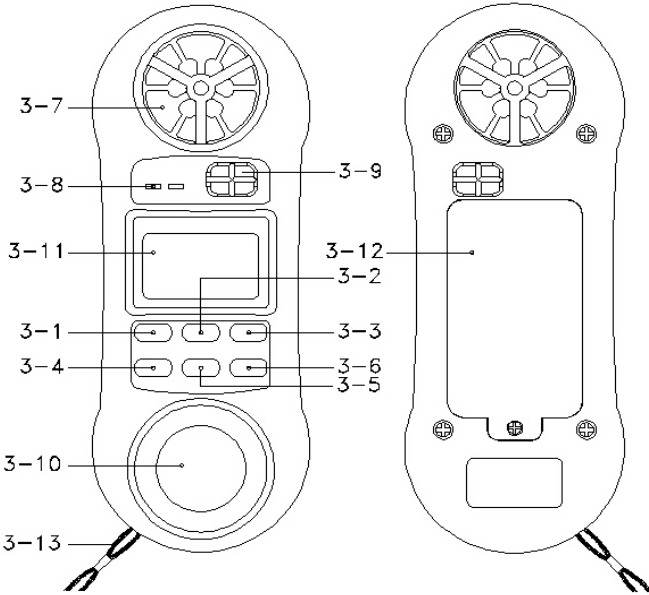


Fig. 1

- | | |
|---|----------------------------------|
| 3-1 ON/ESC Button | 3-6 Function/▼ Button |
| 3-2 Hold Button | 3-7 Anemometer Sensor |
| 3-3 REC/Enter Button | 3-8 Thermocouple Input Socket |
| 3-4 Unit/Zero/ ◀
(CFM/CMM) Button. | 3-9 Humidity Sensor |
| 3-5 °C/°F/▲
Lux/Ft-cd
Area-set Button | 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 " °C/°F Button " (3-5, Fig. 1) to select °C or °F 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 change a probe or plug 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 lmeasurement Light value ≤ 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 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 CMM 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.
 - * 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.
- 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 (CMM, CFM) will show on the LCD display.

5. OTHER FUNCTIONS

5-1 Hold Function

Whenever press 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 measurement 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.

7. OPTIONAL TEMPERATURE PROBE AND OTHER ACCESSORIES

Thermocouple Probe

(Type K) TP-01 Thermocouple Probe	<ul style="list-style-type: none"> * Measuring Range : -40 to 250 °C (-40 to 482 °F) * Max. short-term operating temperature: * It's an ultra fast response naked-bead thermocouple suitable for many general purpose application.
(Type K) TP-02A Thermocouple Probe	<ul style="list-style-type: none"> * Measuring Range : -50 to 900 °C (-50 to 1650 °F) * Dimension: 10cm tube, 3.2 mm Dia.
(Type K) TP-03 Thermocouple Probe	<ul style="list-style-type: none"> * Measuring Range : -50 to 1200 °C (-50 to 2200 °F) * Dimension: 10cm tube, 8 mm Dia.
(Type K) TP-04 * <i>surface Temp. probe.</i> Carrying case	<ul style="list-style-type: none"> * Measuring Range : -50 to 400 °C (-50 to 752 °F) * Size : Temp. sensing head - 15 mm Dia. Probe length - 12 mm.
CA-52A	<ul style="list-style-type: none"> * High quality carrying case with sash.