

11 in 1

Anemometer, Humidity meter, Barometer

Light Meter, Altitude. Pt 1000 Temp. (optional)

Sport/Weather meter

ENVIRONMENT METER


Model : SP-9201



Your purchase of this 11 in 1 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

- * 11 in 1 professional environment instruments:
1. Air velocity/Temp., 2. Humidity/Temp., 3. Light
4. Barometer, 5. CFM, CMM, 6. Dew point,
7. Wet bulb, 8. Wind chill, 9. Heat index,
10. Altitude, 11. Pt 1000 ohm Temp.(optional)
- * 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 humidity sensor with fast response time.
- * Built in baro sensor for the atmosphere value and altitude measurement precisely.
- * Optional Pt 1000 ohm Temp. probe for the precision Temp. measurement.
- * 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 detection by pressing button on the front panel.
- * Hold function to freeze the current reading value.

2. SPECIFICATIONS

2-1 General Specifications

Display	8 mm LCD display
Measurement	1. Air velocity/Temp. 2. Humidity/Temp. 3. Light 4. Barometer 5. CFM, CMM 6. Dew point 7. Wet bulb 8. Wind chill 9. Heat index 10. Altitude 11. Pt 1000 ohm Temp.(optional)
Operating Humidity	Max. 80% RH.
Operating Temperature	0 to 50° C (32 to 122° F)
Over Input Display	Indication of "- - - -"
Power Supply	CR 2032 DC 3V battery
Power Consumption	Approx. DC 5 mA
Weight	160g (battery included)
Dimension	HWD 120 x 45 x 20 mm (4.7 x 1.8 x 1.2 inch).
Standard Accessory	Instruction Manual
Optional Accessories	Pt 1000 ohm Temp. probe, TP-1000

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

Air velocity

Unit	Range	Resolution	Accuracy
ft/min	80 to 3937 ft/min	1 ft/min	$\leq 20 \text{ m/s} : \pm 3\% \text{ F.S.}$ $> 20 \text{ m/s} : \pm 4\% \text{ F.S.}$
m/s	0.4 to 20.0 m/s	0.1 m/s	
km/h	1.4 to 72.0 km/h	0.1 km/h	
MPH	0.9 to 44.7 mile/h	0.1 MPH	
knots	0.8 to 38.8 knots	0.1 knots	
Temp.	0 to 50 °C	0.1 °C	
	32 to 122 °F	0.1 °F	
Remark : <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</i>			

Humidity/Temp.

Unit	Range	Resolution	Accuracy
% RH	10 to 95 %RH	0.1 %RH	$< 70\% \text{ RH} :$ $\pm 4 \% \text{ RH}$ $\geq 70\% \text{ RH} :$ $\pm (4 \% \text{rdg} + 1.2 \% \text{RH})$
Temp.	0 to 50 °C	0.1 °C	$\pm 1.2 \text{ °C}$
	32 to 122 °F	0.1 °F	$\pm 2.5 \text{ °F}$

Light * auto range

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
Lux	0 to 2,200 Lux	1 Lux	± 5% rdg ± 8 dgt
	1,800 to 20,000 Lux	10 Lux	
Ft-cd	0 to 204.0 Fc	0.1 Ft-cd	
	170 to 1,860 Fc	1 Ft-cd	
<i>Remark : Ft-cd : feet candle</i>			

Barometric pressure (Barometer)

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
hPa	10.0 to 999.9	0.1 hpa	± 1.5 hPa
	1000 to 1100	1 hpa	± 2 hPa
mmHg	7.5 to 825.0	0.1 mmHg	± 1.2 mmHg
inHg	0.29 to 32.48	0.01 inHg	± 0.05 inHg

Pt 1000 ohm Thermometer (optional probe)

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
°C	-10.0 to 100.0 °C	0.1 °C	± 1.2 °C
°F	14.0 to 212.0 °F	0.1 °F	± 2.5 °F

Air flow

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>
CMM	0.024 to 36000	0.001/0.01/0.1/1
CFM	0.847 to 1271300	0.001/0.01/0.1/1/10 (x10)/100 (x100)

Dew point Temp.

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Remark</i>
°C	-25.3 to 49.0 °C	0.1 °C	* Calculate from the humidity/Temp. value
°F	-13.5 to 120.0 °F	0.1 °F	

Please refer to http://en.wikipedia.org/wiki/Dew_point

Wet bulb Temp.

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Remark</i>
°C	-5.4 to 49.0 °C	0.1 °C	* Calculate from the humidity/Temp. value
°F	22.2 to 120 °F	0.1 °F	

Please refer to http://en.wikipedia.org/wiki/Wet-bulb_temperature

Heat index

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
°C	0 to 100.0 °C	0.1 °C	± 2.0 °C
°F	32 to 212 °F	0.1 °F	± 3.6 °F

Please refer to http://en.wikipedia.org/wiki/Heat_index

Effects of the heat index (shade values)

Celsius	Fahrenheit	Notes
27– 32 °C	80– 90 °F	Caution : Fatigue is possible with prolonged exposure and activity. Continuing activity could result in heat cramps
32– 41 °C	90– 105 °F	Extreme caution : Heat cramps, and heat exhaustion are possible. Continuing activity could result in heat stroke
41– 54 °C	105– 130 °F	Danger : Heat cramps, and heat exhaustion are likely ; heat stroke is probable with continued activity
over 54 °C	over 130 °F	Extreme danger : Heat stroke is imminent

Note :

Exposure to full sunshine can increase heat index values by up to 8 °C (14 °F).

Wind chill

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
°C	-9.4 to 44.2 °C	0.1 °C	± 2.0 °C
°F	15.0 to 112.0 °F	0.1 °F	± 3.6 °F

** Wind chill value is effect only when the Temp. value < 15 °C and Air velocity value > 1.4 m/s.*

** Please refer to http://en.wikipedia.org/wiki/Wind_chill*

Altitude

<i>Unit</i>	<i>Range</i>	<i>Resolution</i>	<i>Accuracy</i>
m	-2000 to 9000 m	1 m	± 15 m
ft	-6000 to 30000 ft	1 ft	± 50 ft

3. FRONT PANEL DESCRIPTION

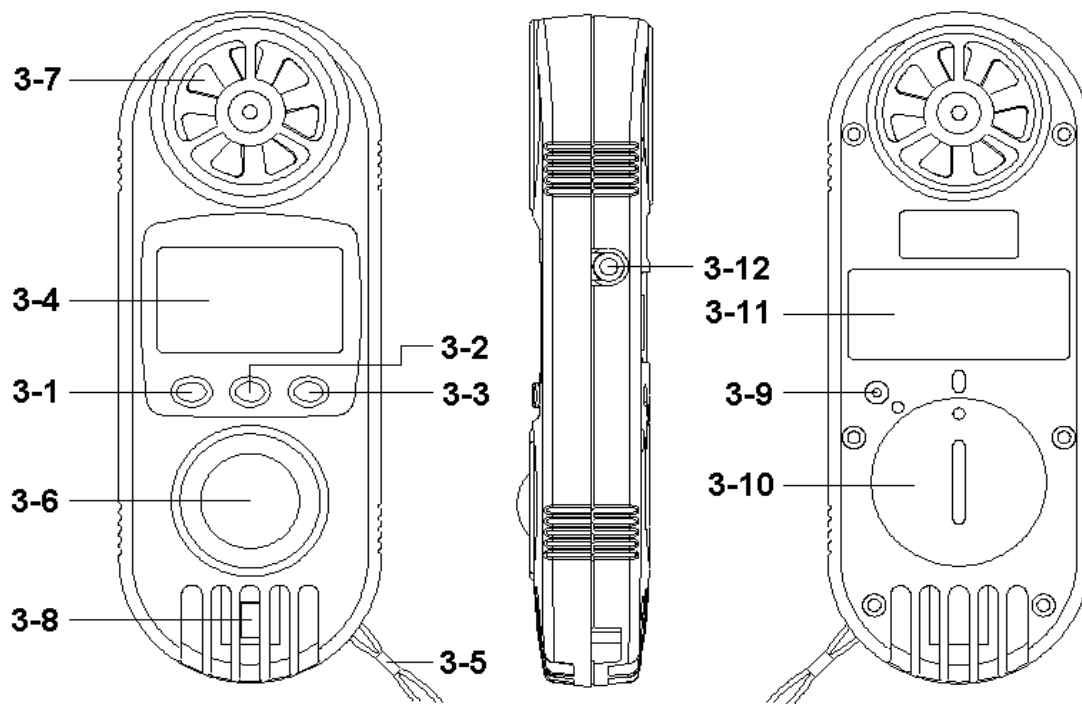




Fig. 1

- 3-1 Hold button
- 3-2  Button (Power button)
- 3-3 REC nutton
- 3-4 LCD display
- 3-5 Wristlet
- 3-6 Light Sensor
- 3-7 Anemometer Vane
- 3-8 Humdity/Temp. sensor
- 3-9 Barometer sensor
- 3-10 Battery Compartment / Cover
- 3-11 Button operation label
- 3-12 Pt 1000 ohm probe socket

4. MEASURING PROCEDURE

4-1 Power on/off

 Button = Power Button

1) Power on :

Press " Power Button " once.

2) Power off :

During power on, press " Power Button " > 3 seconds.
will power off.

4-2 LCD backlight on/off

During power on, press " Power Button " once, then the LCD backlight will be on 5 seconds then off automatically,

4-3 Function selection

The meter can select 11 kind function as :


- a. Anemometer (Air velocity/Temp.)
- b. Air flow (CMM, CFM)
- c. Wind chill
- d. Humidity/Temp.
- e. Dew point Temp.
- f. Wet bulb Temp.
- g. Heat index
- h. Light
- i. Barometric pressure
- j. Altitude
- k. Pt 1000 ohm Temp.(optional)

During power on, press the " Hold button " continuously (not release the button), the Display will show the following text in sequence :


<i>Display text</i>	<i>Function</i>
An	Anemometer (Air velocity/Temp.)
AirFL	Air flow (CMM, CFM)
CHiLL	Wind chill
rH	Humidity/Temp.
dP	Dew point
_Et	Wet bulb Temp.
HEAt	Heat index
LlGht	Light
bAr	Barometric pressure
HigH	Altitude
Pt	Pt 1000 ohm Temp.(optional)

Until the Display show the desired function, just release the " Hold button " , the meter will execute this function with default.

4-4 Unit selection

- 1) During power on, press the " REC button " continuously > 3 seconds, the Display will show the text " Unit " release the " REC button ", then press "  button " to select the desired unit, after the desired unit is selected, press the " REC button " to save the unit with default.

REC button = Enter button

2) If the Display with two units, such as anemometer with two Display, upper Display show the air velocity value, lower Display show the Temp. value. After finish the upper Display unit selection (already press the " REC buton " to enter) then can select the lower Display unit (°C, °F) following by pressing the "  button " once. After finish the lower Display unit selection, then press the " REC button " to save the lower Display unit with default.

The selection unit for all function are :

<i>Measurement</i>	Unit
Air velocity	M/S, Km/h, mph, knot, FPM
Temp. (Air velocity)	°C, °F
Air flow	CMM, CFM
Wind chill	°C, °F
Temp. (Humidity)	°C, °F
Dew point	°C, °F
Wet bulb Temp.	°C, °F
Heat index	°C, °F
Light	Lux, Ft-cd
Barometric pressure	hPa mmHg inHg * HPA = hpa, mHg = mmHg
Altitude	m, Ft
Pt 1000 ohm Temp.	°C, °F

4-5 Reverse the Display direction automatically

As intend to match the sensor convenient position, Light sensor should put on the top case side to prevent when hand hold the case may interrupt the sensor, the Display direction for Light measurement will reverse automatically will reverse automatically

4-6 Special attention for the Humidity measurement



Attention :

Intend to get the precision reading, for the Humidity / Temp. , Dew point Temp., Wet bulb Temp., Heat index measurement, the hand or fingers do not touch (or stay away) the Humidity sensor (3-8, Fig. 1).

4-7 Air flow measurement


1) Power on, select the function to " Air flow measurement " (refer to chapter 4-3), now the meter is ready for Air flow measurement.


2) Set the measurement area dimension :

Press the " Hold button " once, the Display will show the indicator " HOLD " then press the " REC button " continuously until the left down bottom of Display show " m-2 " or " F-2 "

m-2 = meter square

F-2 = ft square

3) Use the " Hold button " and the "  button " to adjust the air flow dimension value.
Until the desired dimension value is set, press " REC button " to save the setting value with default.

 button = ▲ button

Hold button = ▼ button

REC button = Enter button

4-8 The barometric pressure measurement

1) Actual air pressure in the measurement location (absolute air pressure value) measurement :

Power on, select the function to " Barometric pressure measurement " (refer to chapter 4-3, Display will show bAr text once awhile at first), now the meter is ready for the actual air pressure in the measurement location (absolute air pressure value).

Remark :


*Actual air pressure in the measurement location changes in response with two things :
changes in altitude and changes in atmosphere.*

2) Sea level barometric pressure value measurement


Not move the location, if intend to see the sea level barometric pressure value, the procedures are :

Press the " Hold button " once, the Display will show the indicator " HOLD " then press the " REC button " continuously until the left down bottom of Display show " m " or " Ft "

m = meter F = feet

Use the " Hold button " and the "  button " adjust the location altitude vale exactly..

Until the location altitude value is set, press " REC button " will show the sea level barometric pressure value.

 button = ▲ button, Hold button = ▼ button
REC button = Enter button

Remark :

After power off and on again, if select the " Barometric pressure " function again, the meter will show actual air pressure in the measurement location (absolute air pressure value) not the sea level barometric pressure value.

4-9 Altitude measurement

Altitude measurement principal :

The higher altitude location will get less barometric pressure value that compare with the sea level.


If intend to measure your altitude value precisely,




- a. Method 1 : It should set the altitude value of your start location is known at the first.
- or** b. Method 2 : It should reset the sea level barometric pressure value at the first.

1) Method 1

To set the altitude value of your start location is known at the first.

- a. Power on the meter and under the altitude function, press the " Hold button " once, the Display will show the indicator " HOLD " then press the " REC button " once, the left down bottom of Display show " m (or Ft) " indicator with flashing.

Use the " Hold button " and the "  button " adjust the location altitude value. Until the desired start location altitude value is set, press " REC button " to save the setting value with default.

 button =  button
Hold button =  button
REC button = Enter button


Remark :




You can obtain your altitude value from a topographical map or local landmark. Goggle Earth is an excellent free program the provides the exact altitude for given address : www.earth.google.com. The other you also can get the reference altitude value from the reading of GPS system.

2) Method 2

To reset the current sea level barometric pressure value is known at the first.

- a. Power on the meter and under the altitude function, press the " Hold button " once, the Display will show the indicator " HOLD " then press the " REC button " > 3 seconds and continuously until the left down bottom of Display show " HPA " indicator with flashing then release the " REC button ".

Use the " Hold button " and the "  button " adjust the current sea level barometric pressure value. Until the desired sea level barometric pressure value is set, press " REC button " to save the setting value with default.

 button =  button
Hold button =  button
REC button = Enter button

Remark :

You can obtain your current sea level barometric pressure value by checking an internet weather site for a nearby location or contacting a local airport.

4-10 Hold Function

Whenever press the " Hold Button " will freeze the current reading value with a "HOLD" symbol on the display.

To release the Hold function, just press the " Hold button " once again, the " HOLD " indicator will be disappeared.

** During execute the " REC function ", the Hold function is disable.*

4-11 REC (Record) function

- 1) The REC (Record) function can record and display the maximum and minimum reading values. Start the Record function by pressing the " REC Button " once. There will be a " REC " symbol on the display.
- 2) With the REC symbol on the display :
 - (a) Press the " REC button " 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 recorded MAX or MIN value by pressing the " Hold button " once. Previous recorded MAX/MIN value will be given up and then revert to the REC. function keep on recording.

4-12 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.

However if intend disable the " Auto power off " function, just execute the " REC " function (above chapter 4-10), then the Auto power off function will be canceled.

4-13 Option Pt 1000 ohm Temp. measurement

- 1) Insert the plug of the optional Pt 1000 ohm Temp. probe, TP-1000 into the " Pt 1000 ohm probe socket " (3-12, Fig. 1).
- 2) Power on the meter, select the function to " Pt 1000 ohm Temp. " (refer to chapter 4-3), now the meter is ready for Pt 1000 ohm Temp. measurement.

5. 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 " (3-10, Fig. 1) and remove the battery.
- 3) Install the battery (CR2032) and then reinstate the cover.