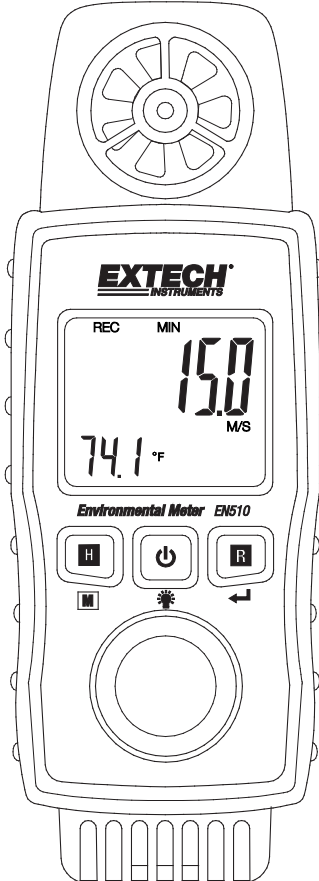


# **ENVIRONMENTAL METER**

**Model EN510**



## ***Introduction***

---

Thank you for selecting the Extech EN510 Environmental Meter. This instrument measures Air Velocity with Air temperature, Air Flow (volume), Light, Relative Humidity % with Air temperature, Dew Point temperature, Wet bulb temperature, Type K temperature (external probe), Heat Index temperature, and Wind Chill temperature. The backlit LCD includes primary and secondary displays plus a variety of intuitive status indicators. This device is shipped fully tested and calibrated and, with proper use, will provide years of reliable service. Please visit our website ([www.extech.com](http://www.extech.com)) to check for the latest version and translations of this User Manual, Product Updates, Product Registration, and Customer Support.

## ***Features***

---

- Professional environmental meter with programming menu for user-customization
- Selectable units of measure
- Air velocity with air temperature readings
- Air Flow (Volume) measurements in CFM (ft<sup>3</sup>) and CMM (m<sup>3</sup>) units
- Light measurements in Foot candle and LUX units
- Environmental measurements: Relative humidity % with air temperature, Dew point temperature, Wet bulb temperature, Wind chill temperature, Heat Index temperature, and Type K temperature (with external probe connected)
- Low-friction ball bearing mounted vane wheel for high accuracy low air velocity measurements
- Built-in barometric sensor for precise atmosphere and altitude monitoring
- MAX-MIN Recording
- Display Hold freezes displayed reading for convenience
- Compact, light-weight, easy-to-use, ergonomic design with lanyard
- Backlit LCD automatically reverses orientation to match selected sensor mode

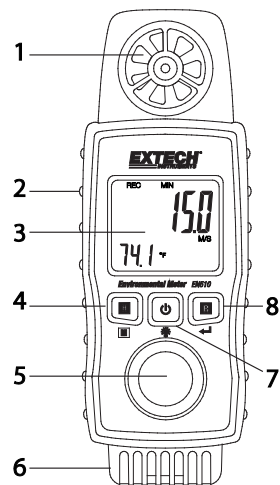
## ***Safety***

---

- Please read the entire User Manual and Quick Start before operating this device.
- Use the meter only as specified and do not attempt to service or open the meter housing.
- Do not allow children to handle the meter.
- Keep hands away from the internal relative humidity sensor (bottom of meter) when taking environmental measurements.

# Meter Description

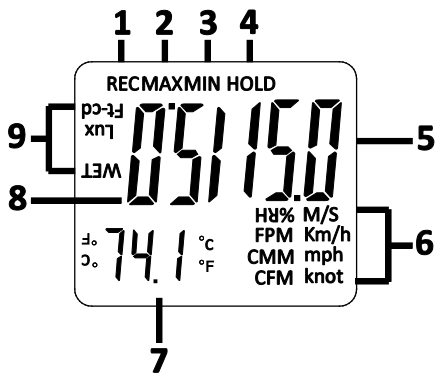
- 1. Air Velocity Vane
- 2. Type K Thermocouple Input
- 3. LCD Display
- 4. Display Hold / Mode Button
- 5. Light Sensor
- 6. Humidity/Temperature sensors
- 7. Power/Backlight button
- 8. MAX-MIN Record/Enter Button



Lanyard not pictured. Battery compartment and tripod mount on rear of meter

# LCD Description

- 1. MAX/MIN Record icon
- 2. MAX Display
- 3. MIN Display
- 4. Display Hold
- 5. Primary Display
- 6. Units of Measure
- 7. Temperature Display
- 8. Reverse Orientation Display
- 9. Units of Measure (for reverse display)



# Meter Functions

---

## Meter Power

- Three (3) 1.5V 'AAA' batteries power the meter. The battery compartment is located on the rear of the meter secured by one flat head screw.
- Short press the power button to switch the meter ON. The meter will begin displaying readings for the mode selected.
- Long press the power button to power OFF the meter.

## Auto Power OFF (APO)

In order to conserve battery life, the meter will automatically switch off after approximately 10 minutes of inactivity. Note that APO does not function while the meter is in the MAX-MIN Recording mode (short press the **R** button to access the MAX-MIN Recording mode).

## Selecting the Operating Mode

Long press the **M** (Mode) button to scroll through the list of functions. When the desired mode is displayed, release the button. See display icons with brief descriptions below:

- **An** Anemometer (Air Velocity plus Air temperature)
- **AirFL** Air flow (Volume) in CFM and CMM units
- **CHiLL** Wind chill temperature
- **rH** Relative Humidity in % and Air temperature
- **dP** Dew point temperature
- **\_Et** Wet bulb temperature
- **HEAt** Heat index temperature
- **LigHt** Light intensity measurements
- **tYPE** Type K thermocouple temperature (must attach thermocouple to meter)

## Changing the Units of Measure

1. Press and hold the R button until the word 'Unit' appears.
2. Now short press the power button to change the units for the selected measurement mode.
3. Short press  to save the selection and move to the secondary function, if applicable (temperature, for example). Short press the power button to change the secondary function units, if applicable, and then short press  to save.
4. See units list below:

Air Velocity units    M/S, km/h, mph, knot, FPM

Air Flow units        CFM (ft<sup>3</sup>) and CMM (m<sup>3</sup>)

Temperature units   °C, °F (for air, wind chill, dew point, wet bulb, heat index, and Type K)

Light units            Foot-candles, LUX

## Reversible Backlight LCD

The LCD display automatically reverses its presentation orientation depending on measurement mode. This is to match the display orientation with the selected sensor mode (light, air velocity, or environmental measurements such as Wet bulb temperature).

The LCD is equipped with backlighting for easier viewing, especially in dimly lit areas. With the meter powered ON, short press the power button to turn ON the backlight. The backlight will power OFF after several seconds.

## Display Hold

Short press the **H** (Hold) button to freeze and unfreeze the displayed reading. The Display Hold mode is not operational when using the MAX-MIN Recording mode.

## MAX-MIN Record Mode

In this mode, the meter records the maximum and minimum readings over time.

- Short press the **R** (Record) button to start recording MAX/MIN readings.
- Now use short presses of the **R** button to toggle MAX and MIN reading displays.
- Short press the **H** button to reset MAX and MIN memories.
- Press and hold the **R** button to exit the Recording mode.

## *Measurement Modes*

---

### Air Velocity with Air temperature

- With the meter ON, press and hold the **M** (Mode) button until '**An**' is displayed; then release the button.
- Hold the measurement vane in the air stream (in either direction).
- View the air velocity and air temperature readings on the LCD.

### Light Measurements

- Press and hold the **M** button until '**Light**' is displayed; then release.
- Hold the meter so that the source of light fully encompasses the light sensor dome.
- View the light reading on the LCD (light readings are displayed in reverse orientation).

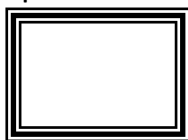
### Type K/Wind chill/Relative Humidity/Dew point/Wet bulb/Heat index Measurements

- Press and hold the **M** button until the desired function is displayed:
- **CHiLL** Wind chill; **rH** Relative Humidity (with air temperature); **dP** Dew point; **\_Et** Wet bulb; **HEAt** Heat index; **tYPE** Type K thermocouple temperature (attach thermocouple to meter)
- Place the meter or type K probe in the measurement area and view the readings on the LCD.

## Air Flow (CFM, CMM) Volume Measurements

- Press and hold the **M** button until 'AirFl' appears.
- Enter the duct area (in square feet or meters) by short pressing **M** and long pressing **R** until 'm-2' (m<sup>2</sup>) or 'f-2' (ft<sup>2</sup>) appears. Short press the power button to increase or **H** to decrease the area; Long press the power or **H** button to scroll quickly. See area equations below.
- Short press **↵** to save.
- Remember to convert inches, centimeters, or other unit to square feet or square meters before entering the area; otherwise, the air flow readings will not be correct.
- Place the vane in the air duct and read the air flow reading in CFM (ft<sup>3</sup>) or CMM (m<sup>3</sup>) units on the LCD.

### Area equation for rectangular or square ducts

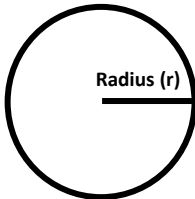


Width (W)

Height (H)

$$\text{Area (A)} = \text{Width (W)} \times \text{Height (H)}$$

### Area equation for circular ducts



Radius (r)

$$\text{Area (A)} = \pi \times r^2$$

Where  $\pi = 3.14$  and  $r^2 = \text{radius} \times \text{radius}$

### Cubic equations

$$\text{CFM (ft}^3/\text{min)} = \text{Air Velocity (ft/min)} \times \text{Area (ft}^2\text{)}$$

$$\text{CMM (m}^3/\text{min)} = \text{Air Velocity (m/s)} \times \text{Area (m}^2\text{)} \times 60$$

## Maintenance

---

### Battery Replacement

When the low battery icon  appears on the display please replace the batteries as described below.

1. Remove power from the meter.
2. Remove the flat head screw that secures the battery compartment at the back of the meter.
3. Open the battery compartment and replace the three (3) 1.5V 'AAA' batteries observing correct polarity. Re-assemble the meter before use.

**Safety:** Please dispose of batteries responsibly; never dispose of batteries in a fire, batteries may explode or leak. If the meter is not to be used for 60 days or more, remove the batteries and store separately.



Never dispose of used batteries or rechargeable batteries in household waste.

As consumers, users are legally required to take used batteries to appropriate collection sites, the retail store where the batteries were purchased, or wherever batteries are sold.

**Disposal:** Do not dispose of this instrument in household waste. The user is obligated to take end-of-life devices to a designated collection point for the disposal of electrical and electronic equipment.

### Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. Do not allow moisture to come in contact with any of the sensors.

# Specifications

| General                                |                                                                                                                                                                                                  |                                       |          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------|
| Display                                | Backlit LCD 3.0 x 3.5 cm (1.18 x 1.38")                                                                                                                                                          |                                       |          |
| Air Velocity Sensor                    | Low friction ball bearing vane                                                                                                                                                                   |                                       |          |
| Light sensor                           | Cosine/color-corrected photo-diode                                                                                                                                                               |                                       |          |
| Air Temperature sensor                 | PT1K ohm RTD (internal sensor)                                                                                                                                                                   |                                       |          |
| Relative Humidity sensor               | Capacitance sensor                                                                                                                                                                               |                                       |          |
| Measurements                           | Air Velocity with Air Temperature, Relative Humidity with Air Temperature, Light, Air Flow, Dew Point, Wet Bulb, Wind Chill, Heat Index, and Type K Temperature (requires external thermocouple) |                                       |          |
| Tripod mount                           | On rear of meter                                                                                                                                                                                 |                                       |          |
| Operating Humidity                     | 80% RH Max                                                                                                                                                                                       |                                       |          |
| Operating Temperature                  | 0 to 50°C (32 to 122°F)                                                                                                                                                                          |                                       |          |
| Over Limit Display                     | "_ _ _ _"                                                                                                                                                                                        |                                       |          |
| Power Supply                           | 3 x 1.5V AAA batteries                                                                                                                                                                           |                                       |          |
| Power Consumption                      | Approximately 5mA DC                                                                                                                                                                             |                                       |          |
| Weight                                 | 160g (5.6oz)                                                                                                                                                                                     |                                       |          |
| Dimensions (HxWxD)                     | 153x 58x 25mm (6.0 x 2.3 x 1.0 inch)                                                                                                                                                             |                                       |          |
| Air Velocity plus Air Temperature      |                                                                                                                                                                                                  |                                       |          |
| Units                                  | Range                                                                                                                                                                                            | Resolution                            | Accuracy |
| ft/min (FPM)                           | 80 to 3937                                                                                                                                                                                       | 1                                     | ±3% F.S. |
| m/s                                    | 0.4 to 20.0                                                                                                                                                                                      | 0.1                                   |          |
| km/h                                   | 1.4 to 72.0                                                                                                                                                                                      | 0.1                                   |          |
| MPH                                    | 0.9 to 44.7                                                                                                                                                                                      | 0.1                                   |          |
| knots                                  | 0.8 to 38.8                                                                                                                                                                                      | 0.1                                   |          |
| °C                                     | 0 to 50                                                                                                                                                                                          | 0.1°                                  | ±1.2°C   |
| °F                                     | 32 to 122                                                                                                                                                                                        | 0.1°                                  | ±2.5°F   |
| <i>Ft/min and FPM: feet per minute</i> |                                                                                                                                                                                                  | <i>MPH: miles per hour</i>            |          |
| <i>m/s: meters per second</i>          |                                                                                                                                                                                                  | <i>knots: nautical miles per hour</i> |          |
| <i>km/h: kilometers per hour</i>       |                                                                                                                                                                                                  |                                       |          |



| Relative Humidity plus Air Temperature                                                          |                                    |                                                                        |                                                   |
|-------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------------|---------------------------------------------------|
| %RH                                                                                             | 10 to 95                           | 0.1                                                                    | ±(4%RH) @ < 70%RH<br>±(4%rdg +1.2%RH) @ > 70%RH   |
| °C                                                                                              | 0 to 50                            | 0.1                                                                    | ±1.2°C                                            |
| °F                                                                                              | 32 to 122                          | 0.1                                                                    | ±2.5°F                                            |
| Light (automatic ranging)                                                                       |                                    |                                                                        |                                                   |
| Lux                                                                                             | 0 to 2,200                         | 1                                                                      | ±(5%rdg + 8dgts)                                  |
|                                                                                                 | 1,800 to 20,000                    | 10                                                                     |                                                   |
| Ft-cd                                                                                           | 0 to 204.0                         | 0.1                                                                    |                                                   |
|                                                                                                 | 170 to 1,860                       | 1                                                                      |                                                   |
| Air Flow                                                                                        |                                    |                                                                        |                                                   |
| CMM (m³)                                                                                        | 0.024 to 36000                     | 0.001 / 0.01 / 0.1 / 1<br>0.001 / 0.01 / 0.1 / 1 / 10(x10) / 100(x100) |                                                   |
| CFM (ft³)                                                                                       | 0.847 to 1271300                   |                                                                        |                                                   |
| Dew Point Temperature                                                                           |                                    |                                                                        |                                                   |
| Unit                                                                                            | Range                              | Resolution                                                             | Accuracy                                          |
| °C                                                                                              | -25.3 to 49.0                      | 0.1                                                                    | Calculated from temperature and humidity readings |
| °F                                                                                              | -13.5 to 120.0                     | 0.1                                                                    |                                                   |
| Wet Bulb Temperature                                                                            |                                    |                                                                        |                                                   |
| °C                                                                                              | -5.4 to 49.0                       | 0.1                                                                    | Calculated from temperature and humidity readings |
| °F                                                                                              | 22.2 to 120                        | 0.1                                                                    |                                                   |
| Heat Index                                                                                      |                                    |                                                                        |                                                   |
| °C                                                                                              | 0 to 100.0                         | 0.1                                                                    | ±2.0°C                                            |
| °F                                                                                              | 32 to 212                          | 0.1                                                                    | ±3.6°F                                            |
| Exposure to direct sunlight can increase heat index readings by 8°C (14°F)                      |                                    |                                                                        |                                                   |
| Type K Thermometer                                                                              |                                    |                                                                        |                                                   |
| °C                                                                                              | -50.0 to 1300.0<br>-50.1 to -100.0 | 0.1                                                                    | ±(0.4% + 0.5°C)<br>±(0.4% + 1°C)                  |
|                                                                                                 | °F                                 |                                                                        | -58.0 to 2372.0<br>-58.1 to -148.0                |
| Accuracy is stated for meter only. Additional error is introduced by the external Type K probe. |                                    |                                                                        |                                                   |
|                                                                                                 |                                    |                                                                        |                                                   |

| Wind Chill                                                                                                          |               |      |         |
|---------------------------------------------------------------------------------------------------------------------|---------------|------|---------|
| °C                                                                                                                  | -9.4 to 44.2  | 0.1° | ±2.0 °C |
| °F                                                                                                                  | 15.0 to 112.0 | 0.1° | ±3.6 °F |
| <i>Wind chill value is displayed only when the temperature is &lt; 15°C (59°F) and air velocity is &gt; 1.4 m/s</i> |               |      |         |

## Unit of Measure Conversion Table

---

|                 | m/s     | ft/min | knots   | km/h    | MPH     |
|-----------------|---------|--------|---------|---------|---------|
| <b>1 m/s</b>    | 1       | 196.87 | 1.944   | 3.6     | 2.24    |
| <b>1 ft/min</b> | 0.00508 | 1      | 0.00987 | 0.01829 | 0.01138 |
| <b>1 knot</b>   | 0.5144  | 101.27 | 1       | 1.8519  | 1.1523  |
| <b>1 km/h</b>   | 0.2778  | 54.69  | 0.54    | 1       | 0.6222  |
| <b>1 MPH</b>    | 0.4464  | 87.89  | 0.8679  | 1.6071  | 1       |

**Copyright © 2017 FLIR Systems, Inc.**

All rights reserved including the right of reproduction in whole or in part in any form

**ISO-9001 Certified**

**[www.extech.com](http://www.extech.com)**