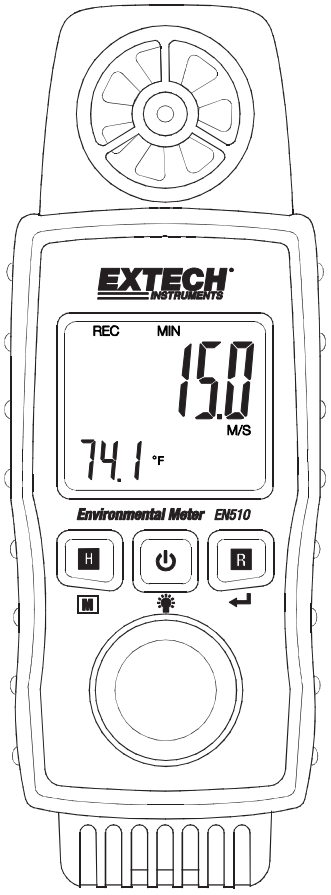
EXTECH®

USER MANUAL

ENVIRONMENTAL METER

MODEL EN510



Additional User Manual Translations available at www.extech.com

Introduction

Thank you for selecting the Extech EN510 Environmental Meter. This instrument measures air velocity plus air temperature, air flow (volume), light, relative humidity plus air temperature, dew point temperature, wet bulb temperature, thermocouple temperature (type-K external probe), heat index temperature, and wind chill temperature.

The backlit display has primary and secondary display digits and 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 the Extech website to check for the latest version, and translations, of this user manual and customer support.

Features

- Professional environmental meter with intuitive programming menu
- Selectable units of measure
- Air flow (volume) measurements in CFM (ft^3) and CMM (m^3) units
- Light measurements in foot candle and lux units
- Low-friction ball bearing 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
- Compact, lightweight, easy-to-use, ergonomic design with lanyard
- Backlit display automatically reverses orientation to match selected mode

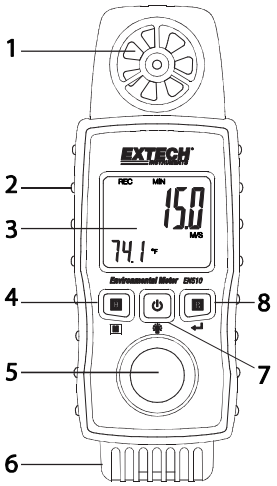
Safety

- 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

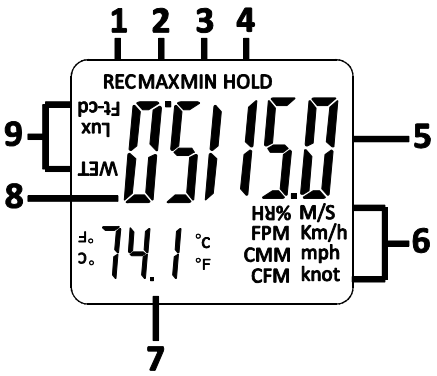
1. Air velocity vane
2. Type K thermocouple Input
3. Display (LCD)
4. Display Hold and Mode button
5. Light sensor
6. Humidity and temperature sensors
7. Power and Backlight button
8. MAX-MIN Record and Enter button

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



Display 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 ON the meter. The meter will begin displaying readings for the selected mode.

Long press the power button to switch OFF the meter.

Auto Power OFF (APO)

To conserve battery life, the meter will automatically switch OFF after approximately 10 minutes of inactivity. APO is disabled in the MAX-MIN recording mode (short press the **R** button to access the recording mode).

Selecting the Mode of Operation

Long press the **M** (Mode) button to scroll through the function list (see below). When the desired mode is displayed, release the button.

- **An** Anemometer (air velocity plus air temperature)
- **AirFL** Air flow (volume) in CFM and CMM units
- **CHiLL** Wind chill temperature
- **rH** Relative humidity in % plus 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)

Changing the Units of Measure

1. Long press the **R** button until the word '**Unit**' appears.
2. Short press the power button to change the units for the selected 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^3) and CMM (m^3)
   - **Temperature units:** ^oC, ^oF
   - **Light units:** Foot candles, Lux

Reversible Display with Backlight

The display automatically reverses orientation depending on measurement mode.

The display is equipped with backlighting. With the meter ON, short press the power button to switch ON the backlight. The backlight will power OFF automatically after several seconds.

Display Hold

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

MAX-MIN Record Mode

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

- Short press the **R** (Record) button to start recording. The **REC** icon will appear.
- Short press the **R** button to toggle MAX and MIN readings. The **MAX** and **MIN** icons indicate which reading is shown.
- Short press the **H** button to reset MAX and MIN memories.
- Long press the **R** button to exit the Recording mode.

Measurement Modes

Air Velocity with Temperature

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

Light Measurements

- Long press the **M** button until '**LigHt**' is displayed.
- Hold the meter so that the source of light fully encompasses the sensor dome.
- View the reading on the display (light readings are displayed in reverse orientation).

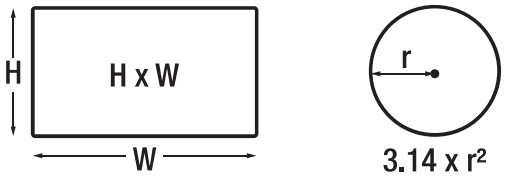
Type K, Wind Chill, RH, Dew Point, Wet Bulb, Heat index Measurements

- Long press 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 in the measurement area and view the reading on the display. For thermocouple measurements, touch the probe tip to the object under test and read the temperature measurement on the display.

Air Flow (CFM, CMM) Volume Measurements

1. Long press the **M** button until '**AirFl**' appears.
2. Enter the duct area (in square feet or meters) by short pressing **M** and then long pressing **R** until '**m-2**' (m^2) or '**f-2**' (ft^2) appears.
3. 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.
4. Short press ↵ to save.
5. Be sure to convert inches or centimeters to square feet or square meters before entering the area; otherwise, the air flow readings will be incorrect.
6. Place the vane in the air duct and read the air flow reading in CFM (ft^3) or CMM (m^3) units on the display.

Area Equations for Rectangular and Circular Ducts



Cubic equations

CFM (ft^3/min) = Air Velocity (ft/min) x Area (ft^2)

CMM (m^3/min) = Air Velocity (m/s) x Area (m^2) x 60

Air Volume Examples

EXAMPLE 1: METRIC UNITS

In this example, the duct is 8 x 12 centimetres, and the measured linear air velocity is 10 m/s.

1. Convert 8 x 12 centimetres to metres (divide by 100). 8 x 12 cm = 0.08 x 0.12 m.
2. Multiply 0.08 x 0.12 to calculate the area in square metres (0.0096 m^2).
3. Multiply 0.0096 by the measured linear air velocity (10 m/s in this example) to calculate the volume in cubic meters per second (0.096 m^3/second).
4. Multiply 0.096 x 60 to calculate the air volume in cubic meters per minute= 5.72 m^3/minute.

EXAMPLE 2: IMPERIAL UNITS

In this example, the duct is 8 x 12 inches, and the measured linear air velocity is 400 ft/min.

1. Convert 8 x 12 inches to feet (divide each dimension by 12). 8 x 12 in. = 0.66 x 1 ft.
2. Multiply 0.66 x 1 to calculate the area in square feet (0.66 ft^2).
3. Multiply 0.66 by the measured linear air velocity (400 ft/min in this example).
4. The volume of air (cubic feet per minute [CFM]) is 266.66 ft^3/minute.

Maintenance

Battery Replacement

The low battery icon appears when the batteries must be replaced.

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.

Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. Avoid getting the sensors wet.

Specifications

General			
Display	Backlit LCD 1.2 x 1.4 in. (3.0 x 3.5 cm)		
Air Velocity Sensor	Low friction ball bearing vane		
Light sensor	Cosine and color-corrected photo diode		
Air Temperature sensor	Platinum 1k ohm RTD (internal) type		
Relative Humidity sensor	Capacitance type		
Measurements	Air Velocity Air Temperature, Relative Humidity, Light, Air Flow, Dew Point, Wet Bulb, Wind Chill, Heat Index, and Type K Temperature		
Tripod mount	Back of meter		
Operating Humidity	< 80% RH		
Operating Temperature	32 to 122˚F (0 to 50˚C)		
Over range display	Dashes (- - - -)		
Power Supply	3 x 1.5V AAA batteries		
Power Consumption	Approximately 5mA DC		
Weight	5.6 oz. (160 g)		
Dimensions (H x W x D)	6.0 x 2.3 x 1.0 in. (153 x 58 x 25 mm)		
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

Ft/min and FPM: feet per minute

m/s: meters per second

km/h: kilometers per hour

MPH: miles per hour

knots: nautical miles per hour

Relative Humidity plus Air Temperature			
%RH	10 to 95	0.1	± (4%RH) @ < 70% RH ± (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 (Volume)			
CMM (m^3)	0.024 to 36000	0.001 / 0.01 / 0.1 / 1	
CFM (ft^3)	0.847 to 1271300	0.001 / 0.01 / 0.1 / 1 / 10 (x10) / 100 (x100)	
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 -50.1 to -100.0	0.1	± (0.4% + 0.5°C) ± (0.4% + 1°C)
°F	-58.0 to 2372.0 -58.1 to -148.0	0.1	± (0.4% + 1°F) ± (0.4% + 1.8°F)
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
Wind chill value is displayed only when the temperature is < 59°F (15°C) and air velocity is > 1.4 m/s			

Unit of Measure Conversion Table

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

Two-year Warranty

Teledyne FLIR warrants this Extech brand instrument *to be free of defects in parts and workmanship for* ***two years*** *from date of shipment. To view the full warranty text please visit:*
https://www.flir.com/support-center/warranty/instruments/extech-product-warranty/

Calibration and Repair Services

Teledyne FLIR offers calibration and repair services *for the Extech brand products we sell. We offer NIST traceable calibration for most of our products.*

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