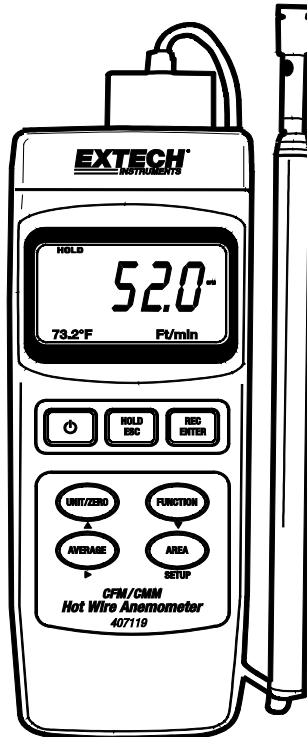# EXTECH®

User Manual

Heavy Duty Hot Wire CFM Thermo-Anemometer

Model 407119

Introduction

Congratulations on your purchase of the Extech 407119 Thermo-Anemometer. The 407119 measures air velocity, air volume, and air temperature. A telescoping probe antenna allows convenient access to grills and diffusers. Careful use of this meter will provide years of reliable service.

Features

- Combination hot wire probe (air velocity) and thermistor sensor (temperature) deliver rapid and precise measurements even at low air velocity values
- Slim probe design with telescoping antenna for easy grill and diffuser access
- Air Velocity, Air Volume, and Air Temperature measurements
- 20 Reading Average feature
- Zero adjustment
- Data Hold and Record/Recall Max/Min features
- Auto Power OFF
- PC Interface (RS-232) with optional software and cable for data acquisition

Applications

Environmental testing, air conveyors, flow hoods, clean rooms, air balancing, fans/motors/blowers, furnace velocity, paint spray booths, and others.

Meter Description

1. Display
2. POWER button
3. HOLD and ESC button
4. REC and ENTER button
5. UNIT, ZERO, and ▲ up arrow button
6. Function and ▼ down arrow button
7. AVG. and ► right arrow button
8. AREA SETUP button
9. Tilt stand
10. Battery compartment
11. Tripod mount
12. Display contrast adjustment
13. System reset switch
14. RS-232 output terminal
15. 9V power adaptor port
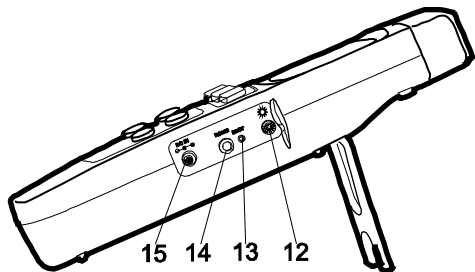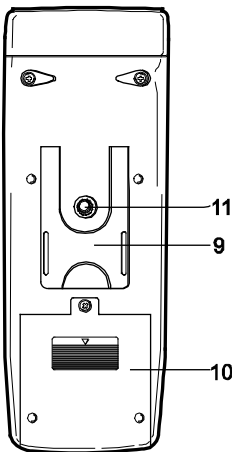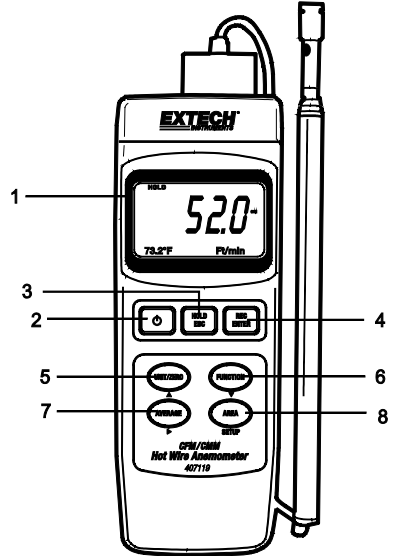
Operation

Initialization and Zero procedures (please follow these steps before use)

Important Note: The meter's probe locking switch must be in the locked position (with the probe inserted) for the meter to turn on and operate correctly. Refer to the accompanying diagram or the diagram at the top of the meter for switch orientation.

TOP VIEW OF METER

LOCKED Position

UNLOCKED Position

For the best accuracy and for proper operation, the following steps must be performed.

1. Connect the sensor to the input jack at the top of the meter by first unlocking the sensor jack and then inserting the sensor plug. Lock the sensor jack after the probe is inserted.

2. Press the POWER button to turn on the meter. The meter will perform a self-test during which the display will count down from 9999 to 0000.

3. Select the air velocity function using the FUNCTION button. The display will indicate the most recently selected unit of measure for air velocity.

4. To change the temperature unit of measure (C/F), use the advanced programming mode discussed later in this manual.

5. Momentary presses of the UNIT button change the air velocity units. The display will reflect the selection.

6. Place the sensor cover in the up (ZERO) position (see diagram below).

7. Open the telescoping sensing antenna to a convenient length.

8. Place the sensor in the area to be measured and allow time for it to stabilize to the ambient temperature.

9. To Zero the display, long press the ZERO button until the second beep is heard.

Warning! Do not touch the air velocity or temperature thermistors inside the sensor head while moving the sensor cover.
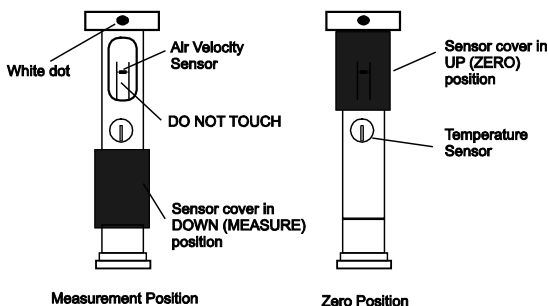

White dot — Air Velocity Sensor — DO NOT TOUCH — Sensor cover in DOWN (MEASURE) position

Measurement Position

Sensor cover in UP (ZERO) position — Temperature Sensor

Zero Position

Air Velocity Measurements

1. Follow the Initialization and Zeroing procedures, above, before continuing.

2. Open the antenna to the desired length.

3. Slide the air velocity sensor cover down.

4. Press the POWER button to turn the meter on.

5. Place the sensor in the air current to be measured. Have the air flow meet the sensor head in the direction of the white dot (as shown in diagram).

Air Direction

6. View the air velocity and temperature readings on the Display. The large main display area shows the air velocity reading. The lower display digits show the temperature reading (left) and the unit of measure (right).

7. To turn the meter off, long press the POWER button until the meter switches off.

Air Flow (Volume) Measurements (CMM / CFM)

NOTE: Temperature is not displayed while the meter is in the air flow mode.

1. Follow the steps in the Initialization and Zeroing section, above, before continuing.

2. Select the air flow mode using the Function button. The display will indicate CMM (cubic meters per minute) or CFM (cubic feet per minute) when air flow is selected.

3. Press the UNIT button momentarily to select the desired air flow units (CMM or CFM). The display will indicate the selection.

4. Calculate the area of the duct or vent under test (refer to the Useful Conversions and Equations section, below). Be sure to compute the area of the vent or duct in square feet or meters. If you have the area in inches or centimeters, convert to feet or meters before entering the area value.

5. Press the AREA SET button to begin entering the area in m^2 or ft^2. The left digit will begin flashing. Follow the steps below to enter the area of the duct or vent:

   Use the ► button to select a digit to change (digit will flash)
   Use the ▲ button to increase the value of the flashing digit
   Use the ▼ button to decrease the value of the flashing digit

6. Press the REC/Enter button and then the AREA SET button to save the new area value.

7. After the area has been entered, the new area value will be shown on the lower left of the display in ft^2 or m^2. If the unit of measure is CFM, the area will be shown in square feet. If the unit of measure is CMM, the area will be shown in meters squared.

8. Press the ESC button to abort the programming at any time.

9. Place the probe in the area under test. The main display digits will indicate the air flow in CFM or CMM. If the reading exceeds 99999, use the displayed x10 multiplier to calculate the reading.

10. To turn the meter off, long press the POWER button.

AVERAGE Feature for the Air Flow Mode

In the Average mode, up to 20 readings can be stored and averaged.

1. In the air flow mode (discussed earlier), short press the FUNCTION button until the AVG icon and 'zero' appears on the lower display area.

2. Press the AVG START button to record the current reading. A '1' will appear on the lower display area indicating that one reading has been stored.

3. Use the AVG START button to average up to 20 measurements. The number on the lower display area will increment with each press of the AVG START button. Note that only the averaged reading is shown while in this mode, not the actual reading.

4. To clear (erase) all the currently stored readings and start again, long press the AVG button until the meter beeps twice. The counter resets to '0' and the meter is ready to start another averaging session.

5. Use the FUNCTION button to exit this mode.

Data Hold Feature

1. While taking measurements, press the HOLD button to freeze a reading.

2. The HOLD indicator will appear on the display.

3. Press HOLD again to return to normal operation.

Maximum (MAX) and Minimum (MIN) Recording

The MAX / MIN Record-Recall feature allows the user to record and view the highest and lowest readings during a measurement session.

1. Press the REC button once. The REC indicator will appear on the display and the meter will begin recording the MAX and MIN values.

2. To view the MAX reading, press REC again. The MAX indicator along with the maximum reading will appear.

3. Press REC again to view the minimum value, the MIN indicator along with the minimum reading will appear.

4. To return to normal operation, long press the REC button until the meter beeps. The display indicators REC, MAX, and MIN will disappear.

Note: Auto Power Off is disabled in the RECORD mode.

Auto Power Off

The meter will automatically switch off after approximately 15 minutes of inactivity. To temporarily disable this feature (until the meter's power is cycled), press the REC button to enter the RECORD mode. Alternatively, use the Advanced Programming menu to disable it long term.

Advanced Programming

From the air velocity mode, long press the SET button until the meter beeps and a '1' is displayed. The Auto Power OFF and Temperature Units settings are available in this menu. Use the ESC button to exit at any time.

Auto Power Enable/Disable

Use the up and down arrow keys to select the desired value. '0' defeats the Auto Power OFF feature; '1' enables the Auto Power OFF feature. Short press the SET button to move to the next parameter.

Temperature Units selection (C/F)

Use the up and down arrow keys to select the desired value. '0' selects degrees 'C'; '1' selects degrees 'F'. Press the Rec/Enter button to confirm. Press the ESC button to exit.

System Reset

If the display freezes, perform a system reset, using one of the following methods.

1. Move the probe lock switch from ON to OFF and then back to ON, and then switch the meter ON.

2. Press and hold the RESET button (side compartment) using a paper clip or similar tool while switching the meter ON.

RS-232/USB PC Interface

To stream data to a PC, using the meter's RS232 output jack, download the 407001-USB kit along with the 407001-PRO software, available free at the link below. www.extech.com/software/downloads

Battery Replacement

When the battery icon appears on the lower left corner of the display, the four (4) 'AA' batteries must be replaced. Please dispose of batteries responsibly.

1. Remove the rear Phillips head screw.
2. Slide off the rear battery compartment.
3. Replace the batteries.
4. Secure the battery compartment.

Specifications

|	
Display	Dual function 5-digit LCD
Measurement units	Air Velocity: m/s, km/h, ft/min, knots, mph; Air Flow: CMM (m^3/min) and CFM (ft^3/min); Temperature: °C and °F
Data hold	Freezes displayed reading
Sampling rate	Display update rate: 1 second (approx.)
Sensors	Air velocity and temperature sensors (Thermistor)
MAX/MIN Memory	Record and view Maximum and Minimum readings
Average feature	Average up to 20 readings
Automatic Power off	Auto shut off after 15 minutes
Data Output	RS-232 PC serial interface with 16-bit data stream
Operating Temperature	32 to 122°F (0 to 50°C)
Operating Humidity	80% Relative Humidity (maximum)
Power Supply	Four (4) 'AA' 1.5V batteries or optional power adaptor
Power Current	70 mA DC (approx.)
Weight (meter only)	1.15 lbs. (521 g) with batteries
Dimensions	Meter: 7.9 x 3.0 x 1.5 in. (200.0 x 76.2 x 36.8 mm) Sensor: 0.5 in. (12.7 mm) diameter Min length of sensor: 8 in. (260 mm) Max. length sensor: 37 in. (0.94 m) Cable length: 5.5 ft. (1.7 m)

Range Specifications

Air Velocity	Range	Resolution	Accuracy (of rdg)
m/s (meters per second)	0.2 – 17.0 m/s	0.1	±(5%rdg + 0.5 m/s)
km/h (kilometers per hour)	0.7 – 61.2 km/h	0.1	±(5%rdg + 1.8 km/h)
ft/min (feet per minute)	40 – 3346 ft/min	1	±(5%rdg + 98 ft/min)
mph (miles per hour)	0.5 – 38.0 mph	0.1	±(5%rdg + 1.1 mph)
knots (nautical miles per hour)	0.4 to 33.0 knots	0.1	±(5%rdg + 1.0 knots)
Air Flow	**Range**	**Resolution**	**Area Range**
CMM (cubic meters per min.)	0 – 36,000 m^3/min	0.001 to 1	0.001 to 30.0 m^2
CFM (cubic feet per minute)	0 – 1,271,200 ft^3/min	0.01 to 100	0.01 to 322.91ft^2
Air Temperature	**Range**	**Resolution**	**Accuracy**
	32 to 122°F (0 to 50°C)	0.1°C/F	±3.6°F (2.0°C)

Useful Equations and Conversions
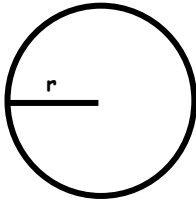
Area equation for rectangular or square ducts

Area (A) = Width (W) x Height (H)

Height (H)

Width (W)
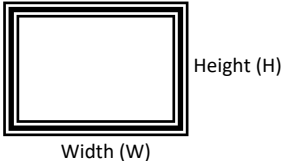
Area equation for circular ducts

Area (A) = pi x r^2
Where pi= 3.14 and r^2 = radius x radius

r

Cubic equations

CFM (ft^3/min) = Air Velocity (ft/min) x Area (ft^2)
CMM (m^3/min) = Air Velocity (m/sec) x Area (m^2) x 60

NOTE: Measurements made in *inches* must be converted to *feet* or *meters* before using the above formulae.

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

Three-year Warranty

*Teledyne FLIR warrants this Extech brand instrument to be free of defects in parts and workmanship for **three years** from date of shipment (a six-month limited warranty applies to sensors and cables). To view the full warranty text please visit: https://www.flir.com/support-center/warranty/instruments/extech-product-warranty/.*

Calibration and Repair Services

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

Contact Customer Support

Local Telephone Support List: *https://support.flir.com/contact*

Return Material Authorization (RMA): *https://customer.flir.com/Home*

Customer Service: *https://support.flir.com/ContactService*

Technical Support: *https://support.flir.com*