User's Guide

EXTECH INSTRUMENTS

Heavy Duty CFM Thermo-Anemometer

Model 407113

Introduction

Congratulations on your purchase of the Extech 407113 CFM meter. This handheld meter can display Air Flow (CFM) with Area or Air Velocity with Temperature on a 10,000-count (0 to 9999) dual display LCD. Other functions include MIN/MAX Record/Recall, RS-232 PC interface, and Data Hold. The metal vane sensor offers rugged durability and higher temperature withstand than comparable devices. Careful use of this meter will provide years of reliable service.

Specifications

General Specifications

Display	Dual Display Multi-function 10,000-count (0 to 9999) LCD
Measurements	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	One (1) reading per second
Sensors	Air velocity/flow sensor: Metal angled vane arms with low-friction ball bearing. Temp. Sensor: Precision thermistor
MIN/MAX	Records/Recalls lowest and highest readings
Auto Power OFF	Automatic shut off after 15 minutes
PC Interface	RS-232 Serial Communications (16-bit data stream)
Over range indication	**1**___ appears on the LCD
Low battery indication	**LBT** appears on the LCD
Power supply	9V Battery (consumption 8.3mA approx.)
Operating conditions	Meter: 32 to 122°F (0 to 50°C); 80% RH max. Sensor: 32 to 175°F (0 to 80°C)
Dimensions / Weight	Main instrument: 7.1 x 2.8 x1.3" (180 x 72 x 32mm) Sensor head: 2.8" (72mm) diameter
Weight	0.84 lbs. (381g) for meter and sensor

Range Specifications

Air Velocity Measurements	**Range**	**Resolution**	**Accuracy (%rdg)**
m/s (meters per second)	0.50 - 40.00 m/s	0.01 m/s	± (2% + 0.2m/s)
km/h (kilometers per hour)	1.8 – 144.0 km/h	0.1 km/h	± (2% + 0.2km/h)
ft/min (feet per minute)	100 – 7880 ft/min	1 ft/min	± (2% + 20ft/min)
mph (miles per hour)	1.1 – 89.4 mph	0.1 mph	± (2% + 0.2m/h)
knots (nautical miles per hour)	1.0 to 78.1 knots	0.1 knots	± (2% + 0.2knots)
Air Flow Measurements	**Range**	**Resolution**	**Area**
CMM (cubic meters per minute)	0-999,900 m^3/min	0.001 to 100	0 to 9,999m^2
CFM (cubic feet per minute)	0-999,900 ft^3/min	0.001 to 100	0 to 9,999ft^2
Air Temperature	**Range**	**Resolution**	**Accuracy**
	32 to 175°F (0 to 80°C)	0.1° F/C	1.5°F (0.8°C)

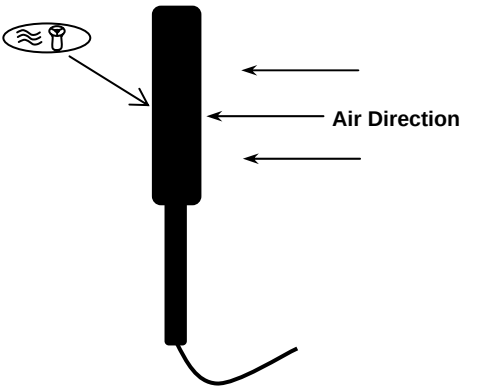
Meter Description

1. Sensor Input
2. RS-232 PC Interface jack
3. LCD Display
4. Keypad
5. Rubber Holster
6. Sensor
7. Battery compartment (rear)

Note: To access the rear battery compartment, first remove the rubber holster that surrounds the meter.

Air Velocity Measurements

1. Connect the sensor to the sensor input jack on top of the meter.
2. Turn on the meter using the Power button.
3. Select the VELOCITY function using the FLOW / VELOCITY button. The LCD will display **VEL** when the velocity mode is selected.
4. Select the desired temperature units using the C/F select button. The LCD will reflect the current unit selection.
5. Select the desired air velocity units using the UNIT button. The LCD will reflect the current unit selection.
6. Place the sensor in the air current to be measured with the  symbol on the exhaust side of the vane (see diagram).
7. View the air velocity and temperature readings on the LCD Display. The large main LCD display shows the Air Velocity reading. The lower LCD sub-display shows the temperature reading.



Data Hold

1. While taking measurements, press the HOLD button to freeze the LCD reading.
2. The **HOLD** indicator will appear on the LCD when the display is in Data Hold mode.
3. Press HOLD again to return to normal operation.

Maximum and Minimum Recording

The 407113 allows the user to record and view the highest (MAX) and lowest (MIN) readings.

1. Press the RECORD/RECALL button once. The **REC** indicator will appear on the display and the meter will begin recording the MAX and MIN values.
2. Press the RECORD/RECALL button to stop the MAX/MIN recording and display the maximum reading. The **MAX** indicator along with the maximum reading will appear on the LCD display
3. Press RECORD/RECALL again to view the minimum value. The **MIN** indicator along with the minimum reading will appear on the LCD display.
4. To return to normal operation, press and hold the RECORD/RECALL button for approx. 3 seconds. The display indicators REC, MAX, and MIN will disappear.

NOTE: Placing the meter in the RECORD/RECALL mode by pressing the RECORD/RECALL button disables the AUTO POWER OFF feature.

NOTE: Handle the vane carefully. If the metal vane blades are inadvertently bent or damaged erroneous readings may result.

Air Flow (Volume) Measurements (CMM / CFM)

1. Connect the sensor to the sensor input jack on top of the meter.
2. Turn on the meter using the POWER button.
3. Select the FLOW mode using the FLOW/VELOCITY button. The LCD will display **FLOW CFM** or **FLOW CMM** when the flow function has been selected.
4. Select the desired air flow units: CMM (cubic meters per minute) or CFM (cubic feet per minute) using the UNIT button. The LCD will reflect the selection.
5. Measure the dimensions of the duct or vent and calculate the area in square feet or square meters

Note: If the dimensional measurements are made in inches (or cm), convert them feet (or meters) before calculating the square area.

6. Press the AREA button to begin entering the area in m^2 or ft^2. Use the ▲ button to increment the flashing digit, use the ▼ button to decrement, use the ▶ button to select the next digit, and use the ● button to set the decimal point.
7. Press the ENTER/RESET button after the area value has been entered. The bottom display will indicate the area entered in ft^2 or m^2. The main LCD displays the Air Flow in CFM (cubic feet per minute) or CMM (cubic meters per minute). If the CFM or CMM reading exceeds 9999, use the displayed X10 or X100 multiplier to calculate the reading.
8. Note that for FLOW measurements, three modes apply: The normal, default mode, where the actual flow is indicated and the two modes described below under **2/3 MAX Flow** and **AVG Flow**.

Note: The temperature function is not active in the FLOW mode.

2/3V MAX Flow Mode

In this mode the meter will display two-thirds the measured Flow (Volume). To access this mode, ensure that the meter is in the FLOW mode (via the FLOW/VELOCITY button) and then press the FLOW MODE button until the 2/3V MAX display icon appears. Now the Flow display will be 2/3 the actual measurement. To return to the normal display mode, press the FLOW MODE button until the 2/3VMAX and the AVG icons switch off.

AVG (Average) Flow Mode

In this mode the meter will display the AVERAGE Flow for up to 20 readings. To access this mode, ensure that the meter is in the FLOW mode (via the FLOW/VELOCITY button) and press the FLOW MODE button until the AVG display icon appears. Now each time the AVG/START button is pressed a reading will be taken and averaged. The lower LCD display becomes a 20-reading counter and with each reading taken the counter is incremented. Allow 3 or 4 seconds between AVG/START button presses for the display counter to update. The main LCD displays the averaged Air Flow value. To return to the normal display mode, press the FLOW MODE button until the AVG icon switches off.

RS-232 PC Interface

The 407113 is equipped with a 3.5mm phone jack (meter top) for connection to a PC for data acquisition purposes. To obtain PC interface cabling and Windows™ data acquisition software (Model 407001), contact Extech Instruments or an authorized distributor. Instructions for use are provided with the data acquisition software/hardware kits.

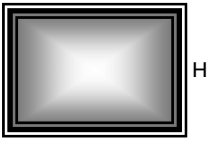
Battery Replacement

When the **LBT** icon appears on the LCD, the 9V battery must be replaced.

1. Remove the rubber holster that surrounds the entire meter
2. Slide off the rear battery compartment
3. Replace the 9V battery
4. Affix the battery compartment cover and the meter holster

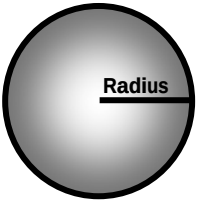
Useful Equations and Conversions

Area equation for rectangular or square ducts



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

Area equation for circular ducts



Area (A) = π x r^2

Where π = 3.14 and r^2 = radius x radius

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