User's Manual

EXTECH
INSTRUMENTS

CFM Thermo Anemometer
Air Velocity, Air Flow, and Temperature

Model 407114

Introduction

Congratulations on your purchase of the Extech CFM Thermo Anemometer. This meter measures Air Velocity, Air Flow and Temperature. An RS-232 PC interface provides data acquisition functionality. Proper use of this meter will provide years of reliable service.

Specifications

Circuit	Custom LSI microprocessor circuit
Display	Dual function 0.5" (13 mm) 4-digit (9999 count) LCD
Measurement units	Air Velocity: m/s, km/h, ft/min, knots, mph;
	Air Flow: CMM (m^3/min) and CFM (ft^3/min);Temp: °C and °F
Data hold	Freezes displayed reading
Sampling rate	1 second approx.
Sensors	Air velocity/flow sensor: Conventional angled vane arms with low-friction ball bearing.
	Temp. sensor: Precision thermistor
MAX/MIN Memory	Record and view Maximum and Minimum readings
Automatic Power off	Auto shut off after 15 minutes to preserve battery life
Data Output	RS 232 PC serial interface with 16-bit data stream output
Operating Temperature	32°F to 122°F (0°C to 50°C)
Operating Humidity	Max. 80% RH
Power Supply	9V battery (Heavy duty alkaline)
Power Current	Approx. DC 8.3 mA
Weight	0.84 lbs. (381 g) including battery & probe
Dimensions	Main instrument: 7.1 x 2.8 x1.3" (180 x 72 x 32mm)
	Sensor Head: 2.8" (72mm) diameter

Air Velocity	Range	Resolution	Accuracy (%rdg)
m/s (meters per sec)	0.4 to 25.00 m/s	0.01 m/s	± (2% + 0.2 m/s)
km/h (kilometers per hour)	1.4 to 90.0 km/h	0.1 km/h	±(2% + 0.2 km/hr)
ft/min (feet per minute)	80 – 4921 ft/min	1 ft/min	±(2% + 20 ft/min)
mph (miles per hour)	0.9 – 55.9 mph	0.1 mph	± (2% + 0.2 mph)
knots (nautical miles per hour)	0.8 to 48.6 knots	0.1 knots	± (2% + 0.2 knots)
Air Flow/ Volume	**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 - 122 ^{o}F (0 - 50 ^{o}C)	0.1 ^{o}F/C	1.5 ^{o}F (0.8 ^{o}C)

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Meter Description

1. LCD Display

2. Keypad

3. Sensor

4. Sensor Input

5. RS-232 PC Interface jack

6. Protective rubber holster

7. Battery compartment (rear)

Note: To access the rear battery compartment first remove the meter's rubber protective holster.

Operation

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 VEL/FLOW 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. For maximum accuracy, the airflow must enter the vane on the side *without* the yellow dot (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.

Side view of Vane

yellow dot

airflow
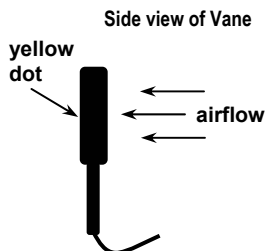
Data Hold Feature

1. While taking measurements, press the HOLD button to freeze the LCD reading for later viewing.
2. The "**DH"** 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 407114 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 keeping track of the MAX and MIN values.
2. To view the MAX reading, press RECORD/RECALL again. 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.

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Air Flow 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**" when the flow function has been properly 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. 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 the flashing digit, use the ▶ button to select the next digit, and use the RECORD/RECALL ● button to set the decimal point. Press the ENTER/RESET button when the area has been entered. The bottom display (normally used for the temperature 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). Refer to the Area Equations in the back of this manual.

6. For air flow measurements, three modes apply: The normal, default mode, where the actual flow is indicated, and the two modes described below: Press the FLOW/MODE button to select one of the two modes listed below:

   2/3V MAX MODE: LCD displays 2/3 the measured value.

   AVG MODE: Up to 20 readings can be taken separately and averaged. Select the AVG mode via the FLOW/MODE button and then press the AVG/START button to take a reading. Up to 20 readings can be taken and averaged. The lower LCD display provides a 1 to 20 counter and each time a reading is taken the counter is incremented. The main LCD displays the averaged air flow.

7. Note that the temperature function is not active in the AIR FLOW mode.

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

RS-232 PC Interface

The 407114 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^{TM} data acquisition software, contact Extech Instruments. Instructions for use are provided with the data acquisition software/hardware kits.

Warranty

EXTECH INSTRUMENTS CORPORATION warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on sensors and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact the Customer Service Department at (781) 890-7440 ext. 210 for authorization or visit our website at www.extech.com (click on 'Contact Extech' and go to 'Service Department' to request an RA number). A Return Authorization (RA) number must be issued before any product is returned to Extech. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. Extech specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. Extech's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

Calibration and Repair Services

Extech offers repair and calibration services for the products we sell. Extech also provides NIST certification for most products. Call the Customer Service Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

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Support Hotline (781) 890-7440
Tech support: Ext. 200; Email: support@extech.com
Repair/Returns: Ext. 210; Email: repair@extech.com
Website: www.extech.com

Useful Equations and Conversions

Area equation for rectangular or square ducts

Height (H)

Width (W)

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

Area equation for circular ducts
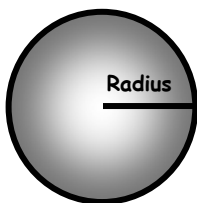
Radius

Area (A) = ⑥ x r²
Where ⑥   = 3.14 and r² = radius x
radius

Cubic equations

CFM (ft³/min) = Air Velocity (ft/min) x Area (ft²)

CMM (m³/min) = Air Velocity (m/sec) x Area (m²) 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

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