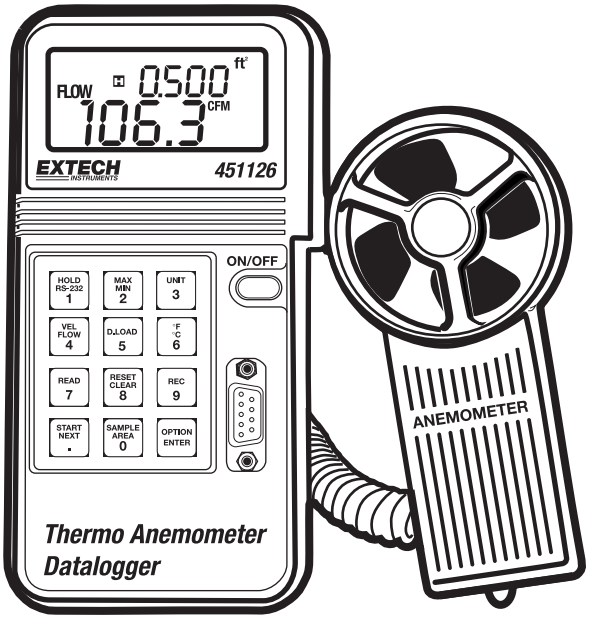
User's Guide

EXTECH INSTRUMENTS
A FLIR COMPANY

Vane Thermo-Anemometer Datalogger

Model 451126



Introduction

Congratulations on your purchase of Extech's Thermo-Anemometer Datalogger. This Vane-type Anemometer can indicate Air Velocity in five units of measure: Feet per minute, Meters per second, Miles per hour, Kilometers per hour, and Knots with Temperature displayed in ^{o}C or ^{o}F units. The meter can also display air flow in CFM or CMM. The built-in datalogger can record up to 2000 readings and the RS-232 interface provides PC data transfer capability.

Specifications

Display	Dual 4-digit (9999 count) Multi-function LCD
Data hold	Locks latest reading on the LCD display
Sensor Structure	Air velocity sensor: Conventional twisted vane arm with low friction (sapphire) ball bearing. Temperature sensor: K-type thermocouple built into vane. 1/4" mounting nut provided
Memory Recall	Records Max/Min readings with push-key RECALL
Data Output	RS-232 PC serial interface
Operating conditions (Meter)	Temperature: 32°F to 122°F (0°C to 50°C); Humidity: <80% RH; Pressure: 500mB to 2 Bar
Operating conditions (Vane)	Temperature: 32°F to 140°F (0°C to 60°C); Humidity: <80% RH; Pressure: 500mB to 2 Bar
Storage temperature	Temperature: -40°F to 140°F (-40°C to 60°C)
Power Supply	9V battery; Battery life: 50 hours typical
Power Consumption	Approx. 3 mA DC
Weight	0.77 lbs. (350g)
Dimensions	Meter: 3.46 x 6.61 x 1.03" (88 x 168 x 26.2mm); Vane: 2.6 x 5.22 x 1.15" (66 x 132 x 29.2mm)
Accessories	9V battery and carrying case

Range Specifications

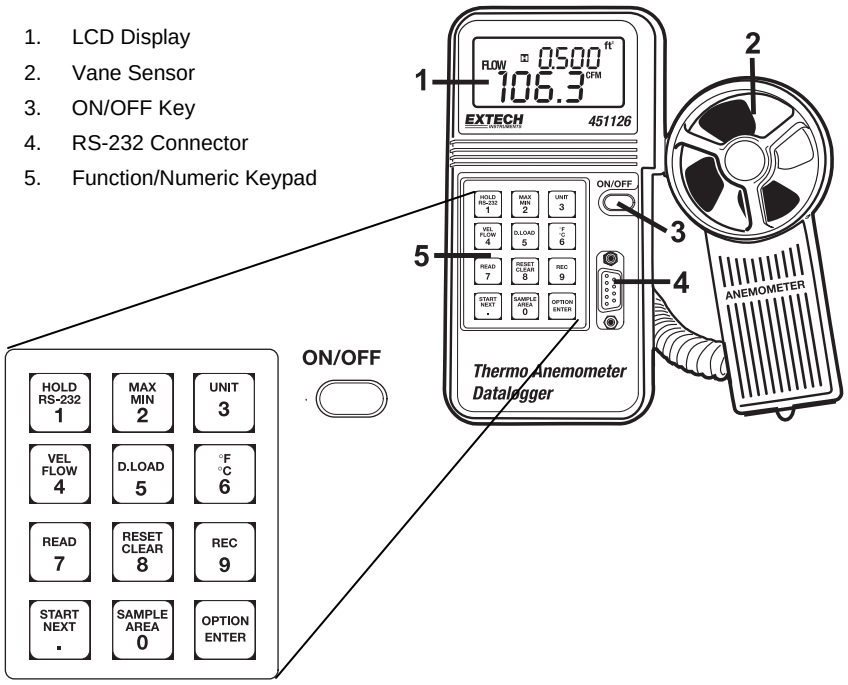
Air Velocity			
Measurement	**Calibrated Range**	**Display Resolution**	**Accuracy (%FS)**
Feet per Minute (ft/min)	60.0 to 8800	0.1	± (3% + 20 ft/min)
Meters per Second (m/s)	0.30 to 45.00	0.01	± (3% + 0.1 m/s)
Kilometers per Hour (km/hr)	1.00 to 140.0	0.01	± (3% + 0.4 km/hr)
Miles per Hour (mile/hr)	0.70 to 100.0	0.01	± (3% + 0.2 mile/hr)
Knots	0.60 - 88.0	0.01	± (3% + 0.2 knots)

Temperature			
Units	**Range**	**Converter Resolution**	**Accuracy**
^{o}C	0.0^{o}C to 45.0^{o}C	0.2^{o}C	±1.0^{o}C
^{o}F	32.0^{o}F to 113.0^{o}F	0.4^{o}F	±1.8^{o}F

Air Flow and Area (CMM: 0 to 45.00 m/s; CFM: 0 to 8800 ft/min)			
	Range	**Resolution**	**Area**
CFM (ft^3/min)	0 to 999900	0.001 to 100	0.001 to 9999
CMM (m^3/min)	0 to 999900	0.001 to 100	0.001 to 9999

Meter Description

1. LCD Display
2. Vane Sensor
3. ON/OFF Key
4. RS-232 Connector
5. Function/Numeric Keypad



LCD Display Icon Definitions

AVE	Average reading mode is selected	**^{o}C**	Temperature is displayed in degrees centigrade
MIN	Minimum reading mode is selected	**^{o}F**	Temperature is displayed in degrees Fahrenheit
2/3V	2/3V Maximum mode is selected	**CFM**	Cubic feet per minute (ft^3/min)
MAX	Maximum reading mode is selected	**CMM**	Cubic meters per minute (m^3/min)
VEL	Air Velocity measurement	**x100**	Multiply reading by one hundred
READ	Recalling stored measurements	**X10**	Multiply reading by ten
REC	Appears when recording readings	**m/s**	Meters per second
RS-232	PC Interface is activated	**ft/min**	Feet per minute
ft^2	Square feet	**MPH**	Miles per hour
m^2	Square meters	**Km/h**	Kilometers per hour

Operation

NOTE: For all air velocity or flow measurements, the air should pass through the vane from back to front. The rear of the vane can be found by locating the mounting nut. The front of the vane has the engraving "ANEMOMETER". For more accurate results, maintain a 20° axis of air direction with the rear of the vane (refer to Fig.2).

Air Velocity

1. Power the meter by pressing ON/OFF.
2. Select Air Velocity measurement function by pressing VEL FLOW 4. VEL will appear on the LCD.
3. Press UNIT 3 to select the desired unit of measure (ft/min, mph, km/h, m/s or knots)
4. Place the vane in the air flow with the air direction matching the direction of the arrows printed on the inner walls of the vane. If the unit does not have the printed arrows, have the tripod mount side of the vane facing the air flow (see Fig.2).
5. Air velocity will be displayed on the bottom line of the LCD.

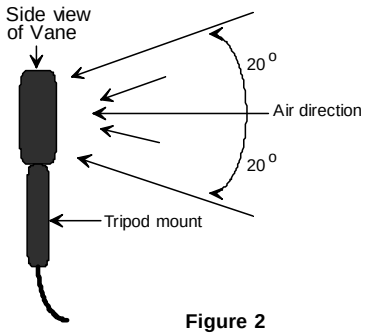


Figure 2

Temperature

1. When the meter is measuring Air Velocity, Temperature is simultaneously being measured by the vane's built-in type-K thermocouple.
2. Press °F °C 6 to select °C or °F. Temperature is displayed on the upper line of the LCD.

Air Flow

1. Power the meter by pressing ON/OFF.
2. Press VEL FLOW 4 to select airflow. FLOW will display.
3. Press UNIT 3 to select the desired unit of measure. (CFM, CMM).
4. To enter the area value, press SAMPLE AREA 0. The lower display line will blank waiting for the user to program new data. Use the numeric keys to enter a new area value **in square feet**. (REMINDER: if measurement is taken in inches, divide by 144 to obtain square feet). Press OPTION ENTER when finished.

Airflow is based on the specific dimensions of the duct being measured. For the meter to correctly measure CFM the user must input the area of the duct. Failing to input the correct area dimensions will result in erroneous readings.

NOTE: If the AVE or the 2/3MAX display icons are displayed in the upper left hand corner of the LCD, press OPTION ENTER until they extinguish.

5. Place the vane in the air flow (Fig.2).
6. Wait approximately 2 seconds for a stabilized Air Flow reading.
7. The equation below is used to calculate Air Flow:

AIR FLOW = (AIR VELOCITY) x (AREA)

2/3Vmax Air Flow

1. Power the meter by pressing ON/OFF.
2. Press VEL FLOW 4 to select Air Flow. FLOW will display.
3. Press UNIT 3 to select the desired units (CFM, CMM).
4. The previously stored area value will be displayed on the upper LCD display line. To enter a new area value press SAMPLE AREA 0. The lower display line will blank waiting for the user to program new data. Use the numeric keys to enter a new area value in square feet. Press OPTION ENTER when finished.
5. Press OPTION ENTER until the 2/3V MAX icon appears on the LCD.
6. Determine the direction of the air to be measured. Move the Vane around the center of the area being measured to read the maximum air velocity. The meter will use the maximum reading obtained to determine the 2/3MAX Air Flow.

Average Air Flow

1. Power the meter by pressing ON/OFF.
2. Press VEL FLOW 4 to select Air Flow. FLOW will display.
3. Press UNIT 3 to select the desired units (CFM, CMM).
4. The previously stored area value will be displayed on the upper LCD display line. To enter a new area value press SAMPLE AREA 0. The lower display line will blank waiting for the user to program new data. Use the numeric keys to enter a new area value. Press OPTION ENTER when finished.
5. Press OPTION ENTER until AVE appears on the LCD display.
6. Press START NEXT . to clear the upper LCD.
7. Select a measurement location. Once a point is selected and a flow measurement is displayed, press START NEXT . to average the flow reading.
8. Select the next measurement location and press START NEXT . again to average the reading with previous readings. The value in the upper LCD line will increment for each reading taken to show how many readings were averaged. **The max is 12 readings.**

Data Hold

Press HOLD RS-232 1 to freeze the reading. The display will hold and an 'H' will appear on the LCD.
Press HOLD RS-232 1 again to return to normal operation.

MAX and MIN Measurements

1. Press MAX MIN 2 to enter MAX mode. The meter will only display the highest reading.
2. Press MAX MIN 2 again to enter the MIN. The meter will only display the lowest reading.
3. Press RESET CLEAR 8 to exit the MAX or the MIN mode.

Datalogging

Instantaneous (One-Shot) Datalogging

To record one data point at any desired time, set the sampling rate = 0 by pressing [SAMPLE AREA 0] in the VEL mode. The previously stored reading will be displayed on the upper LCD line. Enter a '0' sampling time and then press [OPTION ENTER] . Now, each time [REC 9] is pressed, the present reading will be stored in non-volatile memory.

Automatic Datalogging

1. Set the Sampling rate for datalogging by pressing [SAMPLE AREA 0] . The previous sample rate will appear.
2. Enter a value from 1 to 240 seconds using the numeric keypad. Press [OPTION ENTER] when done.
3. Press [REC 9] to begin storing readings in non-volatile memory every n seconds (n = the value entered in step 2. above).
4. The REC icon will appear on the LCD indicating that the datalogging mode is activated.
5. The maximum number of readings that can be stored is 2000.
6. To stop datalogging, press [REC 9] again. The datalogger will automatically stop recording data when 2000 records have been stored.

   See software section of this manual for instruction on viewing logged data.

IMPORTANT NOTE: If power is removed before datalogging is properly halted, data will be lost.

Reading Stored Data Sequentially

Press [READ 7] , the RECORD NUMBER will briefly display on the upper LCD line before the measurement data appears. Press [RESET CLEAR 8] to return to normal operation.

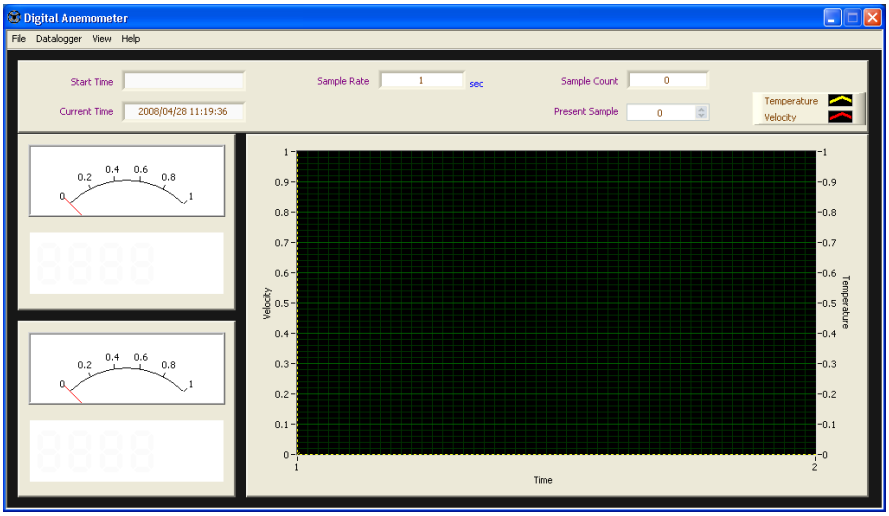
Reading Stored Data Randomly

1. Press [READ 7] to enter the READ mode.
2. Press [SAMPLE AREA 0] and enter the number of the record in question.
3. Press [READ 7] again and the desired data will be displayed.
4. Press [RESET CLEAR 8] to return to normal operation.

Clearing Datalog Memory

Press and hold [RESET CLEAR 8] while powering up the meter to clear the meter's datalog memory.

Software Requirements and Installation



The 451126 software lets the user:

- Download logged recordings from the meter's memory
- Record to the PC
- Graphically display readings from the meter

System Requirements

Hardware Requirements: PC recommended with processor of Pentium III 600MHz or above.

RAM: Recommended 512MB of RAM or more

Screen Resolution: requires 1,024 x 768 pixels.

451126 Anemometer

Operating System Compatibility: Windows™ 95/98/NT/2000/XP/VISTA

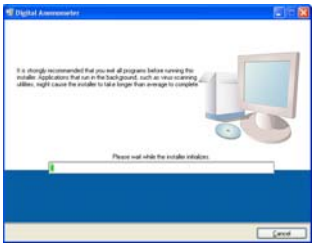
Hardware Connection

The meter connects to a PC with the supplied DB-9 to DB-9 interface cable. The meter can also be used with a Serial to USB Adaptor. NOTE: The driver that comes with the adaptor should be installed in order to connect via USB. Please follow the instructions that came with your adaptor.

Software Installation

Load the software CD in the PC CD-ROM drive. Close any open programs. Click on SETUP and the following windows will appear directing the user through the install:

1.



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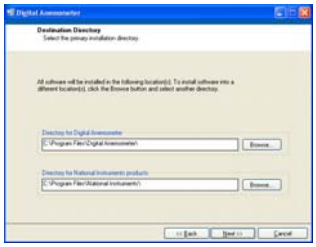
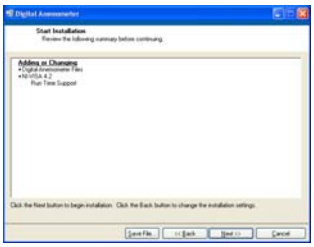


Click “Next”

3.

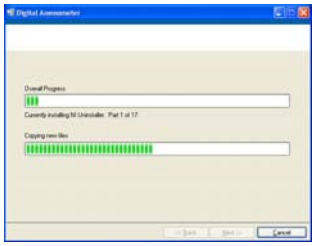
Click “I accept”

4.



Click “Next”

5.



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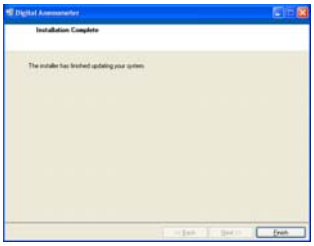


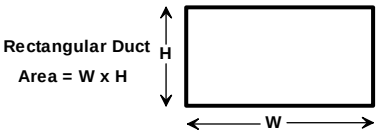
Reboot PC

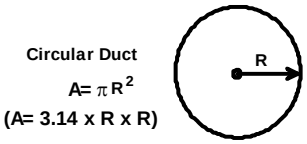
NOTES: The meter is supplied with a 9 pin DB9 RS232 cable. In order to establish communication with the meter the correct COM PORT must be selected in the 451126 Software. To find out what COM PORTS are available go to Windows Device Manager>Ports. It is here the COM PORTS will be listed.

If using the meter with a Serial to USB Adaptor make sure you install the driver that is supplied with the 3rd party adaptor. Once this is done ,check under Windows Device Manager>Ports and make sure that the brand name of the Serial to USB Adaptor is listed here. Note what COM PORT it has assigned. Make sure that in the 451126 Software you select the COM PORT it is assigned to in order to establish communication.

Useful Equations and Conversions

Area equations





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

Units Conversion Table

	m/s	ft/min	knots	km/hr	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/hr	0.2778	54.69	0.54	1	0.6222
1 mph	0.4464	87.89	0.8679	1.6071	1

Battery Replacement

The low battery indicator appears on the LCD display when it is time to replace the 9V battery, which powers the meter.

To replace the battery:

a. Turn the meter off.

b. Remove the battery compartment screw and remove the battery compartment cover.

c. Replace the 9V battery and reinstall the compartment cover.

d. Fasten the compartment screw

Warranty

EXTECH INSTRUMENTS CORPORATION (A FLIR COMPANY) 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 to 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 www.extech.com for contact information. 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 Care Department for information on calibration services available for this product. Extech recommends that annual calibrations be performed to verify meter performance and accuracy.

Support line (781) 890-7440

Technical Support: Extension 200; E-mail: support@extech.com

Repair & Returns: Extension 210; E-mail: repair@extech.com

Product specifications subject to change without notice

For the latest version of this User Guide, Software updates, and other up-to-the-minute product information, visit our website: www.extech.com