

OWNER'S MANUAL

CompuFlow[®] Thermo-anemometer Model 8570/8571



ALNOR[®]

TSI Incorporated

WARRANTY

Copyright©

TSI Incorporated / July 2002 / All rights reserved

Address

TSI Incorporated, Alnor Products, 500 Cardigan Road, Shoreview, MN 55126 USA

Toll-free: (800) 424-7427 **Phone:** (651) 490-2811 **Fax:** (651) 490-3824

LIMITATION OF WARRANTY AND LIABILITY. Seller warrants the goods sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for twenty-four (24) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions:

- a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment.
- b. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment.
- c. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies.
- d. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

The foregoing is IN LIEU OF all other warranties and is subject to the LIMITATIONS stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE.**

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF SELLER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO SELLER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against Seller more than 12 months after a cause of action has accrued. The goods returned under warranty to Seller's factory shall be at Buyer's risk of loss, and will be returned, if at all, at Seller's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of Seller.

Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call Customer Service at (800) 424-7427 (USA) and (1) 651-490-2811 (International).

TABLE OF CONTENTS

1.	General Description	2
2.	Theory of Operation: Thermo-anemometers	2
3.	Safety	3
4.	About the Instrument	3
5.	Getting Started	4
6.	Detailed Operation	5
7.	Troubleshooting	8
8.	Maintenance	8
9.	Service Information	9

SECTION 1

General Description

The CompuFlow Model 8570/8571 thermo-anemometer is a hand-held, battery powered, microprocessor-based instrument capable of measuring either air velocity or temperature. This digital instrument measures velocities from 0 to 9999 ft/min (0 to 50 m/s). The instrument accepts up to 1871 readings and displays the average on demand. The thermo-anemometer provides steady digital readings and quick response, due to time-weighted averaging software. Readings are available in both English and metric units by changing the position of the DIP switches. To allow for maximum long-term accuracy, this instrument is electronically calibrated and should be calibrated by TSI once a year.

For measuring air velocity or temperature in difficult locations, the Model 8570 probe extends to 43.25 inches and can be used either as a straight wand or with the probe tip at 90° to the main probe body. This allows for traversing large ducts as well as clean benches and clean room ceilings (often without requiring a ladder). The Model 8571 has a permanently straight wand for making the same measurements.

The CompuFlow kit comes in a convenient carrying case that is foam padded for maximum protection. The carrying case holds the meter, probe, and A/C adapter, and additional compartments are available for optional accessories such as the printer, printer paper, and extra batteries.

SECTION 2

Theory of Operation: Thermo-anemometers

Thermo-anemometers use two sensors: an air velocity sensor and a temperature compensation sensor. The velocity sensor is heated to an elevated temperature (relative to the surrounding air) by means of control electronics. The temperature compensation sensor senses the ambient air temperature and forces the velocity sensor to stay at a constant “overheat” above ambient temperature.

When air flows past the velocity sensor, the sensor tends to cool. This causes the control electronics to apply more power to keep the velocity sensor at a constant “overheat”. This power is directly related to the velocity of the air flowing past the sensor. This is the basic principle of operation for constant temperature thermo-anemometers.

SECTION 3 Safety

When using the CompuFlow to check air flow and/or temperature, make certain that you can safely raise and hold the instrument while making measurements. Be especially careful when working on a ladder.

Observe all necessary precautions so that the unit does not become caught in moving machinery or touch any exposed electrical wiring.

DANGER:

The CompuFlow is not designed for use in gas mixtures other than air. Use with corrosive or other dangerous or explosive gas mixtures is not recommended.

SECTION 4 About the Instrument

The CompuFlow has a digital display (shown in Figure 1). This display has two places where numbers are displayed. There are small display digits in the upper left-hand corner, which is primarily used to display temperature. The large display digits, on the lower left-hand area of the display, are used to show the other measurement being taken (i.e., velocity, volume flow, temperature, etc.).

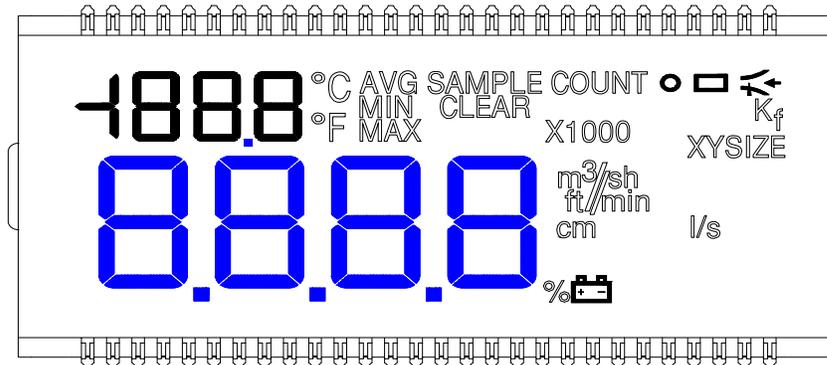


Figure 1

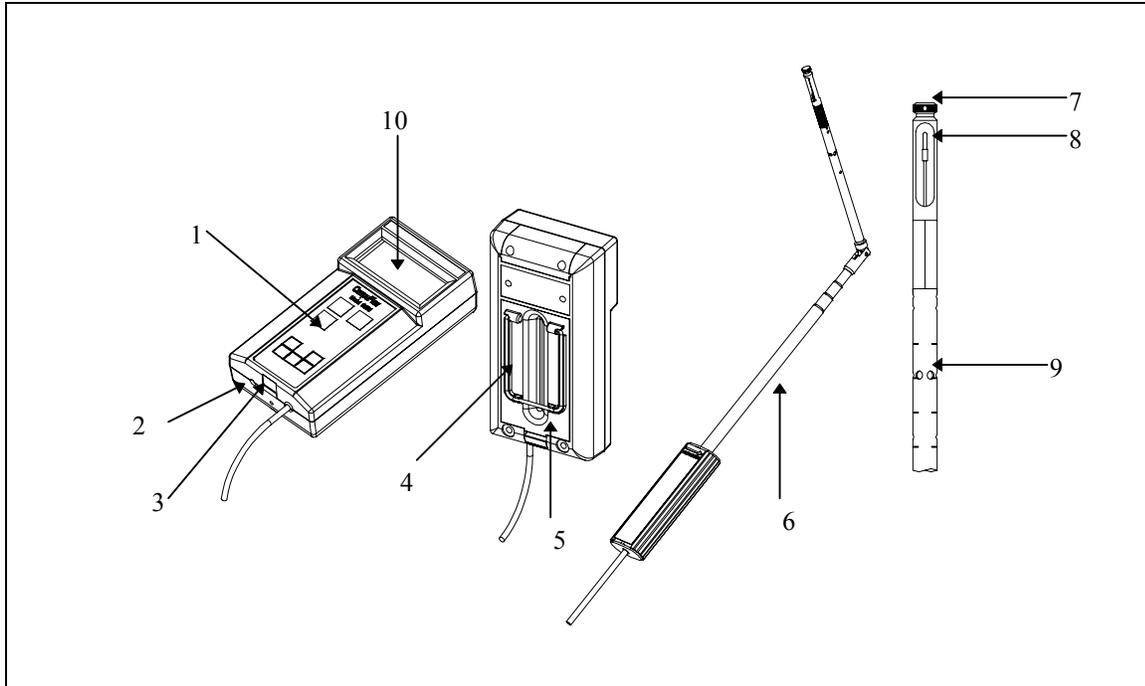


Figure 2: CompuFlow

In Figure 2 you can see the CompuFlow and its parts.

- | | |
|------------------------|-----------------------|
| 1. Keypad | 6. Probe |
| 2. AC Adapter Port | 7. Dimple |
| 3. Printer Port | 8. Velocity Sensor |
| 4. Battery Compartment | 9. Temperature Sensor |
| 5. Stand | 10. Display |

SECTION 5 Getting Started

Note: Instrument should be allowed to stabilize to room conditions in order to achieve the specified accuracy.

Taking Readings

1. Install four C-size batteries into the battery case. Make sure they are oriented as shown in the battery compartment.
2. Extend the probe to the desired length, making sure that the sensor window is fully exposed to the air stream and the orientation dimple is facing upstream.
3. Turn the instrument on by pressing the ON/OFF switch on the front keypad of the instrument. Each time the instrument is turned on, it will go through a power-up

sequence and display the % battery life and the baud rate. The instrument is in measurement mode once the power-up sequence is complete.

The first time the instrument is turned on it will display velocity on the large digits and temperature on the small digits of the display. If the instrument was used before, it will power up and display the last measurement type that was displayed before the instrument was turned off.

4. Press the VEL/TEMP key to display velocity on the large digits and temperature on the small digits of the display. Press again to display velocity on the large digits and nothing on the small digits. Press again to display temperature on the large digits and nothing on the small digits. Press again to return to velocity on the large digits and temperature on the small digits. *Note: When measuring temperature, make sure that at least 3 inches (7.5 cm) of the probe is in the air flow to allow the temperature sensor to be in the air stream.*
5. Press VOLUME to display volumetric flow rate on the large digits and temperature on the small digits. *Note: If this is the first time the key has been pressed, or the desired measurement parameters need to be changed, refer to the Detailed Operation section for a explanation of entering volumetric flow rate parameters.* Press the key again to display volume on the large digits and nothing on the small digits. Press again to return to volume on the large digits and temperature on the small digits.
6. When in measurement mode, press ↵ to record a measurement and add it to the average reading.

SECTION 6 Detailed Operation

Measuring Flow Rate

The first time the VOLUME key is pressed, the type of volume measurement to be made must be selected. The choices are represented by a circle, rectangle and horn symbols. Use the ↑↓ arrow keys to choose one of the symbols.

If circle is chosen, “SIZE” will light up on the display. Use the ↑↓ arrow keys to select the size (diameter). Press ↵ to accept the choice and return to measuring mode. The circle symbol will remain lit on the display.

If rectangle is chosen, “X SIZE” will light up on the display. Use the ↑↓ arrow keys to select the x-size of the duct, then press ↵ to accept the choice and advance to the next dimension. “Y SIZE” will light up on the display. Use the ↑↓ arrow keys to select the y-

dimension of the duct, then press ↵ to accept the choice and return to measurement mode. The rectangle will remain lit on the display.

If horn symbol is chosen, use the ↑↓ arrow keys to scroll through the horn model numbers on the display. The choices are 100, 300, 600, 1200 or K_f . *Note: K_f is the number by which the instrument multiplies the velocity measurement to display volume.* Press ↵ to accept the choice. If a horn model number is chosen, press ↵ to return to measurement mode. If K_f is chosen, the K factor choices will be shown in the following order: last 5 values used, then a new value which can be adjusted from 0.01 to 999.9. Use the ↑↓ arrow keys to scroll through the K_f choices, then press ↵ to accept the choice and return to measurement mode. The horn symbol will remain lit on the display.

To change the flow rate parameters once set, press either ↑ or ↓ while displaying flow rate and use the ↑↓ arrow keys to change your settings as stated above.

Averaging

1. Press the ↵ key to add the currently displayed reading to a stored running average. This reading could be velocity and temperature, temperature only, volume and temperature, or volume only.
2. When the ↵ key is pressed, “SAMPLE” will light up on the display, and a countdown the length of the time constant begins and is displayed in the large digits. At the end of the countdown, the sample number is displayed for a second, then the value stored, and then the instrument returns to measuring mode.
3. When all readings have been taken, press the AVE key to display the average. The number of samples will be displayed for a second, then the average of the stored readings.
4. Press the ↵ key to return to measuring mode and delete all stored values.

Choosing a Time Constant

Press the TC key to display the current time constant. Press the ↑↓ arrow keys to scroll through the choices and press ↵ key to confirm your choice and return to measuring mode. The choices for the time constant are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, and 30 seconds.

The time constant is an averaging period. It is used to dampen the display. If you are experiencing fluctuating flows, a longer time constant will slow down those fluctuations. The display will update every second, but the displayed reading will be the average over the last time constant period. For example, if the time constant is 10 seconds, the display will update every second, but the displayed reading will be the average from the last 10 seconds. This is also referred to as a “moving average.”

Changing the Baud Rate

The CompuFlow has a variable baud rate that is used when printing information from the instrument. By increasing the baud rate, the data will be printed faster. *Note: The baud rate must be equal to that of your printer.* The baud rate is displayed during the initial power-up sequence. To change the baud rate, press and hold both $\uparrow\downarrow$ arrow keys during the power-up sequence while the baud rate is displayed. Release the keys when the unit beeps twice. Use the \uparrow and \downarrow arrow keys to scroll through the options (1200, 2400, 4800, 9600, 19200). Press \leftarrow to set the value that is on the display.

Printing Data to the Portable Printer

When the printer is connected to the instrument while taking readings, each time the \leftarrow key is pressed, the reading will be printed to the portable printer. Also, each time a parameter is changed (type of flow rate, time constant, etc.), the new setting will also be printed. Printer should be set with bit length 8, one stop bit, and no parity.

Auto Shut Off

The CompuFlow is designed to automatically shut off 10 minutes if no keys were pressed. You can disable the function by switching DIP switch 2 to ON.

Changing Measurement Units

The measurement units can easily be changed by changing a few DIP switch positions. To access the DIP switches, turn the instrument off and remove the batteries from the battery compartment. On the inside of the battery compartment, there is a window with eight DIP switches (see figure 3). The table below shows the functions of each switch.

Switch	Function	Settings
1	Temperature	OFF: Degrees Fahrenheit (°F) ON: Degrees Celsius (°C)
2	Auto Shut Off	OFF: Enabled ON: Disabled
3, 4	Velocity / Flow rate	3 ON, 4 OFF: m/s, l/s 3 OFF, 4 ON: m/s, m ³ /hr 3 OFF, 4 OFF: ft/min, ft ³ /min 3 ON, 4 ON: m/s, m ³ /min
5	Unused	Always leave in OFF position
6	Unused	Always leave in OFF position
7	Calibration. adjust	Factory use only.
8	Data format	OFF: Decimals; MM/DD/YY ON: Comas; DD/MM/YY

Note:

Switch 8 OFF will show decimal points for numbers less than one and dates in month/day/year format.

Switch 8 ON will show comas for the numbers less than one and dates in day/month/year format.

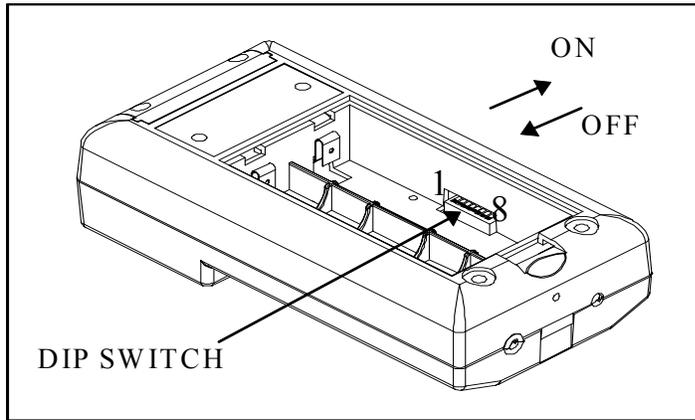


Figure 3: DIP Switch Location

SECTION 7 Troubleshooting

Symptom	Possible Cause and Corrective Action
Meter does not turn on.	<ul style="list-style-type: none">• Batteries may be discharged. Charge or replace them.• Switch failure, wiring failure, or circuit failure. Contact TSI.
Meter reading lower or higher than expected.	<ul style="list-style-type: none">• Odd air flow pattern. Perform traverse to get average airflow.• Meter out of calibration. Contact TSI.

SECTION 8 Maintenance

Carrying Case

The carrying case can be cleaned using a wet cloth.

Calibration

It is recommended that you return your CompuFlow to the factory once per year for a calibration check. When shipping the CompuFlow for factory calibration, pack it carefully, and follow the Instructions for Return in this manual.

SECTION 9

Service Information

Service and Repair

Please return your Product Registration Card immediately. This allows us to send service reminders, special offers, and important information about your product.

Before sending your instrument for calibration or repair, you should call Customer Service. The service department will provide you with the cost of service or calibration, Return Material Authorization (RMA) number, and shipping instructions.

Please have the following information available when you call:

- Owner's name, address, and phone number
- Billing address, if different and applicable
- Instrument name and model
- Serial number
- Date of purchase
- Where purchased

TSI recommends that you keep a "calibration log" and keep all records of service on your instrument.

Instructions for Return

Send the instrument prepaid. Securely package your instrument in a strong container surrounded by at least two inches (5 cm) of suitable shock-absorbing material. Include the purchase order showing instrument model number, cost of service and/or calibration, and the RMA number. Mark the outside of the shipping container with the RMA number. This will expedite processing of your instrument when we receive it.

Please note that instruments received improperly marked or without an accompanying purchase order may be returned at your expense. See back cover for factory address.

Damaged in Transit

All orders are carefully packed for shipment. On receipt, if the shipping container appears to have been damaged during shipment, the instrument should be thoroughly inspected. The delivering carrier's papers should be signed noting the apparent damage. **DO NOT DISCARD THE BOX.**

If the instrument itself has been damaged, a claim should be promptly filed against the carrier by the customer. The selling agent will assist the customer by supplying all pertinent shipping information; however, the claim must be filed by the insured. If the instrument is damaged beyond use, a new order should be placed with TSI while awaiting reimbursement from the carrier for the damaged instrument. Call TSI directly for assistance if necessary.

COMPUFLOW[®] MODEL 8570/8571 SPECIFICATIONS

Velocity

Range:	0 - 9999 ft/min (0-50 m/s)
Accuracy: ^{1&2}	±3 % of reading or ±3 ft/min, whichever is greater
Resolution:	1 ft/min (0.01 m/s), 5 ft/min over 500 ft/min (0.05 m/s over 5.00 m/s)

Volumetric Flow Rate

Range:	Actual range is a function of maximum velocity and duct size
--------	--

Duct Dimensions

1 to 250 inches in increments of 0.1 inches (1 to 635 cm in increments of 0.1 cm)

Temperature

Range:	0 to 200°F (-17.8 to 93.3°C)
Accuracy: ³	±0.5°F (±0.3°C)
Resolutions:	0.1°F (0.1°C)

Time Constant

Intervals:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, or 30 seconds
------------	--

Instrument Dimensions: 3.8 x 7.5 x 2.35 inches (9.65 x 19 x 6 cm)

Probe Dimensions (all models)

Length:	43.25 inches (110 cm)
Diameter (tip):	0.276 inches (7.01 mm)
Diameter (base):	0.395 inches (10.03 mm)

Probe Dimensions (Model 8570)

Diameter (knuckle):	0.372 inches (9.44 mm)
---------------------	------------------------

Weight: 1.9 lbs. (0.86 kg)

Display

Primary Display:	4-digit LCD, 0.6 in. (15 mm) digit height
Secondary Display:	3.5-digit LCD, 0.3 in. (8 mm) digit height

Power Source: Four C size batteries

Battery Life: 24 hours average

-
- 1 Temperature compensated over an air temperature range of 40-150°F (5 to 65°C)
 - 2 The accuracy statement of ±3.0% of reading or ±3 ft/min (±0.015m/s), whichever is greater, begins at 30 ft/min through 9999 ft/min (0.15 m/s through 50 m/s).
 - 3 Accuracy with instrument case at 77°F(25°C), add uncertainty of 0.05°F/°F (0.03°C/°C) for change in instrument temperature.



TSI Incorporated
Alnor Products
500 Cardigan Road
Toll-free (800) 424-7427
Telephone (651) 490-2811
Fax (651) 490-3824
www.alnor.com
customerservice@alnor.com

September 2002
Printed in USA
Part No. 116-159-857 rev. 6 (1980365e)
© Copyright 2002 TSI Incorporated