



CompuFlow® Thermo Anemometer Model 8525

Owner's Manual



SAFETY NOTICE

All necessary precautions must be observed when operating the CompuFlow Thermo Anemometer in the vicinity of moving equipment such as motors and blowers. The user must exercise care to ensure that the probe or the instrument does not interfere with any moving equipment.

CAUTION

The operational range of the probe is 32 to 158°F (0 to 70°C) and must not be exceeded. Calibration inaccuracies along with possible damage to the sensing elements may result if the temperature range is exceeded.

The Thermo Anemometer is **NOT** designed for gas mixtures other than air. Use with corrosive or other dangerous gas mixtures is not recommended, and is at the user's risk.

Although the sensing elements are protected, they can be damaged if subjected to abuse. They are not repairable.

WARNING

If the instrument is not to be used for more than two months, remove the batteries from the instrument and store them separately in a plastic container to avoid damage from possible leakage.

Do not use the optional battery charger while the standard alkaline batteries are installed in the instrument.

WARRANTY

Your warranty information and reply card are enclosed elsewhere in this package. After locating this material, please return the reply card and retain the remaining warranty information.

WARNING: Opening or otherwise attempting to service your Alnor instrument will void the warranty. Please read the warranty statement carefully.

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TABLE OF CONTENTS

GENERAL DESCRIPTION	1
PREPARATION FOR USE	2
OPTIONAL RECHARGEABLE BATTERY KIT	3
OPERATION	5
LIST OF MODELS AND PARTS	12
PERFORMANCE CHECK	13
MAINTENANCE	14
TROUBLESHOOTING GUIDE	15
THEORY OF OPERATION	16
SPECIFICATIONS	18
APPENDIX	21
PRACTICAL APPLICATIONS	22
WARRANTY/REPAIR INFORMATION	26
INSTRUCTIONS FOR RETURN	27

LIST OF FIGURES

FIGURE 1. TELESCOPIC PROBE	2
FIGURE 2. BATTERY CHARGER INSERTION	3
FIGURE 3. FRONT VIEW, INSTRUMENT CONTROLS	5
FIGURE 4. REAR VIEW OF THE THERMO ANEMOMETER ..	8
FIGURE 5. BLOCK DIAGRAM OF THE THERMO ANEMOMETER	17
FIGURE 6. CORRECTION FACTORS FOR NON-STANDARD CONDITIONS	20
FIGURE 7. 6, 8, AND 10 POINT TRAVERSE METHOD	23

LIST OF TABLES

TABLE 1. INSTRUMENT CONTROLS DESCRIPTION	6
TABLE 2. DESCRIPTION OF FEATURES AT REAR OF INSTRUMENT	9
TABLE 3. PROBE IMMERSION AS A FUNCTION OF DUCT DIAMETER	24
TABLE 4. PROBE IMMERSION FOR 6 POINT TRAVERSE ..	25
TABLE 5. PROBE IMMERSION FOR 8 POINT TRAVERSE ..	25
TABLE 6. PROBE IMMERSION FOR 10 POINT TRAVERSE ..	25

GENERAL DESCRIPTION

The CompuFlow Thermo Anemometer is a hand-held, battery operated, microprocessor based instrument capable of measuring either air velocity or temperature. This digital instrument measures velocities from 20 to 2000 FPM (0.1 to 10 m/s) and temperatures from 32° to 158°F (0° to 70°C). Readings are displayed in 1 FPM increments between 20 and 600 FPM and in 10 FPM increments between 600 and 2000 FPM. The unique software program incorporated into this instrument allows it to accept up to 125 readings and display the average on demand. The Thermo Anemometer provides steady digital readings, as well as quick response, due to time-weighted averaging software with automatic override. When the parameter being measured changes radically with time or position, a HOLD feature freezes the display allowing the operator to concentrate on timing or probe positioning. The display can then be read afterward. Readings are available in English or metric units at the touch of a button.

Three alkaline batteries are used as the power supply and provide up to ten hours of continuous operation. A kit containing NiCd rechargeable batteries and battery charger is also available as an option.

The Thermo Anemometer kit comes in a convenient carrying case that is foam padded for maximum protection and additional compartments are available in the carrying case for optional accessories such as the battery charger and insulated duct sleeve.

PREPARATION FOR USE

1. Probe set up:

Remove the protective cap from the tip of the probe. Carefully extend the probe to the desired length by pulling out the telescopic sections as shown in Figure 1. Do not place fingers inside the window of the protective tip. The sensor elements are located in this vicinity and must not be touched.

CAUTION: To avoid damaging the probe, do not use excessive force when removing the protective tube from the tip.



Figure 1. Telescopic Probe

2. Check the charge on the batteries by switching the instrument to TEMPERATURE mode. For the first three seconds the display will show:

- 0 — indicates less than one hour battery life
- 1 — indicates at least one hour battery life

If the display is blank, the batteries are probably completely discharged. If a 0 appears, battery life may not be adequate for use, and should be replaced with a fresh set.

OPTIONAL RECHARGEABLE BATTERY KIT

WARNING: DO NOT ATTEMPT TO RECHARGE THE STANDARD ALKALINE BATTERIES. DO NOT USE A CHARGING SYSTEM OTHER THAN THE ONE SUPPLIED BY ALNOR. DAMAGE TO THE INSTRUMENT MAY RESULT.

When using the optional battery charger kit, remove the standard alkaline batteries from the instrument, and replace with the nickel-cadmium rechargeable batteries included with the kit.

Plug the charger into the instrument's charge connector as shown in Figure 2. The opposite end is connected to any 115v 50/60 Hz outlet. The instrument



Figure 2. Battery Charger Insertion

must be turned off to charge the batteries. A false reading on battery charge may be obtained if the instrument is turned on during the charging operation. Once a 0 battery charge reading occurs, the instrument should be recharged for the full 12 to 14 hour period to ensure maximum battery life. If the battery charger is removed before the 12 to 14 hour recharge is complete, initial battery charge indication may be incorrect. If this is the case, leave the instrument on for 60 seconds and then recheck battery life by turning the instrument off and then on the TEMP mode. Battery life indication should now be correct.

The instrument may be run from the battery charger if necessary. A recharge time of at least one half hour should be allowed if starting from a completely discharged set of batteries.

OPERATION

The operating controls of the CompuFlow Model 8525 are all located on the front of the instrument. These controls are illustrated in Figure 3 and described in Table 1.

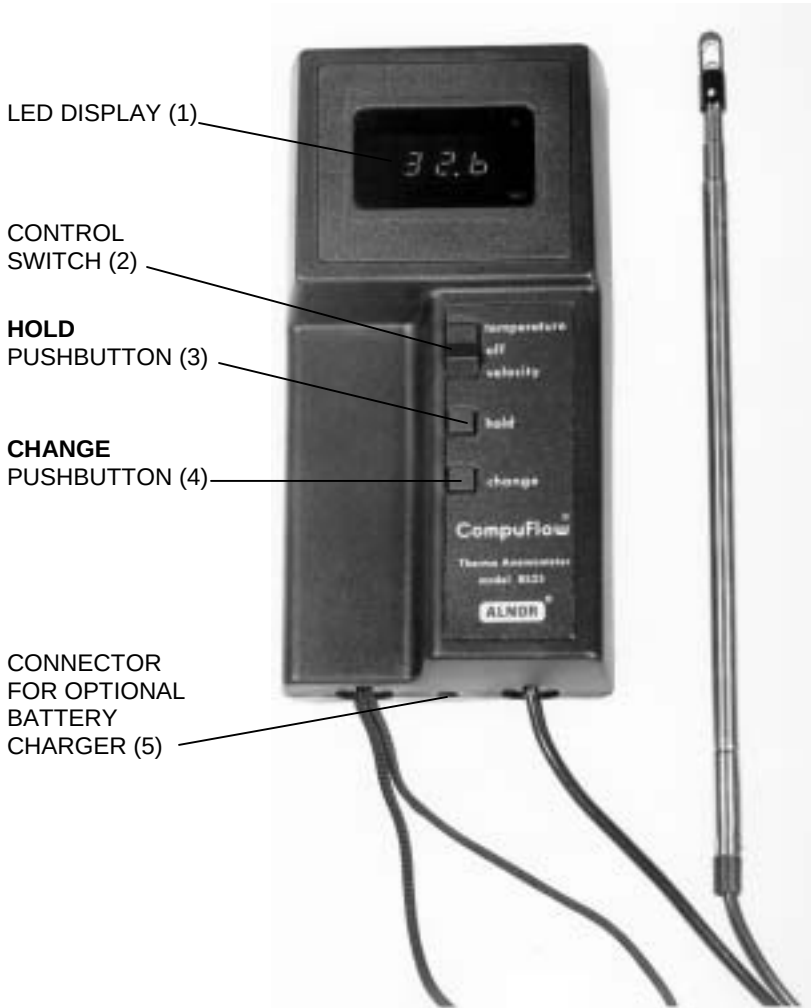


Figure 3. Front View, Instrument Controls

Table 1. Instrument Controls Description

INDEX NO.	NAME	DESCRIPTION
1	LED Display	The temperature or air velocity reading is displayed on the 4-digit LED (Light Emitting Diode) display. This display is also used to show the average reading and the number of readings in the average. Initially, the display indicates battery life when in temperature mode. During temperature measurements, the display shows the unit °F or °C. In velocity mode, the units FPM or m/s are shown. The units are changed as described below under CHANGE push button. Measurement can be frozen as described below under HOLD push button.
2	Control Switch	The three position control switch turns the power on or off, and selects temperature or air velocity as the measurement parameter. In the middle position, the power is off and any information stored in the unit is lost. In the upper position, the instrument is in temperature mode. A °F or °C will show on the display as verification of this condition. In the lower position, the instrument is in velocity mode and the display will show either FPM or m/s.
3	HOLD Push Button	The HOLD push button can be pressed briefly to freeze the display. When the push button is pressed again, the display will show the value of temperature or velocity that is currently being measured by the probe. This action also enters the value previously frozen into the average memory. Up to 125 readings can be entered into the averaging circuit by this procedure. (Attempting to average more than 125 readings may lead to an erroneous result.) If the HOLD button is held down for more than three seconds, the average of all the previously stored readings is displayed. The memory is cleared by turning the instrument off. (See Control Switch)

Table 1. Instrument Controls Description (Cont.)

INDEX NO.	NAME	DESCRIPTION
4	CHANGE Push Button	The CHANGE push button provides three different functions depending upon the prior operation of the instrument. UNITS CHANGE The CHANGE push button can be pressed for about one second to change the unit of measurement from °F to °C while in temperature mode. In velocity mode, it will change the unit of measurement from FPM to m/s. <u>Note that the alternate symbol does not come on until the push button is released.</u> The instrument can be changed between English and metric units at any time. AVERAGE COUNT If the CHANGE button is pressed when the HOLD LED is on, the number of readings put into the average will be displayed. RESOLUTION SCALE CHANGE In velocity mode, if the CHANGE button is pressed continuously until “0000” appears on the display, the instrument is put into high resolution mode. Readings from 20 to 600 FPM with increments of 1 FPM may now be taken. It is not recommended that readings be taken above 600 FPM in the high resolution mode. To return to low resolution, turn the instrument off, and then back on to velocity mode.
5	Connector for Optional Battery Charger	The 2 pin connector attaches the optional battery charger to the instrument. Be certain NiCd batteries are installed in the instrument when using the optional battery charger.

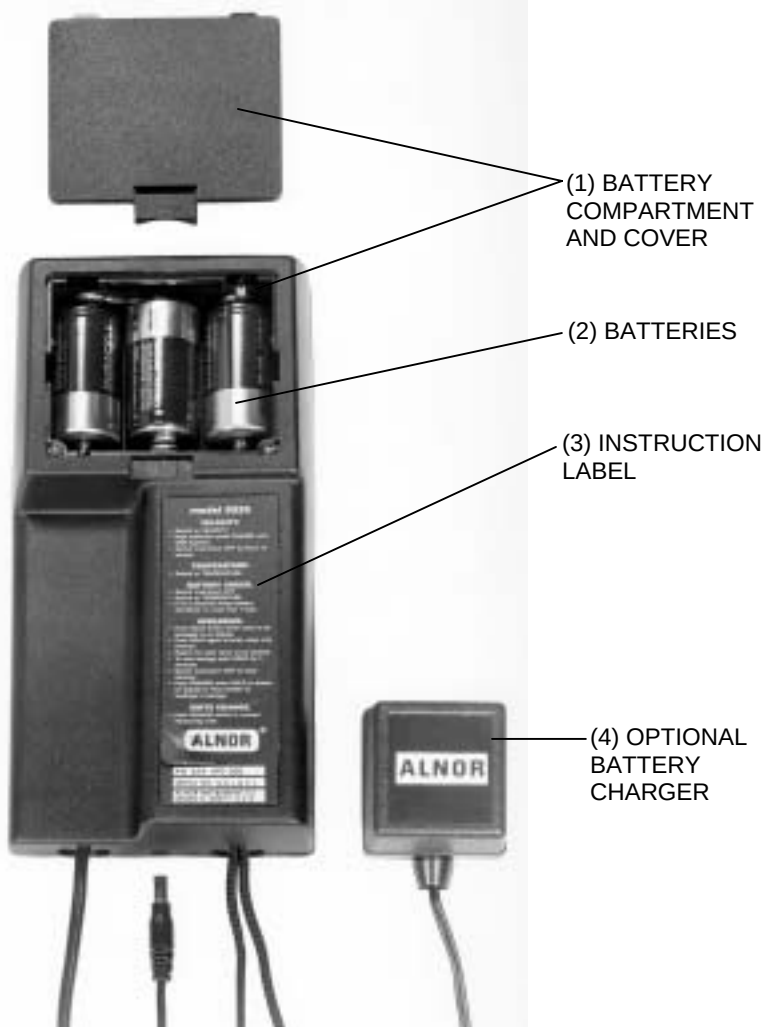


Figure 4. Back View of the Thermo-anemometer

Table 2. Description of Features at Rear of Instrument

INDEX NO.	NAME	DESCRIPTION
1	Battery Compartment with Cover	The battery compartment located behind the display accommodates three “C” size (alkaline or NiCd) batteries to power the instrument. The user should inspect the batteries at least every two months for leakage. To open the cover, hold instrument firmly in both hands, and press forward and up on the tab marked OPEN with both thumbs.
2	Batteries	Three “C” size alkaline batteries are included as standard to supply power to the instrument. Rechargeable NiCd batteries are included in the Optional Battery Charger Kit. Do not attempt to recharge the standard alkaline batteries.
3	Instruction Label	A brief set of operating instructions is printed on the back label for quick reference.
4	Optional Battery Charger	4.5 VDC, 180 mA charger.

A. STEP BY STEP OPERATION—VELOCITY MEASUREMENT

1. Switch the instrument to temperature mode to check the battery voltage. Do this by depressing the control switch to the upper position. If the display shows a 1 for the first three seconds, proceed to step 2. If the display shows a 0, the batteries are weak and should be replaced before taking extensive measurements. A blank display likely means that the batteries are fully discharged. If this is the case, replace the batteries. If NiCd batteries are being used, they may be recharged as indicated in the section titled "Optional Rechargeable Battery Kit" on page 3.
2. Switch the instrument to velocity mode by depressing the control switch to the lower position. The FPM LED will light and the instrument will drift to 00 FPM reading if the probe tip is covered.
3. If measurements are to be taken in the 200 to 2000 FPM range, then the instrument is ready for use. If measurements are to be taken in the 20 to 600 FPM range, push down on the CHANGE button until "0000" appears on the display. Readings will now change in 1 FPM increments.
4. If m/s rather than FPM are preferred, push the CHANGE button for approximately 1 second. The LED indicator should change. If it does not change, repeat the process.
5. Take readings as required. Make sure that the air flow is coming towards the red dot on the tip of the telescopic probe. (NOTE: Use optional Part No. 534-493-127, insulated duct sleeve, when inserting probe through insulation.)
6. To freeze the reading on the display, push the HOLD button for about 1 second. To release the display, push the HOLD a second time.
7. If an average of the readings is required, freeze the reading to be averaged as in step 5 above. When the display is released by pushing the HOLD button a second time, the number shown on the display is entered into the average. Do not change resolution mode (step 3) while taking readings to be included in the average; an erroneous average will result.
8. To determine the number of readings in the average, hold the CHANGE button down while the HOLD LED is on.
9. To read out the final average, push the HOLD button for at least 3 seconds (until the HOLD LED turns on). The number shown is the average. To determine the number of readings in the average, push the CHANGE button down after the HOLD LED is on.

ONCE THE AVERAGE IS DISPLAYED, THE INSTRUMENT MUST BE TURNED OFF TO TAKE ADDITIONAL READINGS. THE MEMORY WILL BE LOST. INTERMEDIATE AVERAGES CANNOT BE SHOWN.

10. The reading from the CompuFlow Thermo Anemometer is in "standard" FPM (or m/s). To determine the true air velocity, multiply by the correction factor shown in Figure 6. The correction factor is based on the pressure and temperature of the air at the probe's tip. Standard air density is .075 lbs/cu. ft.

B. STEP BY STEP OPERATION—TEMPERATURE MEASUREMENT

1. Switch the instrument to temperature mode by depressing the control switch to the upper position. An indication of battery voltage will appear for the first three seconds. If the display shows a 1 for the first three seconds, proceed to step 2. If the display shows a 0, the batteries are weak and should be replaced before taking extensive measurements. A blank display likely means that the batteries are fully discharged. If this is the case, replace the batteries. If NiCd batteries are being used, they may be recharged as indicated in the section titled "Optional Rechargeable Battery Kit" on page 3.
2. If °C rather than °F are preferred, push the change button for approximately 1 second. The LED indicator should change. If it does not change, repeat the process.
3. Take readings as required.
4. To freeze the reading on the display, push the HOLD button for about 1 second. To release the display, push the HOLD a second time.
5. If an average of the readings is required, freeze the reading to be averaged as in step 4 above. When the display is released by pushing the HOLD button a second time, the number shown on the display is entered into the average.
6. To determine the number of readings in the average, hold the CHANGE button down while the HOLD LED is on.
7. To read out the final average, push the HOLD button for at least 3 seconds (until the HOLD LED turns on). The number shown is the average. To determine the number of readings in the average, push the CHANGE button down after the HOLD LED is on.

ONCE THE AVERAGE IS DISPLAYED, THE INSTRUMENT MUST BE TURNED OFF TO TAKE ADDITIONAL READINGS. THE MEMORY WILL BE LOST. INTERMEDIATE AVERAGES CANNOT BE SHOWN.

LIST OF PARTS

MODEL NO.	PART NO.	DESCRIPTION
8525	634-493-310	CompuFlow Thermo Anemometer with telescopic probe, and carrying case
	346-000-010	Carrying Case
	116-159-025	Instruction Manual
	459-000-001	Alkaline C-size battery (3 required)

OPTIONAL ACCESSORIES

634-493-001	Battery Charger Kit
459-009-004	Battery Charger only
459-000-000	NiCd Rechargeable Battery (3 required)
534-493-127	Insulated Duct Sleeve (To protect probe tip when inserting into insulated ducts)

LOCALLY AVAILABLE ITEMS

Radio Shack (Archer) Cat. No. 64-2322	Cleaner/degreaser
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PERFORMANCE CHECK

If a calibration check is made by the user, the following points should be considered. The telescopic probe is calibrated with the red dot facing the air flow (see Figure 1). If the flow is meeting the probe from the opposite direction, the stated accuracy may not be met. (NOTE: If probe has been inserted through insulation be sure the probe tip is clean.)

It is also important to remember that environmental conditions such as temperature, pressure, humidity and turbulence can have very different effects on the measuring result for different instrument types. These effects must be considered when comparing the CompuFlow Thermo Anemometer to other air velocity instruments.

Air velocity is rarely distributed evenly in a duct or in an open air stream. The velocity will generally be higher in the middle of the air stream than at the periphery due to either the friction at surfaces or to free standing air. This may cause discrepancies when comparing different instruments in the “same” air stream. The user should also realize that insertion of a probe in a channel of relatively small cross-sectional area changes the air velocity from the undisturbed case.

The user can check the calibration of the Thermo Anemometer against a Pitot static tube and inclined manometer. The Thermo Anemometer will have better resolution and generally be more accurate than a Pitot static probe and inclined manometer, especially for velocities below 600 FPM.

The instrument can be checked for zero conditions by covering the probe tip completely. If the display does not show 00 FPM, the instrument may be either out of calibration, or damaged. If the calibration is ever suspect, the probe tip should be cleaned as described in the MAINTENANCE section of this manual. If the instrument still seems to be out of calibration, contact your local Alnor distributor or Alnor Instrument Company.

If it becomes necessary to return the unit for repair, see the WARRANTY/REPAIR INFORMATION AND INSTRUCTION FOR RETURN sections of this manual.

MAINTENANCE

PROBE

The probe tip should be cleaned occasionally by immersing it briefly in denatured or isopropyl alcohol, and drying it in a gentle stream of air. If moisture appears on the probe, allow it to dry thoroughly before use. Do NOT apply direct heat. If probe has been inserted through insulation, use of spray cleaner (see List of Models and Parts) may produce better cleaning.

THERMO ANEMOMETER

NOTE: Except for the batteries, there are no user maintainable parts inside the unit. Do not open the case.

The outside carrying case can be wiped clean using cool water and a mild detergent.

BATTERY CARE AND REPLACEMENT

The batteries should be examined at least every two months for signs of corrosion. To open the battery cover, hold instrument firmly in both hands, and press forward and up on the tab marked OPEN with both thumbs. Remove the batteries if there is corrosion on the ends of the batteries, or in the compartment. Clean the affected parts with a clean cloth moistened with water only. Allow all parts to dry thoroughly and reinstall the batteries. The instrument should never be stored with weak or corroded batteries. If the instrument is not to be used for more than two months, remove the batteries and store them separately in a plastic container to avoid damage from possible leakage.

LIFE OF RECHARGEABLE BATTERIES

If the life of the (optional) rechargeable NiCd batteries consistently falls short of 6 hours, the batteries may have to be exercised by completely discharging them. The batteries should then be recharged for 12 to 14 hours. This process of completely discharging and then fully recharging the batteries may have to be repeated two or three times. Battery life should then return to 6 hours after a full charge. If not, the batteries should be replaced.

NOTE: When installing batteries, observe the polarity markings shown on the bottom of the battery compartment.

TROUBLESHOOTING GUIDE

A guide to the elimination of minor problems is provided in the table below.

SYMPTOM	POSSIBLE CAUSES AND CORRECTIVE ACTIONS
No display	Switch is not fully on. Batteries are fully discharged. Replace alkaline batteries, or recharge optional NiCd batteries. DO NOT recharge alkaline batteries.
Display is dim	Batteries are low. Replace alkaline batteries, or recharge optional NiCd batteries. DO NOT recharge alkaline batteries.
Measurement is erratic	Probe is not being held steady. Flow field is unstable or very turbulent.
Erroneous readings	Probe sensing element is dirty. Clean Probe tip. Measurement method is incorrect. See PERFORMANCE CHECK section. Air flow is beyond instrument range. (Display may show 2188, 1110 or 1111.)
Display goes blank, instrument does not respond	Hold button was depressed while attempting to read beyond instrument range. Turn instrument OFF, then back ON again.
Optional NiCd Batteries do not last 6 hours	Cycle batteries from complete discharge to full charge two or three times. Batteries are old. Replace batteries. Clean battery ends and contact springs.

THEORY OF OPERATION

As shown in Figure 5, the CompuFlow 8525 consists of four basic parts:

- 1) measurement sensors
- 2) microprocessor and memory
- 3) display port
- 4) power supply

The probe contains two sensors, each made of fine nickel wire. Temperature is measured by simply monitoring the sensor's resistance and then making a suitable conversion in the microprocessor to either degrees F or degrees C.

Velocity is measured by heating the second sensor with a constant current. Air passing over this sensor will result in a cooling of the sensor. If the velocity sensor experiences greater cooling, its resistance will be decreased. In this manner, a relation between air velocity and the sensor's resistance can be obtained. This non-linear relationship is stored in the instrument's memory. In velocity mode, the temperature sensor is used as a reference for the velocity sensor, and compensation for air temperature is automatic.

Resistance measurements of the probe sensors are analyzed by the microprocessor and then sent to the display as a digital read-out of either velocity or temperature. The system is powered by three alkaline or optional NiCd batteries.

DENSITY CORRECTION FACTORS

The velocity readings of ALNOR Thermo Anemometers are referenced to standard conditions, 70°F and 29.98 in. Hg (20°C and 1015 mbar). Therefore they directly measure the mass velocity of the air. In order to obtain the actual velocity a density correction should be used as follows:

$$V_a = V_i \times d_s/d_a$$

Where d_s = air density at standard calibration conditions of .075 lb/cu ft or 1.20 Kg/cubic meter

d_a = actual air density at local temperature and barometric pressure

V_a = actual air velocity

V_i = indicated velocity on the Alnor Thermo Anemometer

This correction can also be determined graphically, by using Figure 6 on page 20.

Normally this correction is small and may be neglected for most work. In many applications it is the mass velocity that is needed and density correction is not required.

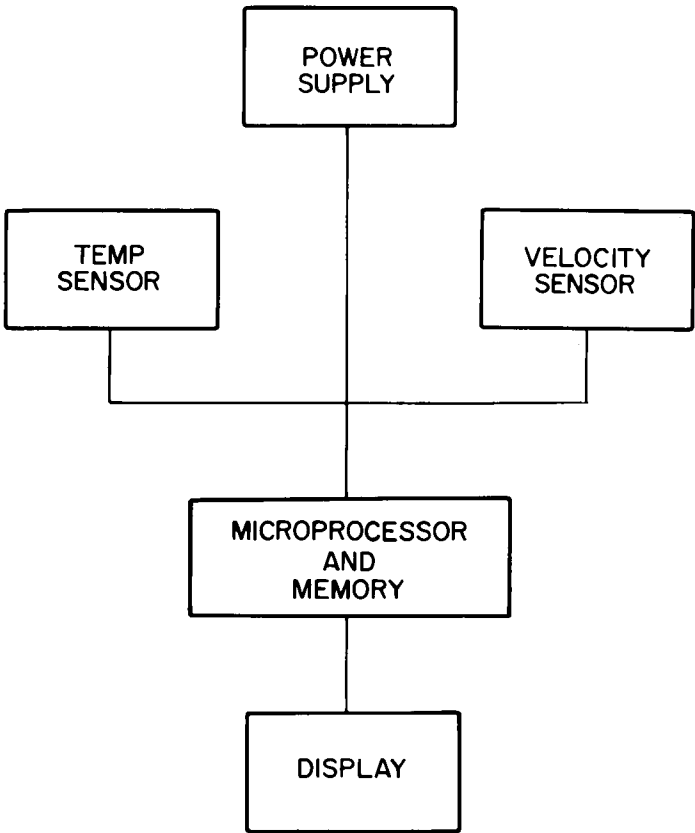


Figure 5. Block Diagram of the Thermo Anemometer

SPECIFICATIONS

INSTRUMENT DISPLAY 4-digit, 5/16" high LED's. Separate indication for FPM, m/s, °F, °C and HOLD

AIR VELOCITY RANGE 20 to 2000 FPM (0.1 to 10 m/s)

INSTRUMENT TEMP MEASURING RANGE 32 to 158 °F (0-70 °C)

OPERATIONAL RANGE

Instrument: 32 to 122 °F (0 to 50 °C)

Probe: 32 to 158 °F (0 to 70 °C)

STORAGE TEMPERATURE - 40° to 150 °F (- 40° to 65 °C)

ACCURACY

Air velocity†:

AIR TEMPERATURE		20-600 FPM The greater of (% is of reading)	600-2000 FPM The greater of (% is of reading)
°F	°C		
75°-79°	24°-26°	(± 3% or 3 FPM) ± 2 FPM	(± 3% or 10 FPM) ± 20 FPM
68°-86°	20°-30°	(± 4% or 4 FPM) ± 2 FPM	(± 4% or 10 FPM) ± 20 FPM
32°-122°	0°-50°	(± 9% or 9 FPM) ± 2 FPM	(± 9% or 20 FPM) ± 20 FPM

Temperature: ± 2 °F (± 1 °C)

Temperature Drift†: ± ¼ % of reading or ¼ FPM (which-ever is greater) for each °C change in Air Temperature

†These specifications are valid only if measurements are taken at standard atmospheric pressure in a 4" dia. or larger duct or free air, the gradient across the duct is less than 0.1 °C, and the turbulence level is less than 1.5%. For conditions other than standard atmosphere, see Density Correction Factors, Page 16.

RESOLUTION

Air velocity:

1 FPM from 20 to 600 FPM
(0.01m/s from 0.1 to 3 m/s)10 FPM from 600 to 2000 FPM
(0.1 m/s from 3 m/s to 10 m/s)

Temperature:

0.1 degree

BATTERIES

Standard—three 1.5V C size alkaline cells

Optional—three 1.2V C-size rechargeable 1800 mAH NiCd cells

**BATTERY RECHARGE TIME
(NiCd BATTERIES ONLY)**

12 to 14 hours

BATTERY LIFE

Alkaline

Minimum 10 hours continuous service

NiCd

Minimum 6 hours continuous service

INSTRUMENT DIMENSIONS

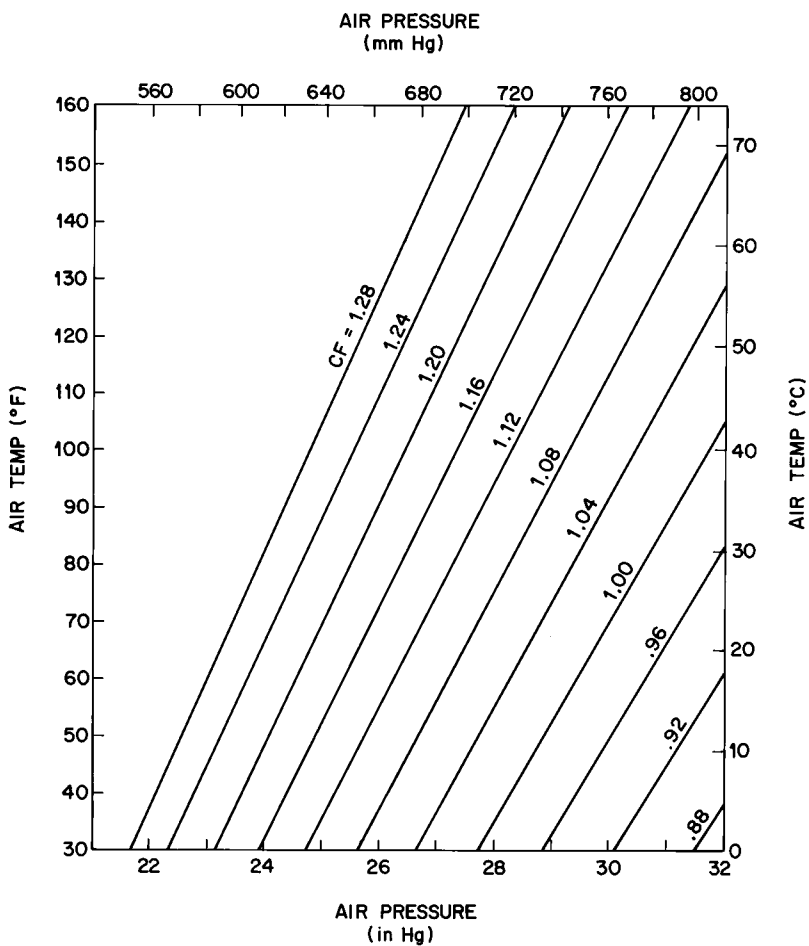
2¾ "x4 "x7½ " (70x102x190 mm)

**INSTRUMENT WEIGHT
WITHOUT PROBE**

1 lb. 7 oz. (651 grams) with batteries

CARRYING CASEBlack plastic, foam padded;
14½ "x9 "x4½ " (368x229x114 mm),
with handle**TELESCOPIC PROBE**.355 " (9mm) max diameter—Probe
10½ " long when closed, extendible to
19 ". (270 mm extendible to 500 mm),
with 7 ' (2.1 M) flexible cable.

Specifications subject to change without notice.



NOTES:

$$1 \text{ (in. H}_2\text{O)} \times 7.36(10^{-2}) = 1 \text{ in. Hg}$$

$$CF = \frac{.075 \times (459.7 + \text{TEMP (}^\circ\text{F)})}{1.325 \times \text{AIR PRESSURE (in. Hg)}}$$

Figure 6. Correction Factors for Non-Standard Conditions

APPENDIX

PRACTICAL APPLICATIONS

AIR VOLUMES AT SUPPLY OPENINGS

When determining the volume output of an opening having no grille, use the following equation:

$$Q = A V$$

where

Q = flow rate in cubic ft/min or cubic meters/sec

A = area in square feet or square meters

V = average velocity in ft/min or meters/sec

If the opening is covered by a grille, divide the opening into a number of equal areas. Measure the velocity at the center of each area. Generally 6 to 20 measurements will be adequate. It is suggested that the probe be held about 1 inch downstream from the grille. The average velocity of all areas will then be "V" in the above equation. "A" will be the core area.

VELOCITIES INSIDE DUCTS

To measure velocities inside ducts, it is necessary to have an opening in the duct wall. In case there is no opening provided, a hole 3/8 inch in diameter must be drilled for insertion of the probe. (NOTE: Use Part No. 534-493-127 insulating duct sleeve when inserting through insulation, to avoid sensor contamination.)

Since air velocities are rarely uniform within the entire cross sectional area of duct, it is necessary to determine the average velocity. In general, the greater the number of readings taken to obtain the average, the higher the accuracy.

Select a straight section of duct, at least 10 duct diameters downstream from the nearest turn, transformation, damper or other source turbulence.

AIR VOLUME INSIDE A DUCT

To determine the air volume passing through a duct, it is necessary to calculate the average velocity inside the duct. The cross sectional area of the duct must also be calculated. Air volume can then be determined from the following equation:

$$Q = A V$$

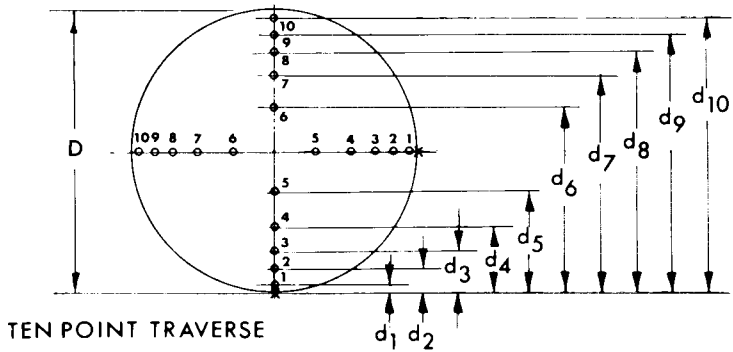
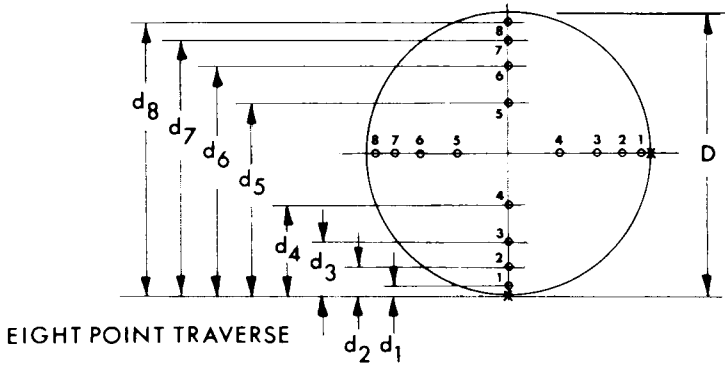
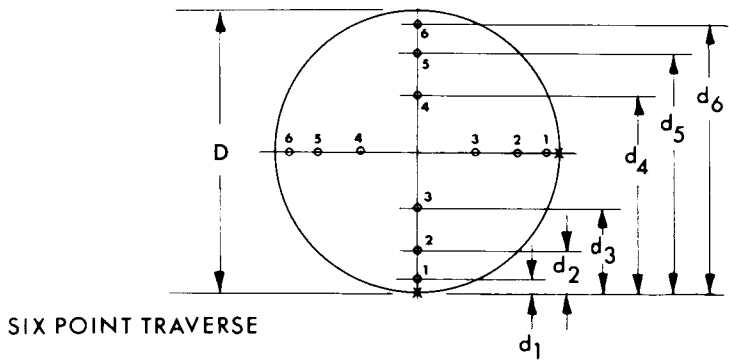
where

Q = volume of air in cubic ft/min or cubic meters/sec

A = Cross sectional area in square ft or square meters

V = Average velocity in ft/min or meters/sec

To calculate the average velocity within a duct, several methods can be used.



'X'-REFERENCE POINTS
(OPENINGS FOR PROBE)

Figure 7. 6-, 8- and 10- Point Traverse Method

For rectangular ducts, mentally divide the duct into at least nine equal areas that are approximately square. Take readings at the center of these areas and determine the average.

In a circular duct use a traversing method whereby the cross sectional area is divided into concentric rings of equal area, as shown in Figure 7. The center distances of the individual areas have been calculated for 6, 8 and 10 point traverses and are tabulated in TABLES 3 through 6.

A traverse should be made across two perpendicular diameters. For the 6, 8 and 10 point traverse method, the distances from the reference point for a variety of duct diameters have been calculated. TABLE 3 shows the distances of the individual measuring points from the reference point expressed in pipe diameters. TABLES 4, 5 and 6 show the required probe immersions from the reference point expressed in inches.

AIR VELOCITY AT EXHAUST OPENINGS

Measure exhaust openings at grinding or buffing wheels only when no work is in progress, to avoid contamination of the sensing elements.

CAUTION

THE USER MUST EXERCISE EXTREME CARE TO ENSURE THAT THE PROBE OR THE INSTRUMENT DOES NOT INTERFERE WITH ANY MOVING EQUIPMENT.

When measuring velocity at spray booths, fume hoods or biological cabinets, place the probe in the plane defined by the edge of the booth.

Traverse Method 	Table 3. Probe Immersion as a Function of Duct Diameter									
	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	d ₇	d ₈	d ₉	d ₁₀
6 point	0.043	0.147	0.296	0.704	0.853	0.957	—	—	—	—
8 point	0.032	0.105	0.194	0.323	0.677	0.806	0.895	0.968	—	—
10 point	0.025	0.082	0.146	0.226	0.342	0.658	0.774	0.854	0.918	0.975

Duct Dia. (In.)	Table 4. Probe Immersion for 6 pt. Traverse					
	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆
10	3/8	1-1/2	3	7	8-1/2	9-5/8
12	1/2	1-3/4	3-1/2	8-1/2	10-1/4	11-1/2
14	5/8	2	4-1/8	9-7/8	12	13-3/8
16	3/4	2-3/8	4-3/4	11-1/4	13-5/8	15-1/4
18	3/4	2-5/8	5-3/8	12-5/8	15-3/8	17-1/4
20	7/8	3	6	14	17	19-1/8
22	1	3-1/4	6-1/2	15-1/2	18-3/4	21
24	1	3-1/2	7-1/8	16-7/8	20-1/2	23

Duct Dia. (In.)	Table 5. Probe Immersion for 8 pt. Traverse							
	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	d ₇	d ₈
10	5/16	1	2	3-1/4	6-3/4	8	9	9-5/8
12	3/8	1-1/4	2-3/8	3-7/8	8-1/8	8-3/4	10-3/4	11-1/2
14	7/16	1-1/2	2-3/4	4-1/2	9-1/2	11-1/4	12-1/2	13-1/2
16	1/2	1-5/8	3-1/8	5-1/8	10-7/8	12-7/8	14-3/8	15-1/2
18	9/16	1-7/8	3-1/2	5-7/8	12-1/4	13-1/2	16-1/8	17-1/2
20	5/8	2-1/8	3-7/8	6-1/2	18-1/2	16-1/8	17-7/8	19-3/8
22	11/16	2-3/8	4-1/4	7-1/8	14-7/8	17-3/4	19-3/4	21-1/4
24	3/4	2-1/2	4-5/8	7-3/4	16-1/4	19-1/2	21-1/2	23-1/4

Duct Dia. (In.)	Table 6. Probe Immersion for 10 pt. Traverse									
	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	d ₇	d ₈	d ₉	d ₁₀
10	1/4	7/8	1-1/2	2-1/4	3-3/8	6-5/8	7-3/4	8-1/2	9-1/8	9-3/4
12	1/4	1	1-3/4	2-3/4	4-1/8	7-7/8	9-1/4	10-1/4	11	11-3/4
14	3/8	1-1/8	2	3-1/8	4-3/4	9-1/4	10-7/8	12	12-7/8	13-5/8
16	3/8	1-1/4	2-3/8	3-5/8	5-1/2	10-1/2	12-3/8	13-5/8	14-3/4	15-5/8
18	1/2	1-1/2	2-5/8	4-1/8	6-1/8	11-7/8	13-7/8	15-3/8	16-1/2	17-1/2
20	1/2	1-5/8	2-7/8	4-1/2	6-7/8	13-1/8	15-1/2	17-1/8	18-3/8	19-1/2
22	1/2	1-3/4	3-1/4	5	7-1/2	14-1/2	17	18-3/4	20-1/4	21-1/2
24	5/8	2	3-1/2	5-3/8	8-1/4	15-3/4	18-5/8	20-1/2	22	23-3/8

WARRANTY/REPAIR INFORMATION FORM

Contact Alnor Instrument Company before returning your Alnor Instrument to the factory. See INSTRUCTIONS FOR RETURN. Follow the procedure carefully as it will expedite processing. Failure to follow the procedure will/may cause return of unit unrepaired. Send your instrument to the factory transportation prepaid. To assure fast turn-around time, fill out this form with as much detail as possible and attach it to the instrument.

Instrument Model _____

Serial Number _____

Date of Purchase _____ Where Purchased _____

Describe malfunction _____

Describe environment _____

Return instrument to:

Name _____
(Your name or company)

Address _____

Telephone _____

Address Correspondence to:

Name _____

Address _____

Telephone _____

INSTRUCTIONS FOR RETURN

Damaged in Transit

All shipments are carefully examined by Alnor Quality Assurance and 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.

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 Alnor while awaiting reimbursement from the carrier for the damaged instrument.

Call Alnor directly for assistance if necessary.

Malfunction

Please follow these steps should you require factory service or repair of your Alnor Instrument:

1. Write or telephone the Alnor distributor in your country for cost of repair or recalibration and shipping instructions. Obtain a Purchase Order or purchase order number from your Purchasing Department showing instrument model number and cost of repair and/or recalibration. 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, or Reference the Purchase Order on your packing slip.
2. In North America, telephone the Repair Department at the USA factory for cost of repair or recalibration, Authorization for Repair (AFR) number, and shipping instructions. On instruments being returned to the factory for recalibration, determine whether you prefer:

--Certificate of Calibration, no data (states instrument checked and found to be within accuracy claimed and specifications listed in current literature).

--Certificate of Traceability to National Institute of Standards and Technology (NIST, formerly NBS) with data (states instrument compared with factory standard traceable to NIST, lists of calibration data, i.e., "Standards reads..." and "This instrument reads...")

Obtain a Purchase Order or purchase order number from your Purchasing Department showing instrument model number and cost of repair and/or recalibration. 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, or Reference the Purchase Order on your packing slip. Mark the outside of the shipping container with the AFR Control number.

3. Forward the instrument prepaid. See back cover for factory addresses.

Please note that instruments received improperly marked or without an accompanying Purchase Order may be returned at your expense. Please also note that if an AFR# has been assigned, it will be cancelled if the instrument is not received by ALNOR within 60 days.

Equipment Log
MODEL _____

DATE OF
PURCHASE _____

CALIBRATION RECORD

1. _____	2. _____	3. _____
4. _____	5. _____	6. _____
7. _____	8. _____	9. _____
10. _____	11. _____	12. _____

Notes: _____

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