Air Volume Instruments

Balometer® Air Balancing Instrument

Owner's Manual

TSI® | ALNOR®

LIMITATION OF WARRANTY AND LIABILITY

LIMITATION OF WARRANTY AND LIABILITY (effective June 2011)

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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 **12 months**, or if less, 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 and exceptions:

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. Pumps are warranted for hours of operation as set forth in product or operator's manuals;

c. 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;

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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) 874-2811 (USA) and (1) 651-490-2811 (International).

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GENERAL DESCRIPTION

The Alnor® Balometer® Air Balancing Instrument is designed to assist you in rapid and accurate measurements of air distribution in heating, ventilating, and air conditioning systems. The Balometer® instrument directly reads average air flow rate, either intake or outflow, at ceiling, wall or floor diffusers.

In use, air to be measured is directed past a manifold which senses flow at multiple points spread across a carefully sized area. The manifold is designed so that the air volume is sensed at either supply or return diffusers with equal accuracy.

The manifold is connected through the range selector to an Velometer® anemometer which can be provided with scales for English measurement units of cubic feet per minute (CFM) or either of two metric scales, cubic meters per hour (cmh) or liters per second (l/s), and is capable of reading flows up to 2000 CFM (3400 cmh, 950 l/s). This time-proven Velometer® anemometer is the heart of the Balometer® measuring system.

A single knob direction and range selecting unit allows control of the Balometer® instrument for either supply or return diffusers, on ranges of 100 to 500, 400 to 1000, and 800 to 2000 CFM. (170 to 850, 700 to 1700, and 1400 to 3400 cmh; 50 to 240, 200 to 475, and 400 to 950 l/s).

A Low flow adapter is also included with each Balometer® instrument for accuracy in balancing modern air systems which incorporate low volume diffusers. When used with the most sensitive range selector setting it provides an additional measurement range up to 250 CFM (400 cmh, 120 l/s).

For increased flexibility the unit can be supplied with up to five sizes of nylon hoods which fit interchangeably on the instrument base. The 2 x 2 size is standard and is attached to its own permanent frame. Other hoods (2 x 2, 1 x 4, 1 x 5, 3 x 3) are used with frame pieces which must be assembled by the user.

**Throughout this manual the units CFM, cmh, and l/s are used for simplicity. Note however that the Balometer® instrument actually reads in standard cubic feet per minute (SCFM), standard cubic meters per hour (scmh), or standard liters per second (std. l/s). See the Specifications section for more information.*

SAFETY NOTICE

When using the Balometer® instrument to check air flow at ceiling diffusers, make certain that you can safely raise and hold the unit while making measurements, especially when working on a ladder.

Observe all necessary precautions so that the unit does not become caught in moving machinery.

The Balometer® instrument is not designed for gas mixtures other than air. Any use with corrosive or other dangerous or explosive gas mixtures is not recommended, and is at the user's risk.

Due to its size and shape, care should be taken when carrying the assembled instrument from place to place so that it does not accidentally bump into people or objects.

PREPARATION FOR USE

Unpacking

BEFORE REMOVING ANY PARTS FROM THE CARRYING CASE THE ARRANGEMENT OF THE VARIOUS ITEMS SHOULD BE NOTED, SO THAT REPACKING CAN BE DONE EASILY.

The support frame for the 2 x 2 hood must be removed from the case before the instrument base can be lifted out. Depending on prior usage, the hood may already be attached to the frame and/or the instrument base. If the entire unit is to be lifted out as an assembly, caution must be exercised to assure that the pieces do not separate, since dropping the instrument may damage the Velometer® anemometer.

At the rear of the carrying case is a built-in accessory case with a hinged lid. Packed inside are four support dowels, anti-static solution, detachable handle, and any unmounted hoods. If the 2 x 4 or 3 x 3 hood size is part of your set, a package of four 8½ inch dowels will also be found in the case.

If your instrument is ordered with more than one hood, the frame channels needed to support other sizes will be found in the back compartment of the carrying case.

Assembly

Frame Channels

The 2 x 2 size frame is permanently assembled and ready to use. If your unit includes only this size, go on to the paragraph on Hood Installation.

Refer to Figures 1 through 4 to determine the frame channels needed to build any of the standard-sized frames. Select the pieces required for the frame size desired and assemble with the aid of the appropriate figure. Several sections (numbers 1, 3 and 4)* consist of a straight channel portion (each a different length) and a corner piece. This corner piece has an eyelet and slot arrangement which mates with a similar eyelet and slot at the end of the straight portion of the channel pieces (see Figure 5). These pieces can be slid together, and are self-locking by means of a retention spring.

The number 1 and 5 channels also have a wing nut at the straight end which will mate with an angle and studs on the ends of numbers 2, 5 and 6 to form the longer frame sides (see Figure 6).

* *Each channel is numbered for easy identification.*

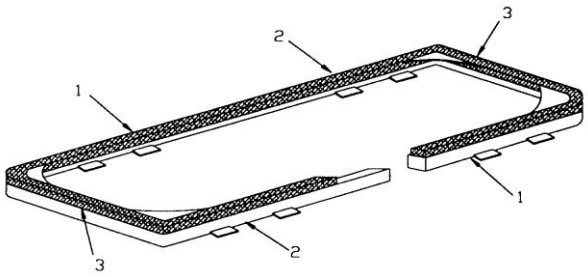


Figure 1—1' x 4' Frame (305 x 1220 mm)

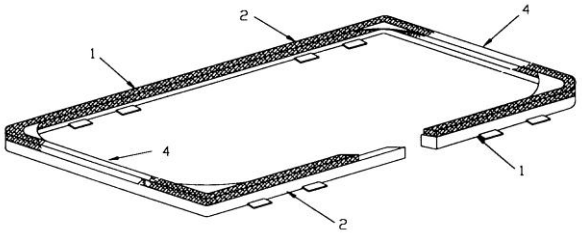


Figure 2—2' x 4' Frame (610 x 1220 mm)

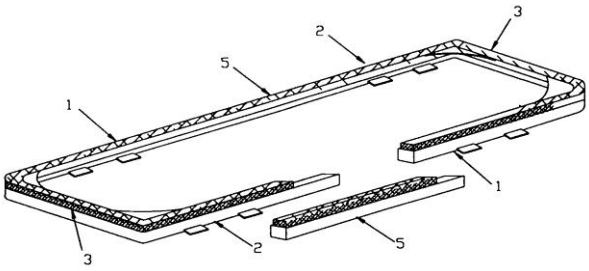


Figure 3—1' x 5' Frame (305 mm x 1525 mm)

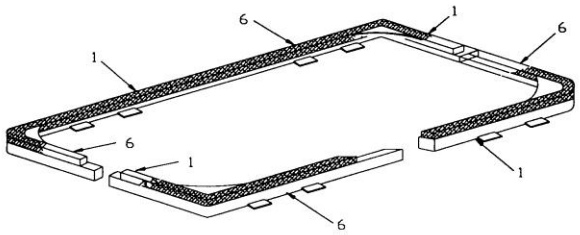


Figure 4—3' x 3' Frame (915 mm x 915 mm)

Hood Installation

The hoods are sewn in a trapezoidal shape so that one open end forms a 14 inch square for attachment to the base, and the other forms a square or rectangle to fit its matching frame assembly. Around each end of the hood an elastic cord has been sewn into the hood. The cord is pushed into the open side of the U-shaped channels of the frame and around the top of the base.

Attach the hood to the frame assembly first, and then to the base unit. By stretching around two corners the cord is slightly reduced in diameter and is easier to press into the channel.

***Note**: Always locate the hood seams at the corners of the frame and base.*

After the first side is pressed into place each remaining side can be done in a similar fashion.

The hood can now be attached to the base in the same way. Do not attempt to set up the hood with the hood support and dowels until the hood has been completely attached to both the frame and the base.

Hood Support Assembly

The hood support must be in the correct position for hood set-up. This is accomplished by swinging the long rods around so they project in a direction opposite to the short rods which hold the springs. In the corners of the base are a series of holes. The ends of the long rods should be inserted in the bottom hole of each corner. If it is later found that the hood is not held as tautly as required the rods can be moved upward to compensate.

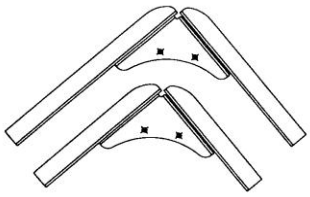


Figure 5—Frame corner assembly

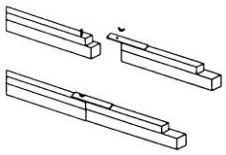


Figure 6—Frame side assembly

The support dowels are now slid over the ends of the short rods. The aluminum tips on the dowels should be facing the top. If the 2 x 4 or 3 x 3 hood is to be used, a set of 8-inch long dowel extensions must be added to either end of the long dowels.

The hood can now be raised and the ends of the dowels inserted in either the corner of the hood frame, or into one of the ferrules (cups) attached to the frame channels, depending on the hood and frame size. **Rods go into corners on the 2 x 2, 2 x 4, and 3 x 3 frames, into the set of inner ferrules for the 1 x 5 frame, and in the outer ferrules for the 1 x 4 frame.** Proper tautness has been achieved if the springs on the short rods of the hood support assembly are slightly (but not fully) compressed.

Detachable Handle

For maximum flexibility in using or carrying the Balometer® instrument, install the detachable handle. Simply screw it “hand tight” into its mating thread on the support plate above the range selector knob.

***Note**: Make a habit of checking the tightness of this handle each time before use, to be sure it doesn't loosen while the instrument is being used to take readings, or while it is being carried from place to place.*

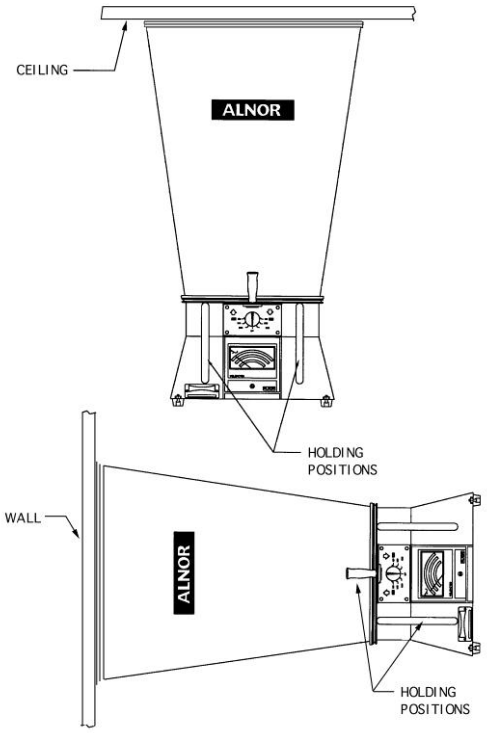


Figure 7—Holding Balometer for measurement

See Figure 7 for ways that the permanent and detachable handles help in making measurements.

Low Flow Adapter

The low flow adapter (screen) can be used for measuring air volumes below 250 CFM, (400 cmh, 120 l/s), **but it is strongly recommended that it be used only when measuring very low flows, below 100 CFM (170 cmh, 50 l/s).**

The low flow adapter is inserted by carefully pushing it into position against the manifold on the side which the air will enter. If air will move through the hood TO the base of the instrument the adapter goes on the "hood" side of the manifold. The adapter should be in as close contact with the manifold as possible, and nowhere more than 1/8 inch away. Take care not to distort the manifold mounting in the process of installing or removing the adapter.

Do not forget to remove the adapter when measuring flow greater than 250 CFM (400 cmh, 120 l/s).

STEP BY STEP OPERATION

If the instrument has been stored at a temperature below 68°F (20°C) or above 86°F (30°C) it should be allowed to stabilize at room conditions (between 68°F and 86°F) in order to achieve specified accuracy.

1. Assemble the Balometer® instrument as described in the Preparation for Use section of this manual.

   If the Balometer® instrument will be carried between locations during use, the detachable handle should be used. Until the Balometer® instrument is repacked in its carrying case the handle can remain mounted.

2. Check the Velometer® anemometer for zero adjustment by placing the instrument away from any air flow, setting the range selector to the OFF position, and verifying that the meter reads zero. If necessary, use a screwdriver to adjust the zero screw so that the pointer reads zero. Although the meter will typically read zero (within one division) regardless of how the unit is held, it is best to zero the meter in the position in which it will be used.

3. Set the range selector to the highest reading in the desired direction, supply or return. This technique is to ensure that the meter will not be damaged by an over range condition.

4. Bring the Balometer® instrument into contact with the perimeter of the diffuser or grill to be measured. To assure maximum accuracy, the foam gasket along the top of the frame must be firmly in contact with the surface all around the opening. Take care to ensure that your body or other material is not accidentally affecting the reading by blocking or diverting the air flow at the base opening.

5. If the reading is found to be below the full scale of the next lower scale, the range selector may be switched to the next lower scale.

6. The Balometer® instrument is calibrated to standard conditions.

   To determine the true volume flow rate, multiply by the correction factor determined from Figure 9. The correction factor is based on the static pressure and air temperature at the manifold.

7. The additional system resistance generated by the Balometer® instrument may affect the output of an individual diffuser. Depending on system design and balancing method, this may or may not be important. When proportionally balancing a system of similar outlets, this is not usually an important factor. If system design or other factors require adjustment, Figure 8 is included for your reference.

Low Flow Adapter Application

(Recommended measurement range
0 to 100 CFM, 0 to 170 cmh, 0 to 50 l/s)

The low flow screen must be placed on the side of the manifold against which the air pressure will be felt. If measuring supply flow, the adapter is placed down against the averaging manifold from the top of the Balometer® base. If measuring return flow, the adapter is placed up against the averaging manifold from the bottom of the Balometer® base. Ensure that the air flow is in the proper range for using the low flow screen before installing it. The Balometer® instrument and adapter are calibrated at the factory for use on the lowest range only.

REPACKING

With the exception of the 2 x 2 hood and frame, hoods must be removed from their support frames, re-rolled and packed in the accessory case. Corner sections can be pulled apart when the retaining spring is pushed out of the latching hole. Put wing nuts back on their threads before storing, to avoid losing them.

All the frame pieces fit in the plastic insert at the case bottom. Use the positioning chart shown on the label attached to the inside of the carrying case to find the correct location for each piece. The formed insert is divided into two sections for convenient storage of parts when less than the maximum number of hoods are supplied with the instrument. Once all the parts are positioned they are held in place with the elastic straps.

Next dismount the dowels and pack them in the accessory case with the hoods.

The hood support is removed by slightly springing the ends of the long wires out of their mounting holes. After the low flow adapter is pressed (gently) into its storage position on top of the manifold, the hood support can be stowed. It will fit inside the base, by swinging the long rods to the same side as the short ones. All four long rod ends can then be inserted into holes in two adjacent corner tubes and the entire mechanism is then inside the base unit. Be careful not to damage the manifold when pressing the screen in place, or by allowing the short rods of the hood support to protrude through the screen.

Remove the detachable handle and store it in the accessory case. The carrying case cannot be closed with this handle attached to the base.

The base assembly can now be placed in the carrying case, with the range selector and Velometer® anemometer facing to the side (either side) of the case. The case will not close if the Velometer® anemometer faces forward or to the rear.

The 2 x 2 frame (with hood attached, if convenient for further use) is the last item to be packed. The frame will be tilted, with the back of the frame resting on the top of the accessory case.

MAINTENANCE

Nylon Hoods

The hoods can be hand washed in cool water with a mild detergent if needed. When handling do not let the cloth come in contact with sharp corners or other objects which may tear the material.

Static Electricity

It is common to encounter static electrical charges, especially in conditions of low humidity. Included with the Balometer® instrument when shipped from the factory is a container of anti-static solution which should be used if the Velometer® anemometer will not hold a zero setting, or gives erratic readings. Using a soft lint-free cloth slightly moistened with anti-static solution, rub gently over the front of the Velometer® case and window.

Velometer Zero Adjustment

Check to see that the pointer of the Velometer® anemometer is at zero each time the meter is put into service. The zero adjustment screw enables you to make an adjustment. With the range selector set to OFF, use a screwdriver to bring the pointer to zero. It should read zero (within one division) regardless of how the Balometer® instrument is held.

Manifold

The manifold should be checked before using to be certain that the sensing holes have not become clogged with dirt or dust particles. Inspect for leaks which may be caused by cracks, or by poor connection to the range selector through the short pieces of tubing. The manifold can be cleaned using mild detergent and warm water, without immersing the manifold in water. It is recommended that cleaning be done with the manifold in place, and with extreme care.

When the instrument is stored or otherwise not being used to take readings, be certain to protect the meter movement by switching the range selector to the OFF position.

The air flow sensing manifold can be damaged if subjected to excessive stress. It is not repairable. Any air flow other than through the calibrated sensing holes (even hairline cracks) will affect instrument accuracy. Special manifold mounting springs are designed to cushion the assembly and allow for some deformation of the base without affecting accuracy. These springs should not be removed or altered in any way.

Calibration

Your Balometer® instrument may be returned to the factory for calibration.

When shipping the Balometer® instrument for factory calibration, pack it carefully, and follow the Instructions for Return in this manual.

PERFORMANCE CHECK

When checking the performance of the Balometer® instrument, first verify that the unit has been properly adjusted to zero. If the calibration is to be checked, a reference flow standard at least 4 times more accurate than the Balometer® instrument should be used. Flow standards that may be used for this purpose include orifice or venturi flow meters or laminar flow elements. These devices require accurate pressure and temperature reading instruments to measure actual flow volume.

If the Balometer® instrument is checked against a velocity standard such as a Pitot-static probe or thermal anemometer, the user should be aware that this may introduce errors. If a velocity standard is used, the average velocity must be obtained by taking a traverse.* The accuracy of this average reading is dependent on the flow uniformity, the number of readings in the average and the accuracy of the velocity reading instrument. This average velocity reading must then be multiplied by the area over which the traverse was taken. If this area is not accurately measured, additional errors in the final flow volume reading will result.

Finally, air flow instrumentation is often dependent on environmental conditions such as temperature, atmospheric pressure, humidity and even turbulence. These conditions can have very different effects on various instrument types. Caution must be exercised when making comparisons.

* *A traverse is a set of velocity readings taken in a prescribed geometric pattern which will provide an overall velocity when averaged together.*

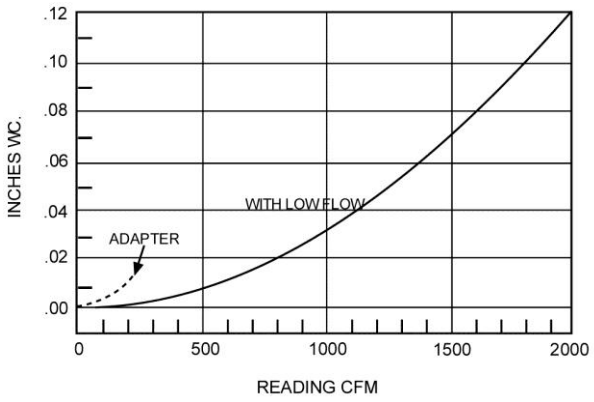
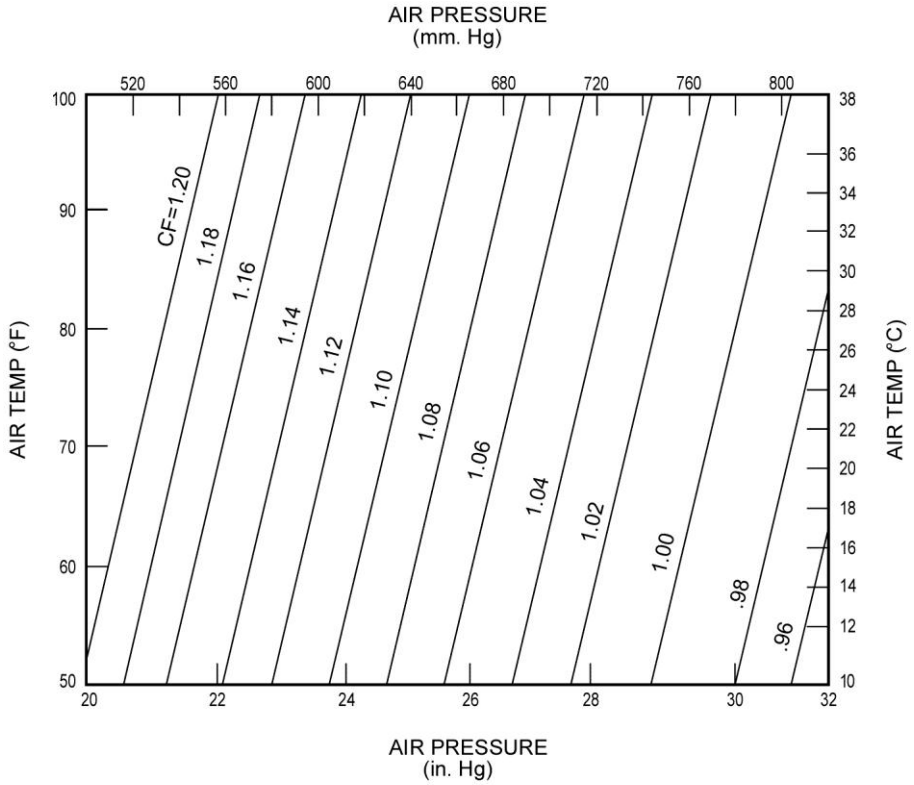


Figure 8—Backpressure Curve



NOTE: 1 (in. H_2O) x 7.36 (10^2) = 1 in. Hg.

$$\text{CORRECTION FACTOR} = \sqrt{\frac{.075 \times (459.7 + \text{TEMP °(F)})}{1.325 \times \text{AIR PRESSURE (in. Hg.)}}}$$

Figure 9—Correction Factors for Non-Standard Conditions

TROUBLESHOOTING GUIDE

Symptom	Possible Cause and Corrective Action
Meter not at zero before use.	Velometer® anemometer not adjusted. Use zero adjustment screw.
Cannot zero meter.	Meter pointer not in balance. Return unit to factory for rebalance. Possible static problem. Use antistatic solution.
Meter reading lower than expected.	Hood frame not sealing properly around diffuser or grill. Press hood evenly against diffuser. Hood torn. Replace, or repair tear with duct tape or other non-porous material. Range selector not properly set. Make sure detent on switch is properly engaged. Manifold is damaged. Call TSI. Manifold holes are plugged. Clean holes. Meter/range selector out of calibration. Calibrate instrument. Low flow adapter not installed when using lowest (blue) scale. Install adapter. Low flow adapter not close enough to the manifold, or installed on wrong side of manifold. See Preparation for Use section. Odd air flow pattern. Perform traverse and use correction factor. Resistance effects could be significant. Perform traverse and use correction factor.
Meter not indicating.	Range selector is switched to OFF. Position switch to correct range. Range selector incorrectly set. Position switch to correct range. Connection between manifold/range selector/meter is broken. Call TSI.
Meter reading higher than expected.	Meter/range selector out of calibration. Calibrate instrument. Low flow adapter mistakenly left installed. Odd air flow pattern. Perform traverse and use correction factor.

THEORY OF OPERATION

The Balometer® instrument is an adaptation of the Velometer® system which allows this instrument to be used for measurement of air volume, by reading average velocity as the air moves through a cross-section of known constant dimension.

The Balometer® instrument consists of six major subassemblies which function as a system to provide accurate air volume measurements:

1. Air Collection System—All the air issuing from or entering a diffuser is collected through a cloth "hood" which is chosen to fit a specific diffuser at one end, and translates this variable size to a standard opening which is slightly larger than one foot square. The diffuser end of this hood is foam-edged to allow for a complete seal around the opening.
2. Instrument Base—The base, in addition to housing the range selector, manifold, and Velometer® anemometer, provides the standard cross-section through which the air is passed. The bottom flared portion acts both as a secure footing for the instrument, and provides the exit for the captured air. This is also the entry point for exhaust or return air measurements.
3. Manifold—This is a grid which contains calibrated holes in a regular pattern spaced within the standard base opening. It is actually two grids back-to-back, with the pattern of holes in a separate network on each side. Air can therefore enter the manifold from either side and be discharged at the other. The amount of air which flows through the manifold is directly proportional to the average velocity of the air moving past the sensing holes. Therefore this velocity, which is moving through a known cross-sectional area, is proportional to the volume of air flow through the instrument.
4. Range Selector—By means of a single control the range selector provides for the measurement of air flow in either direction, and provides calibrated orifices for three ranges, which effectively triples the scale length of the meter. Accuracy of the measurement in either direction is assured by separate calibrations of each range, in each direction.
5. Velometer® anemometer—TSI's standard air measuring instrument is provided with a special scale graduated either in cubic feet per minute, cubic meters per hour, or liters per second.
6. Low flow Adapter—This screen assembly makes use of the standard area and velocity principles mentioned above. The adapter reduces the effective area through which the air flows, causing a corresponding increase in velocity past the manifold. The screen blocks 50% of the standard opening, increasing the velocity to twice the original. This means, for example, that with the adapter a volume of 250 CFM will create the same velocity as 500 CFM without the adapter. A fourth scale has been provided on the Velometer® anemometer to be used with the adapter, on the most sensitive range setting.

   Note that the adapter provides higher sensitivity at low flow rates, but can more easily upset the system being measured at flow rates above 100 CFM (170 cmh, 50 l/s) because of additional flow resistance. It is therefore suggested that measurements above this value be taken without the adapter.

Note: *All capture hoods are susceptible to "odd" air flow patterns. "Odd" could refer to any air flow pattern different from the pattern where it was calibrated. For example, substantial negative effects can be observed when using a large hood on a small diffuser. This creates large recirculation regions on the sides of the fabric hood and causes an "odd" air flow pattern as it passes over the manifold. It is recommended to match the hood closely to the size of the diffuser.*

SERVICE INFORMATION

Service and Repair

Please return your Product Registration Card immediately. This allows us to send you 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 to TSI prepaid. Securely package your instrument in a strong container surrounded by at least 2 inches (5 cm) of suitable shock-absorbing material. Include a purchase order that clearly shows the instrument model number and serial number, a contact name, phone, fax number, and RMA number. Mark the outside of your shipping container with the RMA number. This will expedite processing of your instrument when we receive it.

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.

BALOMETER® AIR BALANCING INSTRUMENT SPECIFICATIONS

Accuracy	±3% of full scale, except ±20 CFM on 250 CFM scale (±35 cmh on 400 cmh scale) (±10 l/s on 120 l/s scale)
Operational Temperature Range	32–122°F (0–50°C)
Storage Temperature	-40 to 140°F (-40 to 60°C)
Supply and Exhaust Ranges	250, 500, 1000, 2000 Standard CFM (note 1) (400, 800, 1700, 3400 standard cmh) (note 1) (120, 240, 475, 950 standard l/s) (note 1)
Scale Divisions	5 CFM from 25 to 200 CFM 10 CFM from 100 to 500 CFM 20 CFM from 400 to 1000 CFM 50 CFM from 800 to 2000 CFM 10 cmh from 50 to 350 cmh 10 cmh from 200 to 850 cmh 25 cmh from 700 to 1700 cmh 50 cmh from 1400 to 3400 cmh 5 l/s from 10 to 100 l/s 5 l/s from 50 to 240 l/s 10 l/s from 200 to 475 l/s 25 l/s from 400 to 950 l/s
Maximum Usable Limit	2000 CFM (3400 cmh, 960 l/s)
Read-Out Time	Approx. 4 seconds
Standard Openings	2 x 2, 2 x 4, 1 x 4, 1 x 5, 3 x 3 ft. (60 x 60, 60 x 120, 30 x 120, 30 x 150, 90 x 90 cm)
Dimensions	
Instructions	Height 40 in. (102 cm) Width, Depth—variable depending on cloth hood size. Up to 5 ft. (153 cm) wide, 3 ft. (92 cm deep at top opening. Base 17" x 17" (43 x 43 cm)
Carrying Case	13" x 26" x 23" (H x W x D) (33 x 66 x 59 cm)
NOTE 1:	*Standard units are defined as volume referenced to standard conditions of atmospheric pressure and temperature—Temperature = 70°F (20°C) Atmospheric Pressure = 29.92" (760 mm Hg)*

LIST OF MODEL AND PART NUMBERS

Model	Part No.	Description
6461	634-593-100	Balometer Kit—CFM Scale, with 2 x 2 hood only
	634-593-101	Balometer Kit—m^3/h, with 2 x 2 hood only
	634-593-102	Balometer Kit—l/s, with 2 x 2 hood only
6463	634-593-110	Balometer Kit—CFM Scale, with 2 x 2, 1 x 4, 2 x 4 hoods
	634-593-111	Balometer Kit—m^3/h Scale with 2 x 2, 1 x 4, 2 x 4 hoods
	634-593-112	Balometer Kit—l/s, with 2 x 2, 1 x 4, 2 x 4, 1 x 5, 3 x 3, hoods
6465	634-593-120	Balometer Kit—CFM Scale, with 2 x 2, 1 x 4, 2 x 4, 1 x 5, 3 x 3 hoods
	634-593-121	Balometer Kit—m^3/h Scale, with 2 x 2, 1 x 4, 2 x 4, 1 x 5, 3 x 3 hoods
	634-593-122	Balometer Kit—l/s, with 2 x 2, 1 x 4, 2 x 4, 1 x 5, 3 x 3 hoods
	634-593-115	Expansion Kit, to expand Model 6461 to Model 6463
	634-593-115	Expansion Kit, to expand Model 6463 to Model 6465

PARTS LIST

Part No.	Qty.	Description
6461 Balometer with 2 x 2 Hood		
534-513-045	1	Hood Support (Spider Assembly)
534-513-016	4	Support Dowels
534-513-063	1	Carrying Case
534-513-031	1	2 x 2 Frame
534-513-034	1	2 x 2 Cloth Hood
534-066-059	1	Anti-static Solution
534-593-173	1	Handle
6463 Balometer with 3 hood sizes—Same as Model 6461, with the following:		
534-513-018	2	#1 Channel
534-513-017	2	#2 Channel
534-513-020	2	#3 Channel
534-513-021	2	#4 Channel
534-513-032	1	2 x 4 Cloth Hood
534-513-033	1	1 x 4 Cloth Hood
370-000-003	2	Elastic Strap (Tie Down)
534-513-042	4	Dowel Extension
6465 Balometer with 5 hood sizes—Same as Model 6463, with the following:		
534-513-018	2	#1 Channel
534-513-040	2	#5 Channel
534-513-041	4	#6 Channel
534-513-035	1	1 x 5 Cloth Hood
534-513-036	1	3 x 3 Cloth Hood

Specifications subject to change without notice.
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