

VOLU-probe/VS

Airflow Traverse Station

AMCA
CERTIFIED
RATINGS

AIRFLOW
MEASUREMENT
STATION
AIR
PERFORMANCE

AIR
MOVEMENT
AND CONTROL
ASSOCIATION
INTERNATIONAL, INC. ®



Accurate airflow measurement for demanding applications



VOLU-probe/VS

Product Description

The VOLU-probe/VS Airflow Traverse Station utilizes one or more VOLU-probe Airflow Traverse Probes, factory mounted in a rigid welded galvanized casing, to sense and average separate total and static pressure traverses of an airstream. Multiple sets of total and static pressure sensing points, positioned along the length of each VOLU-probe on an equal area basis, traverse the airstream and average the sensed pressures in separate internal manifolds. Factory installed static and total pressure signal tubing connect the

individual VOLU-probes together, terminating at the galvanized casing for field connection. The VOLU-probe/VS is suited for installations in ductwork, fan inlets, etc., operating at temperatures ranging from -20 to 200°F. As a primary flow sensing means, the VOLU-probe/VS can be used in applications ranging from commercial building HVAC to laboratory, pharmaceutical and electronics production, and health care institutions.

2% Certified Measurement Accuracy



Air Monitor Corporation certifies that the VOLU-probe/VS Airflow Traverse Station shown herein is licensed to bear the AMCA Certified Ratings Seal – Airflow Measurement Station Performance. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 611 and comply with the requirements of the AMCA Certified Ratings Program.

Test Data

Model. VOLU-probe/VS

Type. Differential Pressure

Conversion Formula. $Velocity = 1096 \sqrt{\frac{AMS \text{ Velocity Pressure}}{Air \text{ Density}}}$

Sizes & Shapes Tested. 36" x 36" Rectangular; 36" dia. Circular

Applicable Sizes Rated. Rectangular stations with cross-sectional areas between 4.5 and 18.0 square feet; Circular stations with cross-sectional areas between 3.5 and 14.1 square feet.

Test Setup. AMCA Standard 610, Figure 1

Test Results – Rectangular Stations

Reference Volume, ACFM	Reference Velocity, AFPM	% Accuracy	Airflow Resistance IN w.c.
35,134	4,015	0.53	.082
31,391	3,488	0.45	.064
26,018	2,891	0.39	.044
19,456	2,162	0.23	.028
13,971	1,552	0.10	.013
8,832	981	-1.40	.005

Test Results – Circular Stations

Reference Volume, ACFM	Reference Velocity, AFPM	% Accuracy	Airflow Resistance IN w.c.
29,602	4,188	1.03	.066
24,915	3,525	0.97	.047
18,728	2,649	0.30	.033
14,463	2,046	0.15	.017
10,455	1,479	0.16	.010
8,285	1,172	-1.37	.005

How It Works

The VOLU-probe/VS operates on the Fechheimer Pitot derivative of the multi-point, self-averaging Pitot principle to measure the total and static pressure components of airflow. Total pressure sensing ports, with chamfered entrances to eliminate air direction effect, are located on the leading surface of the individual VOLU-probes to sense the impact pressure (P_t) of the approaching airstream (see Figure 2). Fechheimer pairs of static pressure sensing ports, positioned at designated angles offset from the flow normal vector, minimize the error inducing effect of directionalized airflow. As the flow direction veers from the normal, one static sensor is exposed to a higher pressure ($P_s + \text{part of } P_t$), whereas the other

static sensor experiences a lower pressure ($P_s - \text{part of } P_t$) of the same magnitude, thereby canceling out the undesired effect of partial total pressure (P_t). It is this unique design of offset static pressure and chamfered total pressure sensors (see Figure 1) that makes the VOLU-probe/VS insensitive to approaching multi-directional, rotating airflow with yaw and pitch up to 30° from straight flow, thereby assuring the accurate measurement of the sensed airflow rate without the presence of an airflow straightener upstream. This unique design of the VOLU-probe/VS is covered by U.S. Patent No. 4,559,835.

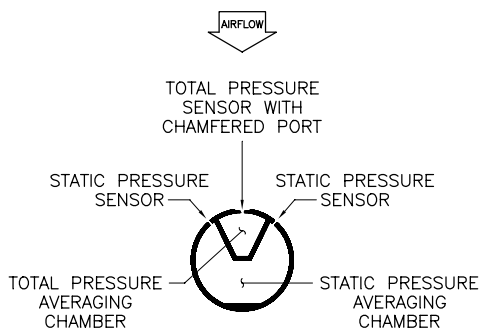


Figure 1

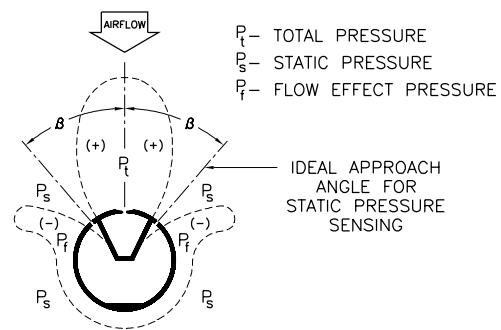
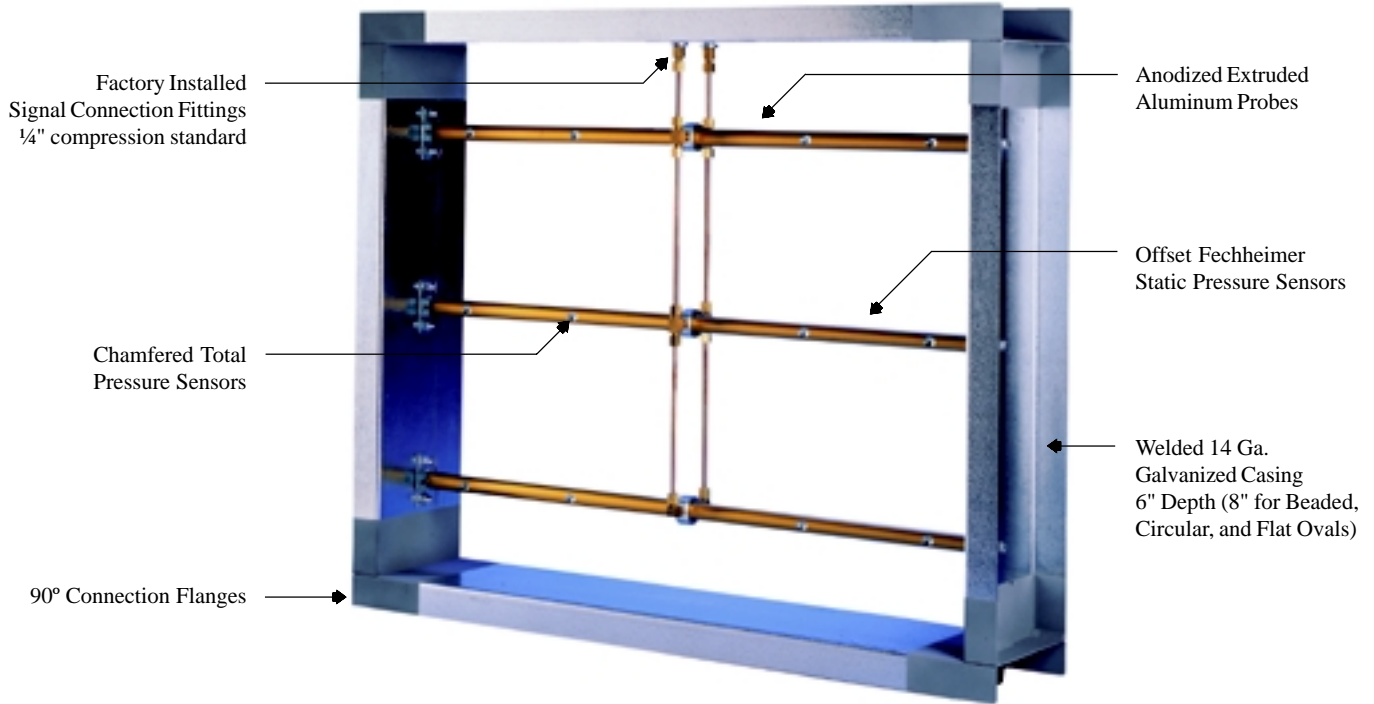


Figure 2

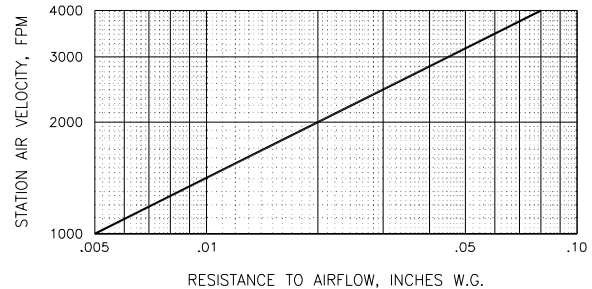
Airflow Traverse Station

Construction Features



Airflow Resistance

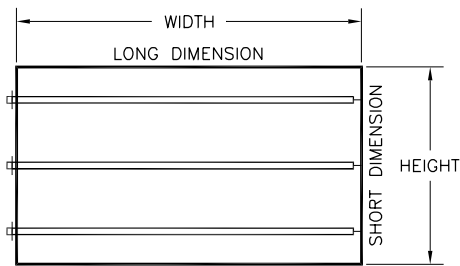
Negligible Resistance to Airflow. The VOLU-probe/VS cylindrical configuration and smooth surface free of external sensor protrusions permit the airstream to flow unrestricted around and between the installed traverse probes, creating a very minimal resistance to airflow.



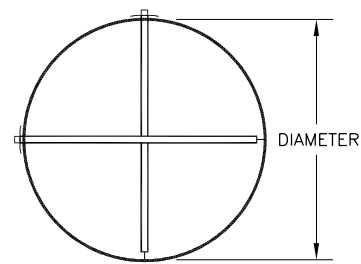
Traverse Probe Quantities

When installed per Air Monitor's Minimum Installation Requirements (see Page 4), the quantity and placement of individual

probes in a VOLU-probe/VS Airflow Traverse Station (see below) will produce assured measuring accuracy of $\pm 2\%$ of actual airflow.



FOR SQUARE AND RECTANGULAR DUCTS



FOR CIRCULAR DUCTS

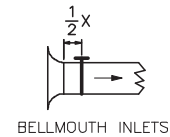
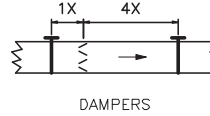
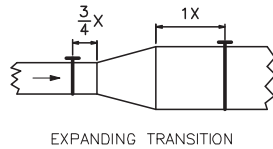
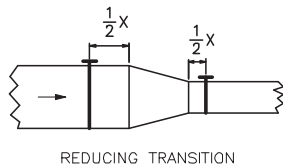
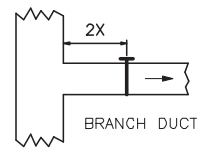
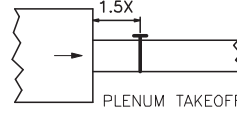
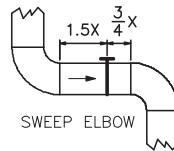
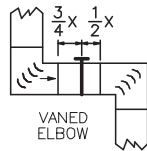
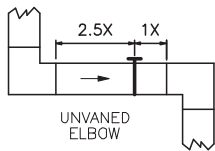
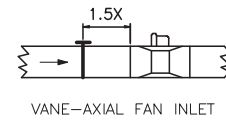
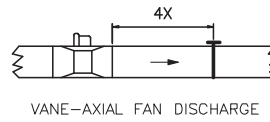
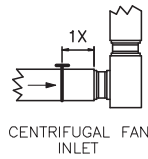
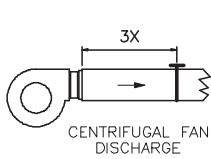
Height Dimension	Min. Qty of VOLU-probes Recommended	Height Dimension	Min. Qty of VOLU-probes Recommended
8" to 12"	1	> 54" to 84"	4
> 12" to 30"	2	> 84" to 120"	5
> 30" to 54"	3	> 120" to 180"	6

Height Dimension	Min. Qty of VOLU-probes Recommended
8" to 18"	1
> 18" to 72"	2
> 72"	3

VOLU-probe/VS

Minimum Installation Requirements

Note: VOLU-probe/VS locations shown are **not** ideal. The locations indicate the **minimum** clearance required from air turbulence producing sources. Wherever possible, the VOLU-probe/VS should be installed where greater runs of straight duct (or clearances) than shown below exist.



Rectangular Duct: $x = \frac{2 \sqrt{H \times W}}{H + W}$

Circular Duct: $x = \text{Duct Diameter}$

Suggested Specification

Provide where indicated, airflow traverse stations capable of continuously measuring the fan or duct capacities (air volumes) they serve.

Each airflow traverse probe mounted within the station shall contain multiple total and static pressure sensors located along its exterior surface, and internally connected to their respective averaging manifolds. The flow sensors shall not protrude beyond the surface of the probe(s), and shall be the offset (Fechheimer) type for static pressure and the chamfered impact type for total pressure measurement. The airflow station's measured accuracy shall not be affected by directional flow having yaw and/or pitch angles up to 30°.

The airflow measuring station(s) shall have a 14 ga. [18 ga. for circular units] galvanized steel, 6" deep welding casing with 90°

connecting flanges. Total and static pressure sensors shall be located at the centers of equal areas (for rectangular ducts) or at equal concentric area centers (for circular ducts) across the station's face area.

Stations shall be AMCA certified and be capable of measuring the airflow rates within an accuracy of ±2% without the use of correction factors. The maximum allowable unrecovered pressure drop caused by the station shall not exceed .025" w.c. at 2000 FPM, or .085" w.c. at 4000 FPM.

The airflow traverse station shall be the VOLU-probe/VS as manufactured by Air Monitor Corporation, Santa Rosa, California.