

VOLU-probe/SM

Airflow Traverse Probe

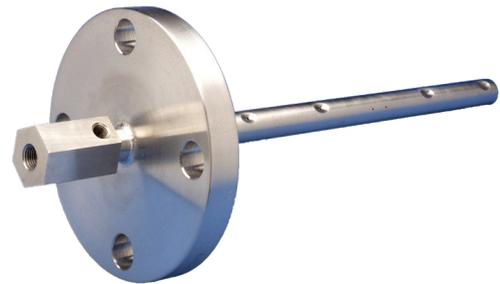
Product Description

The VOLU-probe/SM Airflow Traverse Probe is ideally suited for new installations or retrofit applications requiring accurate flow measurement in pipes or small duct locations having limited straight duct runs. The "tube-in-tube" design has multiple total and static pressure sensing ports along the length of the probe to traverse the airstream in a single line across the duct or pipe,

providing separately averaged pressures at the signal connections. The VOLU-probe/SM is suited for clean applications, operating at temperatures ranging from -20 to 900°F. As a primary flow sensing means, the VOLU-probe/SM can be used in industrial process applications such as fiber quenching, process drying, emission monitoring, wastewater treatment, etc.

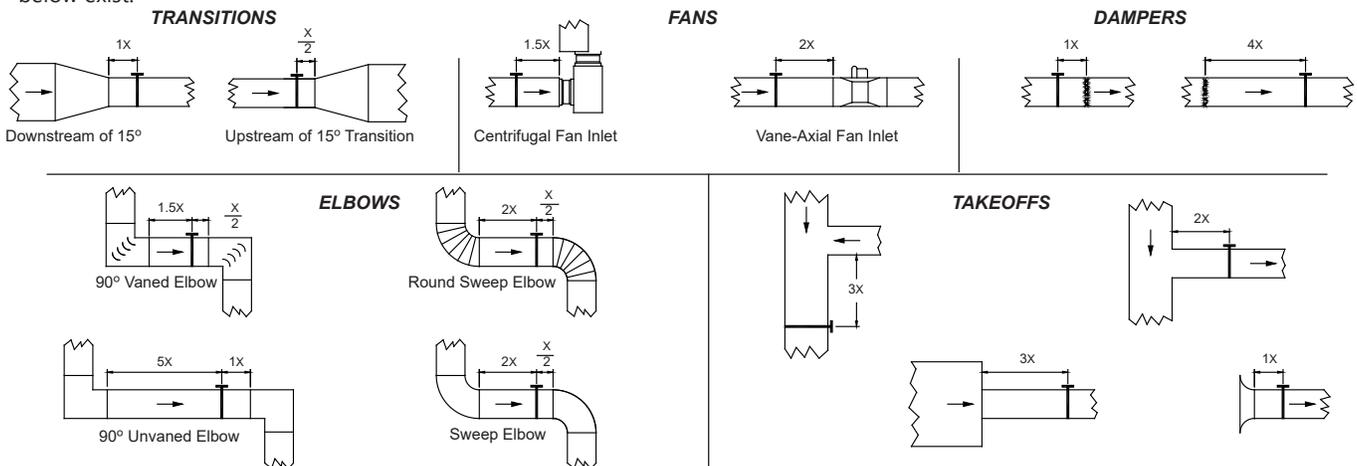
Product Specifications

- **Accuracy.** ±2%; dependent upon quantity and placement of probes to achieve traverse of ducted airflow.
- **Outputs.** Averaged signals of static and total pressure.
- **Operating Velocity.** 100 to 10,000 FPM.
- **Directional Sensitivity.** Not measurably affected by directional airflows with pitch and yaw angles up to 30°.
- **Traverse Pattern.** On an equal area basis for rectangular probes. On an equal concentric area basis for circular probes.
- **Resistance.** Less than 0.1 times the velocity pressure head at probe operating velocity.
- **Construction.** All welded construction, utilizing Type 316 stainless steel. 10 ga. plate, 1" MPT, or 150 lb. RF flange mounting options.



Minimum Installation Requirements

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



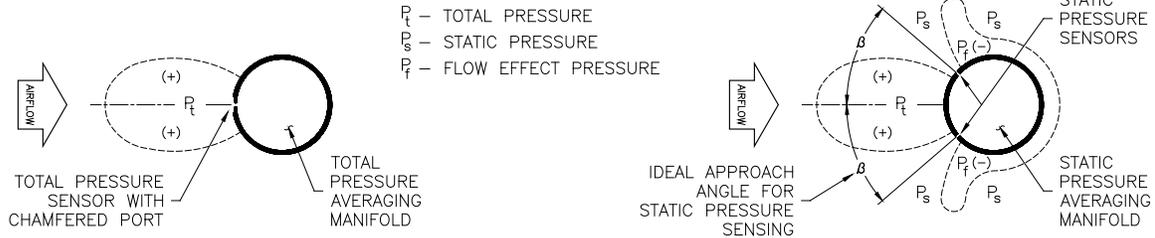
Rectangular Duct: $x = \frac{z(H \times W)}{H + W}$

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

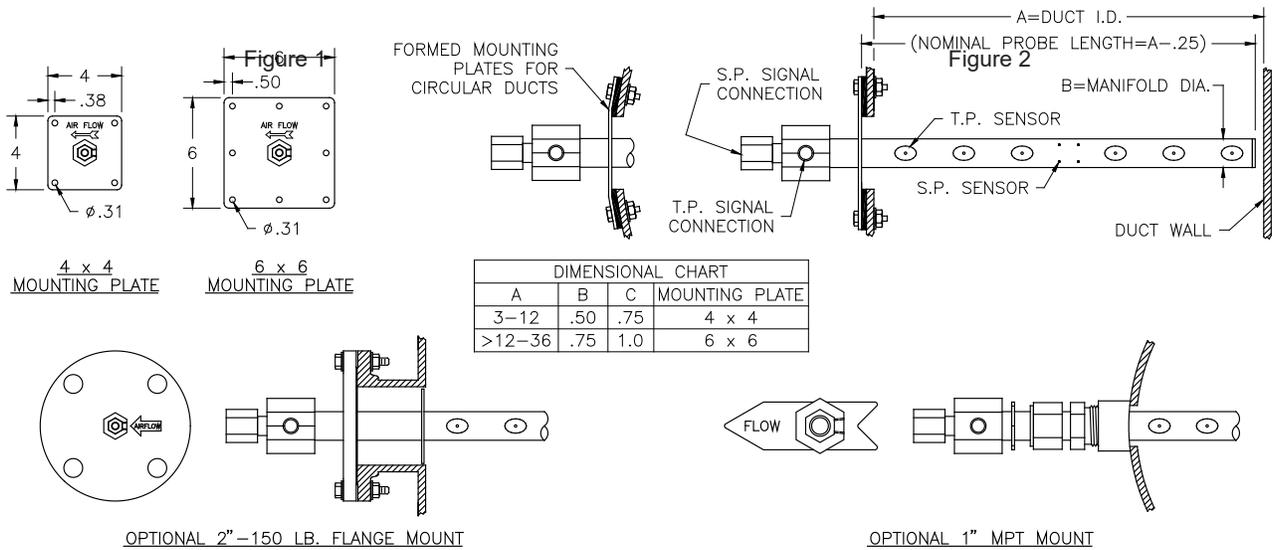
How It Works

The VOLU-probe/SM 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 effects, are located on the leading surface of the VOLU-probe/SM to sense the impact pressure (P_t) of the approaching airstream (see Figure 2). Fechheimer pair 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 make the VOLU-probe/SM 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/SM is covered by U.S. Patent No. 4,559,835.



Dimensional and Construction Information



Suggested Specification

Provide where indicated airflow traverse probe(s) capable of continuous measurement of ducted airflow.

Each airflow traverse probe shall contain multiple forward facing total and static pressure sensors, internally connected to their respective tube-in-tube averaging manifolds. The flow sensors shall not protrude beyond the surface of each probe, and shall be the offset (Fechheimer) type for static pressure and the chamfered impact type for total pressure measurement. The airflow sensing probe's measurement accuracy shall not be affected by directional flow having pitch and/or yaw angles up to 30°.

Each airflow traverse probe shall be fabricated of Type 316 stainless steel (or Inconel, Hastelloy, etc.), all welded construction, and shall be furnished with a 10 ga. plate [or 1" MPT, 2"-150 lb.

RF flange] mounting means.

Total and static pressure sensors shall be located at the centers of equal areas (for rectangular duct) or at equal concentric area centers (for circular ducts) along the probe length. The airflow traverse probe shall be capable of producing steady, non-pulsating signals of total and static pressure without need for flow corrections or factors, with an accuracy of 2-3% of actual flow, over a velocity range of 400 to 4000 FPM.

The airflow traverse probe(s) shall be the VOLU-probe/SM as manufactured by Air Monitor Corporation, Santa Rosa, California.