



FE-1000 INSERTION TYPE AIRFLOW SENSING ELEMENT

DESCRIPTION

The **FE-1000** is an insertion type airflow sensing element designed for quick, easy installation through a small cutout in the existing ductwork. Where multiple elements are required for proper duct traversing, the output ports are manifolded together, external to the ductwork. Each element is furnished complete with mounting hardware and sealing gaskets. Standard aluminum elements also include all brass compression fittings required to manifold the elements together.

The **FE-1000** airflow sensing element is a head type device, which generates a differential (velocity) pressure signal similar to the orifice, venture, and other head producing primary elements. The **FE-1000** is constructed so that strategically located sensing ports (based on duct size) continually sample the total and static pressures, when inserted normal to flow. The total pressures sensed by the upstream ports are continually averaged within the element in an isolated chamber. The static sensing ports (located where the influence of the velocity head is zero) are averaged in a second isolation chamber. Each chamber is then connected to one side of a differential measurement device (gauge, transmitter, etc.) for flow measurement and indication purposes.

Features

- Low signal-to-noise ratio
- Multiple total and static pressure sensing ports along the length of the element
- Averaging internal manifold
- Insensitive to flow angle variations of as much as $\pm 20^\circ$ when faced in the normal direction of flow
- $\pm 2\%$ accuracy throughout the velocity ranges of 100 fpm and over
- Standard construction is 6063-T5 aluminum with anodized finish
- Available in optional corrosive resistance materials including Type 316L stainless steel, Hastaloy C276, and Type 1 PVC
- Standard elements can be operated (in air) continuously in temperatures up to 350°F or intermittently in temperatures up to 400°F
- All elements can be operated in humidity ranges of 0 to 100%
- Standard elements have good salt air and mild acid resistance; excellent solvent and aromatic hydrocarbon resistance

FE-1000 Technical Specifications

1. Accuracy

Within 2% of actual flow (even in moderately turbulent flows) with approach angle variation of $\pm 20^\circ$, when installed in accordance with published recommendations

2. Operating Velocity Range

100 to 10,000 fpm

3. Material

6063-T5 anodized aluminum (standard)
 Type 316L stainless steel (optional)
 Hastaloy C276 (optional)
 Type 1 PVC (optional)

Note

Other corrosive resistant materials are available. Consult factory for further information.

4. Temperature

Aluminum Elements

350°F continuous operation (in air)

400°F intermittent operation (in air)

Stainless Steel Elements

1600°F continuous or intermittent operation (in air)

Hastaloy C276 Elements

900°F continuous or intermittent operation (in air)

PVC Elements

120°F continuous operation and 170°F intermittent operation (in air)

Note: Corrosive resistant element maximum operating temperatures vary greatly with the concentration of the media in the process stream. Consult factory for further information.

5. Humidity

All Elements

0 to 100% non condensing

6. Corrosion Resistance

Aluminum Elements

Good salt, air, and mild acid gas resistance; excellent solvent and aromatic hydrocarbon resistance

Stainless Steel Elements

Good for sulfates, phosphates and other salts, as well as reducing acids such as sulphurous and phosphoric

Hastaloy C276 Elements

Excellent resistance to strong oxidizers such as ferric and cupric chlorides, chlorine, formic and acetic acids, acetic anhydride, and salts.

PVC Elements

Excellent acid and alkalis resistance

7. Instrument Connections

Aluminum Elements

1/4" compression, suitable for use with thermoplastic or copper tubing; thermoplastic tubing requires the use of tubing inserts, which are supplied with the fittings

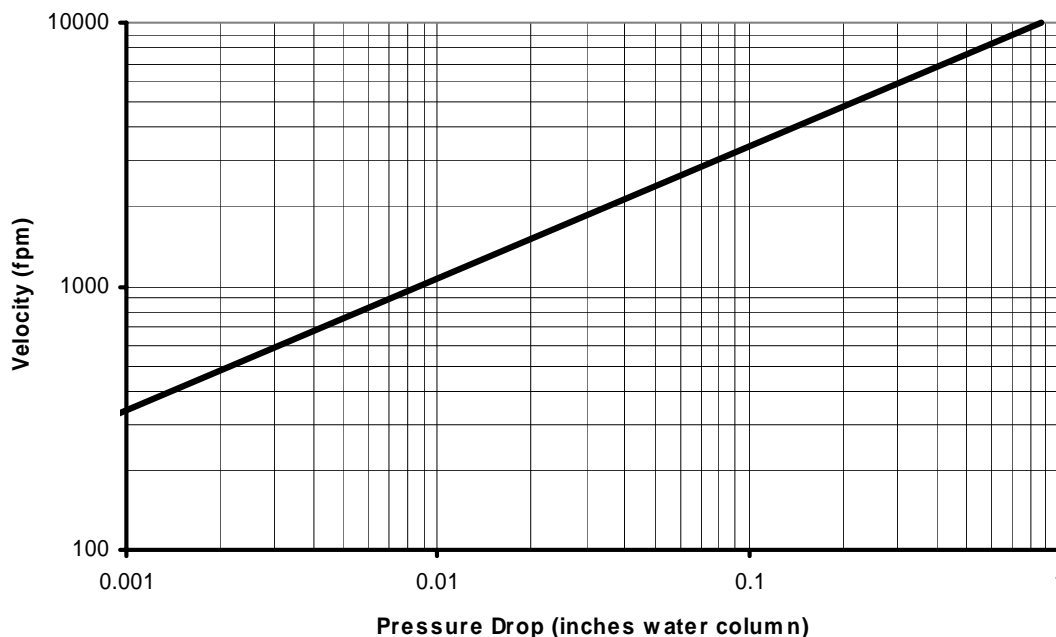
Stainless Steel and Hastaloy C276 Elements

1/8-27 Female NPT

PVC Elements

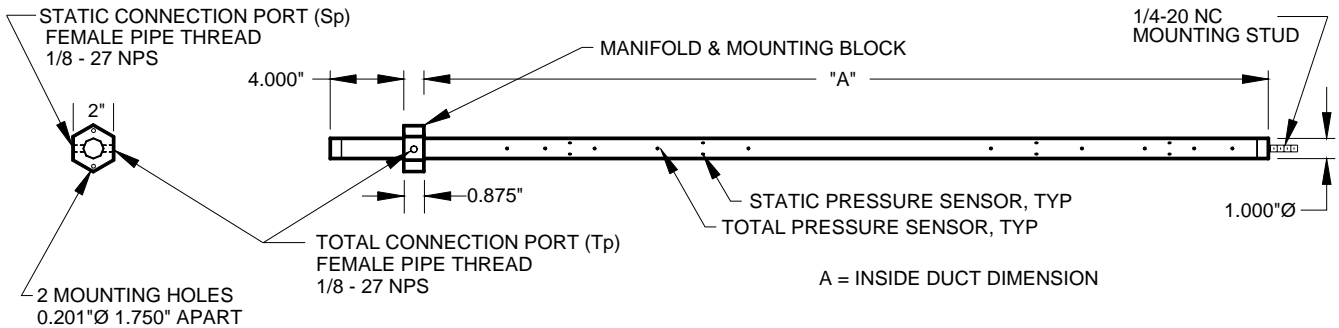
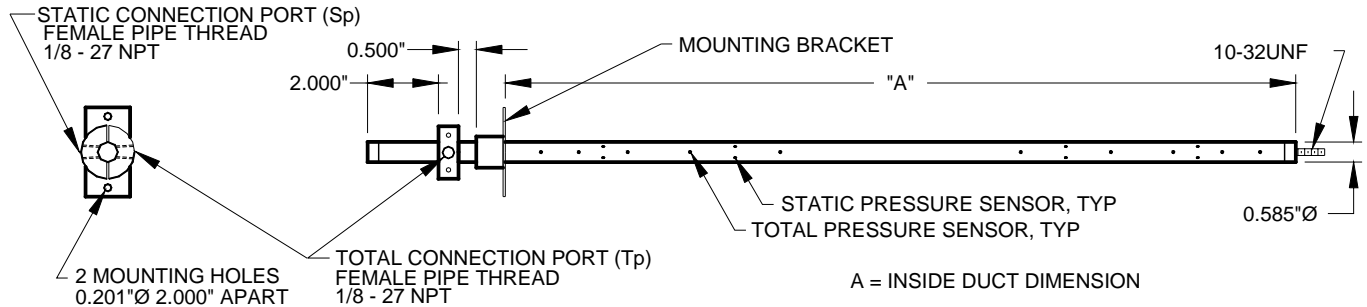
1/8-27 Female NPT

FE-1000 Resistance to Airflow



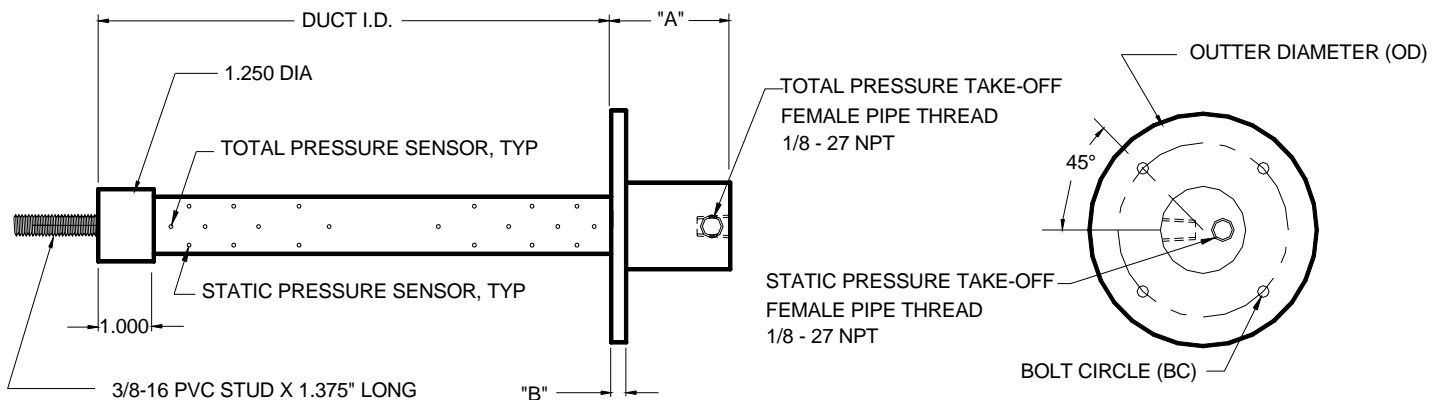
FE-1000 Dimensions

Aluminum Elements



Note: The 0.585 inch diameter probe is used for elements up to 36 inches long and the 1 inch diameter probe is used for elements greater than 36 inches long.

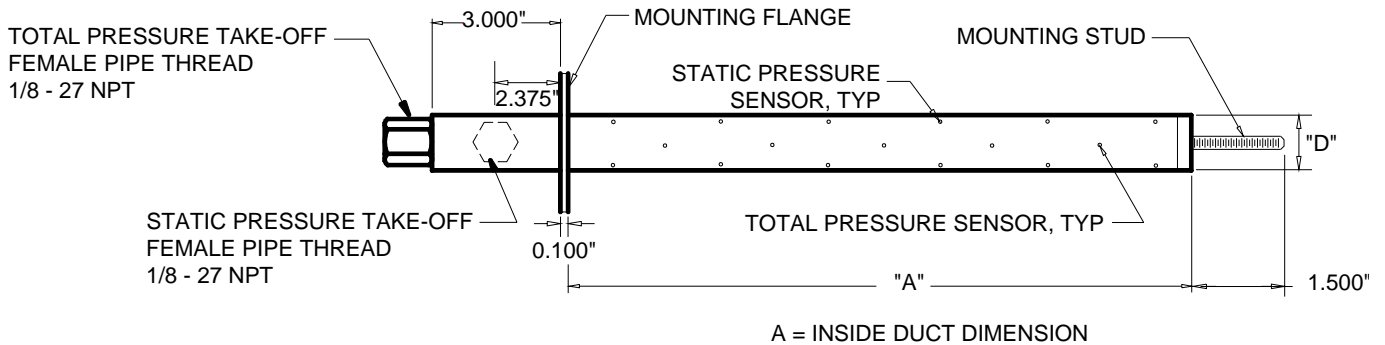
PVC Elements



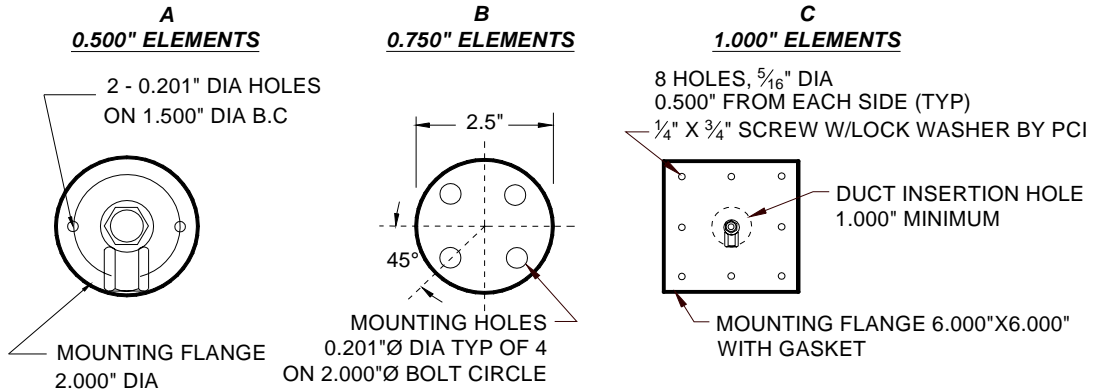
Dimension	Standard Flange (inches)	Optional 150# Flange (inches)
A	2.000	2.500
B	0.250	0.750
OD	4.000	5.000
BC	4-0.201" Diameter Holes on 3.000" BC	4-0.625" Diameter Holes on 3.880" BC

FE-1000 Dimensions (Continued)

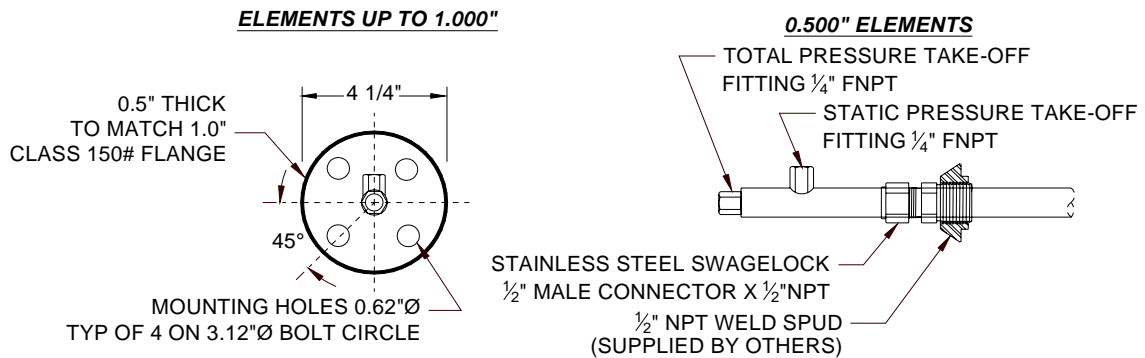
Stainless Steel, Hastaloy C276, and Other Corrosive Resistant Elements



STANDARD MOUNTING FLANGES

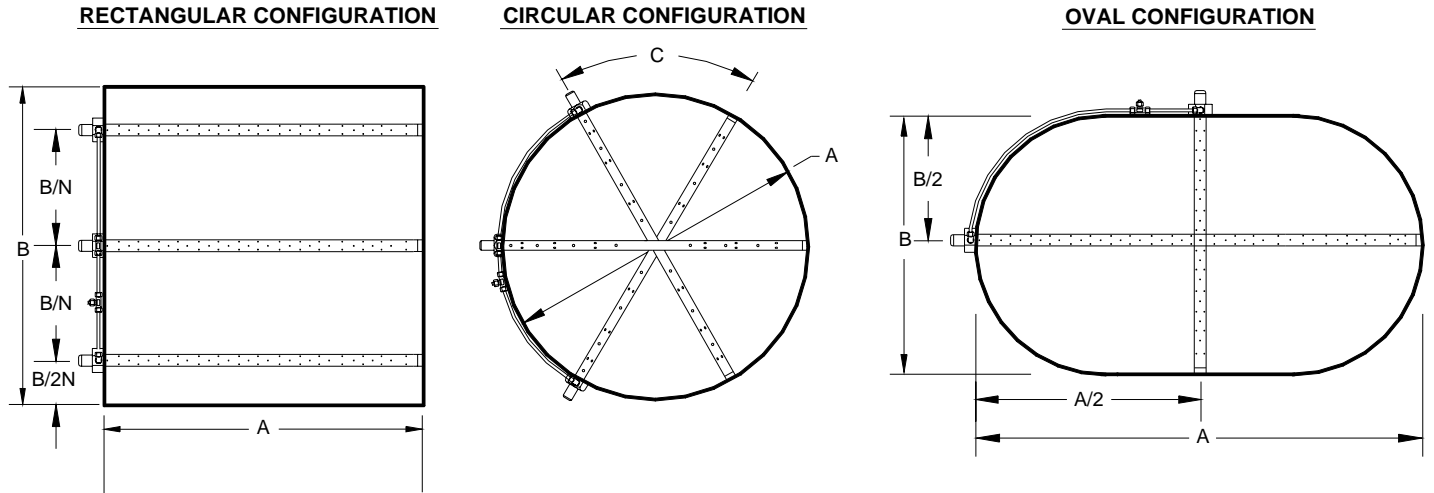


OPTIONAL MOUNTING ARRANGEMENTS



Element Dimensions		Standard Mounting Flanges	Mounting Stud
"A"	"D"		
0 - 24"	0.500"	A	1/4-20 NC
25 - 60"	0.750"	B	1/4-20 NC
Over 60"	1.000"	C	3/8-16 NC

FE-1000 Element Arrangement



Notes:

- A = Inside duct dimension (element length side)
- B = Inside duct dimension (element mounting side)
- C = Angle between elements, $360^\circ/2N$
- N = Number of elements mounted on 'B' dimension
- For rectangular ducts, if dimension 'B' is less than 12 inches then $N = 2$

FE-1000 Application Guide

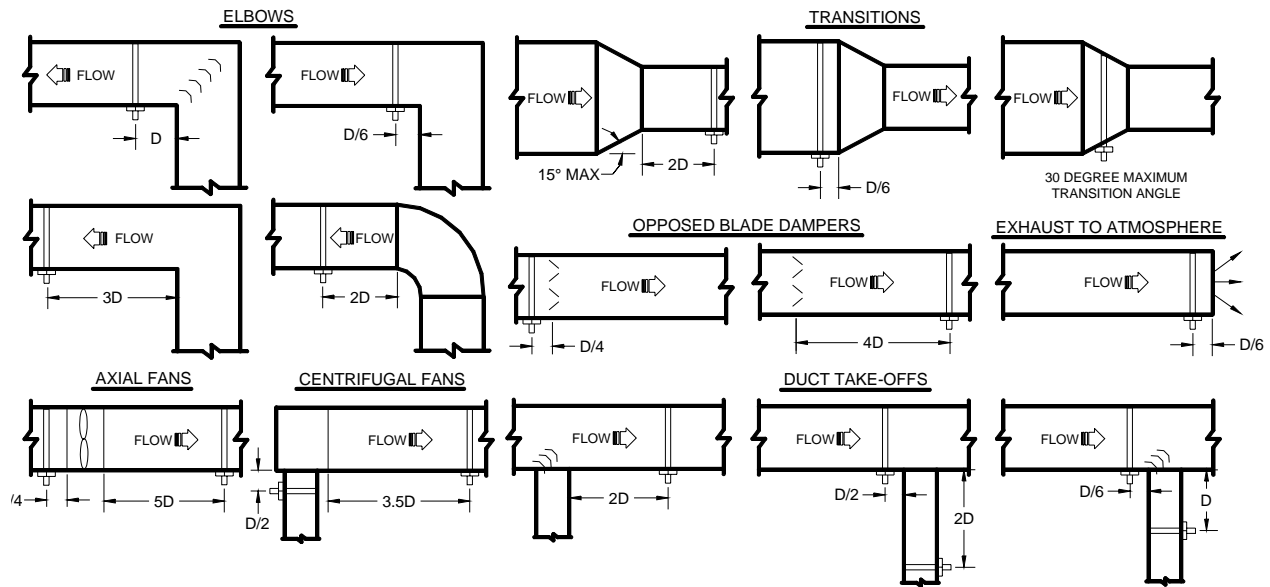
Rectangular		Circular	
Dimension B (inches)	Number of Elements Required	Dimension A (inches)	Number of Elements Required
6 - 11	1	6 - 11	1
12 - 23	2	12 - 45	2
24 - 36	3	46 - 84	3
37 - 64	4	85 & Over	4
65 - 96	5		
97 & Over	6		

Notes:

- A = Inside Duct Dimension (Element Length Side)
- B = Inside Duct Dimension (Element Mounting Side)
- Oval** ducts require one element 'A' inches long and one element 'B' inches long

FE-1000 Minimum Installation requirements

The elements may be installed in most duct configuration. However, the accuracy of the installation is dependent on the flow conditions in the duct. The minimum installation requirements for the elements based upon a uniform velocity profile approaching the duct disturbance for flow rates less than 2,500 fpm are shown below. Elements should always be installed across the flow gradient. Add one duct diameter to the installation requirements shown below for each additional flow rate of 1,000 fpm. These are not ideal locations. It is always best to locate the elements as far as possible from all duct disturbances, with upstream disturbances being the most critical consideration.



Notes:

Round Ducts:

D = Duct diameter

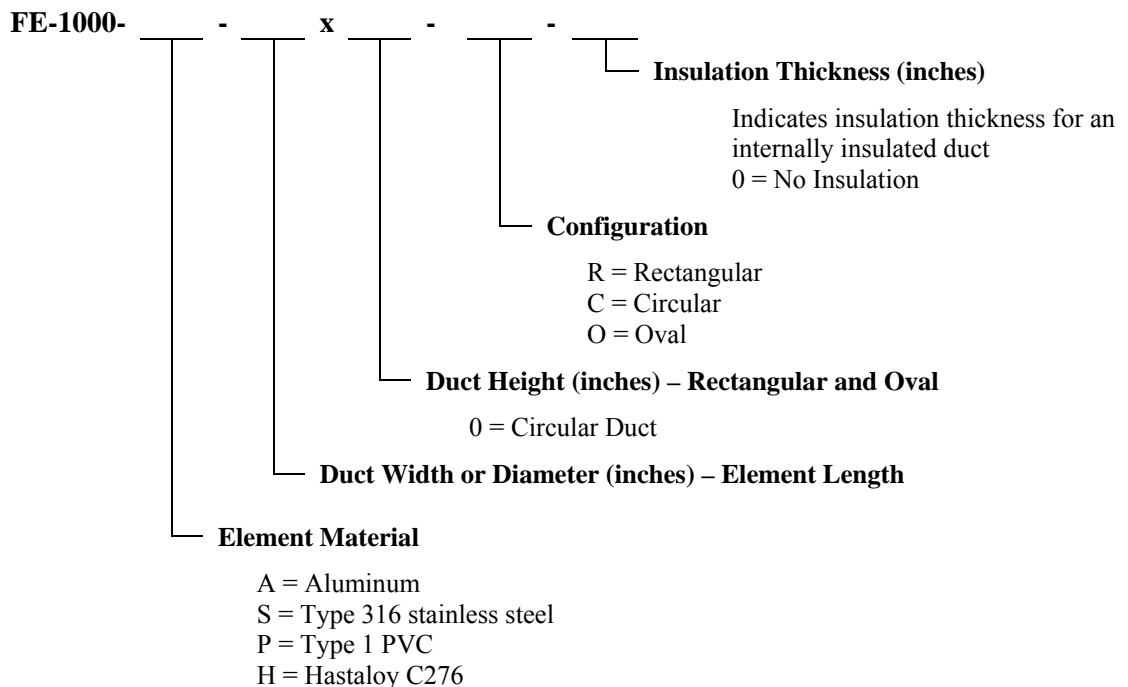
Rectangular Ducts:

$$D = \sqrt{\frac{4HW}{\pi}}$$

H = Duct height

W = Duct width

FE-1000 Ordering Information



FE-1000 Specification Guide

Airflow Measurement Stations

1. Provide where indicated and/or scheduled airflow traverse elements capable of continuously monitoring the duct air volumes they serve.
2. Each element shall be designed and built to comply with, and provide results in accordance with, accepted practice for duct system traversing as defined in the ASHRAE Handbook of Fundamentals, AMCA publication #203, as well as the Industrial Ventilation Handbook. The number of sensing ports on each element, and the quantity of elements utilized at each installation, shall comply with ASHRAE Standard #111 for equal area duct traversing.
3. Each element shall be of a dual integral chambered design. Each airflow measuring element shall contain multiple total and static pressure sensing ports placed along the leading edge of the cylinder. The static pressure chamber shall incorporate dual offset static taps on opposing sides of the averaging chamber, so as to be insensitive to flow angle variations of as much as ± 20 degrees in the approaching airstream.
4. The airflow traverse elements shall be capable of producing steady, non-pulsating signals of true total and static pressure, with an accuracy of 2% of actual flow for operating velocities as low as 100 feet per minute (fpm). Signal amplifying sensors requiring flow correction (K factors) for field calibration are not acceptable.
5. The airflow traverse elements shall not induce a measurable pressure drop, greater than 0.18 inch at 4,000 fpm. The units shall have a self-generated sound rating of less than NC40 and the sound level within the duct shall not be amplified, nor shall additional sound be generated.
6. Where primary flow elements are located outside of the manufacturer's published installation guidelines the manufacturer shall be consulted, and approve of any special configurations, such as air equalizers and/or additional and strategically placed measuring points, as may be required.

Installation Considerations

1. Primary flow elements shall be installed in strict accordance with the manufacture's published requirements and with ASME guidelines effecting non-standard approach conditions. These elements serve as the primary signals for the airflow systems; it shall be the responsibility of the contractor to verify correct installation to assure that accurate primary signals are obtained.
2. An identification label shall be place on each primary flow element showing airflow direction and listing the model number; system served, size and identifying tag number.

Manufacturer

1. Airflow sensing elements shall be Paragon Controls Inc. Model FE-1000 or equal as approved by the Engineer.
2. Naming of a manufacturer does not automatically constitute acceptance of this standard product nor waive the responsibility of the manufacturer to comply totally with all requirements of the proceeding specification.

