

## **FE-1500-FX DUCT MOUNTED AIRFLOW MEASUREMENT STATION**

### **DESCRIPTION**

The **FE-1500-FX** airflow measurement station consists of single or multiple airflow elements, factory mounted and pre-piped in a casing designed for flanged connection to the ductwork. The station also incorporates an airflow straightening section using honeycomb having a ½ inch opening by 3 inch depth. Standard materials consist of a G90 galvanized casing, 6063-T5 anodized aluminum flow sensors, and 3003 aluminum airflow straightener.

The **FE-1500-FX** airflow measurement station has been developed for use in duct systems having a highly turbulent condition at the point of measurement. The airflow averaging element, utilized in the **FE-1500-FX**, 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-1500-FX** 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. Multiple elements are manifolded together for connection to 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
- Factory mounted and pre-piped in a flanged duct section (casing)
- Honeycomb airflow straightening section
- ±2% accuracy throughout the velocity ranges of 100 fpm and over
- Standard construction includes a galvanized casing, 6063-T5 anodized aluminum flow sensors, and 3003 aluminum airflow straightener
- Available in optional corrosive or high temperature resistance materials including Type 304L and 316L stainless steel, Hastelloy C-22, Type 1 PVC, and phenolic and polyurethane enamel coatings
- Standard airflow stations can be operated (in air) continuously in temperatures up to 350°F or intermittently in temperatures up to 400°F
- All airflow stations can be operated in humidity ranges of 0 to 100%
- Standard airflow stations have good salt air resistance and are suitable for most HVAC applications



## **FE-1500-FX Technical Specifications**

### **1. Accuracy**

Within 2% of actual flow when installed in accordance with published recommendations

### **2. Operating Velocity Range**

100 to 10,000 fpm

### **3. Material**

#### ***Elements***

6063-T5 anodized aluminum (standard)

Type 316L stainless steel (optional)

Hastelloy C22 (optional)

Type 1 PVC (optional)

#### ***Casings***

16 ga G90 galvanized steel (standard)

Type 304L stainless steel (optional)

Type 316L stainless steel (optional)

Hastelloy C22 (optional)

#### ***Coatings***

Heresite VRL 500 phenolic coating

Imron 333 polyurethane enamel

#### ***Air Straightner***

3003 aluminum (standard)

Type 304L stainless steel, bonded (optional)

Type 316L stainless steel, welded (optional)

#### ***Note***

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

### **4. Temperature**

#### ***Galvanized Casing, Aluminum Elements, and***

#### ***Aluminum Air Straightner***

350°F continuous operation and 400°F intermittent operation (in air)

#### ***Stainless Steel Elements and Casing***

Type 304L-900°F continuous or intermittent operation (in air)

Type 316L-1600°F continuous or intermittent operation (in air)

#### ***Stainless Steel Air Straightner***

Type 304L-350°F continuous operation and 400°F intermittent operation (in air)

Type 316L-800°F continuous or intermittent operation (in air)

#### ***Hastelloy Casings and Elements Elements***

900°F continuous or intermittent operation (in air)

#### ***PVC Elements***

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

#### ***Heresite Phenolic Coating***

150°F continuous operation and 3200°F intermittent operation (in air)

#### ***Imron Polyurethane Enamel***

200°F continuous operation and 300°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 Airflow Stations***

0 to 100% non condensing

### **6. Corrosion Resistance**

#### ***Galvanized Casings***

Widely used for most air handling systems; not recommended for corrosive atmospheres

#### ***Aluminum Elements and Air Straightner***

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

#### ***Stainless Steel Elements, Casings and Air Straightner***

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

#### ***Hastelloy Elements and Casings***

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

#### ***Heresite Phenolic Coating***

Excellent resistance to acids and salt air. Good resistance to alkalis and solvent.

#### ***Imron Polyurethane Enamel***

Excellent resistance to acids, alkalis, salts, weather, and humidity. Very good resistance to solvents.

### **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 Hastelloy Elements***

1/8-27 Female NPT

#### ***PVC Elements***

1/8-27 Female NPT

## FE-1500-FX Casing Construction

### *Circular Stations*

Standard circular airflow measuring stations include a 16 gage galvanized casing with attached 90° connecting flanges as listed below:

Circular Flange Dimensions			
Station Size	Flange Thickness	Flange Size	Casing Length "L"
6" – 15"	0.064"	1"	8"
16" – 44"	0.064"	1½"	8"
45" – 72"	0.188"	1½"	10"
73" & Over	0.188"	2"	12"

### *Rectangular Stations*

Standard rectangular airflow measuring stations include a 16 gage galvanized casing, 8 inches long, with formed integral 90° connecting flanges as listed below:

Rectangular Flange Dimensions	
Station Size	Flange Size
8" – 72"	1½"
73" & Over	2"

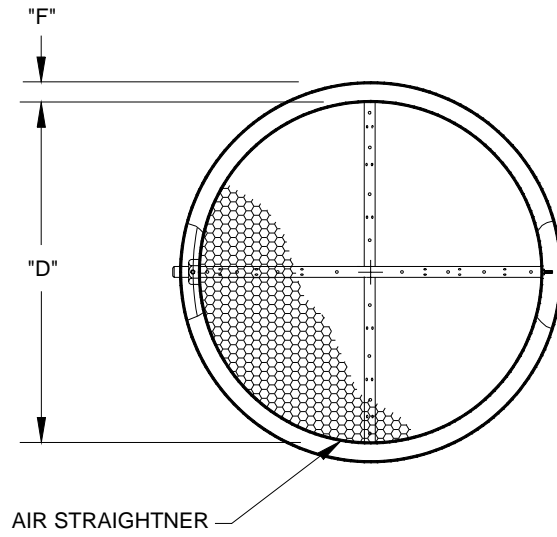
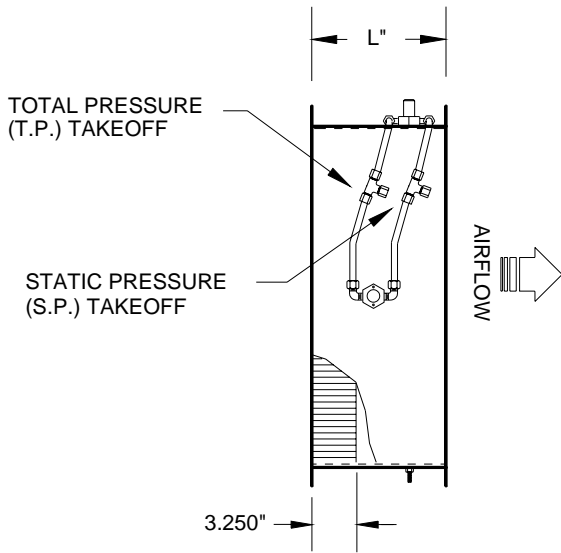
### *Oval Stations*

Standard oval airflow measuring stations include a 18 gage galvanized casing, 8 inches long between beads with 1 inch connecting sleeve on each end (10 inch overall length). Actual O.D. dimensions are ¼ inch less than specified duct I.D. dimensions.

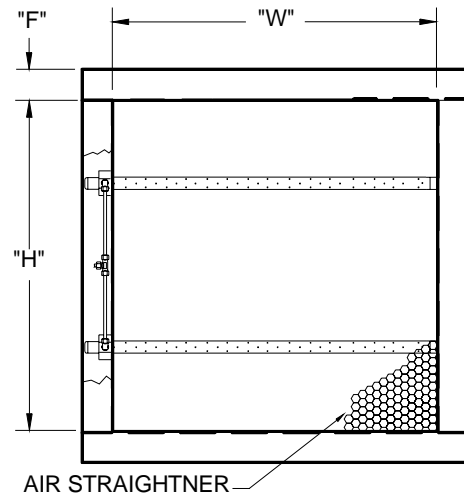
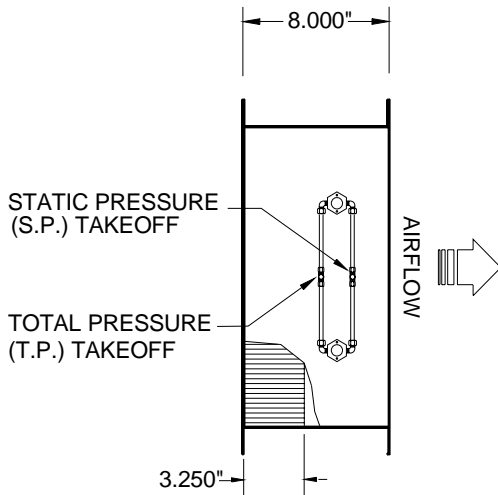
Oval Flange Dimensions (Optional)			
Station Width	Flange Thickness	Flange Size	Casing Length "L"
Up to 48"	0.064"	1½"	8"
Over 48"	0.188"	1½"	10"

**FE-1500-FX Dimensions**

*Circular Stations*

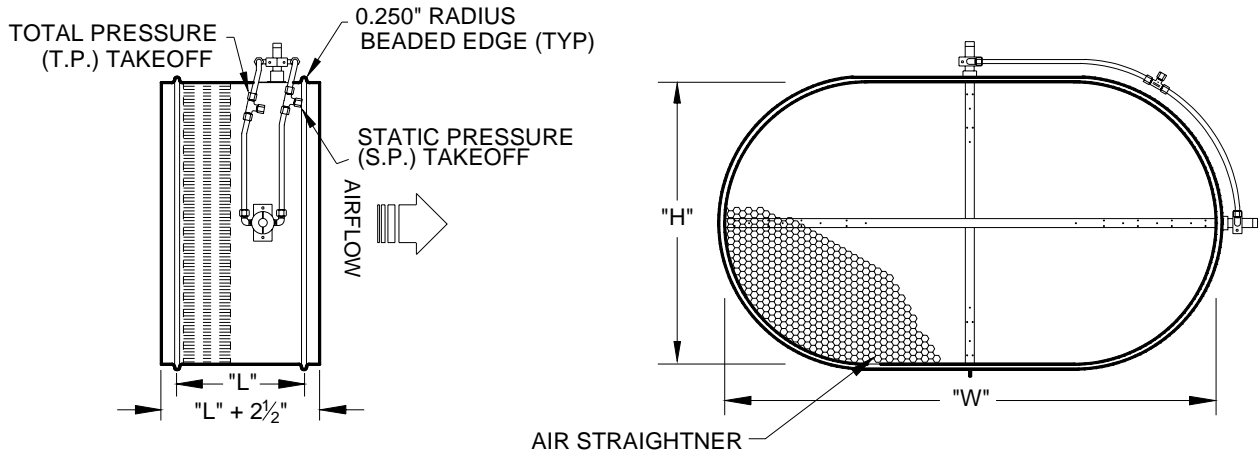


*Rectangular Stations*



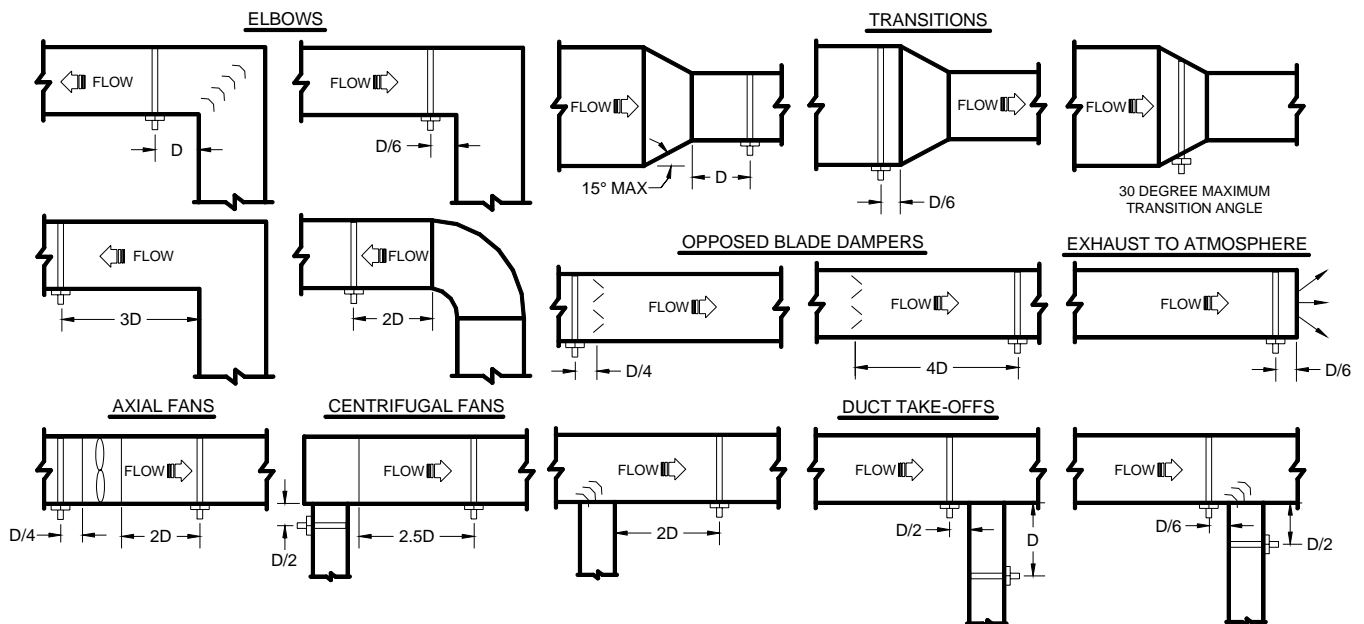
## FE-1500-FX Dimensions (Continued)

### Oval Stations



## FE-1500-FX Minimum Installation requirements

The elements may be installed in any 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. 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

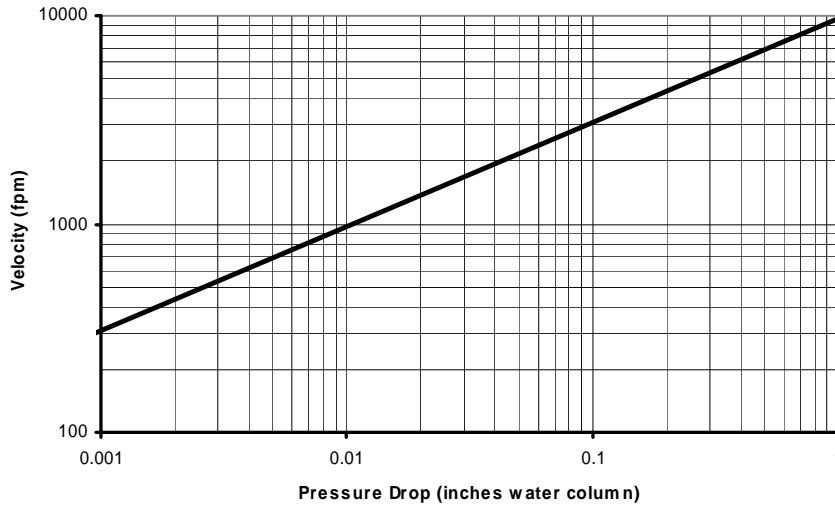
Rectangular Ducts:

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

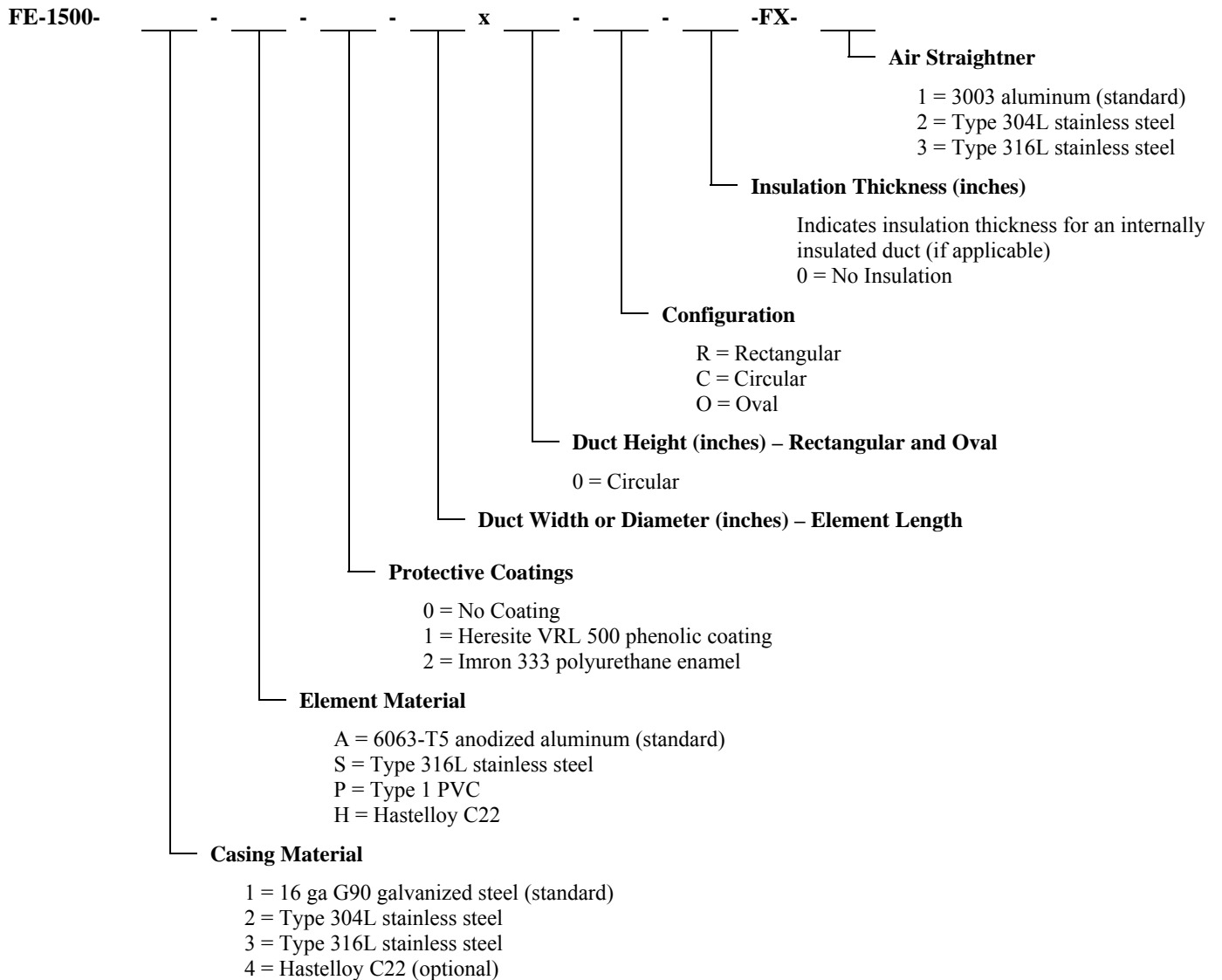
H = Height

W = Width

## FE-1500-FX Resistance to Airflow



## FE-1500-FX Ordering Information



## **FE-1500-FX Specification Guide**

### **Airflow Measurement Stations**

1. Provide where indicated and/or scheduled airflow traverse elements capable of continuously monitoring the fan or 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  $\pm 20$  degrees in the approaching air stream.
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 180 feet per minute (fpm). Signal amplifying sensors requiring flow correction (K factors) or 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. The probes shall be mounted in an eight inch deep, 16 gauge galvanized steel casing with 90 degree undrilled flanges, fabricated to the duct size, and shall contain multiple airflow traverse elements interconnected as herein before described.
7. 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.
8. Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct. Station flanges shall be sized to facilitate matching connecting ductwork.

### **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 placed on each unit casing listing model number, size, area, and specified airflow capacity.

### **Manufacturer**

1. Airflow measurement stations shall be Paragon Controls Inc. Model FE-1500-FX 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.

