



Air Monitor

Precision Airflow Measurement
An ONICON Brand

FAN-E

AIRFLOW MEASURING STATION

The FAN-E Station is a multi-point, self-averaging Pitot traverse station with an integral air straightening honeycomb cell. This is designed for continuously measuring fan discharges or ducted airflow.

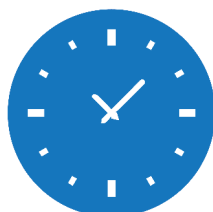
We believe in our products, so should you.

1 YEAR NO FAULT WARRANTY

3 YEAR MANUFACTURER WARRANTY



FACTORY CONFIGURED



ON TIME DELIVERY



BEST CUSTOMER SERVICE

• Ducted Airflow • Fan Discharge •

VOLU-probe FAN-E

AIRFLOW MEASURING STATION



DESCRIPTION

The FAN-E is a multi-point, self-averaging Pitot traverse station with integral air straightener-equalizer honeycomb cell, capable of continuously measuring fan discharges or ducted airflow with an accuracy of 2% or better. The FAN-E derives its high degree of measurement accuracy from a combination of precision sensor locations, honeycomb airflow processing, pneumatic averaging of a large number of sensed airflow pressures, and patented symmetrical averaging (Patent No. 3,685,355), which requires that all stages in the averaging process occur at a point where there is a balanced array of sensors present, thereby assuring that each sensed pressure is given the same equal weight in the averaging process as other sensed pressures.

ACCURACY

Air Monitor Corporation certifies that the FAN-Evaluator Airflow Measuring 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: FAN-E and FAN-E/SS

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 Stand 610, Figure 1

Test Results - Rectangular Stations

Reference Volume, ACFM	Reference Velocity, AFPM	% Accuracy	Airflow Resistance IN w.c.
35,838	3,982	1.72	.297
29,689	3,299	1.59	.225
24,616	2,735	1.51	.158
20,400	2,267	1.14	.089
14,434	1,604	0.84	.046
8,629	959	2.08	.021

Test Results - Circular Stations

Reference Volume, ACFM	Reference Velocity, AFPM	% Accuracy	Airflow Resistance IN w.c.
29,141	4,123	0.64	.272
24,275	3,434	-0.17	.200
20,176	2,854	-0.51	.112
14,550	2,058	-0.77	.067
10,215	1,445	0.33	.038
8,672	1,227	1.24	.021

HOW IT WORKS

Log-Tchebycheff Sensor Location

A high concentration of total and static pressure sensors positioned according to the log-Tchebycheff rule sense the multiple and varying flow components that constitute the airstream’s velocity profile. The log-Tchebycheff’s perimeter weighted sensor pattern is utilized to minimize the positive error (measurements greater than actual) caused by the failure to account for slower velocities at the duct wall when using traditional equal area sensor locations. Spacing of total pressure sensors is per *ASHRAE 1993 Fundamentals Handbook* which is summarized below. Since the static pressure across the station is relatively uniform, a lesser number of static pressure sensors are utilized to minimize unrecovered pressure drop.

Duct / Station Configuration	ASHRAE 1993 Fundamentals Handbook
Rectangular	25 or more points, maximum 6" or 8" apart, depending on duct size.
Circular	12 to 30 points, along 2 or 3 diameters.

Fechheimer Pitot Flow Measurement

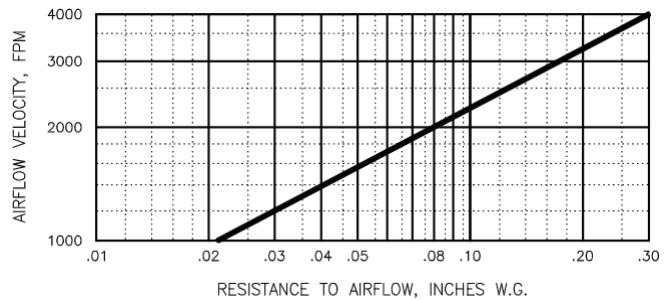
The FAN-E operates on the Fechheimer Pitot derivative of the multi-point, self-averaging Pitot principle to measure the total and static pressure components of airflow. Total pressure sensing ports with patented (U.S. Patent No. 4,559,835) chamfered entrances, and Fechheimer pairs of offset static pressure sensing ports combine to minimize the effect of directional airflow. When located downstream of honeycomb airflow processing cell, the Fechheimer Pitot method is extremely effective at accurately measuring airflow in limited straight duct runs.

Airflow Processing

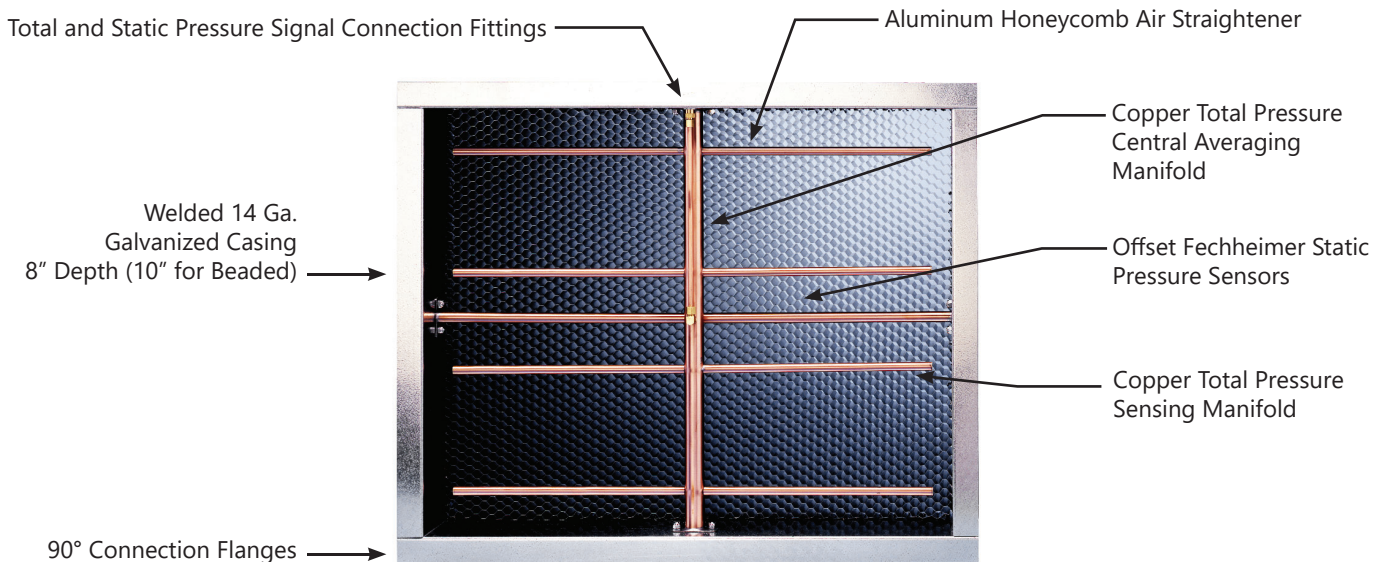
To assure extremely high levels of measuring accuracy (2% of actual flow or better) under extreme conditions caused by turbulent, rotating, and multi-directional airflows normally present near fan inlets or discharge ducts and directly downstream from duct elbows, transitions, etc., the FAN-E uses open, parallel cell, honeycomb panels to process the air into straightened flow just prior to the total pressure measurement plane. These honeycomb panels sharply reduce the need for long, straight runs of duct before and after the station to obtain accurate flow measurement.

Negligible Airflow Resistance

The FAN-E airflow measuring station is designed to function while producing a minimum of resistance to airflow, due to the unique honeycomb air straightener-equalizer section having a free area of 99.6%. The unique, non-restrictive characteristic of the FAN-E is seen in the Resistance vs. Airflow Velocity graph below. The values indicated are total resistance and do not include any allowances for static regain (a potential 20% reduction to the values).



CONSTRUCTION FEATURES



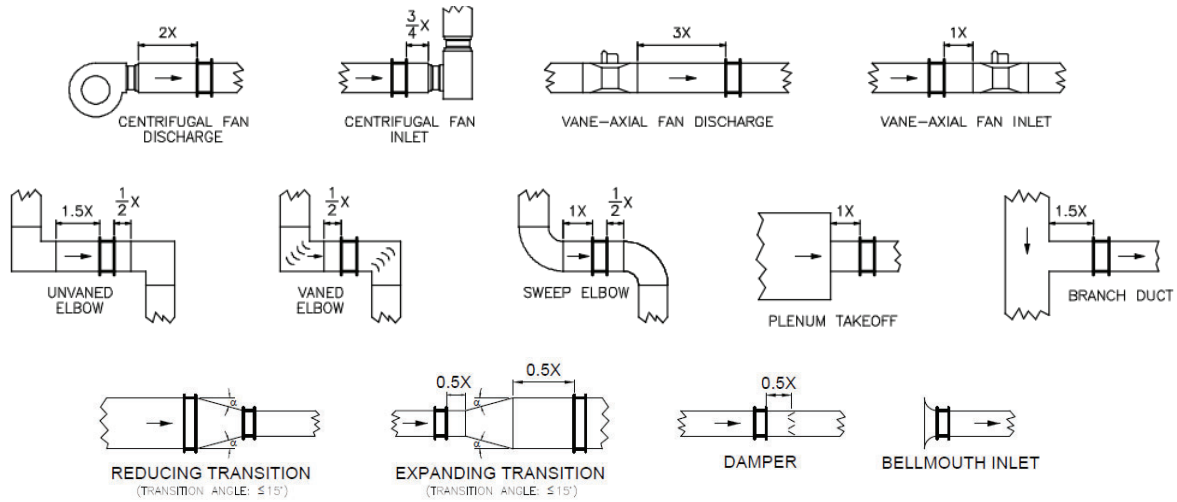
SPECIFICATIONS

CONFIGURATIONS	Rectangular, Circular, and Flat Oval
ACCURACY	2% of actual airflow
OUTPUTS	Individually averaged signals of total and static pressure
OPERATING TEMPERATURE	Continuous operation to 200°F
OPERATING VELOCITY	400-4000 FPM
DIRECTIONAL SENSITIVITY	Not measurably affected by directional airflows with pitch and yaw angles up to 30°
AIR STRAIGHTENER - EQUALIZER CELL	Corrosion resistant 3003 aluminum. 3" deep x 1/2" cell
PRESSURE SENSING PORTS	Rectangular: 8" to 144", 2 to 12 ports per probe Circular: 8" to 144", 4 to 12 ports per probe
RESISTANCE	Shall not exceed 0.08" w.c. @ 2000 FPM or 0.3" w.c. @ 4000 FPM
TRAVERSE PATTERN	Log-Tchebycheff rule for rectangular and equal area for circular ducts
TOTAL PRESSURE MANIFOLD	Copper tubing assembled with 50/50 tin/lead solder. Galvanized mounting and support brackets
STATIC PRESSURE HEADER AND SENSORS	<ul style="list-style-type: none"> • Copper tubing • Galvanized mounting bracket
CONNECTION FITTINGS	1/4" brass compression type located on the long dimension of rectangular and flat oval stations
CASING DEPTH	<ul style="list-style-type: none"> • 8" deep for stations with 90° flanges • 10" deep, 8" from bead-to-bead for stations with beaded edges
CASING	<ul style="list-style-type: none"> • Rectangular - 14 gauge galvanized sheet metal, intermittent welded casing sealed with metal caulking • Circular and Flat Oval - 18 gauge galvanized sheet metal, spot welded casing seams
FLANGES	<ul style="list-style-type: none"> • Rectangular: 1 1/2" wide, 90° formed. Sizes up to 144" x 144" • Circular and Flat Oval: Sizes 10" to 24" - 1" wide flanges or beaded edge Sizes > 24" and < 45" - 1 1/2" wide flange Sizes > 45" - 3/16" x 2" bar stock flanges
SPECIAL CONSTRUCTION	<ul style="list-style-type: none"> • Casing and Flanges: Aluminum, Carbon Steel, Stainless Steel, PVC and Fiberglass, Hastelloy, Inconel • Air Straightener - Equalizer Cell: Type 304 and 316 Stainless Steel, Carbon Steel, PVC, Hastelloy • Total and Static Pressure Manifolds: Type 316 Stainless Steel, Hastelloy, Inconel, PVC, Kynar • Construction Fittings: Stainless Steel, Hastelloy, Nylon

Contact the factory for special construction stations using the above listed and other materials.

MINIMUM INSTALLATION REQUIREMENTS

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



$$\text{Rectangular Duct: } x = \frac{2(H \times W)}{H+W} \quad \text{Circular Duct: } x = \text{Duct Diameter}$$

MODEL SELECTION GUIDE

FAN-E Model Number Codification = FAN-E/ABC-DEF-GH

FAN-E = AIRFLOW MEASURING STATION

A = Station Configuration

- R = Rectangular
- C = Circular
- O = Oval

B = Long Dimension (Diameter)

- A = >8 to 12
- B = >12 to 18
- C = >18 to 24
- D = >24 to 30
- E = >30 to 36
- F = >36 to 44
- G = >44 to 60
- H = >60 to 72
- I = >72 to 84
- J = >84 to 96
- K = >96 to 108
- L = >108 to 120
- M = >120 to 132
- N = >132 to 144

C = Short Dimension

- A = >8 to 12
- B = >12 to 18
- C = >18 to 24
- D = >24 to 30
- E = >30 to 36
- F = >36 to 44
- G = >44 to 60
- H = >60 to 72
- I = >72 to 84
- J = >84 to 96
- K = >96 to 108
- L = >108 to 120
- M = >120 to 132
- N = >132 to 144
- 9 = Round

D = Width (Depth) Dimension

- 1 = 8" depth (default)
- 2 = 10" depth (beaded edge only)
- 3 = 24" depth (extended casing)

E = Materials of Construction

- 1 = 14 gauge galv steel (Rectangular)
- 2 = 18 gauge galv steel (Circle or Oval)
- 3 = 14 gauge series 316 SS (Rectangular)
- 4 = 18 gauge series 316 SS (Circle or Oval)

F = Flange Construction

- 1 = 1 1/2" 90° formed flange (Rectangle)
- 2 = 1" 14 gauge, welded flange (Circle or Oval <24")
- 3 = 1 1/2" 14 gauge, welded flange (Circle or Oval 24"-45")
- 4 = 3/16" x 2" bar stock, welded flange (Circle or Oval >45")
- 5 = Beaded edge (10" depth required, circle or oval <24" only)

G = Signal Mounting

- L = Long side (default)
- S = Short side
- 9 = Round

H = Process Connection

- 1 = 1/4" brass compression fitting (default for galv)
- 2 = 1/4" brass hose barb fitting (for galv steel)
- 3 = 1/4" SS compression fitting (default for SS)



November 2023