



## INDUSTRIAL CATALOG

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***Accurate Airflow Measurement for Demanding Applications***

# STANDARDS

## Velocity Traverse of Air Ducts

**ASHRAE HANDBOOK**

**FUNDAMENTALS**

I-P Edition

American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc.  
1791 Tullie Circle, NE  
Atlanta, GA 30329

**AMCA**

**FIELD PERFORMANCE  
MEASUREMENT OF FAN SYSTEMS**

Publication 203

Air Movement and Control Association, Inc.  
30 West University Drive  
Arlington Heights, IL 60004-1893

**CODE OF  
FEDERAL REGULATIONS**

**40 CFR 60, APPENDIX A**

**Method 1**  
Velocity Traverses for Stationary Sources

**Method 2**  
Determination of Gas Velocity and Volumetric Flow Rate

These Standards, and others, provide formats for the quantity and positioning of individual velocity measurements. Simply stated, these long established Standards recognize that the accuracy of any duct velocity traverse is highly dependent upon the quantity and location of the flow measuring points in a duct (or stack) cross-section. Listed below is a summary table of the duct traverse formats set forth in the above Standards. In addition, for your referral, we have reproduced portions of the text of the referenced Standards.

Duct / Station Configuration	ASHRAE HANDBOOK	AMCA PUBLICATION 203	CODE OF FEDERAL REGULATIONS
Rectangular	25 or more points, maximum 6 or 8 inches apart, depending on duct size	24 or more points, no less than 1 point per 3 square feet	9 to 16 minimum, depending on distance to flow disturbances
Circular	12 to 30 points, along 2 or 3 diameters	24 to 48 points, along 3 diameters	8 to 16 minimum, along 2 diameters, depending on distance to flow disturbances

### ASHRAE HANDBOOK – FUNDAMENTALS

published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

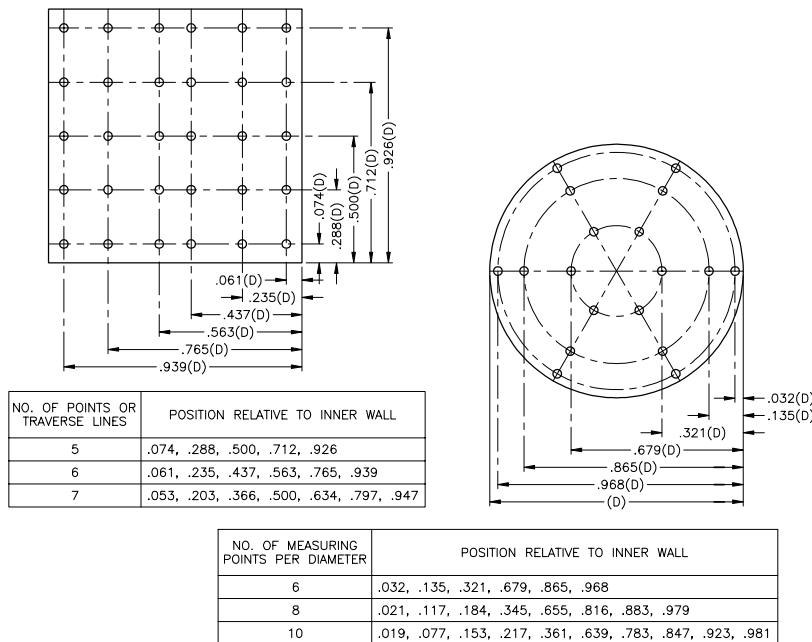


Figure 6 – Measuring Points for Round and Rectangular Duct Traverse

To determine the velocity in the traverse plane, a straight average of individual point velocities will give satisfactory results when point velocities are determined by the log-Tchebycheff rule (ISO 3966). Figure 6 shows suggested sensor locations for traversing round and rectangular ducts. For circular ducts, the log-Tchebycheff and log-linear traverse methods are similar. Log-Tchebycheff is now recommended for rectangular ducts as well. It minimizes the positive error (measured greater than actual) caused by the failure to account for losses at the duct wall. This error can occur when using the older method of equal subareas to traverse rectangular ducts.

For a rectangular duct traverse, a minimum of 25 points should be measured. For a duct side less than 18 inches, locate the points at the center of equal areas not more than 6 inches apart, and use a minimum of 2 points per side. For a duct side greater than 56 inches, the maximum distance between points is 8 inches. For a circular duct traverse, the log-linear rule and three symmetrically disposed diameters may be used. Points on two perpendicular diameters may be used where access is limited.

**Accurate airflow measurement for demanding applications**

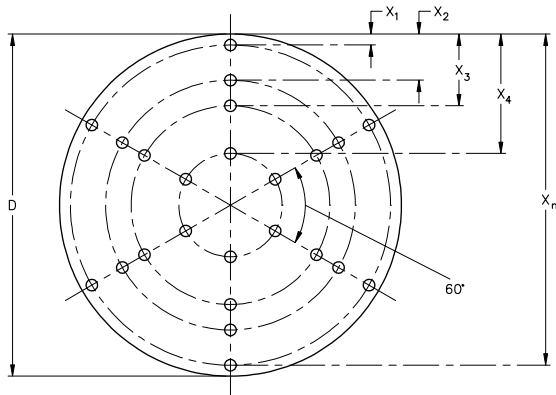


**FIELD PERFORMANCE MEASUREMENTS – PUBLICATION 203**

published by the Air Movement and Control Association, Inc.

**Appendix H – Distribution of Traverse Points**

In order to obtain a representative average velocity in a duct, it is necessary to locate each traverse point accurately. It is recommended that the number of traverse points increase with increasing duct size. The distribution of traverse points for circular ducts, as indicated below, are based on log-linear Pitot traverse method.



$X_n = D \times K_a$

where D is the inside diameter of the duct and  $K_a$  is the factor corresponding to the duct size and the traverse point location as indicated in the table below.

Inside Dia of Duct	# of Traverse Pts in Each of 3 Dia	$K_1$	$K_2$	$K_3$	$K_4$	$K_5$	$K_6$	$K_7$	$K_8$	$K_9$	$K_{10}$	$K_{11}$	$K_{12}$	$K_{13}$	$K_{14}$	$K_{15}$	$K_{16}$
< 8 ft	8	.021	.117	.184	.345	.655	.816	.883	.978	-	-	-	-	-	-	-	-
8-12 ft	12	.014	.075	.114	.183	.241	.374	.626	.750	.817	.886	.925	.986	-	-	-	-
>12 ft	16	.010	.055	.082	.128	.166	.225	.276	.391	.609	.724	.775	.834	.872	.918	.945	.990

Figure H-1. Distribution of Traverse Points for Circular Ducts

The recommended minimum number of traverse points for rectangular ducts is indicated below in Figure H-3. For rectangular ducts with cross-sectional areas of 24 square feet and less, the recommended minimum number is 24. For cross-sectional areas greater than 24 square feet, the minimum number of points increases as indicated in Figure H-3. The points are to be located in the centers of equal areas with the areas as nearly square as practical (see Figure H-2). If the flow conditions at the traverse plane are less than satisfactory, the accuracy of the determination of flow rate may be improved by using more than the recommended minimum number of points. Fewer points may be used if the flow is very uniform; however the maximum area covered per point should not exceed 3 square feet.

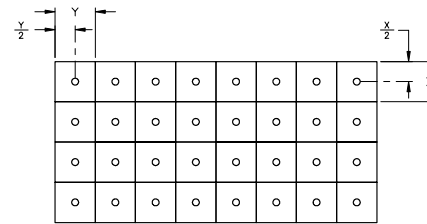


Figure H-2. Distribution of Traverse Points for Rectangular Duct

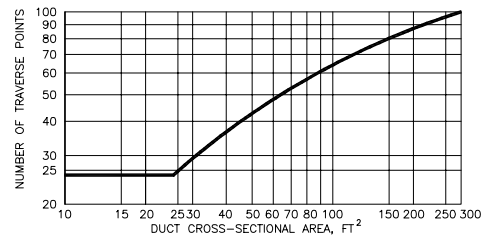


Figure H-3. Recommended Minimum Number of Traverse Points for Rectangular Ducts

**CODE OF FEDERAL REGULATIONS – 40CFR60 Appendix A, Methods 1 and 2**

Method 1 – Velocity Traverses for Stationary Sources

Method 2 – Determination of Gas Velocity and Volumetric Flow Rate

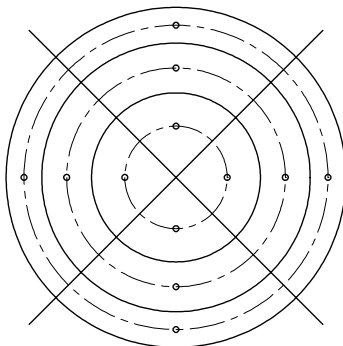


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points indicated.

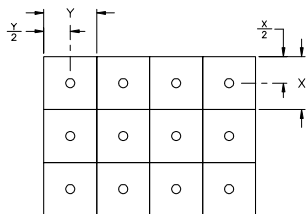


Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with a traverse point at centroid of each area.

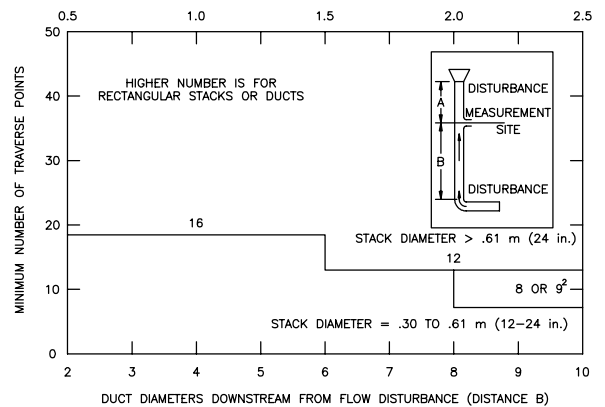


Figure 1-2. Minimum number of traverse points for velocity (non-particulate) traverses.

# CONVERSION CHART

## VELOCITY PRESSURE in inches of water to VELOCITY in feet per minute

**Calculating Air Velocity.** Fechheimer Pitot airflow stations and traverse probes measure in the same manner and magnitude as the Pitot tube, via separate signals of airstream *total pressure* and *static pressure*, in inches water column (IN w.c.). To obtain *velocity pressure* (the force generated by the velocity of the air moving in a duct), the *static pressure* must be subtracted from the *total pressure*:

$$\text{Velocity Pressure (IN w.c.)} = \text{Total Pressure (IN w.c.)} - \text{Static Pressure (IN w.c.)}$$

*Air velocity*, expressed in feet per minute, is a function of *velocity pressure*, converted by means of the following formula:

$$\text{Air Velocity (FPM)} = 1096.5 \times \sqrt{\frac{\text{Velocity Pressure (IN w.c.)}}{\text{Density of (Gas)}}}$$

In commercial applications where air is the gas, its density is at 70° Fahrenheit and 29.92 inches of mercury (barometric pressure), and the airflow is not compressed (under 10 IN w.c.), the formula reduces to:

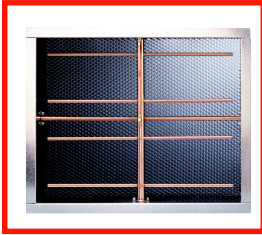
$$\text{Air Velocity (FPM)} = 4005 \times \sqrt{\text{Velocity Pressure (IN w.c.)}}$$

.001"	127	.052"	913	.102"	1279	.152"	1561	.202"	1800	.252"	2011	.302"	2200	.352"	2376	.51"	2860	1.01"	4025	1.51"	4921
.002"	179	.053"	922	.103"	1285	.153"	1567	.203"	1804	.253"	2015	.303"	2204	.353"	2379	.52"	2888	1.02"	4045	1.52"	4938
.003"	219	.054"	931	.104"	1292	.154"	1572	.204"	1809	.254"	2019	.304"	2208	.354"	2383	.53"	2916	1.03"	4064	1.53"	4954
.004"	253	.055"	939	.105"	1298	.155"	1577	.205"	1813	.255"	2023	.305"	2212	.355"	2386	.54"	2943	1.04"	4084	1.54"	4970
.005"	283	.056"	948	.106"	1304	.156"	1582	.206"	1818	.256"	2027	.306"	2215	.356"	2389	.55"	2970	1.05"	4103	1.55"	4986
.006"	310	.057"	956	.107"	1310	.157"	1587	.207"	1822	.257"	2031	.307"	2219	.357"	2393	.56"	2997	1.06"	4123	1.56"	5002
.007"	335	.058"	964	.108"	1316	.158"	1592	.208"	1827	.258"	2035	.308"	2223	.358"	2396	.57"	3024	1.07"	4142	1.57"	5018
.008"	358	.059"	973	.109"	1322	.159"	1597	.209"	1831	.259"	2039	.309"	2226	.359"	2400	.58"	3050	1.08"	4162	1.58"	5034
.009"	380	.060"	981	.110"	1328	.160"	1602	.210"	1835	.260"	2042	.310"	2230	.360"	2403	.59"	3076	1.09"	4181	1.59"	5050
.010"	400	.061"	989	.111"	1334	.161"	1607	.211"	1839	.261"	2046	.311"	2233	.361"	2406	.60"	3102	1.10"	4200	1.60"	5066
.011"	420	.062"	996	.112"	1340	.162"	1612	.212"	1844	.262"	2050	.312"	2236	.362"	2410	.61"	3127	1.11"	4219	1.61"	5082
.012"	439	.063"	1004	.113"	1346	.163"	1617	.213"	1848	.263"	2054	.313"	2239	.363"	2413	.62"	3153	1.12"	4238	1.62"	5098
.013"	457	.064"	1012	.114"	1352	.164"	1622	.214"	1853	.264"	2058	.314"	2242	.364"	2416	.63"	3179	1.13"	4257	1.63"	5114
.014"	474	.065"	1020	.115"	1358	.165"	1627	.215"	1857	.265"	2062	.315"	2245	.365"	2420	.64"	3204	1.14"	4276	1.64"	5129
.015"	491	.066"	1029	.116"	1364	.166"	1632	.216"	1862	.266"	2066	.316"	2248	.366"	2423	.65"	3229	1.15"	4295	1.65"	5144
.016"	507	.067"	1037	.117"	1370	.167"	1637	.217"	1866	.267"	2070	.317"	2251	.367"	2426	.66"	3254	1.16"	4314	1.66"	5160
.017"	522	.068"	1045	.118"	1376	.168"	1642	.218"	1870	.268"	2074	.318"	2254	.368"	2429	.67"	3279	1.17"	4332	1.67"	5175
.018"	537	.069"	1052	.119"	1382	.169"	1646	.219"	1875	.269"	2078	.319"	2257	.369"	2433	.68"	3303	1.18"	4350	1.68"	5191
.019"	552	.070"	1060	.120"	1387	.170"	1651	.220"	1879	.270"	2081	.320"	2260	.370"	2436	.69"	3327	1.19"	4368	1.69"	5206
.020"	566	.071"	1067	.121"	1393	.171"	1656	.221"	1883	.271"	2085	.321"	2264	.371"	2439	.70"	3351	1.20"	4386	1.70"	5222
.021"	580	.072"	1075	.122"	1399	.172"	1661	.222"	1887	.272"	2089	.322"	2268	.372"	2443	.71"	3375	1.21"	4405	1.71"	5237
.022"	594	.073"	1082	.123"	1404	.173"	1666	.223"	1892	.273"	2093	.323"	2272	.373"	2445	.72"	3398	1.22"	4423	1.72"	5253
.023"	607	.074"	1089	.124"	1410	.174"	1670	.224"	1896	.274"	2097	.324"	2276	.374"	2449	.73"	3422	1.23"	4442	1.73"	5268
.024"	620	.075"	1097	.125"	1416	.175"	1675	.225"	1900	.275"	2101	.325"	2280	.375"	2453	.74"	3445	1.24"	4460	1.74"	5283
.025"	633	.076"	1104	.126"	1422	.176"	1680	.226"	1905	.276"	2105	.326"	2284	.376"	2456	.75"	3468	1.25"	4478	1.75"	5298
.026"	645	.077"	1111	.127"	1427	.177"	1685	.227"	1909	.277"	2109	.327"	2289	.377"	2459	.76"	3491	1.26"	4495	1.76"	5313
.027"	658	.078"	1119	.128"	1433	.178"	1690	.228"	1913	.278"	2113	.328"	2293	.378"	2462	.77"	3514	1.27"	4513	1.77"	5328
.028"	670	.079"	1125	.129"	1439	.179"	1695	.229"	1917	.279"	2116	.329"	2297	.379"	2466	.78"	3537	1.28"	4531	1.78"	5343
.029"	682	.080"	1133	.130"	1444	.180"	1699	.230"	1921	.280"	2119	.330"	2301	.380"	2469	.79"	3560	1.29"	4549	1.79"	5359
.030"	694	.081"	1140	.131"	1449	.181"	1704	.231"	1925	.281"	2123	.331"	2304	.381"	2472	.80"	3582	1.30"	4566	1.80"	5374
.031"	705	.082"	1147	.132"	1455	.182"	1709	.232"	1929	.282"	2127	.332"	2308	.382"	2475	.81"	3604	1.31"	4583	1.81"	5388
.032"	716	.083"	1154	.133"	1461	.183"	1713	.233"	1933	.283"	2131	.333"	2311	.383"	2479	.82"	3625	1.32"	4601	1.82"	5403
.033"	727	.084"	1161	.134"	1466	.184"	1718	.234"	1937	.284"	2135	.334"	2315	.384"	2481	.83"	3647	1.33"	4619	1.83"	5418
.034"	738	.085"	1167	.135"	1471	.185"	1723	.235"	1941	.285"	2139	.335"	2318	.385"	2485	.84"	3669	1.34"	4636	1.84"	5433
.035"	749	.086"	1175	.136"	1477	.186"	1727	.236"	1945	.286"	2143	.336"	2322	.386"	2488	.85"	3690	1.35"	4653	1.85"	5447
.036"	759	.087"	1181	.137"	1482	.187"	1732	.237"	1950	.287"	2147	.337"	2325	.387"	2491	.86"	3709	1.36"	4671	1.86"	5462
.037"	770	.088"	1188	.138"	1488	.188"	1737	.238"	1954	.288"	2151	.338"	2329	.388"	2495	.87"	3729	1.37"	4688	1.87"	5477
.038"	780	.089"	1193	.139"	1493	.189"	1741	.239"	1958	.289"	2154	.339"	2332	.389"	2499	.88"	3758	1.38"	4705	1.88"	5491
.039"	791	.090"	1201	.140"	1498	.190"	1746	.240"	1962	.290"	2157	.340"	2335	.390"	2501	.89"	3779	1.39"	4722	1.89"	5506
.040"	801	.091"	1208	.141"	1504	.191"	1750	.241"	1966	.291"	2161	.341"	2338	.391"	2503	.90"	3800	1.40"	4739	1.90"	5521
.041"	811	.092"	1215	.142"	1509	.192"	1755	.242"	1970	.292"	2164	.342"	2342	.392"	2506	.91"	3821	1.41"	4756	1.91"	5535
.042"	821	.093"	1222	.143"	1515	.193"	1759	.243"	1974	.293"	2168	.343"	2345	.393"	2509	.92"	3842	1.42"	4773	1.92"	5550
.043"	831	.094"	1228	.144"	1520	.194"	1764	.244"	1978	.294"	2171	.344"	2349	.394"	2512	.93"	3863	1.43"	4790	1.93"	5564
.044"	840	.095"	1234	.145"	1525	.195"	1768	.245"	1982	.295"	2175	.345"	2352	.395"	2515	.94"	3884	1.44"	4806	1.94"	5579
.045"	849	.096"	1241	.146"	1530	.196"	1773	.246"	1987	.296"	2179	.346"	2356	.396"	2518	.95"	3904	1.45"	4823	1.95"	5593
.046"	859	.097"	1247	.147"	1536	.197"	1777	.247"	1991	.297"	2182	.347"	2360	.397"	2521	.96"	3924	1.46"	4840	1.96"	5608
.047"	868	.098"	1254	.148"	1541	.198"	1782	.248"	1995	.298"	2186	.348"	2363	.398"	2524	.97"	3945	1.47"	4856	1.97"	5623
.048"	877	.099"	1260	.149"	1546	.199"	1787	.249"	1999	.299"	2189	.349"	2366	.399"	2527	.98"	3965	1.48"	4873	1.98"	5637
.049"	887	.100"	1266	.150"	1551	.200"	1791	.250"	2003	.300"	2193	.350"	2369	.400"	2530	.99"	3985	1.49"	4889	1.99"	5651
.050"	896	.101"	1273	.151"	1556	.201"	1795	.251"	2007	.301"	2197	.351"	2372	.400"	2532	1.00"	4005	1.50"	4905	2.00"	5664

**Calculating Air Volume.** The *station air volume*, expressed cubic feet per minute (CFM), is the product of the *air velocity* through the airflow station and the *station area* in square feet (Ft<sup>2</sup>).

$$\text{Station Air Volume (CFM)} = \text{Air Velocity (FPM)} \times \text{Station Area (Ft}^2\text{)}$$

## Air Monitor's Product Families of Flow Measurement and Pressure Sensors



### ***FAN-E AIRFLOW MEASURING STATION.***

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 two percent or better.

***AMCA CERTIFIED*** in accordance with Standard 610.



### ***VOLU-PROBE/1,2,3,4 AIRFLOW TRAVERSE PROBES.***

Multi-point, self-averaging, Pitot Fechheimer airflow traverse probes with integral airflow direction correcting design. Four mounting configurations to fit every application.

***AMCA CERTIFIED*** in accordance with Standard 610.



### ***VOLU-PROBE/FI FAN INLET AIRFLOW PROBES.***

Multi-point, self-averaging, Pitot Fechheimer airflow probes with integral airflow direction correcting design. For mounting directly in the inlet cones or bellmouth of centrifugal or vane-axial fans to measure fan capacities within three percent of actual flow.



### ***VOLU-PROBE/VS AIRFLOW PROBE TRAVERSE STATIONS.***

Multi-point, self-averaging, Pitot Fechheimer airflow probes factory mounted in a flanged sheet metal casing, with interconnecting tubing. Capable of measuring ducted airflow within two percent accuracy without using an air straightener or incurring significant resistance to airflow.

***AMCA CERTIFIED*** in accordance with Standard 610.



### ***S.A.P./1,2,3 and S.O.A.P. STATIC PRESSURE SENSORS.***

Available in three separate mounting configurations, the S.A.P. family of static pressure sensors generate a steady, non-pulsating output of room, space or plenum pressure.

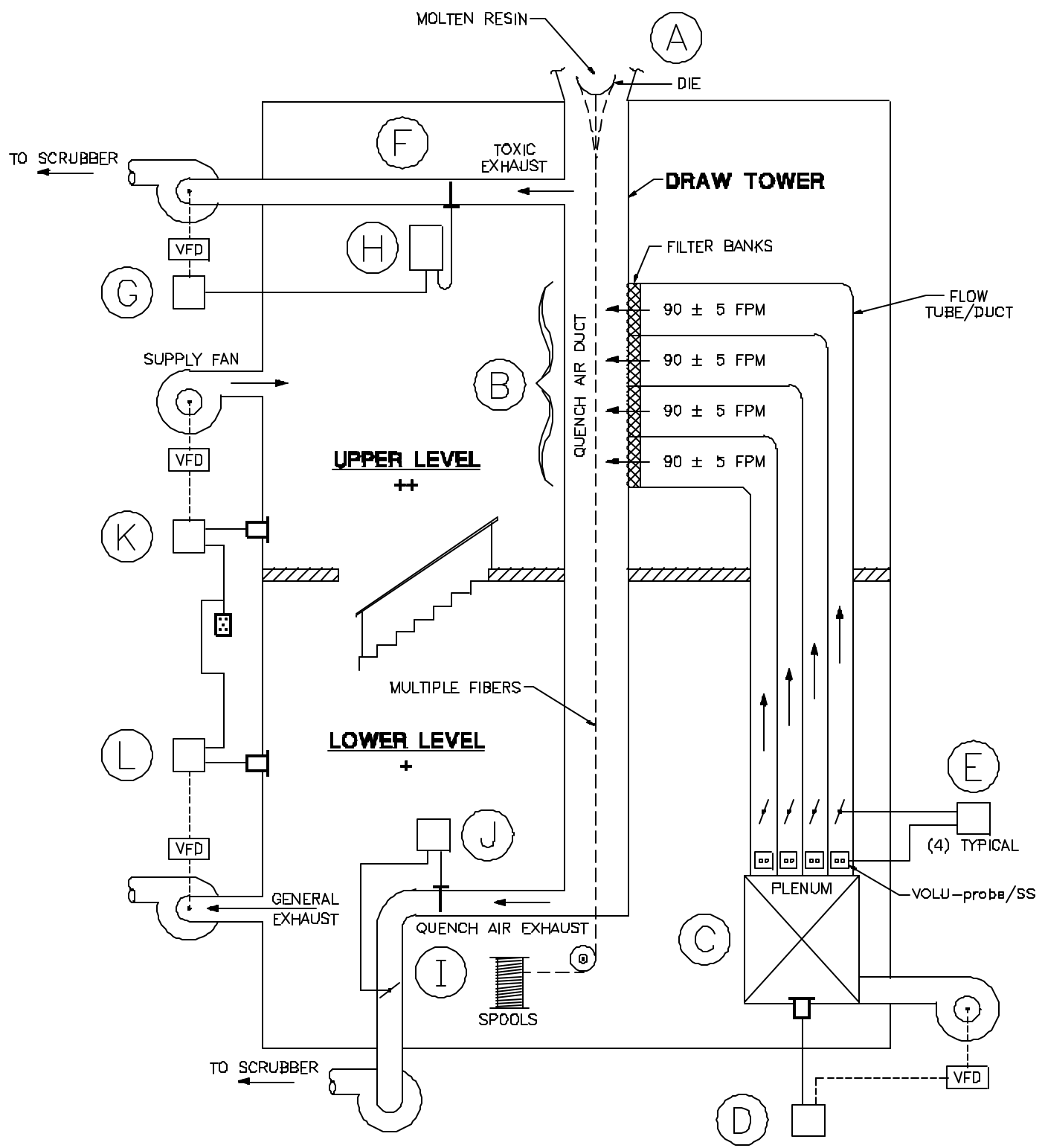
The S.O.A.P. was designed to accurately sense outside atmospheric air pressure.



### ***STAT-PROBE STATIC PRESSURE TRAVERSE PROBE.***

Multi-point, self-averaging, Fechheimer static pressure traverse probe for accurate sensing of duct or system static pressure in the presence of turbulent or rotational airflows.

# FIBER DRAWING PRODUCTION AREA





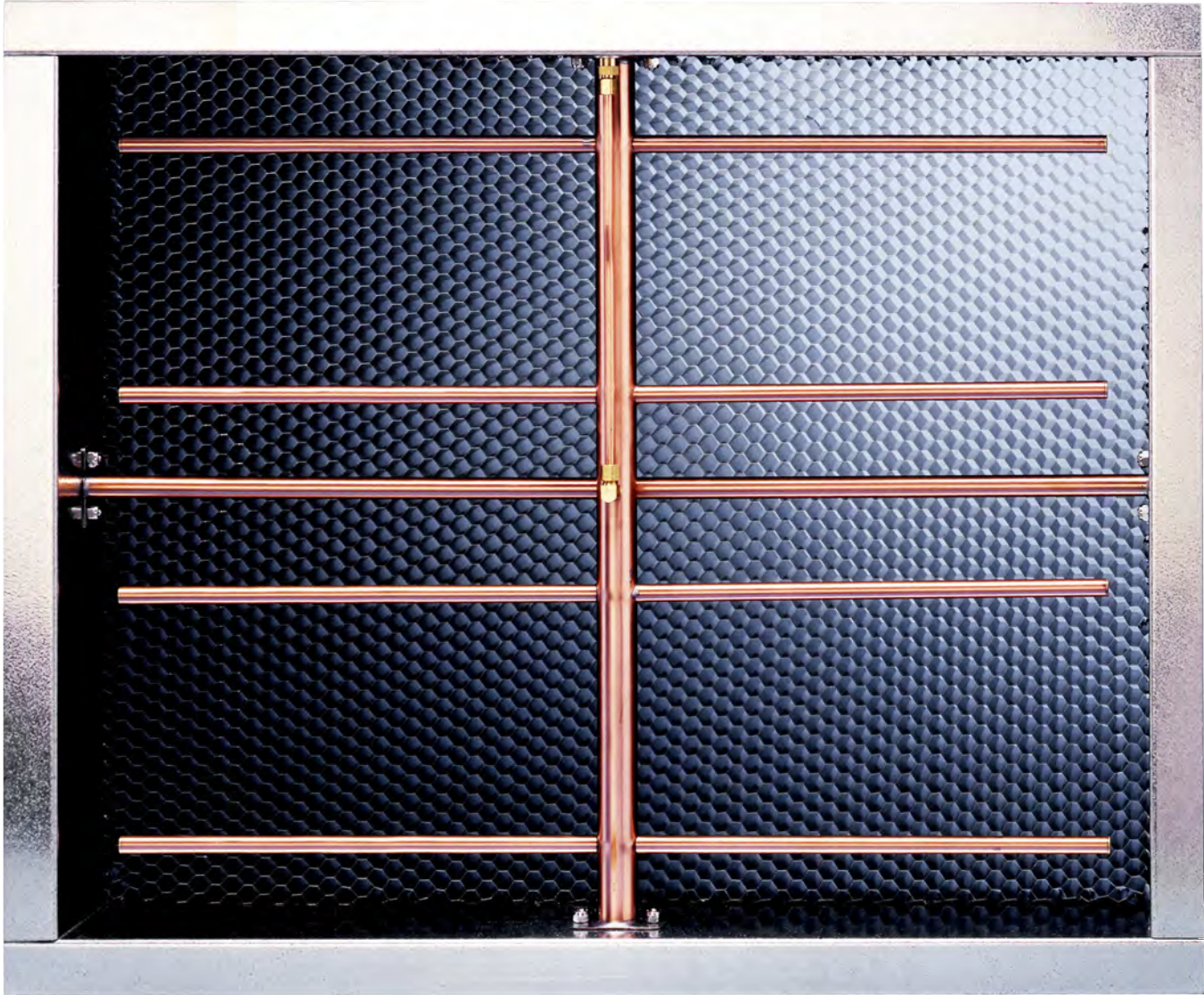
# FAN-Evaluator

## Airflow Measuring Station

amca  
CERTIFIED  
RATINGS

AIRFLOW  
MEASUREMENT  
STATION  
AIR  
PERFORMANCE

AIR  
MOVEMENT  
AND CONTROL  
ASSOCIATION  
INTERNATIONAL, INC. ®



# FAN-Evaluator

## Product 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.

## 2% Certified Measurement 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.*

*Performance ratings include the effect of an integral air equalizer-straightener cell in the AMS.*

### 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 Standard 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

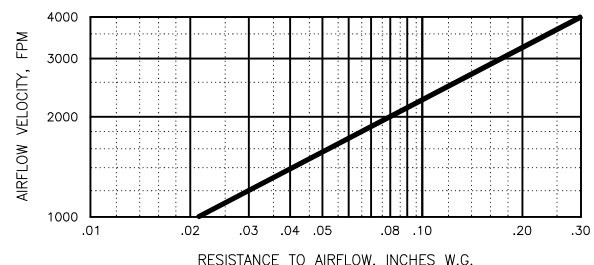
**Log-Tchebycheff Sensor Location.** A high concentration of total and static pressure sensors positioned according to the log-Tchebycheff rule sense the multiple and varying flow components that constitute the airstream's velocity profile. The log-Tchebycheff's perimeter weighted sensor pattern is utilized 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.

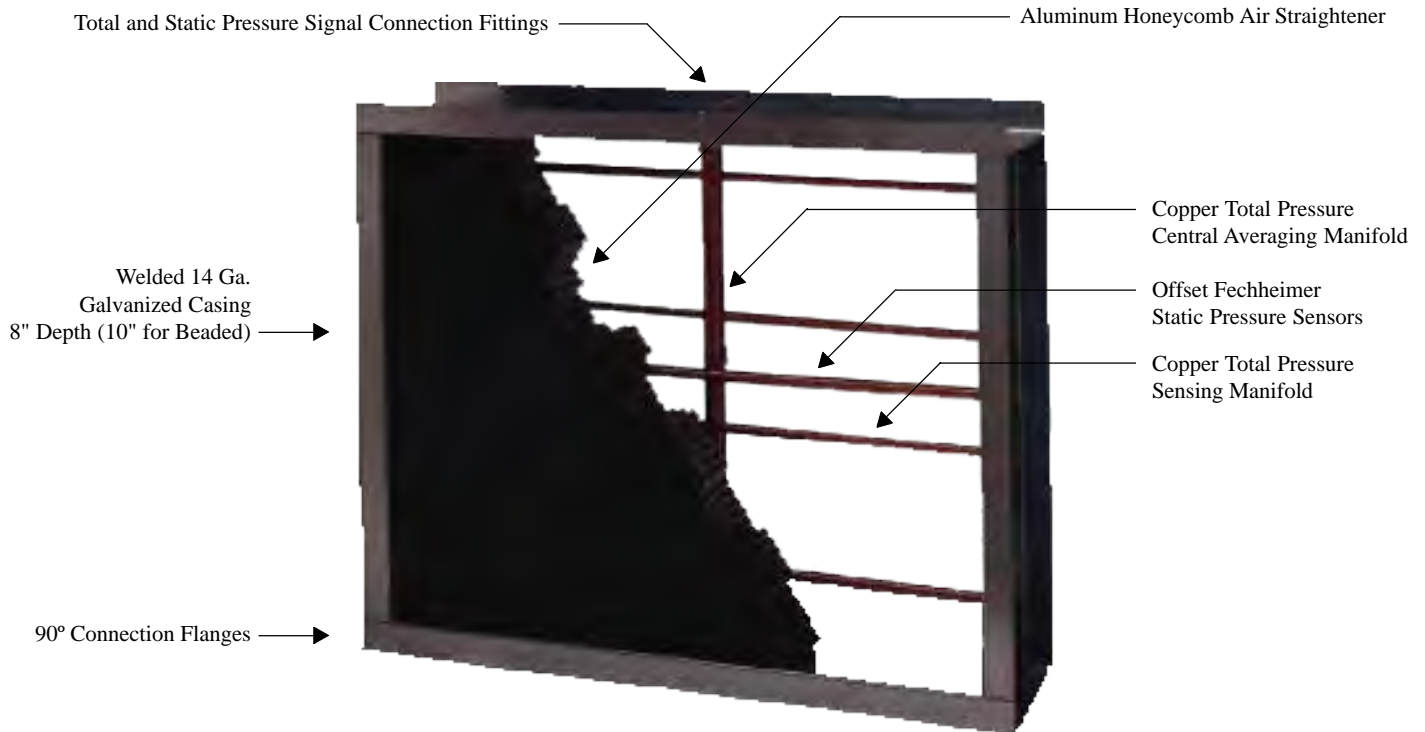
**Negligible Airflow Resistance.** The FAN-E airflow measuring station is designed to function while producing a minimum of resistance to airflow, due to the unique honeycomb air straightener-equalizer section having a free area of 96.6%. The unique, non-restrictive characteristic of the FAN-E is seen 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).





# Airflow Measuring Station

## Construction Features



## Specifications

### Configurations.

Rectangular, Circular, and Flat Oval.

### Accuracy.

2% of actual flow.

### Operating Temperature.

Continuous operation to 200°F.

### Casing.

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.

### Casing Depth.

8" deep for stations with 90° flanges.

10" deep, 8" from bead-to-bead for stations with beaded edges.

### Flanges.

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.

### Air Equalizer – Straightener Cell.

Corrosion resistant 3003 aluminum. 3" deep x 1/2" cell.

### Total Pressure Manifold.

Copper tubing assembled with 50/50 tin/lead solder.

Galvanized mounting and support brackets.

### Static Pressure Header and Sensors.

Copper tubing. Galvanized mounting bracket.

### Connection Fittings.

1/4" brass compression type located on the long dimension of rectangular and flat oval stations.

### Special Construction.

Casing and Flanges: Aluminum, Carbon Steel, Stainless Steel, PVC and Fiberglass, Hastelloy, Inconel.

Air Equalizer–Straightener Cell: Type 304 and 316 Stainless Steel, Carbon Steel, PVC, Hastelloy.

Total and Static Pressure Manifolds: Type 316 Stainless Steel, Hastelloy, Inconel, PVC, Kynar.

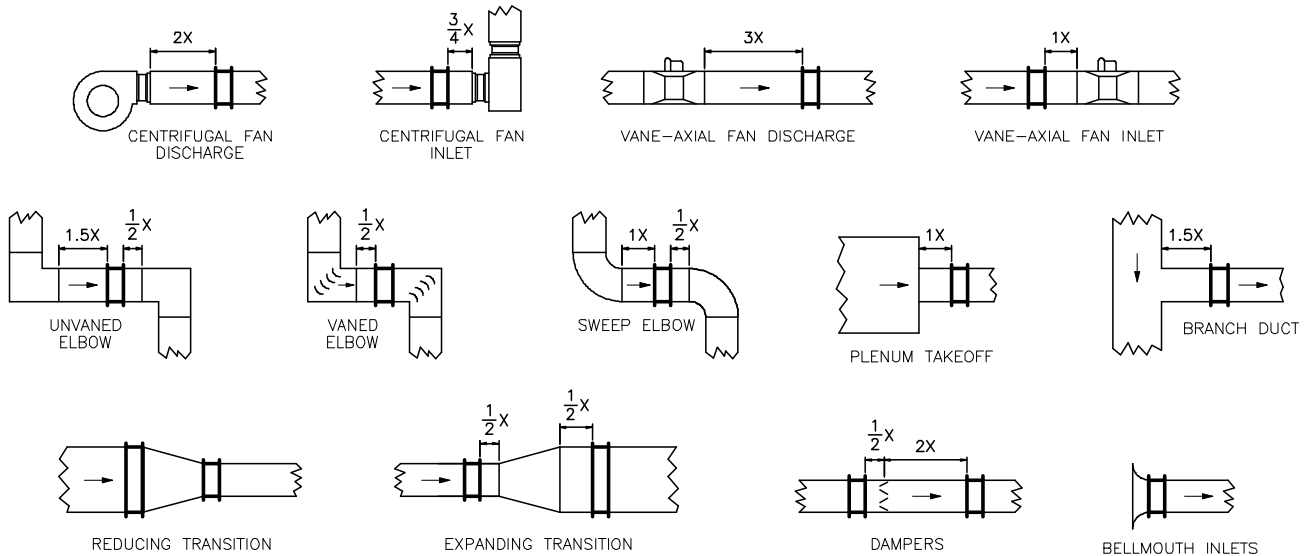
Connection Fittings: Stainless Steel, Hastelloy, Nylon.

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

# FAN-Evaluator

## 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.



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

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

## Suggested Specification

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

Each airflow measuring station shall contain multiple total and static pressure sensors positioned in a log-Tchebycheff pattern. Rectangular stations having a cross-section greater than 4 square feet will have a minimum of 25 points of measurement. For stations having a dimension less than 18", locate the points of measurement at the center of equal areas not more than 6" apart, and use a minimum of two measurement points per side. For a station having a dimension greater than 56", the maximum distance between measurement points will be 8". For circular ducts having a diameter of 18" or greater, locate measurement points on three systematically disposed diameters. For round stations smaller than 18", locate the measurement points on two perpendicular diameters.

The airflow measuring station(s) shall be fabricated of a minimum of 14 ga. galvanized steel, welded casing in 8" depth with 90° connecting flanges in a configuration and size equal to that of the duct it is mounted into. Each station shall be complete with an open parallel cell air straightener-equalizer honeycomb mechanically fastened to the casing, and external signal connection fittings. An identification label shall be placed on each station casing listing the model number, size, area, and specified airflow capacity.

Stations shall be AMCA certified and be capable of measuring the airflow rates within an accuracy of ±2%. The maximum allowable unrecovered pressure drop caused by the station shall not exceed .085" wc. at 2000 FPM, or .30" wc. at 4000 FPM.

The airflow measuring station(s) shall be the FAN-Evaluator as manufactured by Air Monitor Corporation, Santa Rosa, California.

# LO-flo/SS

Pitot Traverse Station



# LO-flo/SS

## Product Description

The LO-flo Pitot Traverse Station is a combination air equalizer-straightener with self-averaging Pitot tube traverse station. The LO-flo is fabricated entirely of Type 316 stainless steel with all welded construction. It is capable of operation up to 1000°F and is suitable for application to corrosive gases within the limitation of the 316 stainless steel construction.

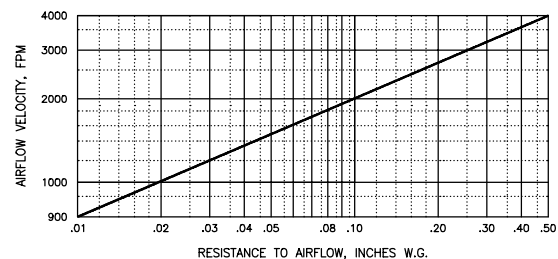
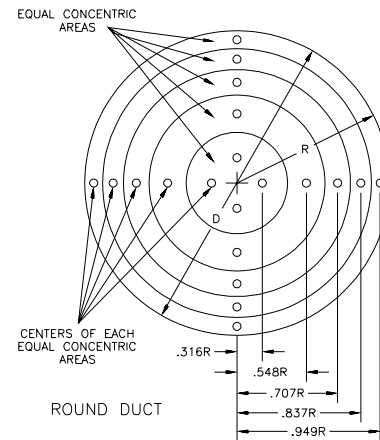
The LO-flo provides highly accurate measurement of low air volumes of 2 to 2000 CFM for monitoring, indicating, and controlling applications when coupled with ultra-low span electronic differential pressure or flow transmitters (such as the Air Monitor VELTRON II, MASS-tron II, and VELTRON DPT-*plus* transmitters). See respective product brochures for operating ranges and performance data.

## How It Works

**Equal Area Traverse.** Total and static pressure sensors are positioned so that each sensor represents an equal portion of the station's cross-sectional area. The total pressure sensors are the only means for sensing the multiple velocity pressures in the airstream profile, therefore, a maximum number of total pressure sensors are utilized. Since the static pressure across the station is relatively uniform, a lesser number of static pressure sensors are utilized.

**Equal Weighted Average.** The "averaging" process in the airflow measuring station manifolds is critical to maintaining high measurement accuracy. Unlike a manual Pitot tube traverse where individually taken velocity readings are totalled and mathematically averaged, the airflow measuring station must pneumatically average all of the sensed total pressure values in a manner that gives equal weight to each value. The adjacent figure illustrates how total pressure sensors are positioned to represent each cross-section equal area in a balanced pattern to achieve equal weighted averaging.

**Airflow Processing.** To assure extremely high levels of measuring accuracy (2% of actual flow or better) under adverse conditions caused by turbulent, rotating, and multi-directional airflows normally present directly downstream from duct elbows, transitions, etc., the LO-flo 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.



## Specifications

### Accuracy.

2% of actual flow.

### Operating Temperature.

Continuous operation to 900°F.

### Maximum Static Pressure.

20 psig.

### Casing.

Schedule 5, Type 316 stainless steel pipe.

### Casing Depth.

12" deep for Models P and F.

12" deep plus the depth of two transitions for Models R and FR. See rear cover for detailed dimensions.

### Flanges.

150 lb. raised face, Type 316 stainless steel for Models F and FR.

### Air Equalizer – Straightener Cell.

Type 316 welded stainless steel cell.

2" deep x 1/8" cell for sizes 3/4" up to 3".

3" deep x 1/4" cell for sizes 4" up to 8".

### Total Pressure Manifold.

Type 316 stainless steel tubing.

### Static Pressure Chamber.

Type 316 stainless steel.

### Signal Connections.

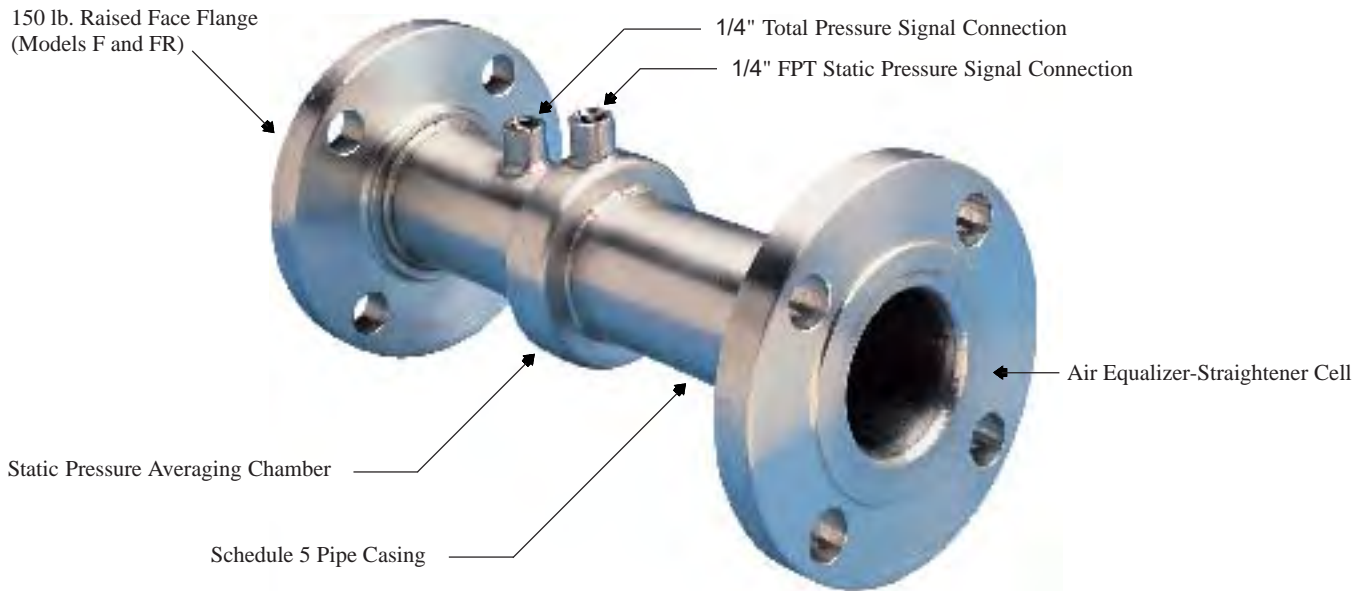
1/4" FPT.

### Special Construction.

14 ga, 10 ga, and 1/4" plate flanges. Integral RTD temperature sensor and transmitter. PVC, Inconel, Hastelloy, etc., materials of construction.

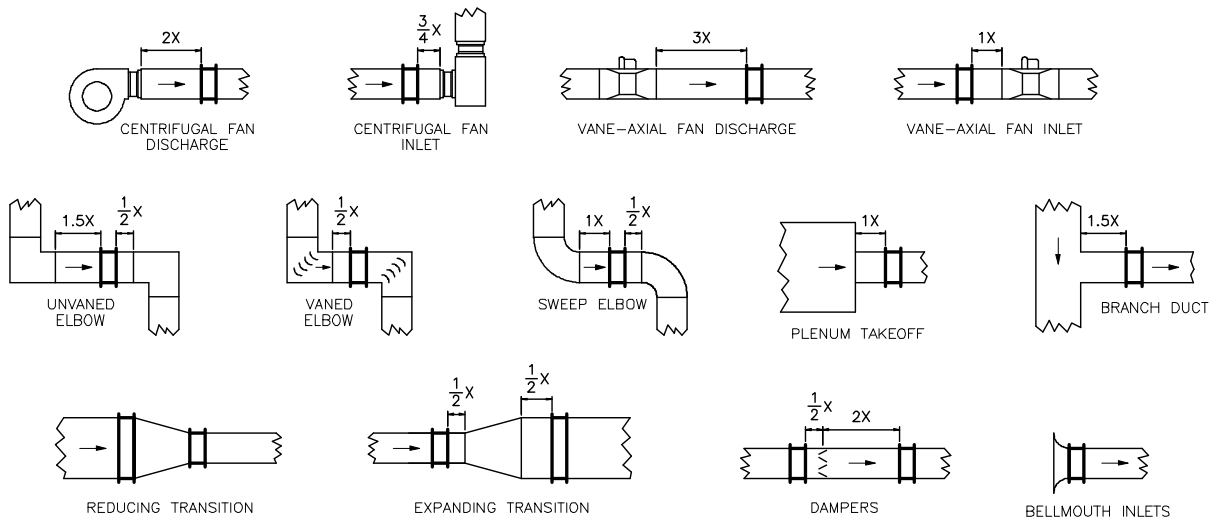
# Pitot Traverse Station

## Construction Features



## Minimum Installation Requirements

**Note:** LO-flo locations shown are **not** ideal. The locations indicate the **minimum** clearance required from turbulence producing sources. Wherever possible, the LO-flo should be installed where straight runs exist.



## Suggested Specification

Provide at each indicated location a self-averaging Pitot traverse station with integral flow straightener-equalizer for continuous monitoring of the air volume flow rate in that line.

Each flow traverse station shall contain multiple Pitot total and static pressure sensors placed at concentric area centers. A flow straightener-equalizer consisting of an open cell honeycomb structure having a minimum cell size-to-length ratio of 12 to 1 shall be mounted upstream of the sensors to eliminate all turbulent and rotational flows. The Pitot sensors shall be mounted on averaging manifolds,

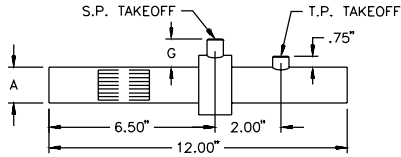
terminating in external 1/4" FPT fittings for signal connections. The entire flow station assembly shall be fabricated of Type 316 stainless steel, all welded construction, and be furnished with the required [pipe flanges, reducers, weld-in, compression fittings] for mounting in the indicated lines.

The flow traverse station shall be capable of measuring the air volume within an accuracy of 2% of actual flow. The station shall be the LO-flo Pitot traverse station as manufactured by Air Monitor Corporation, Santa Rosa, California.

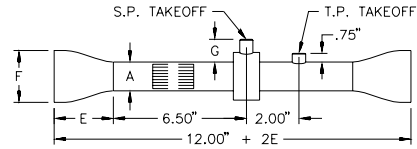


# LO-flo/SS Pitot Traverse Station

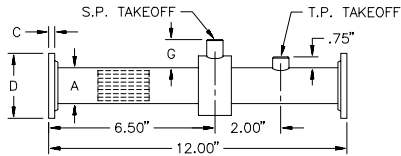
## Dimensional Specifications



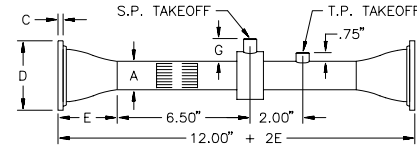
Model P – Plain Ends



Model R – Reducer



Model F – Flanged Ends



Model FR – Flanged Reducer

Station Nominal Size	Basic Station		Flange Options			Reducer Options			G Nominal	No. of Sensors		Air Volume Range, CFM	Area Factor Sq Ft	Straightener/ Equalizer
	A		Flange Size	ASA 150# Raised Face		Pipe Size	E	F O.D.		Total Pressure	Static Pressure			
	O.D.	I.D.		C*	D									
3/4"	1.05	.920	3/4" 1" 1 1/4" 1 1/2"	.50 .56 .62 .69	3.88 4.25 4.62 5.00	— 1" 1 1/4" 1 1/2"	— 2.0 2.0 2.5	— 1.315 1.66 1.90	1.10	4	4	2 to 25	.0046	1/8" x 2"
1"	1.32	1.185	1" 1 1/2" 2"	.56 .69 .75	4.25 5.00 6.00	— 1 1/2" 2"	— 2.5 3.0	— 1.90 2.375	1.10	4	4	3 to 33	.0077	1/8" x 2"
1 1/4"	1.66	1.53	1 1/4" 2" 2 1/2"	.62 .75 .88	4.62 6.00 7.00	— 2" 2 1/2"	— 3.0 3.5	— 2.375 2.975	1.10	6	6	5 to 70	.0128	1/8" x 2"
1 1/2"	1.90	1.77	1 1/2" 2" 2 1/2" 3"	.69 .75 .88 .94	5.00 6.00 7.00 7.50	— 2" 2 1/2" 3"	— 3.0 3.5 3.5	— 2.375 2.875 3.50	1.25	6	6	7 to 95	.0171	1/8" x 2"
2"	2.38	2.245	2" 3" 3 1/2" 4"	.75 .94 .94 .94	6.00 7.50 8.50 9.00	— 3" 3 1/2" 4"	— 3.5 4.0 4.0	— 3.50 4.00 4.50	1.25	8	6	12 to 170	.0275	1/8" x 2"
3"	3.50	3.334	3" 4" 5" 6"	.94 .94 .94 1.00	7.50 9.00 10.00 11.00	— 4" 5" 6"	— 4.0 5.0 5.5	— 4.50 5.562 6.625	1.25	14	8	24 to 340	.0606	1/8" x 2"
4"	4.50	4.334	4" 6" 8"	.94 1.00 1.12	9.00 11.00 13.50	— 6" 8"	— 5.5 6.0	— 6.625 8.625	1.25	14	8	40 to 570	.1025	1/4" x 3"
5"	5.56	5.345	5" 6" 8"	.94 1.00 1.12	10.00 11.00 13.50	— 6" 8"	— 5.5 6.0	— 6.625 8.625	1.25	14	8	60 to 880	.1558	1/4" x 3"
6"	6.63	6.407	6" 8"	1.00 1.12	11.00 13.50	— 8"	— 6.0	— 8.625	1.25	14	8	90 to 1250	.2239	1/4" x 3"
8"	8.63	8.407	8"	1.12	13.50	8"	6.0	8.625	1.25	14	8	150 to 2160	.3855	1/4" x 3"

# FAN-E and LO-flo

## MINIMUM INSTALLATION REQUIREMENTS

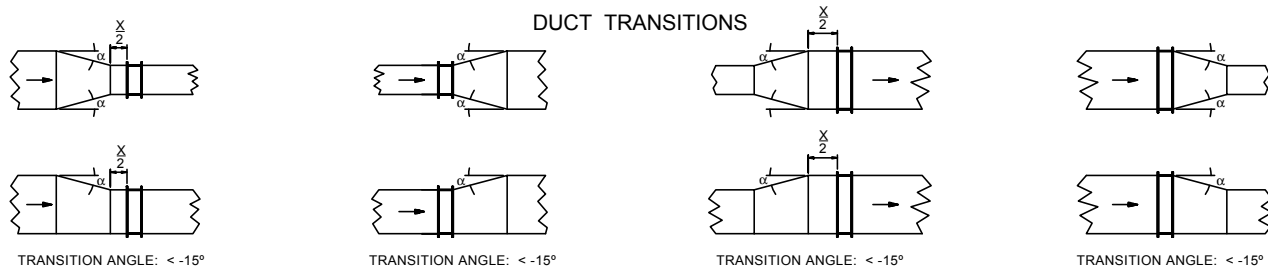
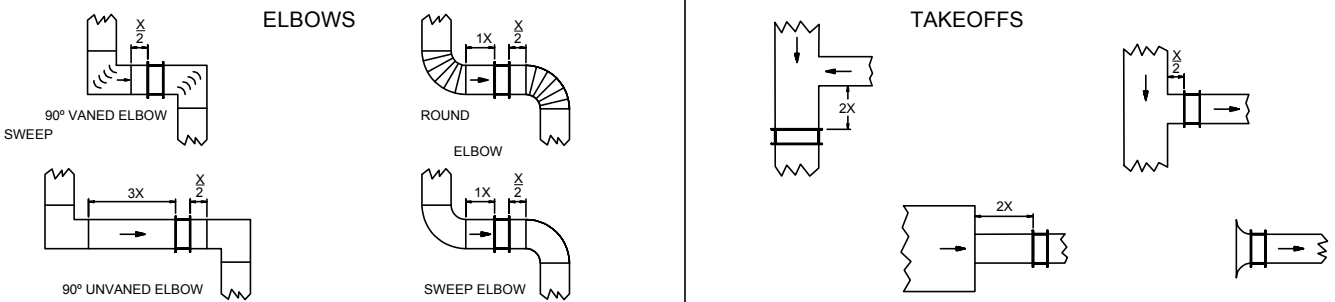
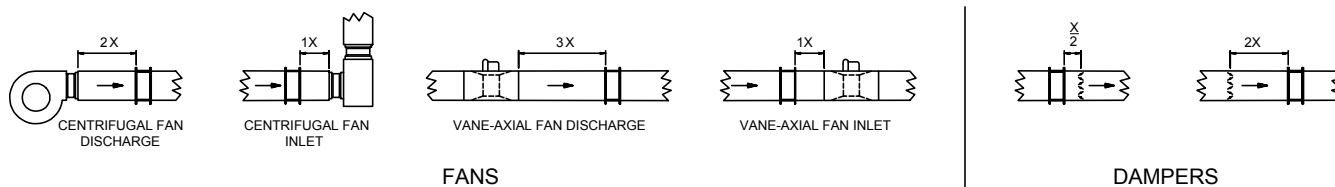
**INSTALLATION CONSIDERATIONS.** Installation factors to be considered when applying the FAN-E are as follows:

**Turbulent Airflow.** The unique use of honeycomb airflow straightener in the FAN-E will permit accurate flow measurement in the presence of moderate air turbulence. The distances from air turbulence producing fittings, transitions, etc., shown below in the Minimum Requirements for Installation, are required to assure accurate FAN-E operation.

**Airborne Contaminants.** The levels of air filtration and cleanliness associated with commercial HVAC Systems, whether supply/return/exhaust/outside air, are satisfactory for operation of the FAN-E. Industrial applications containing airborne contaminants may require periodic manual or automatic cleaning using compressed air applied via the signal fittings, and/or physical cleaning.

**Direction of Airflow.** The FAN-E will function only with the airflow passing through the air straightener section prior to entering the total and static pressure sensing section. To prevent improper installation, each FAN-E is marked with an arrow indicating the required direction of airflow.

**MINIMUM REQUIREMENTS FOR INSTALLATION.** Note: FAN-E locations shown are NOT ideal. They 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 exist.



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

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

# ACCU-flo / NP

## Nozzle Pitot Flow Station



*Accurate airflow measurement for demanding applications*

---

**Air Monitor**  
Precision Airflow Measurement  
An ONICON Brand

# ACCU-flo / NP

## Product Description

The ACCU-flo/NP is a combination precision nozzle and multi-point self-averaging Fechheimer Pitot airflow measuring station. When combined with an ultra high accuracy transmitter such as Air Monitor's VELTRON II, MASS-tron II or VEITRON DPT-plus, the ACCU-flo/NP provides high accuracy ( $\pm 0.5\%$ ) flow measurement for process monitoring and control applications. Due to the combined effect of the integral flow straightener cell

and the nozzle, the ACCU-flo/NP requires little or no upstream straight run to achieve its published measurement accuracy. Constructed of either Type 316 stainless steel or carbon steel with a combination of welded and bolted flanges, the ACCU-flo/NP is capable of operation up to 900°F and is suitable for application to corrosive gases within the limitations of Type 316 stainless steel.

## How It Works

**Precision Nozzle.** The precision nozzle incorporated in the ACCU-flo/NP reduces the measurement area by 50%, which has the effect of conditioning the velocity profile of the measured flow stream, producing highly uniform and stable process pressure signals that are measured at each total and static pressure sensing port. The nozzle also boosts the measured differential pressure by a factor of 4, ensuring high accuracy flow measurement of  $\pm 0.5\%$  of actual flow down to 175 FPM.

**Airflow Processing.** In order to achieve its precise measurement accuracy under adverse conditions caused by turbulent, rotating, and multi-directional airflows, the ACCU-flo/NP uses a parallel cell honeycomb panel to process the flow into velocity vectors parallel with its longitudinal axis. Downstream of the cell the precision nozzle compresses the straightened airflow, which has the effect of flattening the velocity profile where it comes in contact with the total and static pressure sensing manifolds. The combination of the honeycomb panel and precision nozzle eliminates the traditional

need for long upstream straight runs of duct required to obtain accurate flow measurement. See Figure 1.

**Equal Weighted Average.** Within the separate total and static pressure manifolds the individually sensed pressures are pneumatically averaged in a manner that gives equal weight to each value. The equal weighted averaging compensates for any remaining minor variances in total pressure at the plane of measurement.

**Fechheimer Static Pressure Measurement.** Even small amounts of flow angularity can contribute to measurement error. The ACCU-flo/NP utilizes paired Fechheimer static pressure ports positioned at designated angles offset from the flow normal vector. As flow angularity veers from normal, one port is exposed to a higher pressure ( $P_s + \text{part of } P_t$ ), whereas the other port experiences a lower pressure ( $P_s - \text{part of } P_t$ ) of the same magnitude, thereby canceling out the undesired effect of the partial total pressure ( $P_t$ ). See Figure 2.

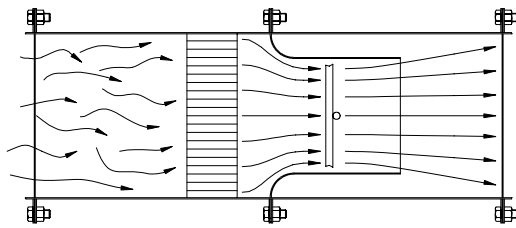


Figure 1

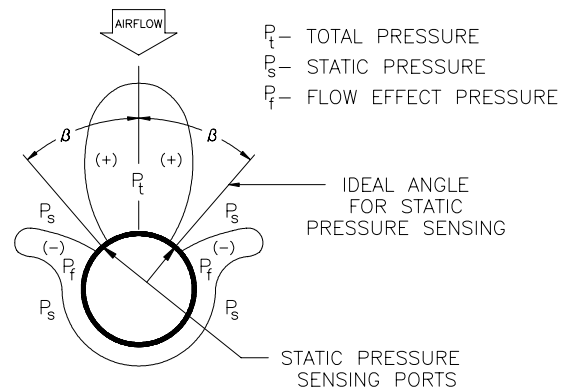


Figure 2

## Specifications

**Accuracy.** 0.5% of actual flow

**Operating Temperature.** Continuous operation to 900°F

**Maximum Static Pressure.** Dependent on materials of construction, operating temperature, and installation. Contact Factory.

**Casing.** Model S. Rolled sheet metal, Type 316 stainless steel.  
Model HP. Pipe, Type 316 stainless or carbon steel.

**Flanges.** Model S. 10 ga. plate, Type 316 stainless steel.  
Model HP. 150 lb. raised face flange, stainless or carbon steel.

**Nozzle.** Type 316 stainless steel.

**Air Straightener Cell.** 1/4" or 3/8" hexagonal welded cell, Type 316 stainless steel.

**Total & Static Pressure Sensors.** Type 316 stainless steel.

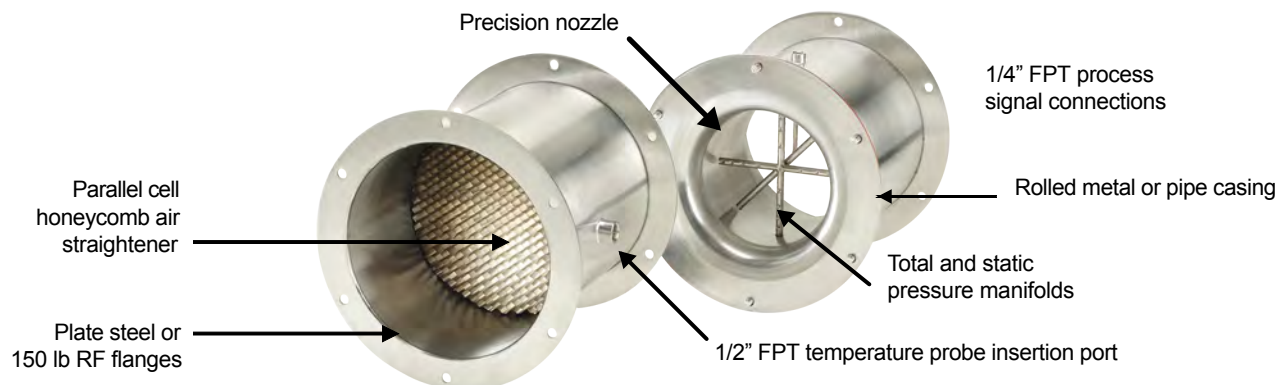
**Signal Fittings.** 1/4" FPT, stainless or carbon steel to match casing material.

**Non-Recovered Pressure Loss.** 42-45% of the velocity head (pressure) for the design flow rate.

**Special Construction.** Integral temperature sensor and transmitter. Static pressure port. Temperature port. 316 stainless zeroing valve with 1/4" NPTF connection.

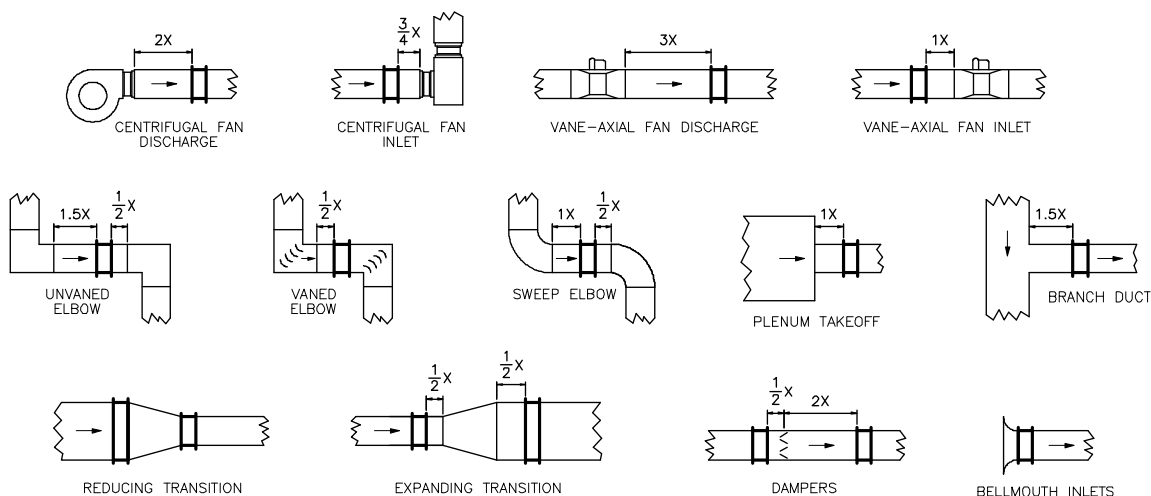
# Nozzle Pitot Flow Station

## Construction Features



## Minimum Installation Requirements

These installation locations indicate the **minimum** clearance from a source of airflow disturbance. If more than the minimum is available, proportionally adjust the upstream and downstream clearances. Avoid locating the ACCU-flo/NP where it will be subjected to condensation from a coil or humidifier. Contact Air Monitor's Applications Engineering Department to discuss sub-minimum installation.



## Suggested Specification

Provide at each indicated location a precision nozzle, multi-point self-averaging Pitot airflow measuring station integral flow straightener, for continuous flow rate measurement.

Each flow measurement station shall contain Fechheimer Pitot traverse probes with multiple total and static pressure sensors placed in the minimum throat diameter of a precision flow nozzle. Flow straightener in the form of an open cell honeycomb structure having a minimum cell length-to-size ratio of 8:1 shall be mounted upstream of the nozzle and traverse probes to eliminate turbulent, rotational and angular flow.

The flow nozzle shall reduce the area at the point of measurement by 50% and shall produce a uniform velocity profile.

The entire flow station shall be constructed off type 316 stainless steel [or carbon steel] casing and flange materials that the construction of the pipe or duct into which the station will be mounted.

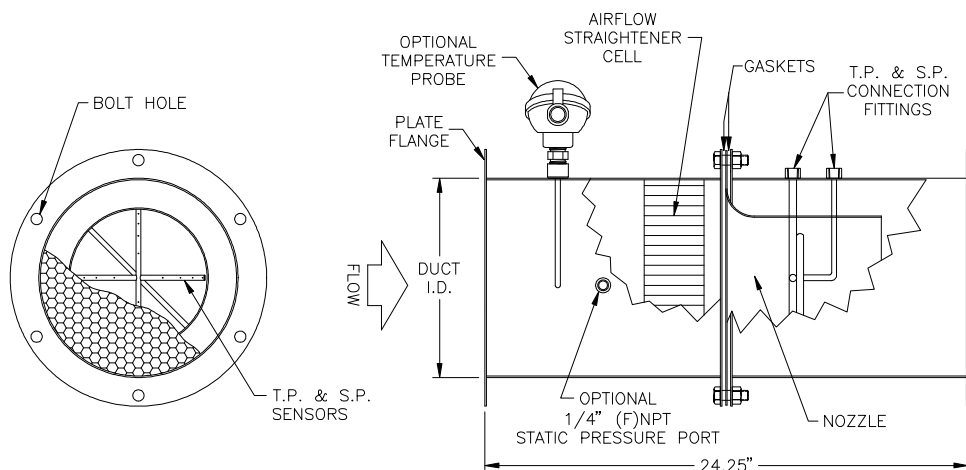
The flow traverse station shall be capable of measuring the volumetric flow within an accuracy of 0.5% of reading over a range of 175 to 10,000 FPM and shall require no length of straight duct upstream of the measurement point.

The station shall be the ACCU-flo/NP Nozzle-Pitot Flow Station as manufactured by Air Monitor Corporation, Santa Rosa, California.



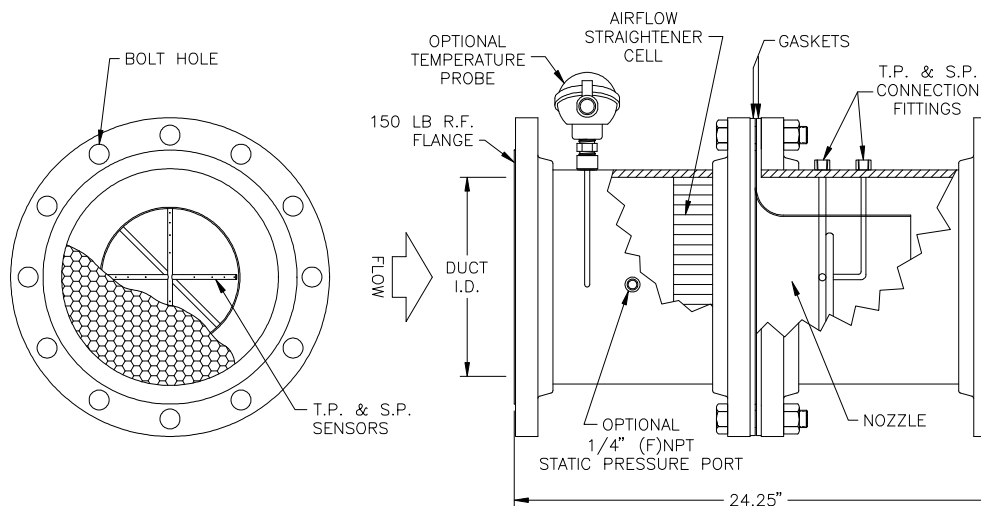
# ACCU-flo / NP – Nozzle Pitot Flow Station

## Dimensional Specifications – Model S



Nominal Duct Size	Duct ID	Duct Wall	Flange O.D.	Bolt Circle	Bolt Qty	Cell Hex Size	Nominal Duct Size	Duct ID	Duct Wall	Flange O.D.	Bolt Circle	Bolt Qty	Cell Hex Size
4"	3.87	0.048	6.06	5.31	6	1/4 x 3	16"	15.85	0.075	19.13	18.00	8	3/8 x 3
6"	5.87	0.075	8.09	7.31	6	1/4 x 3	18"	17.85	0.075	21.13	20.00	8	3/8 x 3
8"	7.85	0.075	10.38	9.56	6	3/8 x 3	20"	19.85	0.075	23.13	21.75	12	3/8 x 3
10"	9.85	0.075	12.88	11.81	6	3/8 x 3	24"	23.85	0.075	27.13	25.88	12	3/8 x 3
12"	11.85	0.075	15.13	14.00	6	3/8 x 3	30"	29.85	0.075	34.13	32.38	16	3/8 x 3
14"	13.85	0.075	17.13	16.00	8	3/8 x 3							

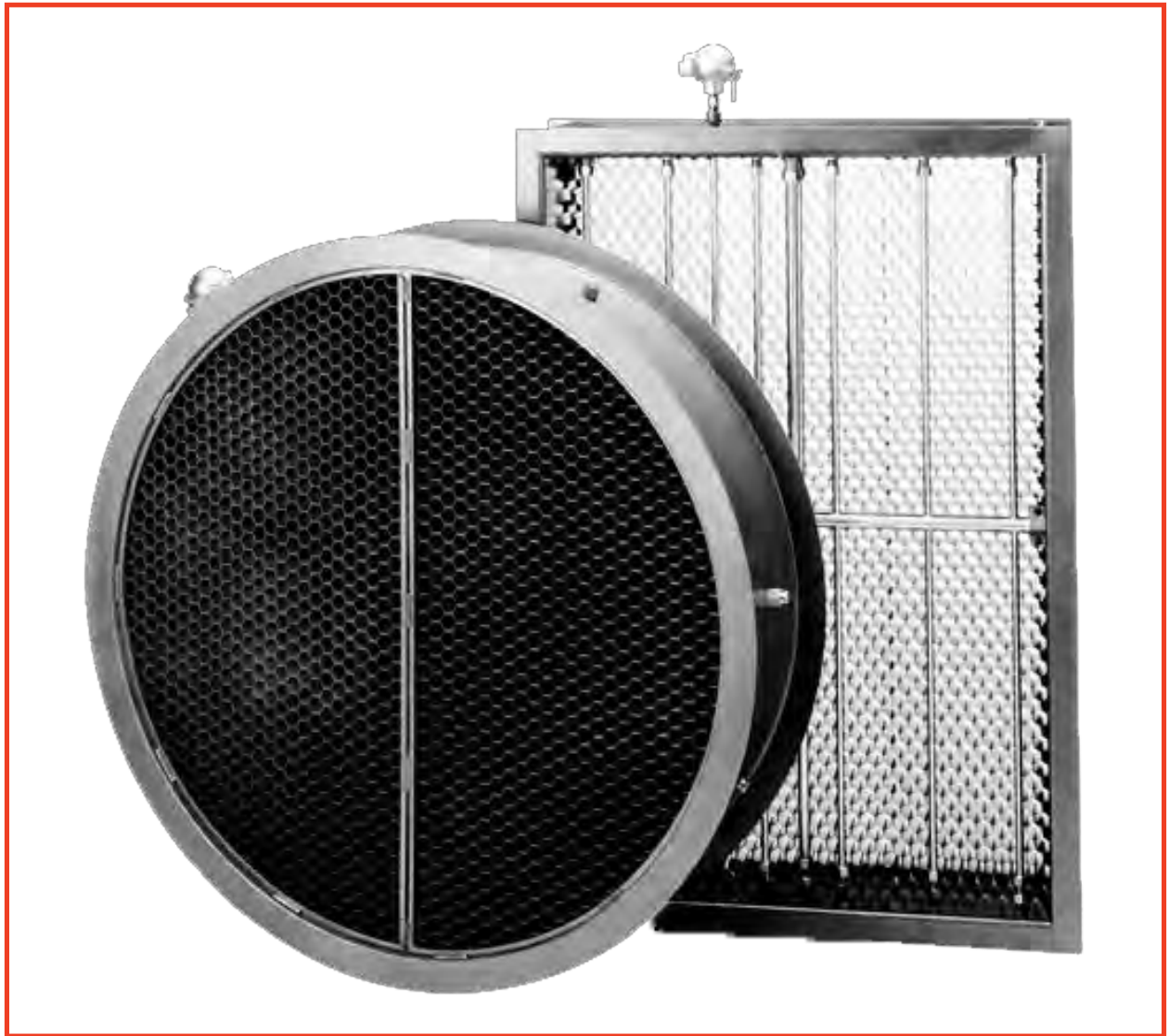
## Dimensional Specifications – Model HP



Nominal Duct Size	Duct ID	Duct Wall	Flange O.D.	Bolt Circle	Bolt Qty	Cell Hex Size	Nominal Duct Size	Duct ID	Duct Wall	Flange O.D.	Bolt Circle	Bolt Qty	Cell Hex Size
4"	4.03	0.237	9.0	7.50	8	1/4 x 3	14"	13.25	0.375	21.0	19.75	12	3/8 x 3
6"	6.07	0.280	11.0	9.50	8	1/4 x 3	16"	15.25	0.375	23.5	21.25	16	3/8 x 3
8"	7.98	0.322	13.5	11.75	8	3/8 x 3	18"	17.25	0.375	25.0	22.75	16	3/8 x 3
10"	10.02	0.365	16.0	14.25	12	3/8 x 3	20"	19.25	0.375	27.5	25.00	20	3/8 x 3
12"	12.00	0.375	19.0	17.00	12	3/8 x 3	24"	23.25	0.375	32.0	29.50	20	3/8 x 3

# CA Station

## Combustion Airflow Measurement Station



*Proven solutions for a tough industry*

**Air Monitor**  
Precision Airflow Measurement  
An ONICON Brand

# CA Station

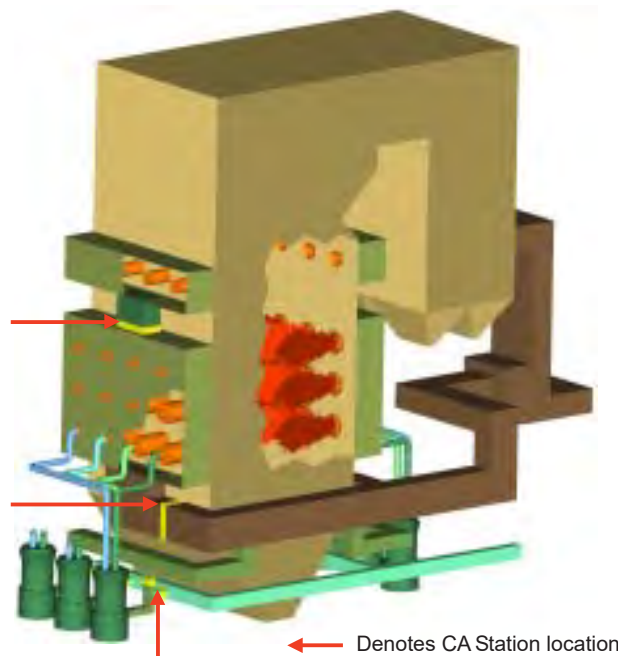
## The Need for Combustion Airflow Measurement

The objectives in the power industry today are twofold; to lower emissions, and increase plant performance. Precise measurement of combustion airflow and fuel rates positively contributes to achieving those objectives, by providing the information needed to optimize stoichiometric ratios and facilitate more complete, stable combustion. Usable measurements cannot be obtained from existing devices such as venturis, foils, jamb tubes, etc., or instrumentation such as thermal anemometers due to limited available straight duct runs, low flow rates, proximity to modulating control dampers, broad turndown range, and high concentrations of airborne particulate (flyash).

AMC Power's ruggedly constructed CombustionAir (CA) Station, with both integral airflow processing cell and Fechheimer-Pitot measurement technology, is engineered to meet the challenging operating conditions of the typical power plant while providing mass flow measurement of PA, SA, and OFA within an accuracy of  $\pm 2-3\%$  of actual airflow.

While the main functions of primary air are to first dry and then pneumatically convey the pulverized coal from the mill to the individual burners, it also determines coal particle velocity at the burner exit, influencing the flame position relative to the burner tip and impacting flame stability, both key factors in achieving optimized burner performance. Accurate PA measurement obtained with a CA Station can contribute to reducing NO<sub>x</sub> and CO, improving flame stability, avoidance of coal pipe layout, minimizing LOI/UBC, reducing waterwall corrosion, and increasing combustion efficiency.

The CA Station is also ideally suited to measure SA entering each burner level of a partitioned windbox, SA being taken out of a windbox to supply multiple OFA ports, at the ducted inlet of FD fans, and bulk SA entering each windbox of a corner fired unit.



## How It Works

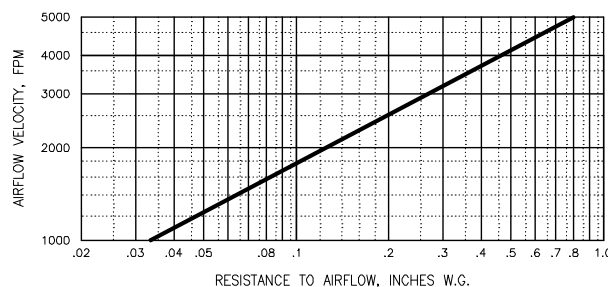
**Log-Tchebycheff Sensor Location.** A high concentration of total and static pressure sensors positioned according to the log-Tchebycheff rule sense the multiple and varying flow components that constitute the airstream's velocity profile. The log-Tchebycheff's perimeter weighted sensor pattern is utilized 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 the table 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	Quantity of Sensing Points
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 CA Station 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.

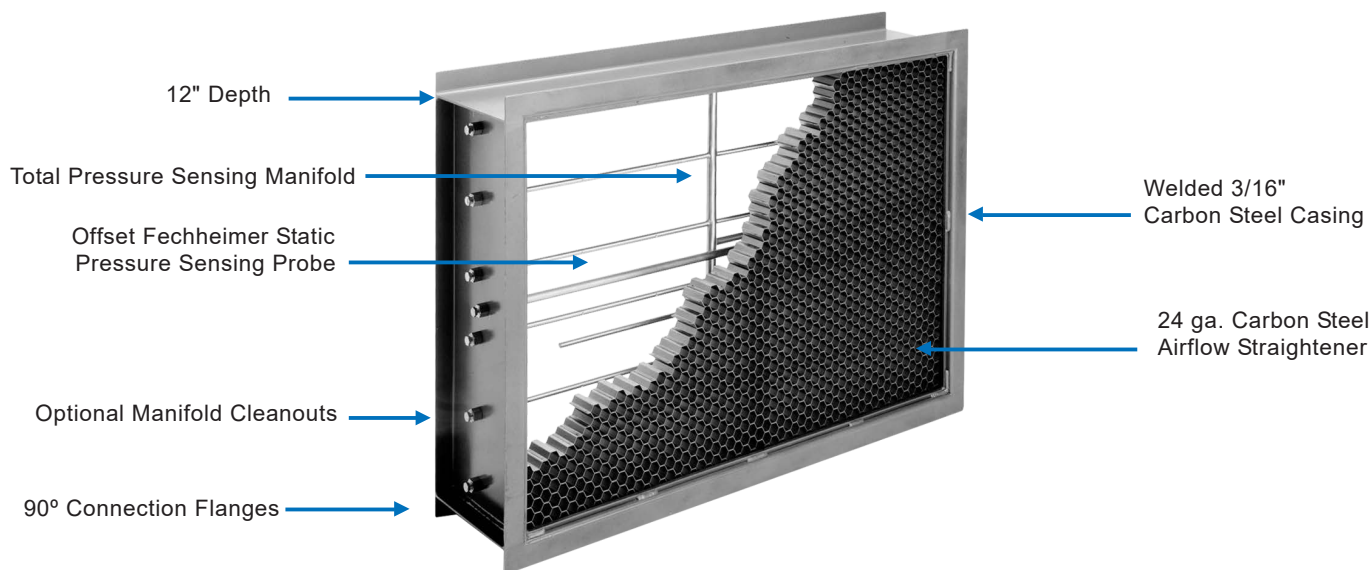
**Airflow Processing.** To assure extremely high levels of measuring accuracy (3% of actual flow) under extreme conditions caused by turbulent, rotating, and multi-directional airflows normally present near fan inlets, discharge ducts, and directly downstream from duct elbows, transitions, etc., the CA Station 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 CA Station 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 96.6%. The unique, non-restrictive characteristic of the CA Station 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).



# Combustion Airflow Measurement Station

## Construction Features



## Specifications

### Configurations.

Rectangular, Circular, and Custom

### Accuracy.

2-3% of actual flow

### Operating Temperatures.

Continuous operation to 800°F

### Connection Fittings.

1/2" FPT, Type 316 stainless steel

### Static and Total Pressure Sensing Manifolds.

Type 316 stainless steel, welded construction

### Airflow Straightener.

1" hexagonal, parallel cell straightener, 3" deep, 24 ga. (.024") thick carbon steel

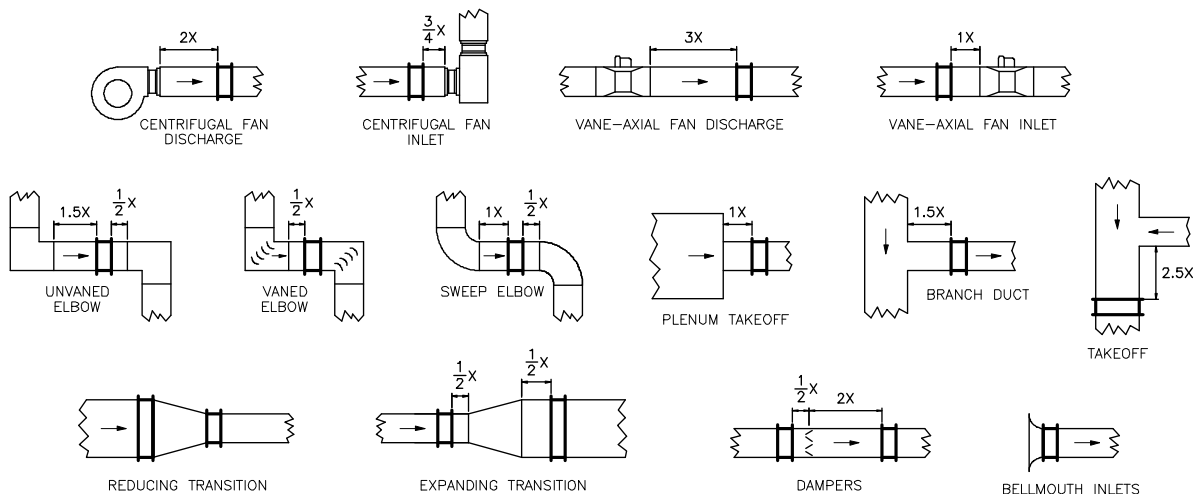
### Casing and Flanges.

3/16" carbon steel, continuous welded seams  
Casing depth is 12"

### Special Construction Options.

Sensing Manifold Cleanouts  
Inlet Bell Mouth  
Multi-point Temperature Measurement  
Alternate Materials of Construction  
Integral Control Damper

## Minimum Installation Requirements





### **Pf-FLO™ – Pulverized Fuel Flow Management**

The Pf-FLO™ system performs continuous and accurate fuel flow measurement in pulverized coal fired combustion applications, providing boiler operators with the real-time data needed to balance coal mass distribution between burners. Balanced fuel improves combustion efficiency and lowers emissions while reducing in-furnace slagging, coal layout, fuel slagging, and coal pipe fires.



### **IBAM™ – Individual Burner Airflow Measurement**

The IBAM™ – Individual Burner Airflow Measurement probe is ideally suited for new or retrofit applications where a reduction in plant emissions and improvement in efficiency can be obtained through accurate measurement of burner secondary airflow. The IBAM™ probe has been designed to accurately measure in the particulate laden, high operating temperature conditions found in burner air passages.



### **VOLU-probe/SS™ Stainless Steel Airflow Traverse Probes.**

Multi-point, self-averaging, Pitot-Fechheimer airflow traverse probes with integral airflow direction correcting design. Constructed of Type 316 stainless steel and available in externally and internally mounted versions for harsh, corrosive or high temperature applications such as fume hood, laboratory exhaust, pharmaceutical, and clean room production and dirty industrial process applications.



### **CAMS™ – Combustion Airflow Management Systems.**

The CAMS™ – Combustion Airflow Management System has been designed to reliably and accurately measure airflow in combustion airflow applications. The CAMS™ contains the microprocessor based instrumentation to measure the airflow and manage the AUTO-purge. The AUTO-purge is a high pressure air blowback system that protects the duct mounted flow measurement device from any degradation in performance due to the presence of airborne particulate (flyash).



### **CEMS™ – Continuous Emissions Monitoring System**

Air Monitor Power's CEMS™ – Continuous Emissions Monitoring Systems assist in complying with the Clean Air Act's stringent emission measurement standards and the requirements of 40 CFR 75. Air Monitor has assembled a cost effective integrated system consisting of in-stack flow measurement equipment and companion instrumentation to provide continuous, accurate, and reliable volumetric airflow monitoring of stacks and dust of any size and configuration.

**Engineering & Testing Services.** Air Monitor Power offers complete engineering and testing to analyze air and coal delivery systems. Air Monitor Power's field testing services use 3D airflow traversing and Pf-FLO coal flow measurement systems for the highest possible accuracy. To ensure cost effective and accurate solutions, Air Monitor Power has full scale physical flow modeling capability and in house Computational Fluid Dynamics (CFD). CFD analysis is used to analyze flow profiles and design/redesign ductwork to improve overall performance. Full scale model fabrication and certified wind tunnel testing is used to develop application specific products that will measure accurately where no standard flow measurement can.



# VOLU-probe/SS

Stainless Steel Pitot Airflow Traverse Probes



# VOLU-probe/SS

## Product Description

The VOLU-probe/SS Stainless Steel Pitot Airflow Traverse Probe is ideally suited for new installations or retrofit applications requiring accurate airflow measurement in locations having limited straight duct runs. Multiple sets of total and static pressure sensing ports along the entire length of the VOLU-probe/SS traverse the airstream in a single line across the duct, and average the sensed pressures in separate manifolds. An array of VOLU-probe/SS

probes are used to properly sense the typically stratified flow to provide an equal area traverse of an entire duct cross-section. The VOLU-probe/SS is suited for clean or harsh and particulate laden applications, operating at temperatures ranging from -20 to 900°F. As a primary flow sensing means, the VOLU-probe/SS can be used in industrial process applications ranging from power generation (combustion airflow), fiber quenching, process drying, emission monitoring, etc.

## How It Works

The VOLU-probe/SS 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/SS 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/SS 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/SS is covered by U.S. Patent No. 4,559,835.

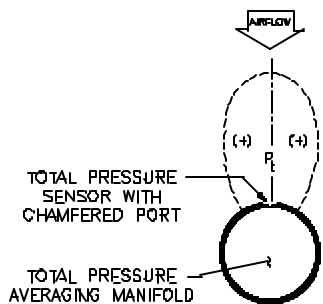


Figure 1

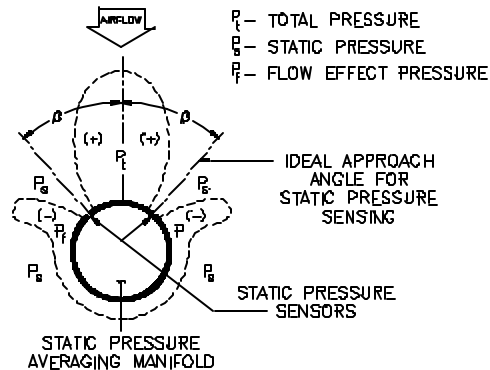
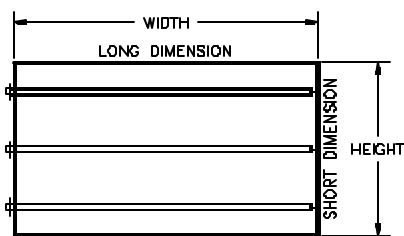


Figure 2

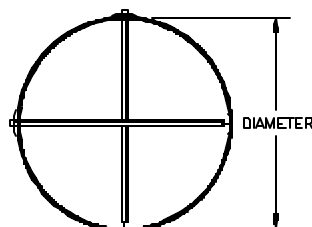
## Accuracy

All recognized flow measurement standards (ASHRAE Fundamentals, AMCA Publication 203, Industrial Ventilation Manual, 40CFR60, etc.) agree that accurate airflow measurement is highly dependent upon the quantity and pattern of sensing points in the airstream, and the relative position of the sensing points to upstream/downstream flow disturbances.

When installed per Air Monitor's Minimum Installation Requirements (see back page), the minimum quantity and placement of VOLU-probe/SS airflow traverse probes shown below will produce assured measuring accuracies of  $\pm 2-3\%$  of actual airflow.



FOR SQUARE AND RECTANGULAR DUCT



FOR CIRCULAR DUCT

HEIGHT DIMENSION	MINIMUM QTY. OF VOLU-probes RECOMMENDED	HEIGHT DIMENSION	MINIMUM QTY OF VOLU-probes RECOMMENDED
8" TO 12"	1	>54" TO 84"	4
>12" TO 30"	2	>84" TO 120"	5
>30" TO 64"	3	>120" TO 180"	6

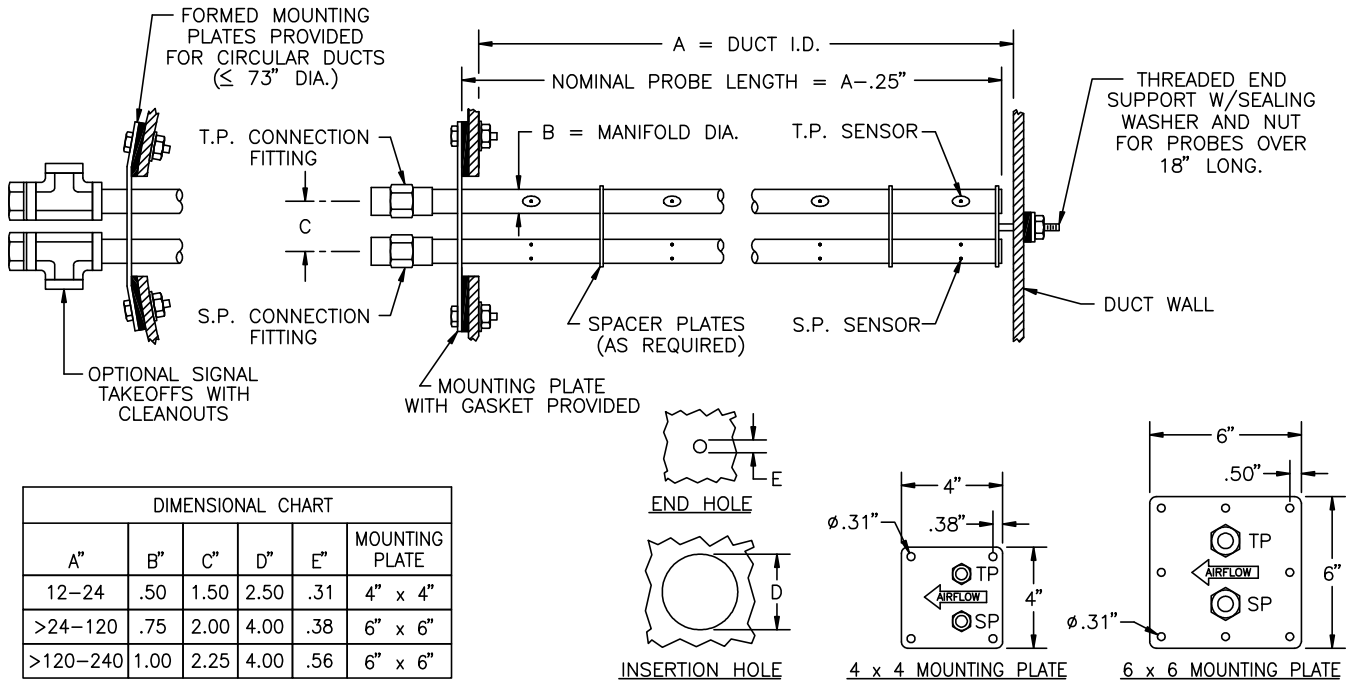
DIAMETER	MINIMUM QTY OF VOLU-probes RECOMMENDED
8" TO 18"	1
>18" TO 72"	2
>72" +	3

# VOLU-probe/1SS & 2SS

## VOLU-probe/1SS – Externally Mounted

The VOLU-probe/1SS is designed for mounting in ducts or stacks by drilling two holes in opposing walls, without the need to enter those structures.

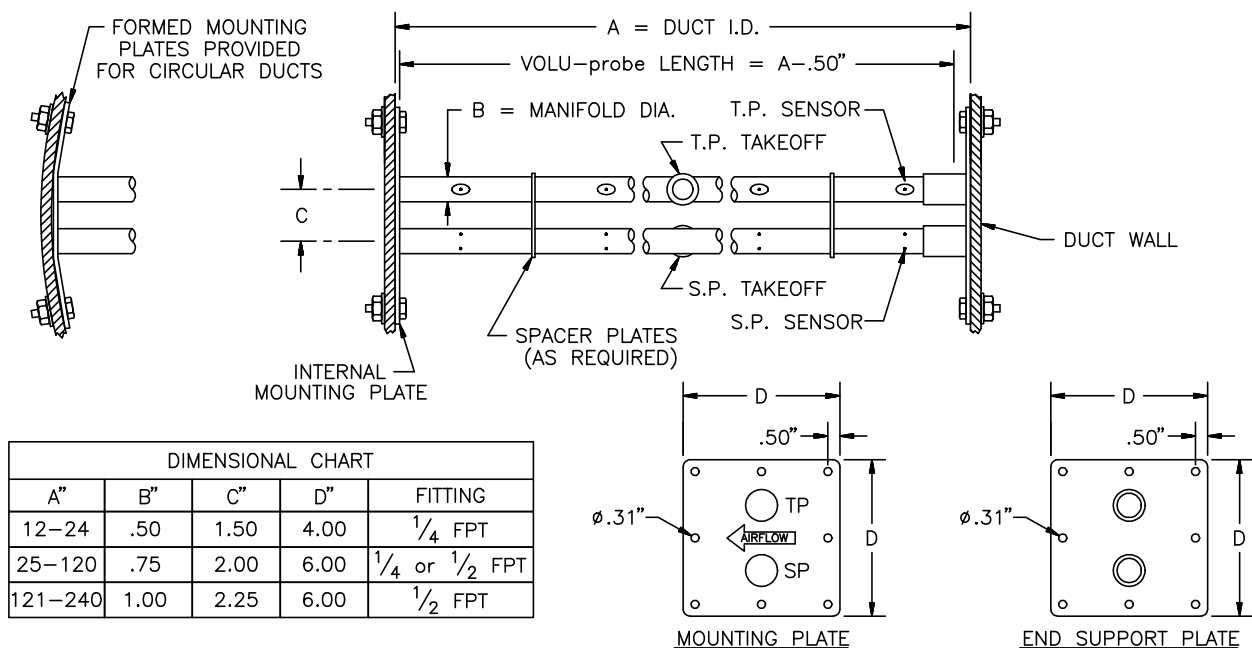
The VOLU-probe/1SS is furnished with a threaded end support, gasketed washer and nut, and a mounting plate with signal take-off FPT connections, all fabricated of type 316 stainless steel.



## VOLU-probe/2SS – Internally Mounted

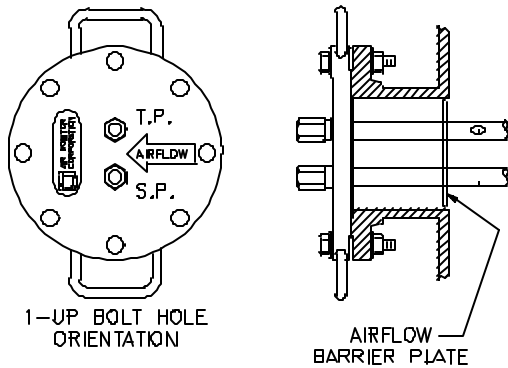
The VOLU-probe/2SS is designed for larger ducts or stacks where the size permits entry for installation, or where duct external accessibility or clearance is insufficient to permit probe mounting from outside the duct.

The VOLU-probe/2SS is furnished with interior mounting and end support plates, and midpoint signal take-off FPT connections, all fabricated of type 316 stainless steel.



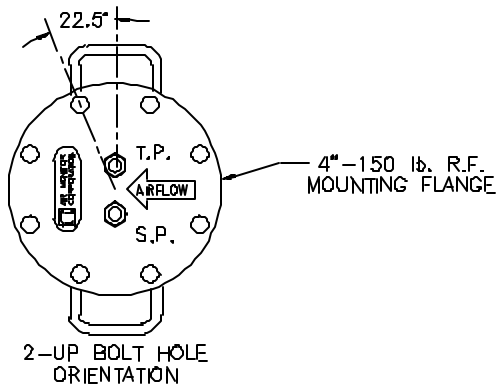
# VOLU-probe/SS Options

## VOLU-probe/SS – Construction Options



1-UP BOLT HOLE ORIENTATION

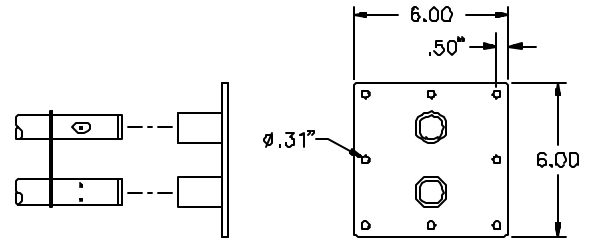
AIRFLOW BARRIER PLATE



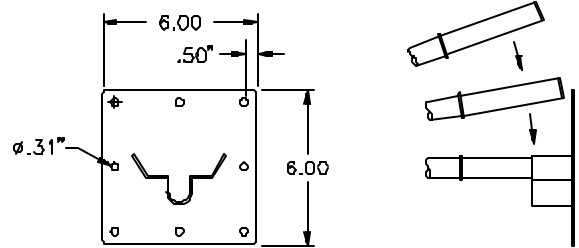
2-UP BOLT HOLE ORIENTATION

4" - 150 lb. R.F. MOUNTING FLANGE

150 lb. Mounting Flange

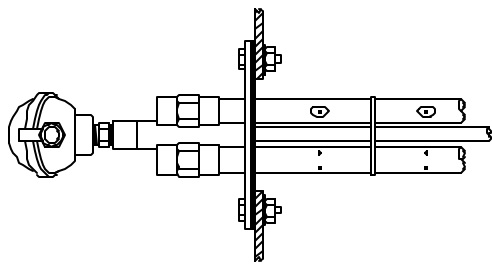


SOCKET

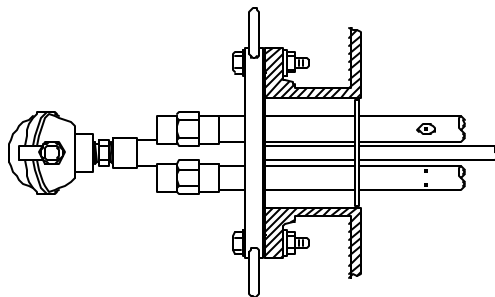


Y-SHAPED

Probe End Supports

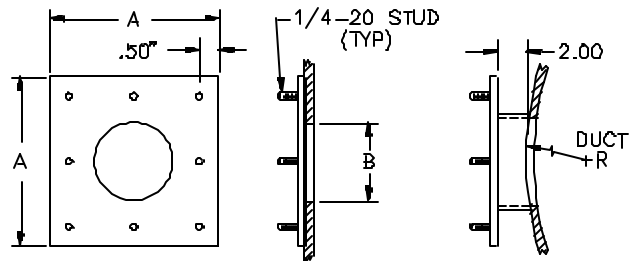


WITH STANDARD MOUNTING PLATE

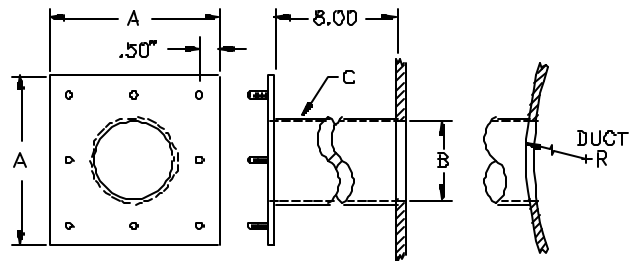


WITH 150lb MOUNTING FLANGE

Temperature Probe



STANDARD



EXTENDED

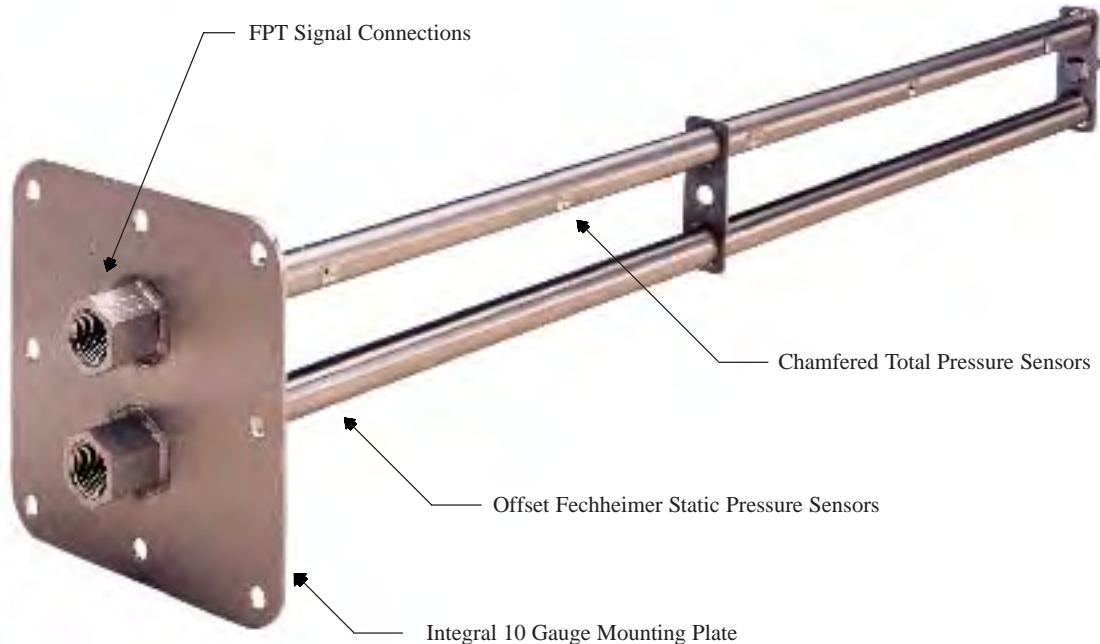
DIMENSIONAL CHART

PROBE LENGTH	A"	B"	C (PIPE)
12-24	4.00	∅2.00	2" SCH 40
25-240	6.00	∅4.00	4" SCH 40

Companion Mounting Plates

# Stainless Steel Airflow Traverse Probes

## Construction Features



## Features

**No Air Straighteners Required.** The VOLU-probe/SS unique dual offset static pressure sensor and patented chamfered total pressure sensor design permit the accurate measurement of the airflow rate in highly turbulent flow locations (with directional yaw and pitch varying up to 30° from the duct's longitudinal axis) without the need for upstream air straightening means.

**Offered in Two Models.** The VOLU-probe/SS is offered in two basic configurations to facilitate installation in new or existing ducts or stacks; the Model 1 for external mounting, and the Model 2 for internal mounting.

**Negligible Resistance to Airflow.** The VOLU-probe/SS 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, if not negligible resistance to airflow (Ex: 0.046 IN w.c. at 2000 fpm air velocity).

**Performs Equal-Weighted Averaging of Flow Signals.** Through the use of separate averaging manifolds, the VOLU-probe/SS instantaneously averages, on an equal-weighted basis, the multiple pressures sensed along the length of the probe, producing separate "averaged" total pressure and static pressures at the probe's external signal connections.

**Provides for Equal Area Traverse.** Each VOLU-probe/SS contains multiple total and static pressure sensors specifically and precisely located along the length of the probe to provide an equal area traverse of ducted airflow. For rectangular duct configurations, the sensors are spaced at equal distances along the probe. For circular duct configurations, the sensors are located at the centers of the equivalent concentric area along the probe.

**True Velocity Pressure Measurement.** The total and static pressure components of airflow measured by the VOLU-probe/SS can be directly converted in velocity pressure (and velocity) without the use of correction factors, thereby facilitating flow verification with a Pitot tube or other hand held instrumentation.

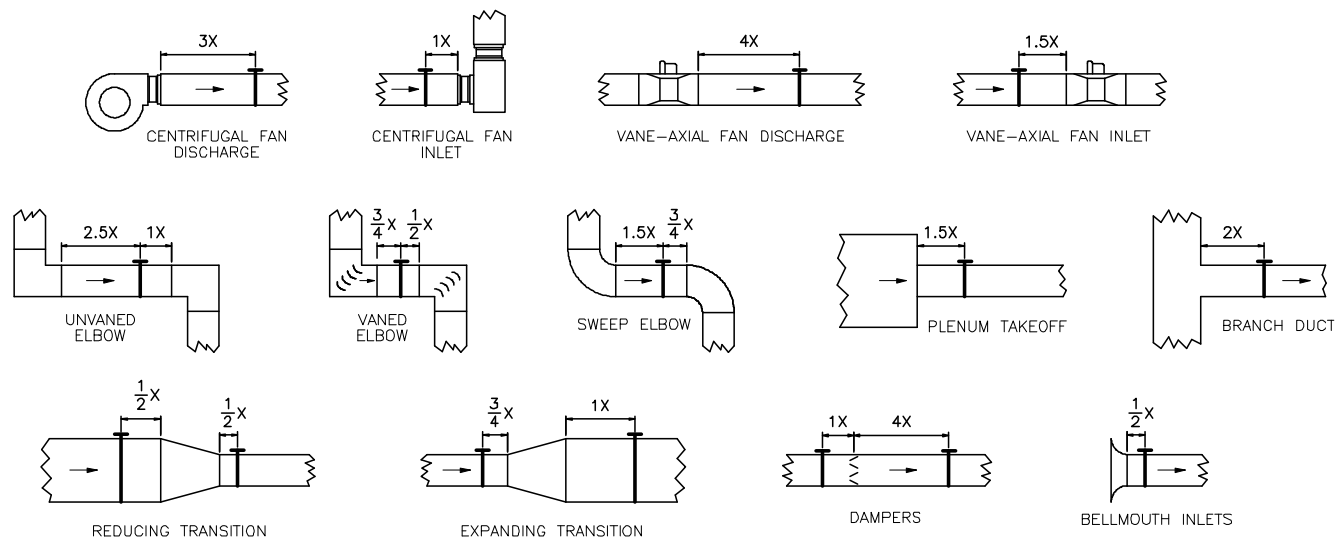
**No Sensor Protrusions.** The VOLU-probe/SS total and static pressure sensors are all contained within the confines of the external surface of the probe. There are no protruding sensors to be bent, broken, or otherwise damaged during installation or possible subsequent removal for inspection or cleaning.

**Rugged Construction Assures Long Service Life.** The standard VOLU-probe/SS is fabricated from Type 316 stainless steel using all welded construction. See Page 4 for construction options, and contact Factory for alternate materials of construction such as Hastelloy, Inconel, Kynar, PVC, etc.

# VOLU-probe/SS

## Minimum Installation Requirements

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



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

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

## Suggested Specification

Provide where indicated an array of airflow traverse probes capable of continuously monitoring the stack or duct capacities (air volumes) it serves.

Each airflow traverse probe shall contain multiple total and static pressure sensors and internally connected to their respective 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, all welded construction, and shall be furnished with the flat or curved plate mounting means. In addition, access ports and accessory

hardware shall be provided to facilitate external installation of the probe and end support (if required), yet permitting easy probe removal for inspection, etc.

The airflow traverse probe shall not induce a pressure drop in excess of 0.046 IN w.c. at 2000 FPM, nor measurably contribute to sound levels within the duct. 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 [1SS, 2SS] as manufactured by Air Monitor Corporation, Santa Rosa, California.



# VOLU-probe/SM

## Airflow Traverse Probe

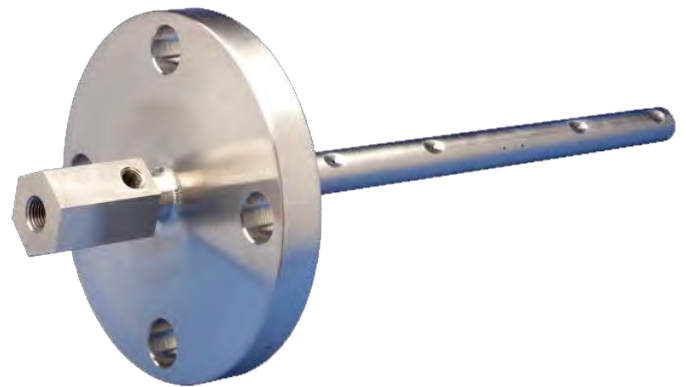
### Product Description

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.

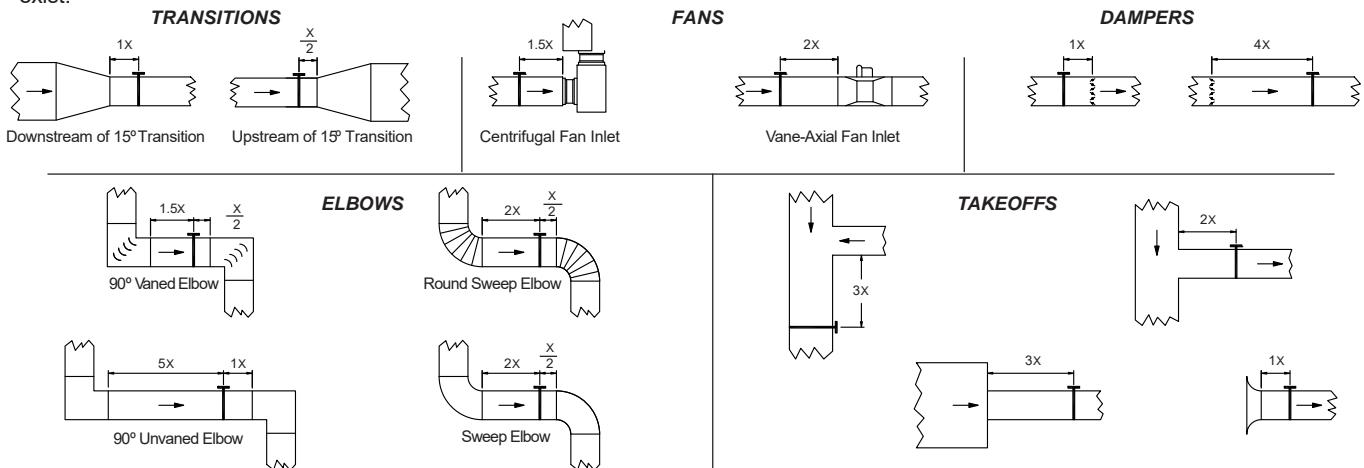
### Product Specifications

- **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" MPJT 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:  $x = \frac{2(H \times W)}{H + W}$

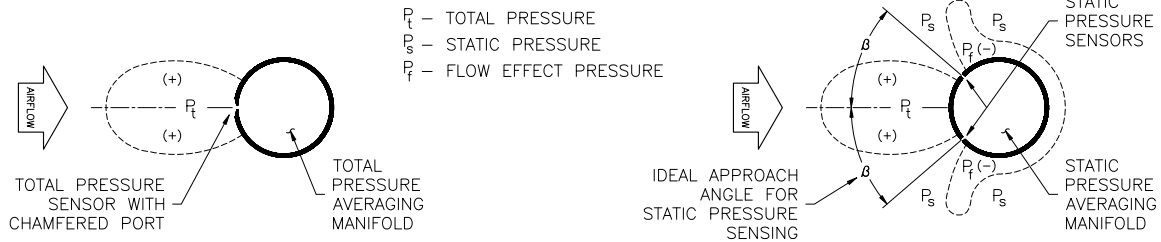
Circular Duct:  $x = \text{Duct Diameter}$

# VOLU-probe/SM

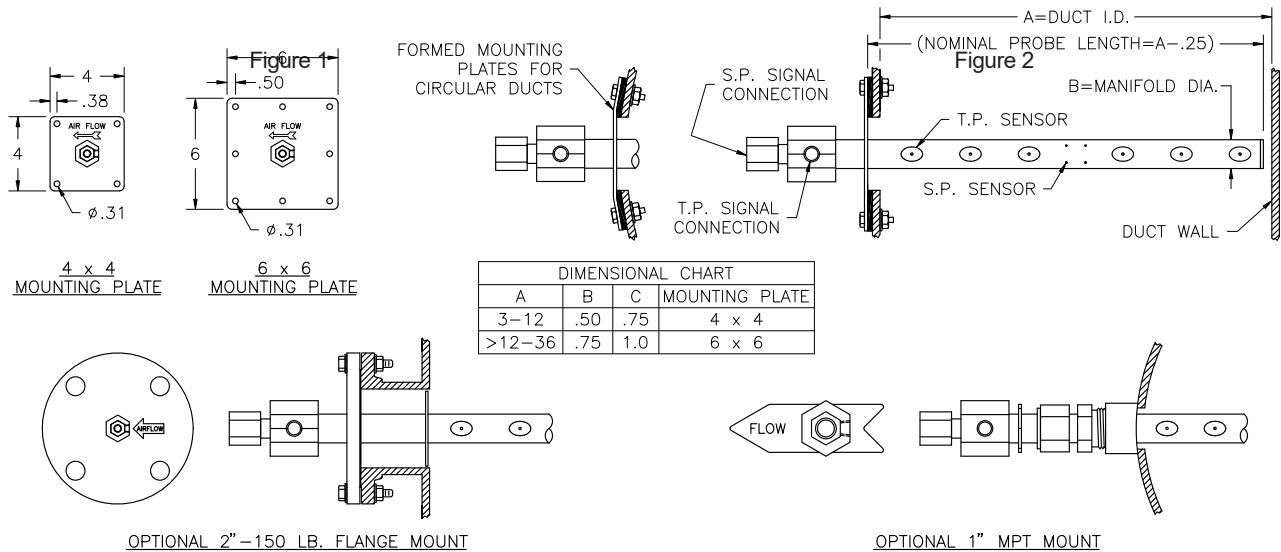
## How It Works

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 ( $P_s +$  part of  $P_t$ ), whereas the other static sensor experiences a lower pressure ( $P_s -$  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  $30^\circ$  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  $30^\circ$ .

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.

# VOLU-probe / FI-SS

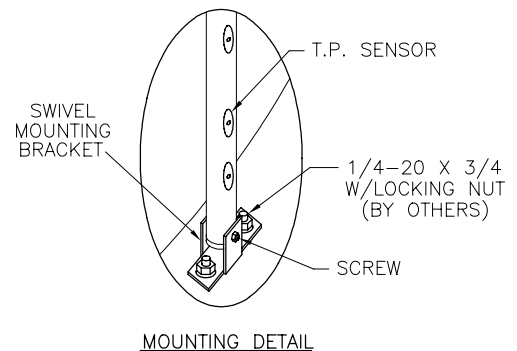
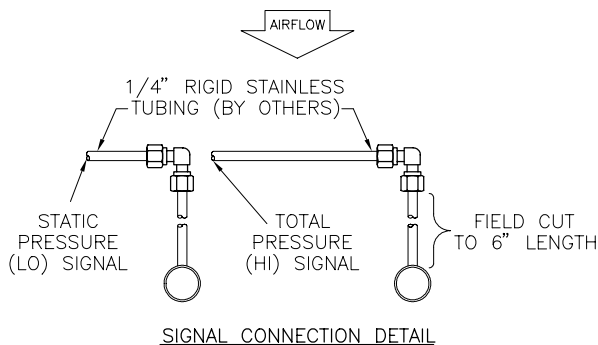
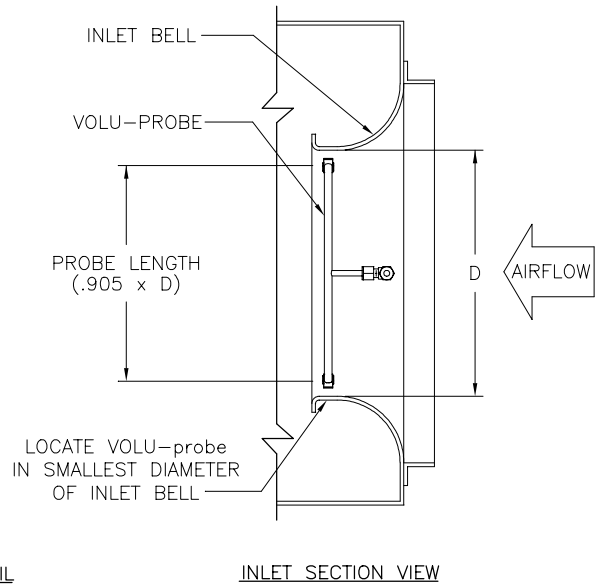
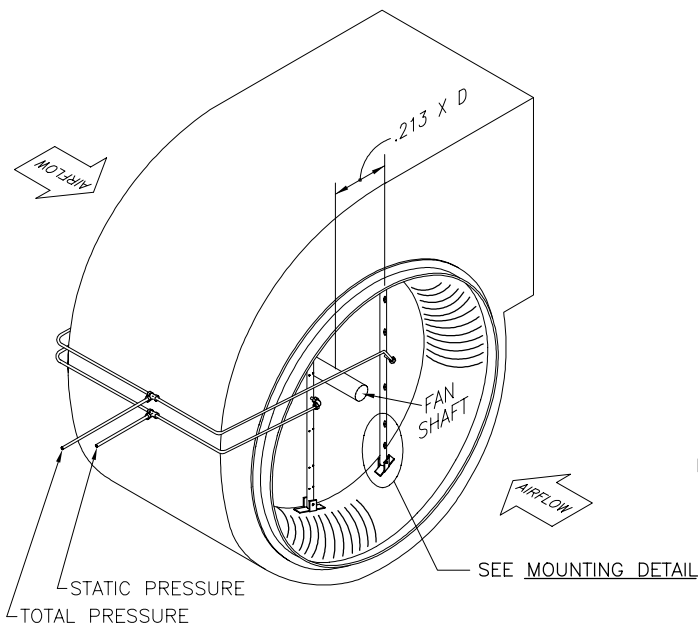
## FAN INLET AIRFLOW TRAVERSE PROBE

- DOUBLE WIDE, DOUBLE INLET
- FAN INLETS LESS THAN 20" IN DIAMETER

### STANDARD CONSTRUCTION

<b>Probe.</b>	3/8" tube. Type 316 stainless steel.
<b>Mounting Brackets.</b>	Type 316 stainless steel.
<b>Connection Fittings.</b>	1/4" stainless steel compression type.
<b>Operating Temperature.</b>	Continuous operation to 900°F.

### DIMENSIONAL SPECIFICATIONS



# VOLU-probe / FI-SS

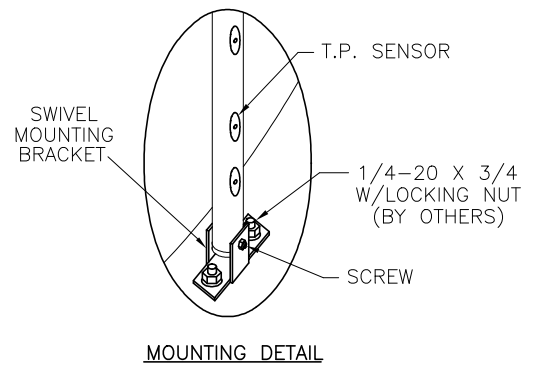
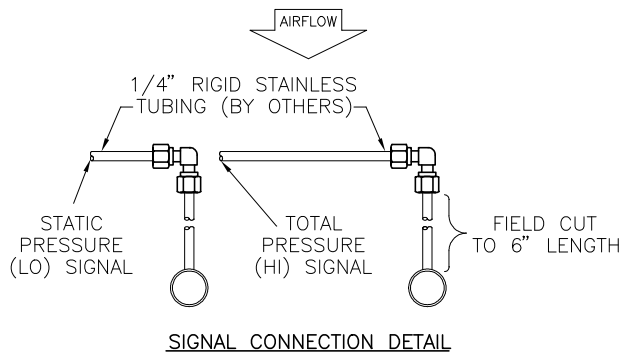
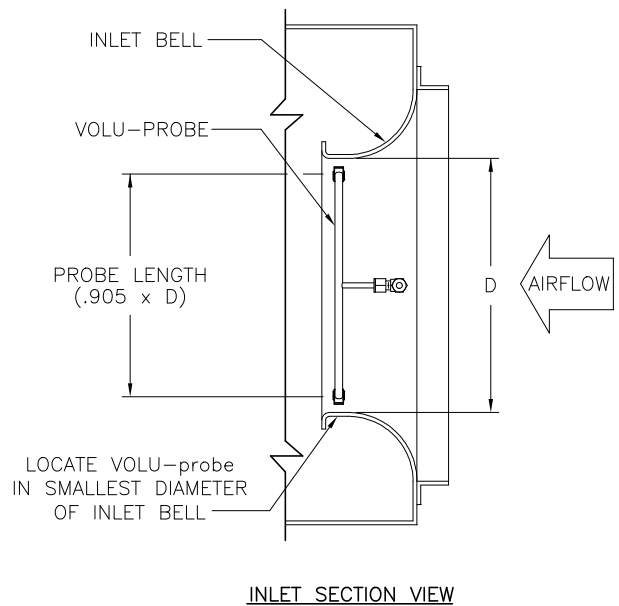
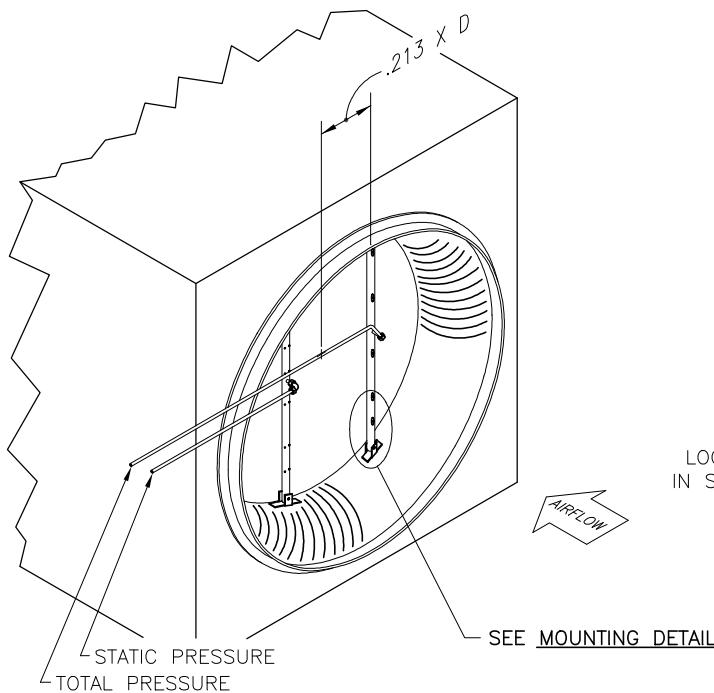
## FAN INLET AIRFLOW TRAVERSE PROBE

- PLUG FAN
- FAN INLETS LESS THAN 20" IN DIAMETER

### STANDARD CONSTRUCTION

<b>Probe.</b>	3/8" tube. Type 316 stainless steel.
<b>Mounting Brackets.</b>	Type 316 stainless steel.
<b>Connection Fittings.</b>	1/4" stainless steel compression type.
<b>Operating Temperature.</b>	Continuous operation to 900°F.

### DIMENSIONAL SPECIFICATIONS



# VOLU-probe / FI-SS

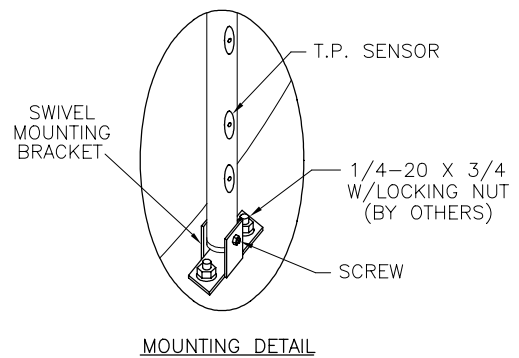
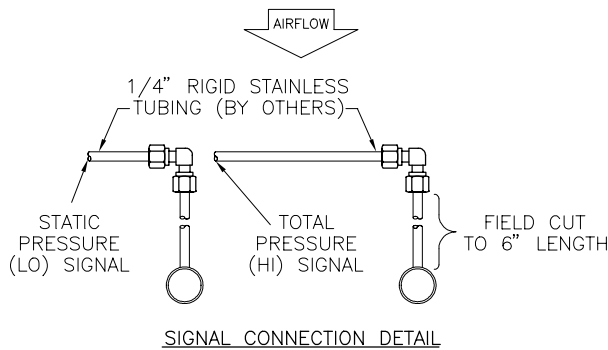
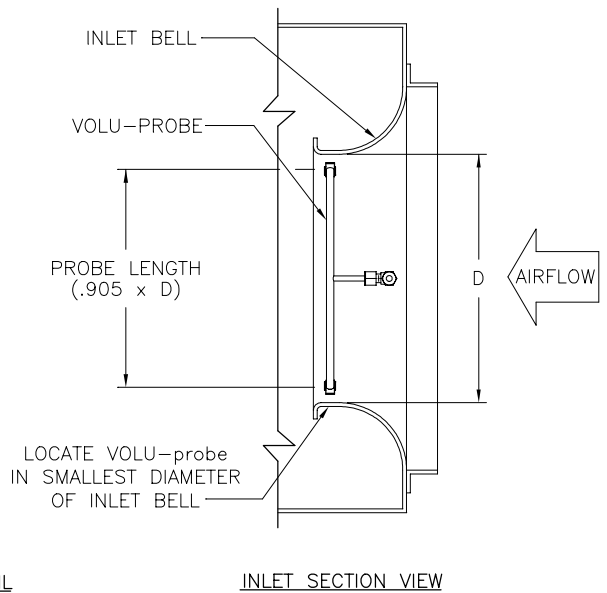
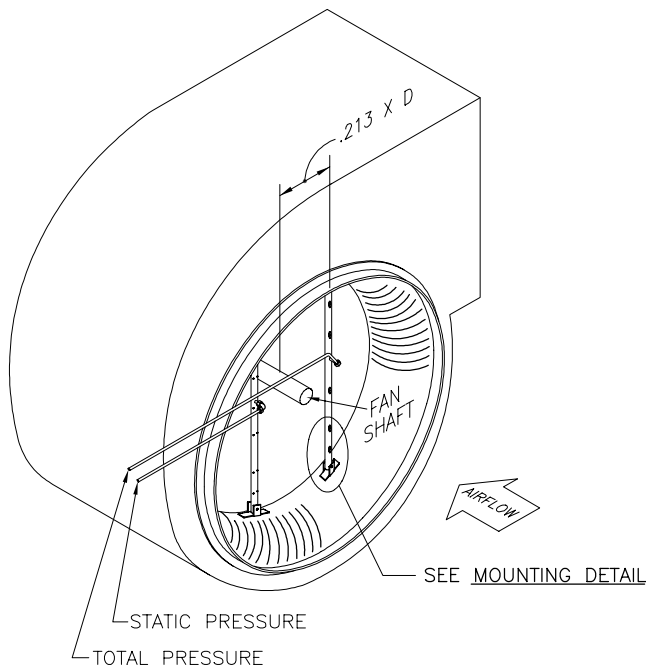
## FAN INLET AIRFLOW TRAVERSE PROBE

- SINGLE WIDE, SINGLE INLET
- FAN INLETS LESS THAN 20" IN DIAMETER

**STANDARD CONSTRUCTION**

<p><b>Probe.</b>  <b>Mounting Brackets.</b>  <b>Connection Fittings.</b>  <b>Operating Temperature.</b></p>	<p>3/8" tube. Type 316 stainless steel.                  Type 316 stainless steel.                  1/4" stainless steel compression type.                  Continuous operation to 900°F.</p>
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**DIMENSIONAL SPECIFICATIONS**





# VOLU-probe / FI-SS

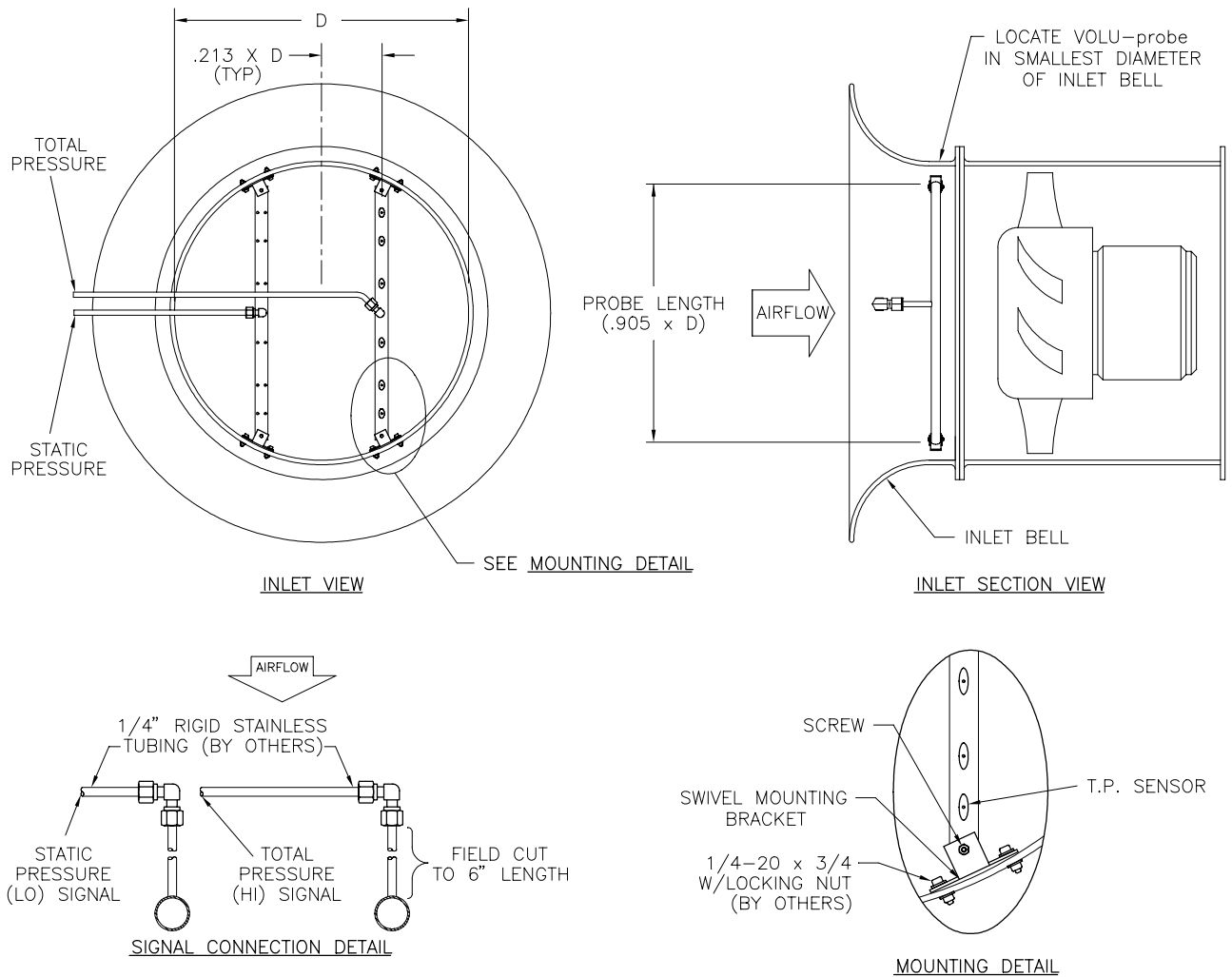
## FAN INLET AIRFLOW TRAVERSE PROBE

- VANE AXIAL
- FAN INLETS LESS THAN 20" IN DIAMETER

**STANDARD CONSTRUCTION**

<b>Probe.</b>	3/8" tube. Type 316 stainless steel.
<b>Mounting Brackets.</b>	Type 316 stainless steel.
<b>Connection Fittings.</b>	1/4" stainless steel compression type.
<b>Operating Temperature.</b>	Continuous operation to 900°F.

**DIMENSIONAL SPECIFICATIONS**



# CEM SYSTEMS

## Continuous Emissions Monitoring



*Proven solutions for a tough industry*

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**Air Monitor**  
Precision Airflow Measurement  
An ONICON Brand

# 40 CFR 75 Summary

## U.S. EPA Requirements for Continuous Emissions Monitoring (CEM)

On October 26, 1992, the Environmental Protection Agency (EPA) signed into law Part 75 of the Code of Federal Regulations governing Continuous Emission Monitoring. First proposed in December 1991 and subjected to extensive public review, the finalized version of 40 CFR 75 follows. The full version of 40 CFR 75 outlines the purpose, standards, certification process, and recordkeeping requirements for monitoring seven emission parameters:

SO <sub>2</sub> concentration	Opacity
CO <sub>2</sub> concentration	Volumetric flow
NO <sub>x</sub> concentration	Diluent concentration (Q <sub>2</sub> or CO <sub>2</sub> )
Moisture concentration	

### Volumetric Flow Monitoring Systems

Prior to receiving certification by the EPA, a flow monitoring system must satisfy continuous emission monitoring requirements via a detailed test procedure to verify that the performance and system configuration is within the EPA mandated requirements relative to:

**Measurement Location**  
**Interference Check**  
**Calibration Error**  
**Relative Accuracy**  
**Bias**

### Measurement Location

EPA defines an appropriate location for installation of a CEM System by referencing 40 CFR 60, Appendix A, Method 2. The desired location would be one with a minimum of eight stack or duct diameters downstream and two diameters upstream of any flow disturbance. Minimum siting requirements are two

downstream diameters and one-half upstream diameter of any flow disturbances. Provisions are made in 40 CFR 75 to petition the EPA for an alternate monitoring location when the minimum site requirements cannot be met.

### Interference Check

Regardless of the technology used to measure flow, all flow monitoring systems must include a means to ensure the in-stack equipment remains free of obstructions that would affect ongoing measurement accuracy. For differential pressure flow

monitors, the requirement is for an automatic timed, periodic back purge using compressed air to keep the probe sensing ports clean and expel condensation of wet gases. Air Monitor meets this requirement with its AUTO-purge/CEM System.

### Calibration Error

Calibration error is calculated as the percentage differential between a reference value and the actual monitor instrumentation reading. Calibration error must be determined during the certification process, then daily, and periodically thereafter. The daily check of calibration must verify that the error has not deviated more than 3.0 percent from the reference

value, with excessive deviation necessitating instrumentation recalibration. Air Monitor's instrumentation, consisting of its MASS-tron/CEM transmitter with AUTO-cal function, provides daily reporting of calibration flow outputs for calculation of calibration error in the DAS.

### Relative Accuracy

Effective January 1, 2000 the accuracy requirement for volumetric flow was lowered to 10%. Flow monitors achieving a relative accuracy of 7-1/2% were granted a reduction in RATA testing frequency from semi-annually to annually.

Correct selection of probe location and quantity, combined with field calibration prior to certification permits the Air Monitor flow monitoring system to achieve **annual** RATA frequencies.

RATA FREQUENCY REQUIREMENTS FOR FLOW MONITORING SYSTEMS	
Relative Accuracy	Required RATA Frequency
10.0%	Semi-Annual
7.5%	Annual

### Bias

Bias is a systematic error resulting in measurements that will be consistently low or high relative to the true flow measurement. Flow monitors that exhibit the need for low bias will not pass

certification. Flow monitors that exhibit the need for high bias can have the monitor output values adjusted by a single correction factor.

# System Components

To assist in complying with the CleanAir Act's stringent emission measurement standards, Air Monitor has assembled a cost effective integrated system consisting of in-stack flow

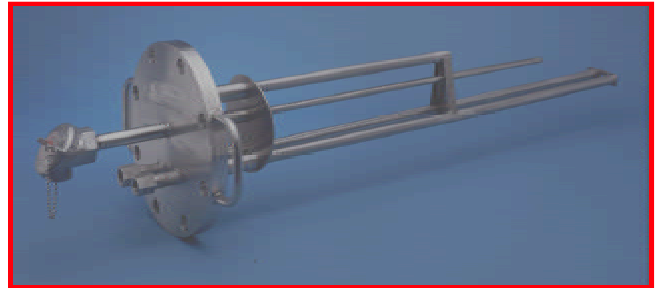
measurement equipment and companion instrumentation to provide continuous, accurate, and reliable volumetric flow monitoring for stacks and ducts of any size and configuration.

## In-Stack Flow Traverse Probe(s)

Required is the means to accurately monitor the average flow rate and temperature of the stack emissions. Flow rate monitoring is performed by sensing individual flow components at multiple points (traversing) across one or more diameters for circular stacks or along multiple parallel traverses for rectangular stacks, and averaging the obtained values. Average temperature measurement is achieved using one or more temperature probes to obtain a single full traverse of a stack.

The Air Monitor STACK-probe is an airflow traverse probe based on differential pressure (Pitot-Fechheimer) technology for measuring airflow; the same technology that will be used during the certification process to verify relative accuracy of the flow monitoring system. Each STACK-probe consists of two separate round tube self-averaging manifolds; one to measure the stack total pressure, and the other to measure stack static pressure. Multiple Pitot-Fechheimer ports are positioned on each manifold on an equal area basis (for rectangular stacks) or on an equal concentric area (for circular stacks). Similarly, average stack temperature is measured using a temperature probe with multiple sensing elements spaced along the probe length.

The engineered truss type design of the STACK-probe utilizes tubular structural materials welded to a 6", 150# raised face



pipe flange, permitting cantilever probe mounting in even extremely large stacks. Standard Type 316 stainless steel construction ensures long-term durability and continuing accuracy in most installations, with materials such as Hastelloy C22 and Inconel available for extreme temperature and/or severely corrosive applications.

As a basic instrument, the STACK-probe does not require any initial or periodic calibration to measure flow accurately. As a passive device with no moving parts or active electrical circuits, removal of the STACK-probe from the stack after installation for repair or calibration is not required.

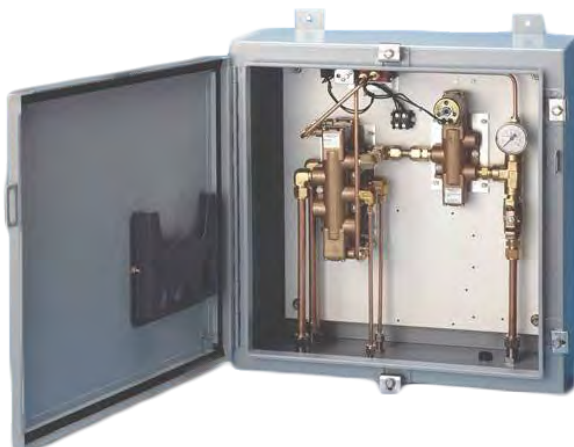
## Probe Back Purge

Required for differential pressure flow monitoring systems is a back purging means to ensure that the in-stack flow monitor probe has its pressure sensing ports and averaging manifold maintained free of particulate build-up and vapor condensation.

When activated by Air Monitor's MASS-tron/CEM or the Data Acquisition System (DAS), the AUTO-purge/CEM System sequentially operates a combination of failsafe valves to automatically back purge the sensing lines and the STACK-

probes with high volume/high pressure compressed air for a short duration, while simultaneously isolating the transmitter from over-pressurization.

Standard AUTO-purge/CEM construction mounts all components in a steel NEMA 4 rated enclosure, with all wetted parts made of copper or brass. The AUTO-purge/CEM is optionally available in a stainless steel NEMA 4X enclosure, with stainless steel wetted parts for corrosive applications.



AUTO-purge/CEM



MASS-tron/CEM

# Data Reporting & Installation Requirements

## Data Reporting

The Air Monitor MASS-tron/CEM multi-variable, ultra-low differential pressure transmitter converts the temperature and differential pressure flow signals received from the in-stack traverse probe(s) into a continuous output signal representing the volumetric flow in SCFM (wet or dry basis) being discharged into the atmosphere.

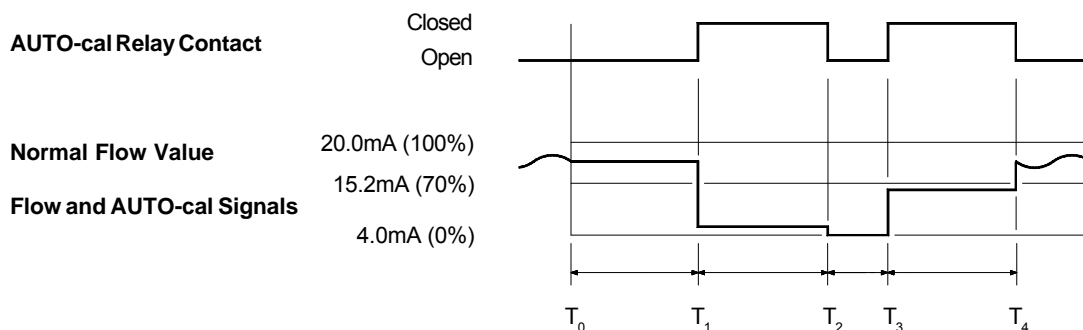
To meet the calibration error reporting requirements of 40 CFR 75, the MASS-tron/CEM used in stack flow monitoring applications is equipped with AUTO-cal circuitry. Once every 24 hours, the MASS-tron/CEM executes an AUTO-cal calibration cycle, during which the transmitter output signal is held at the last sensed flow level. Sequentially activated valves expose the MASS-tron/CEM transmitter to reference pressures for zero and span resulting in corresponding calibration flow outputs, after which the MASS-tron/CEM resumes normal flow monitoring.

In addition to the local display of information, the MASS-tron/CEM provides outputs to the DataAcquisition System (DAS) for:

Temperature °F	4-20mADC
AUTO-cal Acknowledgment	Dry Contact
AUTO-purge Acknowledgment	Dry Contact
SCFM	4-20mADC*
Zero Calibration Error Signal	4-20mADC*
Span Calibration Error Signal	4-20mADC*

\*Serial Output. See Figure below.

The MASS-tron/CEM is available in either a 19" rack mount or NEMA 4 enclosure, with a NEMA 4X stainless steel enclosure optionally available.



- T<sub>0</sub> MASS-tron/CEM internal timer or external dry contact from DAS initiates AUTO-cal cycle. Transmitter output signal for stack flow is held at the last flow value during the AUTO-cal cycle.
- T<sub>1</sub> AUTO-cal relay contact closes. Zero flow output signal begins.
- T<sub>2</sub> AUTO-cal relay contact opens. Flow output signal goes to 4mADC.
- T<sub>3</sub> AUTO-cal relay contact closes. Calibration flow output signal begins.
- T<sub>4</sub> AUTO-cal relay contact opens. Calibration flow output signal ends. Transmitter returns to reporting actual stack flow.

## Installation Requirements

**Purge Air Requirement.** 80 to 125 psig at 100 CFM, oil and dirt free. 1 to 24 purge cycles per day, with a duration of less than 2 minutes during which compressed air is released.

**Instrument Air Requirement.** 25 to 120 psig instrument air supply. Per ISA S7.3, required for AUTO-span equipped MASS-tron/CEM.

**Ambient Temperature.** 32°F to 140°F for the AUTO-purge/CEM panel; 60°F to 80°F for the MASS-tron/CEM. Recommended installation is within the environmentally controlled analyzer instrumentation shelter.

**Accumulator Tank** (strongly recommended). Requires coalescing filter, pressure regulator, and check valve at the tank inlet.

- 1 stack traverse – 80 gallons
- 2 stack traverses – 120 gallons

**Electrical Power Requirements.** 120VAC, 10 amp for heater equipped AUTO-purge/CEM panel; 120VAC, 1 amp for MASS-tron/CEM.

**Line from Accumulator Tank to AUTO-purge/CEM Panel.** 25' maximum length, 1/2" pipe (minimum). Recommend locating accumulator tank as close as possible to AUTO-purge/CEM panel.

**Line Size from AUTO-purge/CEM to STACK-probe.**

Distance	< 25'	25' to 50'	> 50'
Tube Size	1/2" S.S. tube	3/4" S.S. tube	1" S.S. tube

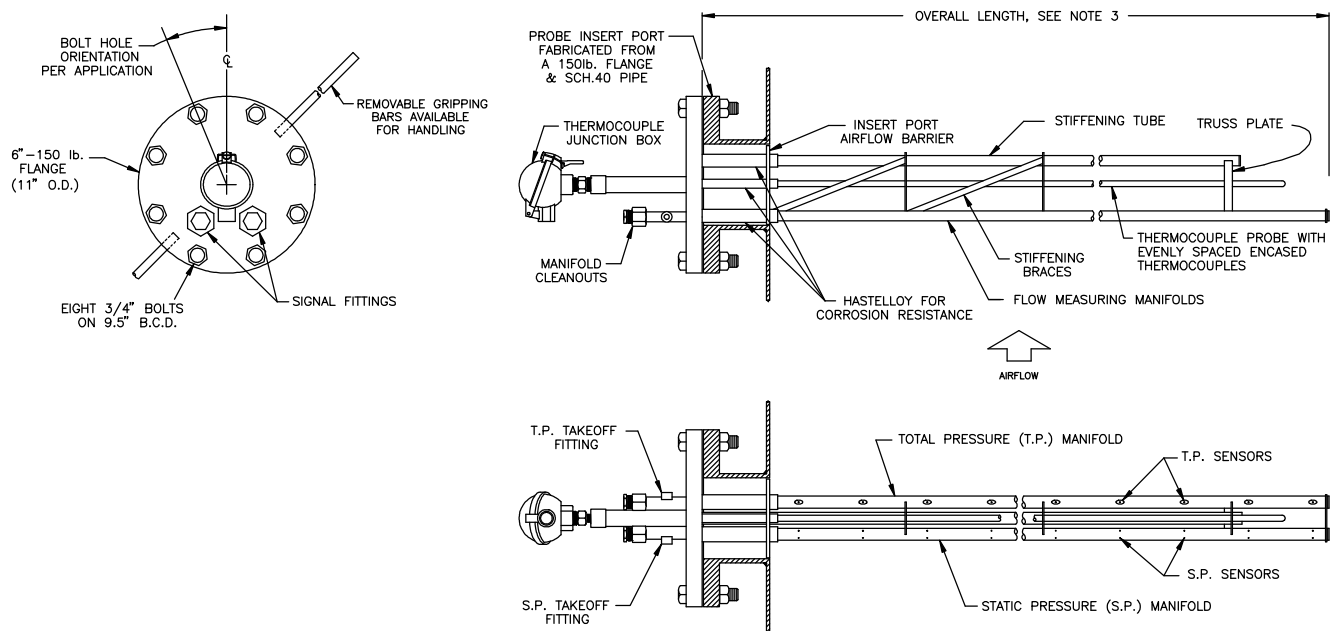
**Line from AUTO-purge/CEM Panel to MASS-tron/CEM Panel.** Via pre-manufactured umbilical or SS tubing.

Distance	< 25'	25' to 200'	> 200'
Tube Size	1/4" S.S. tube	3/8" S.S. tube	1/2" S.S. tube

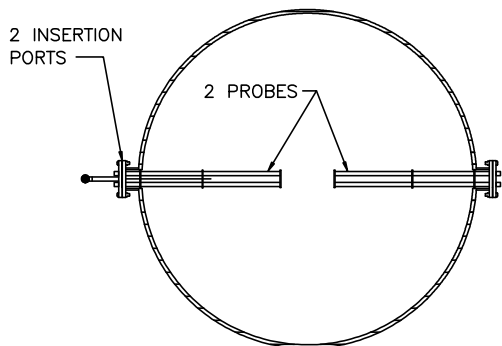


# Typical Installation

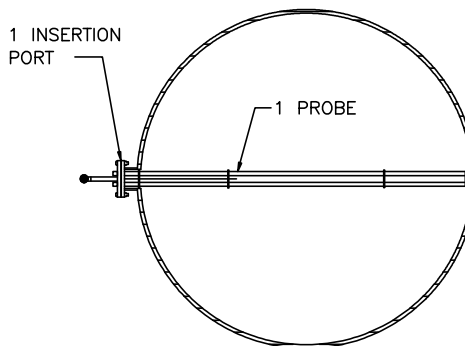
## STACK-probe w/Temperature and Insert Port



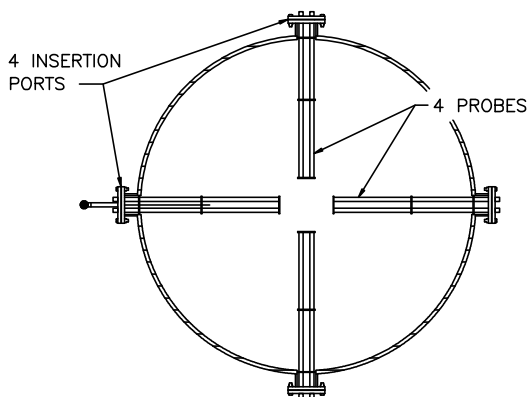
## In-Stack Probe Configurations – Single-Wall Stacks



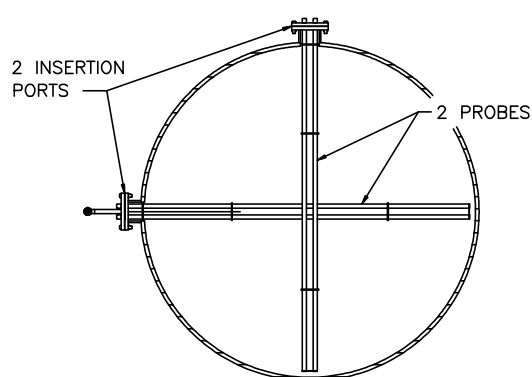
TWO CANTILEVERED STACK-probes  
(ONE WITH TEMPERATURE SENSOR)



ONE FULL-LENGTH STACK-probe  
(WITH TEMPERATURE SENSOR)



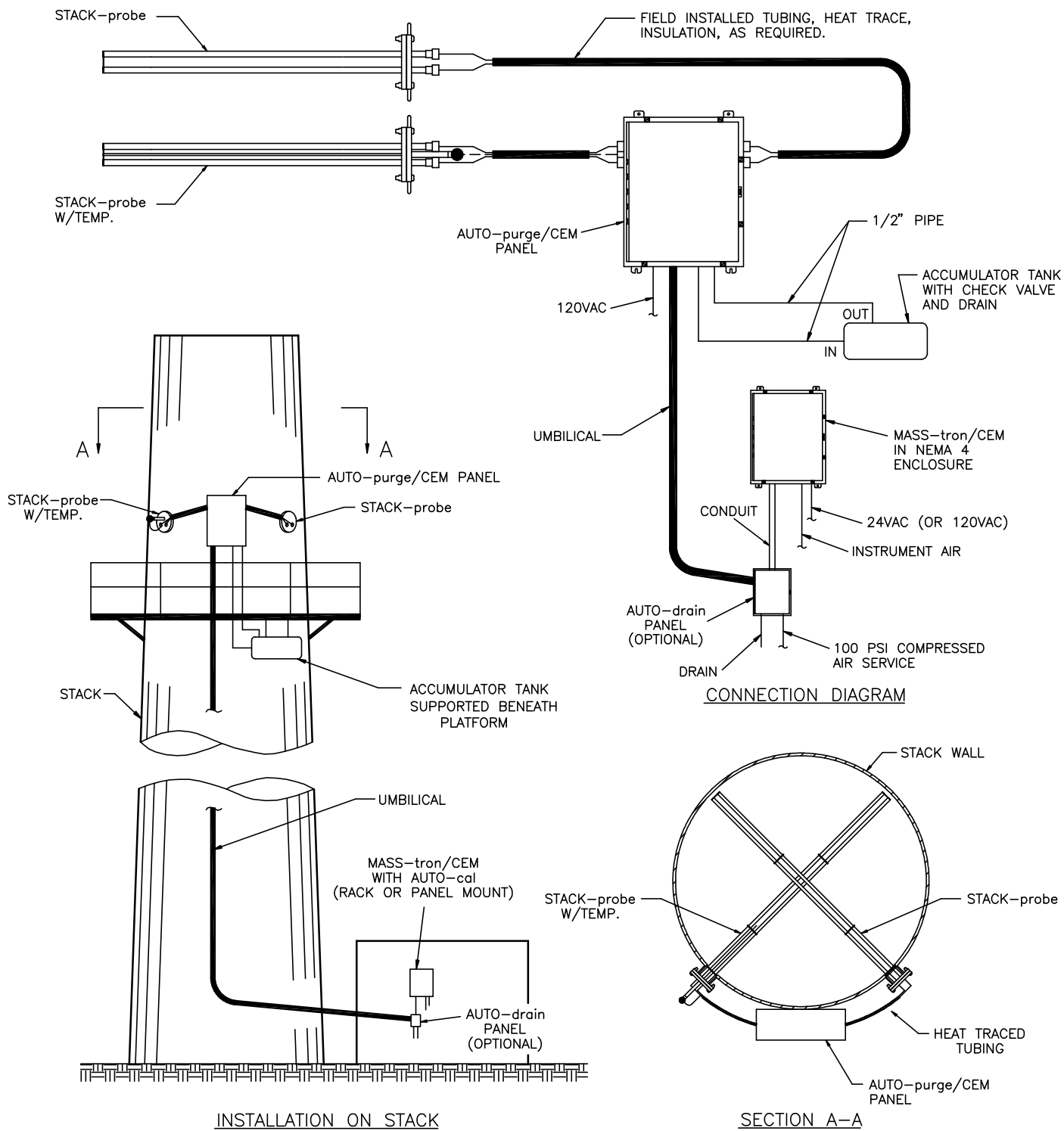
FOUR CANTILEVERED STACK-probes  
(ONE WITH TEMPERATURE SENSOR)



TWO FULL-LENGTH STACK-probes  
(ONE WITH TEMPERATURE SENSOR)

# Typical Installation

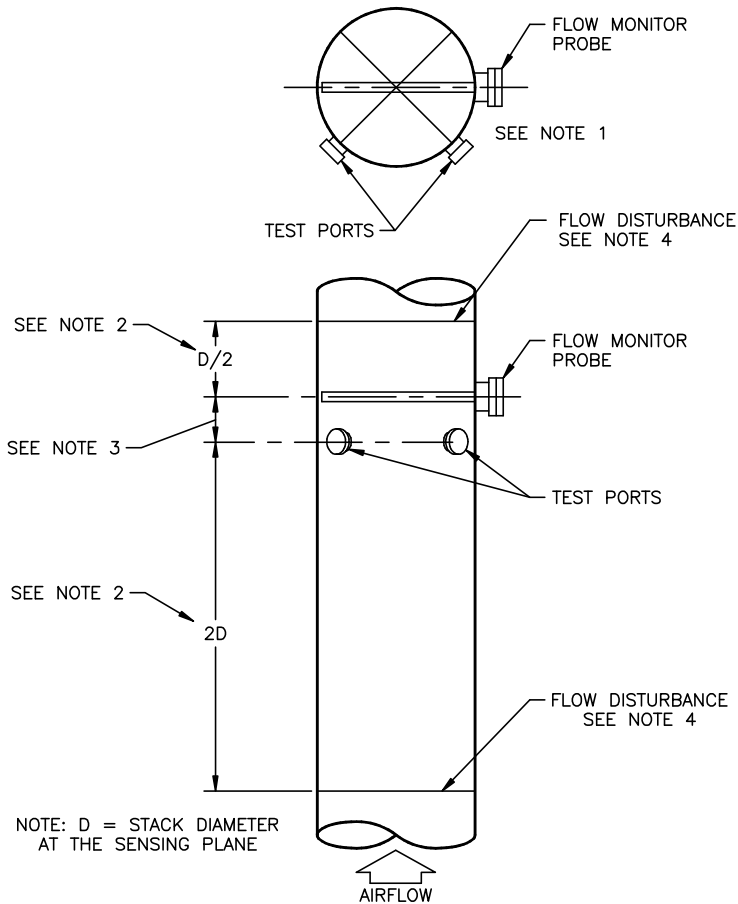
## Dual Traverse Schematic



AUTO-purge/CEM Located on the Stack Platform  
 MASS-tron/CEM Located in the Instrumentation Enclosure

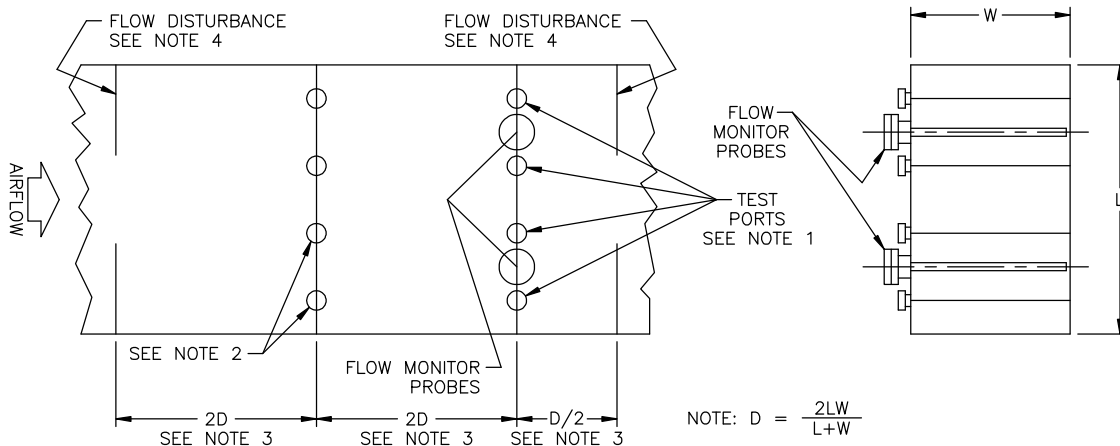
# STACK-probe Locations

## Flow Monitor Probe and Test Port Locations



### NOTES:

1. Test ports should be located on a different axis than flow monitor probe(s) to minimize disturbing the flow being sensed by the probe(s) during 40CFR60, Appendix A, Method 2 testing.
2. The distance from the flow monitor probe(s) or test ports to an upstream flow disturbance is  $2D$  minimum,  $8D$  desirable. The distance from the flow monitor probe(s) or test ports to downstream flow disturbance is  $D/2$  minimum,  $2D$  desirable.
3. The distance between the flow monitor probe(s) and the test port planes is usually only 6" to 12" due to practical limitations relative to stack platform access. Flow disturbances created by the test probe may affect flow monitor readings during 40CFR60, Appendix A, Method 2 testing.
4. Considered as flow disturbances are:
  - Any stack mounted equipment or structure that protrudes or extends out into the air stream.
  - Any dimensional changes in the stack.
  - Any directional changes in the stack.



### NOTES:

1. Test ports should be located on the same plane or elevation as the flow monitor probe(s) to minimize disturbing the flow being sensed by the flow monitor probe(s) during 40CFR60, Appendix A, Method 2 testing.
2. If test ports cannot be located on the same plane or elevation as the flow monitor probe(s) due to insufficient space or clearance, locate the test ports  $2D$  upstream of the flow monitor probe(s).

The distance from the flow monitor probe(s) or test ports to an upstream flow disturbance is  $2D$  minimum,  $8D$  desirable. The distance from the flow monitor probe(s) or test ports to downstream flow disturbance is  $D/2$  minimum,  $2D$  desirable.

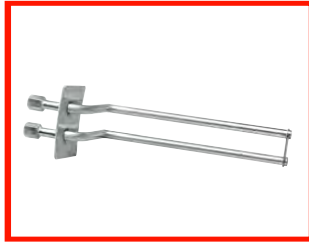
4. Considered as flow disturbances are:
  - Any stack mounted equipment or structure that protrudes or extends out into the air stream.
  - Any dimensional changes in the stack.
  - Any directional changes in the stack.

# Air Monitor's Product Families of Air & Coal Flow Measurement Systems



## ***VOLU-probe/SS™ Stainless Steel Airflow Traverse Probes***

Multi-point, self-averaging, Pitot-Fechheimer airflow traverse probes with integral airflow direction correcting design. Constructed of Type 316 stainless steel and available in externally and internally mounted versions for harsh, corrosive or high temperature applications such as fume hood, laboratory exhaust, pharmaceutical, and clean room production and dirty industrial process applications.



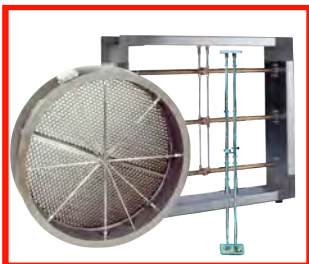
## ***IBAM™ – Individual Burner Airflow Measurement***

The IBAM™ – Individual Burner Airflow Measurement probe is ideally suited for new or retrofit applications where a reduction in plant emissions and improvement in efficiency can be obtained through accurate measurement of burner secondary airflow. The IBAM™ probe has been designed to accurately measure in the particulate laden, high operating temperature conditions found in burner air passages.



## ***CAMS™ – Combustion Airflow Management System***

The CAMS™ – Combustion Airflow Management System has been designed to reliably and accurately measure airflow in combustion airflow applications. The CAMS™ contains the microprocessor based instrumentation to measure the airflow and manage the AUTO-purge. The AUTO-purge is a high pressure air blowback system that protects the duct mounted flow measurement device from any degradation in performance due to the presence of airborne particulate (flyash).



## ***Combustion Airflow Measuring Station & VOLU-probe/SS™ Traverse Probes***

Air Monitor's duct mounted airflow measurement devices have been designed to accurately and repeatedly measure air mass flow in power plants. The Combustion Air (CA) Station™ includes honeycomb air straightener to accurately measure in shorter straight duct runs than any other flow measurement device. The VOLU-probe/SS™ delivers accurate airflow measurement performance in the form of an insertion probe. Both devices feature Type 316 stainless steel flow sensing arrays.



## ***Pf-FLO™ – Pulverized Fuel Flow Management***

The Pf-FLO™ system performs continuous and accurate fuel flow measurement in pulverized coal fired combustion applications, providing boiler operators with the real-time data needed to balance coal mass distribution between burners. Balanced fuel improves combustion efficiency and lowers emissions while reducing in-furnace slagging, coal layout, fuel slagging, and coal pipe fires.

**Engineering & Testing Services.** Air Monitor offers complete engineering and testing to analyze air and coal delivery systems. Air Monitor's field testing services use 3D airflow traversing and Pf-FLO coal flow measurement systems for the highest possible accuracy. To ensure cost effective and accurate solutions, Air Monitor has full scale physical flow modeling capability and in house Computational Fluid Dynamics (CFD). CFD analysis is used to analyze flow profiles and design/redesign ductwork to improve overall performance. Full scale model fabrication and certified wind tunnel testing is used to develop application specific products that will measure accurately where no standard flow measurement can.

## STACK-probe / SP TYPE S PITOT FLOW SENSOR ADJUSTABLE LENGTH

<b>STANDARD CONSTRUCTION</b>	
<b>Adjustable Flow Sensor.</b> <b>Insertion Port Sheath.</b> <b>Insertion Port Airflow Barrier.</b> <b>Mounting Flange.</b> <b>Handles.</b> <b>Signal Fittings.</b>	½" dia. 316 SST tube. Hastelloy for protection of SST sensors. Hastelloy disk for 4" Schedule 40 insertion port. 4" - 150 lb. raised face (R.F.) pipe flange, 316 SST. 316 SST. ½" compression, SST.
<b>PERFORMANCE SPECIFICATIONS</b>	
<b>Flow Coefficient.</b> <b>Accuracy.</b>	0.84 When installed in accordance with 40CFR60 Appendix A, accuracy shall be within 40CFR75 specifications.
<b>OPTIONAL CONSTRUCTION</b>	
<b>Probe Material</b> <input type="checkbox"/> 316SS (standard) <input type="checkbox"/> Hastelloy	<b>Mounting Flange Size</b> <input type="checkbox"/> 4" - 150# (standard) <input type="checkbox"/> 6" - 150#
<b>Bolt Hole Orientation</b> <input type="checkbox"/> 1-Up <input type="checkbox"/> 2-Up (standard)	<b>Flange Standoff</b> <input type="checkbox"/> 4" (standard) <input type="checkbox"/> Other: _____
<input type="checkbox"/> <b>Temperature Probe and Transmitter</b> 2-wire, 4-20mA, non-isolated, linearized output (standard)	
<b>Temperature Probe Type</b> <input type="checkbox"/> RTD: Single point, 100Ω, platinum <input type="checkbox"/> Thermocouple <input type="checkbox"/> Single Point <input type="checkbox"/> Multi Point <input type="checkbox"/> E <input type="checkbox"/> K <input type="checkbox"/> J	
<b>Temperature Transmitter Type</b> <input type="checkbox"/> Non-Isolated Output (standard) <input type="checkbox"/> Isolated Output	
<b>DIMENSIONAL SPECIFICATIONS</b>	
<p style="text-align: center;">NOMINAL LENGTH = <math>S + 1/3</math> STACK I.D.</p> <p style="text-align: center;">ADJUSTABILITY</p> <p style="text-align: center;">LOW PORT</p> <p style="text-align: center;">HIGH PORT</p> <p style="text-align: center;">TYPE "S" PITOT TUBE SENSOR</p> <p style="text-align: center;">AIRFLOW</p> <p style="text-align: center;">22.5"</p> <p style="text-align: center;">S.P.</p> <p style="text-align: center;">T.P.</p> <p style="text-align: center;">2-UP BOLT HOLE ORIENTATION (HANDLES &amp; TEMP. PROBE NOT SHOWN FOR CLARITY)</p> <p style="text-align: center;">9.0" NOMINAL</p> <p style="text-align: center;">(S) FLANGE STANDOFF</p> <p style="text-align: center;">AIRFLOW BARRIER</p> <p style="text-align: center;">PROTECTIVE SHEATHS</p> <p style="text-align: center;">TEMP. PROBE (OPTIONAL)</p> <p style="text-align: center;">TEMP. PROBE (OPTIONAL)</p> <p style="text-align: center;">LOW TAKEOFF</p> <p style="text-align: center;">HIGH TAKEOFF</p> <p style="text-align: center;">4" - 150 lb. R.F. MOUNTING FLANGE</p> <p style="text-align: center;">1-UP BOLT HOLE ORIENTATION</p> <p style="text-align: center;">1/2" COMP UNION SHIPPED LOOSE FOR FIELD INSTALLATION AFTER DETERMINING SINGLE POINT MEASURING POSITION.</p>	



# S.A.P.

## Shielded Static Air Probes

The Air Monitor S.A.P. family of static air probes is designed for room or space pressurization applications where it is essential that the static pressure level within a room or space, and that of a reference pressure (corridor, adjacent space, outdoor location, etc.), be accurately sensed, free of pulsations or effects of air movement in the vicinity of the sensing probe(s). The S.A.P. can also be utilized to sense the static pressure within fan inlet and discharge plenums or large ducts, where the presence of multi-directional and turbulent airflows prohibit the use of flow sensitive static pressure tips or probes.

### Performance Specifications

- Engineered sensing ports and integral volume chamber suppress minor room, space or plenum pressure pulsations, providing a steady (non-noisy) static pressure signal.
- Capable of sensing room, space or plenum pressures within 1% of actual static pressure.
- Measurement accuracy is unaffected by airflows up to 1,000 FPM from a 360° radial source.
- Available in aluminum or Type 316 stainless steel construction.
- Self draining sensing ports for applications where room or space washdown is required.
- Available in four mounting configurations:
  - S.A.P./B – Electrical Junction Box Mount
  - S.A.P./P – Suspended Mount via 1/2" Pipe
  - S.A.P./S – Surface Mount
  - S.A.P./R – Recessed Flush Mount



### Suggested Specification

#### Shielded Room and Space Static Pressure Sensor

Provide for each room or space, a shielded static pressure sensor suitable for surface [recessed flush; suspended; junction box; external flush] mounting, complete with multiple sensing ports, pressure impulse suppression chamber, airflow shielding, and 1/8" FPT [1/2" FPT (for S.A.P./P)] takeoff fitting, all contained in an aluminum [316 stainless steel] casing, with brushed finish on exposed surfaces. These probes shall be capable of sensing the static pressure in the proximity of the sensor to within 1% of the actual pressure value while being subjected to a maximum airflow of 1,000 FPM from a 360° radial source.

The shielded room or space static pressure sensors shall be the S.A.P. [B /P /S /R] shielded static air probe as manufactured by Air Monitor Corporation, Santa Rosa, California.

#### Shielded Plenum or Duct Static Pressure Sensor

Provide where indicated for each plenum [duct], two shielded static pressure sensors suitable for mounting externally on the plenum [duct] wall in opposing positions. The plenum [duct] pressure sensors shall be complete with multiple sensing ports, pressure impulse suppression chamber, airflow shielding, and 1/8" FPT takeoff fitting, all contained in an aluminum [316 stainless steel] casing, with brushed finish on exposed surfaces. These probes shall be capable of sensing the static pressure of the plenum or duct in the proximity of the sensor to within 1% of the actual pressure value.

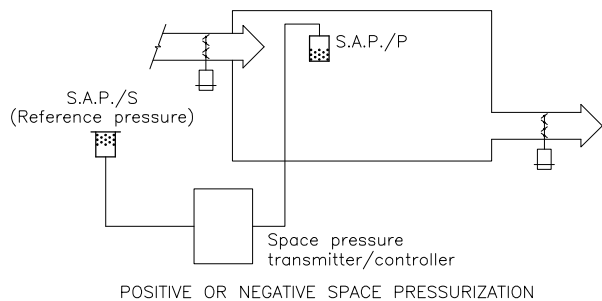
The shielded plenum or duct static pressure sensors shall be the S.A.P./R shielded static air probe as manufactured by Air Monitor Corporation, Santa Rosa, California.

*Accurate airflow measurement for demanding applications*

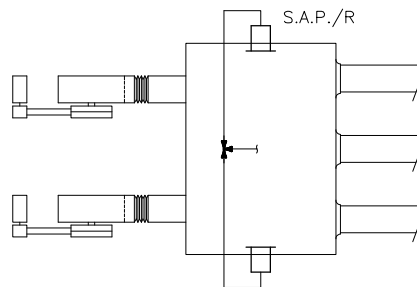
**Air Monitor**  
Precision Airflow Measurement  
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# S.A.P. – Shielded Static Air Probes

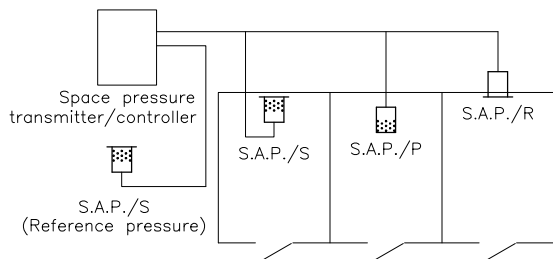
## Application Examples



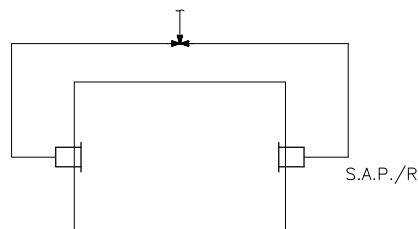
POSITIVE OR NEGATIVE SPACE PRESSURIZATION



FAN DISCHARGE PLENUM PRESSURE

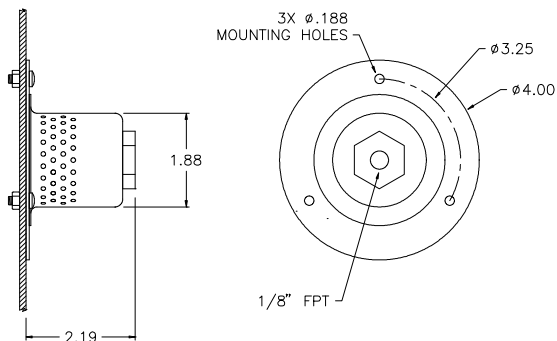


MULTIPLE ROOM PRESSURE AVERAGE SENSING

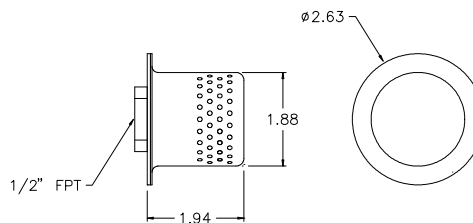


LARGE DUCT PRESSURE

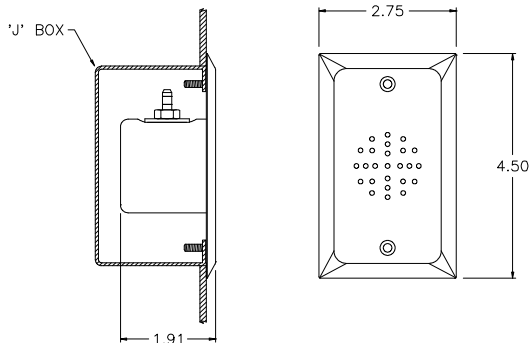
## Construction / Dimensional Data



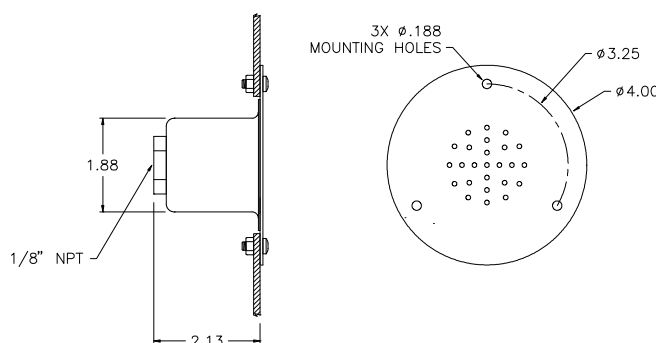
**S.A.P./S** Surface mount; 1/8" FPT signal connection



**S.A.P./P** Suspended mount via 1/2" pipe; 1/2" FPT signal connection



**S.A.P./B** Recessed flush mount via electrical junction box (provided by others)



**S.A.P./R** Recessed flush mount; 1/8" FPT signal connection

# S.O.A.P.

## Static Outside Air Probe

### Product Description

Air Monitor's S.O.A.P. static outside air probe is designed for accurate and instantaneous sensing of outside static air pressure levels.

To optimize the performance of the S.O.A.P., it must be located away from all structures and obstacles of sufficient size to create a wind induced pressure envelope. Typical locations are on an elevated position in an outdoor parking lot, in a below ground recess (landscaped or lawn area), away from buildings, in a below ground location like a parking garage with non-forced ventilation, or on a rooftop mounted pole sufficiently elevated to be outside any anticipated wind induced pressure envelope.

The circular shape of the S.O.A.P. presents a 360° radial entrance for the flow of air (wind) through the sensor. The perforations located on the entering air edges of the parallel plates act as a means of diffusing the entering airflow to minimize the effect of non-horizontal flow on the sensor performance, thereby permitting entry flows with approach angles up to 60° from the horizontal without affecting the accuracy of the pressure measurement. The perforations located near the center of the bottom plate opposite the signal connection serve to relieve the venturi effect that will develop with higher airflow rates (winds) through parallel plates, thereby permitting non-pulsating sensing in the presence of high wind gusts. It is the combined action of the above unique design features of the S.O.A.P. static outside air probe that permits it to sense the outside atmospheric air pressure to within 1% of the actual value when being subjected to varying horizontal radial wind flows with velocities up to 40 miles per hour and sense within 2% and 3% when subjected to similar wind flows having approach angles up to 30° and 60° to the horizontal respectively.



### Product Features

- Capable of sensing the outside atmospheric air pressure to within 1% of the actual value.
- Unique circular parallel plate design maintains sensing accuracy regardless of flow (wind) direction or pattern.
- Operation not affected nor impaired by rain or snow.
- Construction has no moving parts nor required maintenance.
- Sensing accuracy not affected by wind velocities up to 40 miles per hour.
- Perforations on plate edges diffuse the effect of wind approach angles on sensor performance.
- Made entirely of Type 316 stainless steel.
- Mounting via 2" FPT stainless steel connection fitting.

*Accurate airflow measurement for demanding applications*

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# S.O.A.P. Static Outside Air Probe

## The Need for a Stable, Common Pressure Reference

For the accurate measurement and/or control of room, laboratory, space, or building pressurization, it is essential that these sensed pressure levels be referenced to a common pressure. Ideally, that reference is the outdoors. But the usual outdoor sensor, because of its design, has to be

shielded from the wind, and often ends up located where it will be subjected to the pressure envelope developed by the wind's effect upon the building, refer to Figure 1 below. The magnitude of the pressure envelope that can be created by various wind velocities is also shown below.

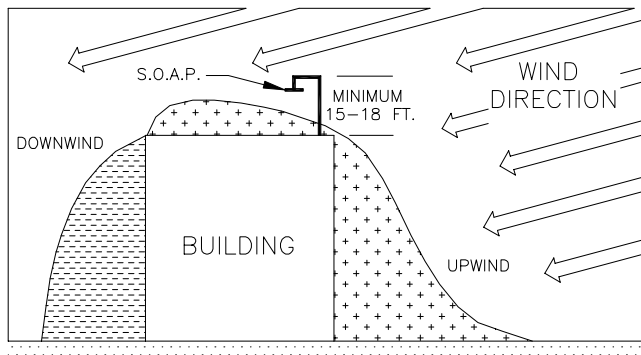
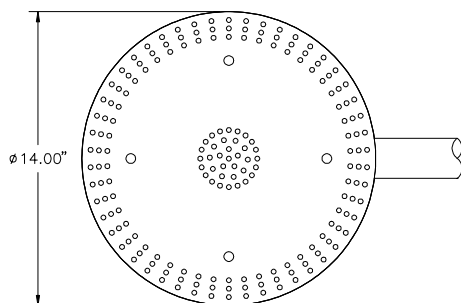


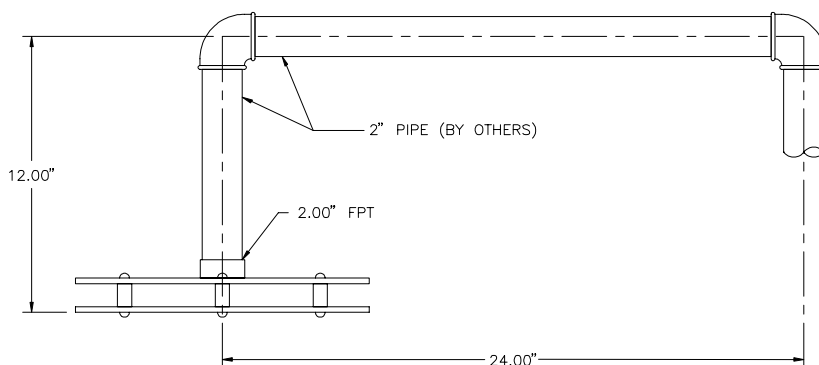
Figure 1

WIND VELOCITY MILES PER HOUR	UPWIND SIDE INCHES W.C.	DOWNWIND SIDE INCHES W.C.
10	0.035	- 0.015
15	0.088	- 0.025
20	0.14	- 0.050
25	0.22	- 0.065
30	0.30	- 0.090
35	0.42	- 0.125
40	0.54	- 0.180
45	0.70	- 0.260
50	0.85	- 0.340
55	1.06	- 0.425
60	1.28	- 0.540
65	1.70	- 0.700

## Dimensional Specification



BOTTOM VIEW



SIDE VIEW

## Suggested Specification

Provide for the room or space static pressure indicating or controlling systems an outdoor static pressure sensor constructed of 10 ga. Type 316 stainless steel with a 2" diameter FPT connection.

The outdoor air probe shall be capable of sensing the outside atmospheric air pressure to within 2% of the actual value when

subjected to radial wind velocities up to 40 miles per hour with approach angles up to 30° to the horizontal.

The static outside air probe shall be the S.O.A.P. as manufactured by Air Monitor Corporation, Santa Rosa, California.

# VELTRON DPT

Ultra-Low Range  
Pressure & Flow Transmitter



*Accurate airflow measurement for demanding applications*

**Air Monitor**  
Precision Airflow Measurement  
An ONICON Brand

# VELTRON DPT

## Performance Specifications

### Transmitter

#### Type.

Differential Pressure, Flow

#### Accuracy.

±0.5% of Natural Span, including non-linearity, hysteresis, deadband, and non-repeatability .

#### Ranges.

<u>Natural Spans</u>	<u>Bi-Polar Natural Spans</u>
0 to 25.00 IN w.c.	-10.00 to 10.00 IN w.c.
0 to 10.00 IN w.c.	- 5.00 to 5.00 IN w.c.
0 to 5.00 IN w.c.	- 2.00 to 2.00 IN w.c.
0 to 2.00 IN w.c.	- 1.00 to 3.00 IN w.c.
0 to 1.00 IN w.c.	- 0.50 to 0.50 IN w.c.
0 to 0.50 IN w.c.	- 0.25 to 0.25 IN w.c.
0 to 0.25 IN w.c.	- 0.10 to 0.10 IN w.c.
0 to 0.10 IN w.c.	

#### Stability.

±0.5% of Natural Span for six months.

#### Vibration Effect.

±0.05% of Natural Span/5G to 60 Hz.

#### Temperature Effect.

Zero. 0.015% of Natural Span/°F.  
Span. 0.015% of Natural Span/°F.

#### Mounting Position Effect.

Zero shift only; corrected through transmitter manual zeroing.

#### Span and Zero Adjustment.

Via multi-turn potentiometers located inside the field wiring end cap.

#### Zero Elevation and Suppression.

Maximum zero elevation. 100% of calibrated span.  
Requires an optional bi-polar transducer .  
Maximum zero suppression. 60% of calibrated span.

#### Damping.

Standard. 1.25 seconds to 98% Full S pan step.  
Adjustable. 0.25 to 10 seconds via socketed resistor .

#### Overpressure and Static Pressure Limit.

25 psig.

#### Temperature Limits.

-20 to 180°F Storage.  
+32 to 140°F Operating.

#### Humidity Limits.

0-95% RH, non-condensing.

### Indication

#### Display.

Optional 3-1/2 digit LCD.

### Input/Output

#### Input.

Differential pressure (high and low).

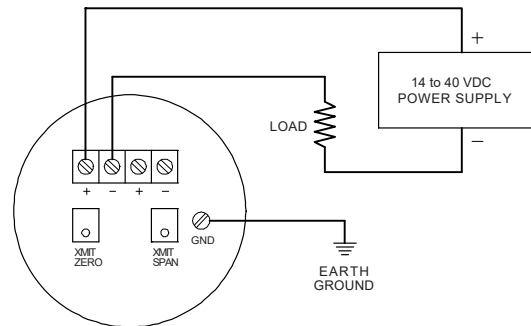
#### Output.

4-20mA DC, linear to pressure or flow (requires optional square root function).

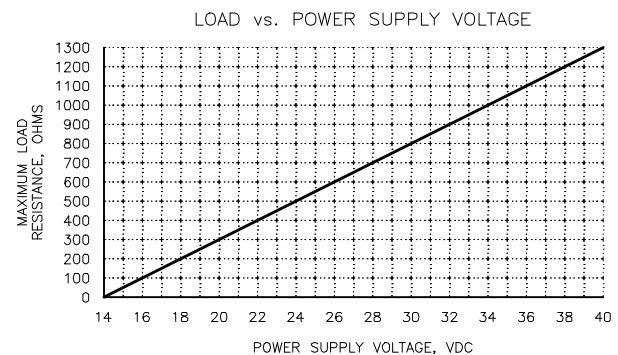
### Power

#### Power Supply.

14-40VDC. Two wire basic configuration.



#### Load Limitations.



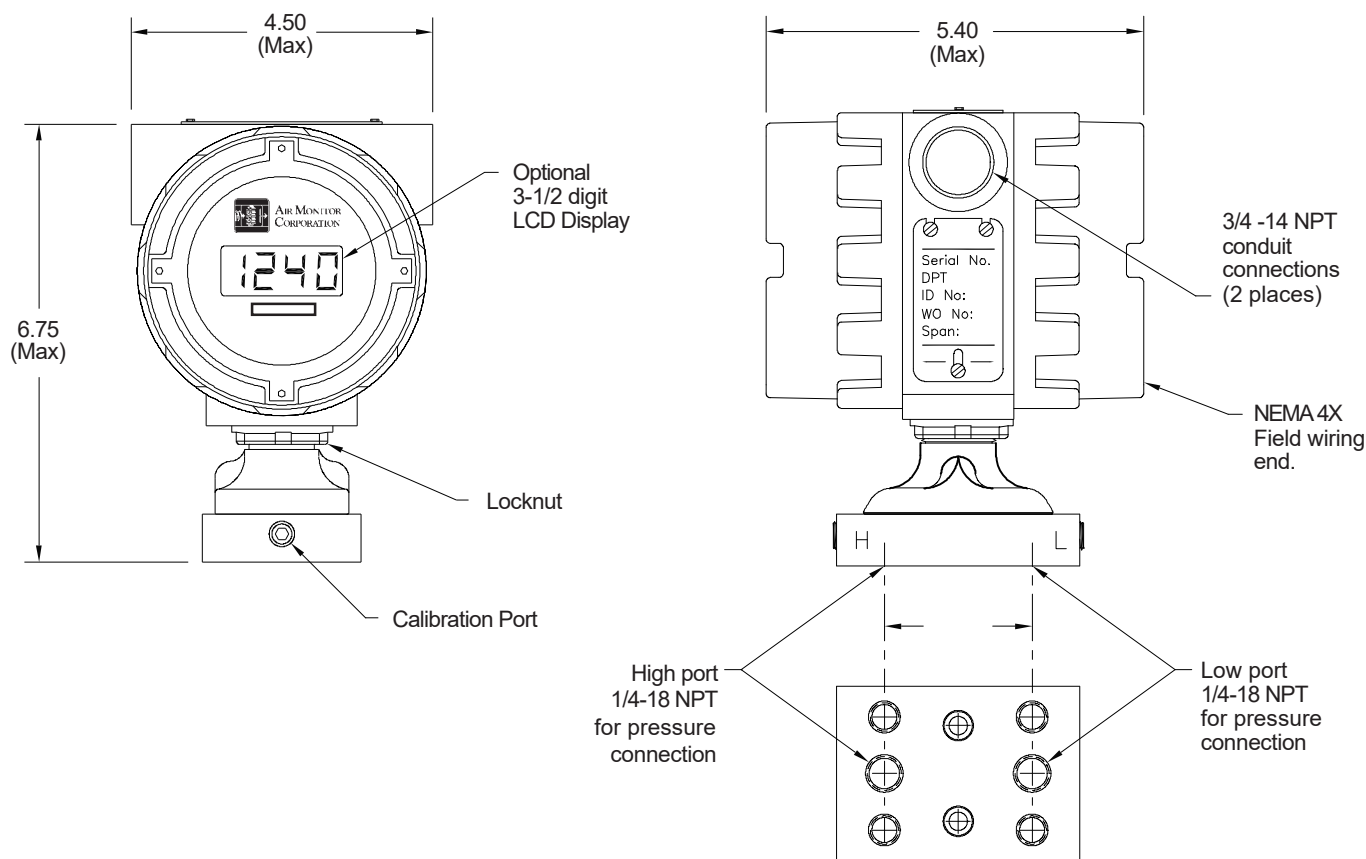
#### Circuit Protection.

Power input is reverse polarity protected.



# Ultra-Low Differential Pressure & Flow Transmitter

## Construction Features



## Performance Specifications

**Accuracy.** The VELTRON DPT is designed to maintain an accuracy of  $\pm 0.5\%$  of Natural Span. For a span of 0 to 0.10 IN w.c., this is equivalent to an output accuracy of  $\pm 0.0005$  IN w.c. differential pressure or  $\pm 6.33$  FPM velocity.

**Primary Signal Noise Filter.** To eliminate background noise and pulsations from the flow signal, the VELTRON DPT is equipped with a user selectable low pass filter.

**Square Root Function** (optional). When equipped with the square root option, the VELTRON DPT can provide an output signal linear to velocity or volume.

**High Turndown Ratio Operation.** The VELTRON DPT, with its high level of accuracy, can maintain linear output signals on applications requiring velocity or pressure turndown of 5 to 1.

**Continuous Display of Process** (optional). The VELTRON DPT can be equipped with a 3 1/2 digit LCD display to provide a continuous readout of the measured process in engineering units (Inches w.c., SCFM, lbs/hr, etc.).

**Hazardous Locations.** The VELTRON DPT is Factory Mutual approved for the following:

- Explosion Proof: Class 1, Division 1, Groups B, C, D.
- Dust Ignition Proof: Class II, III, Division 1, Groups E, F, G.
- Suitable for indoor and outdoor NEMA Type 4X hazardous locations.

**Enclosure.** The VELTRON DPT is packaged in a NEMA Type 4X enclosure with standard industrial process connections.

# VELTRON DPT

## Physical Specifications

**Process Connections.** Industry standard 1/4"-NPT ports on 2-1/8" centers on bottom of base.

**Electrical Connections.** Dual 3/4" conduit connections. Terminal strip for field wiring and test points.

**Electrical Enclosure.** NEMA Type 4X aluminum body with Neoprene gaskets.

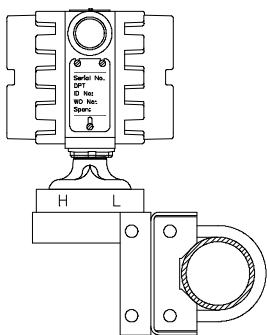
**O-Rings.** BUNA N.

**Paint.** Polyurethane with epoxy primer.

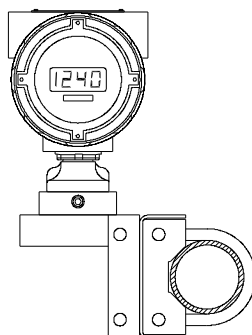
**Mounting.** Flat and angle mounting brackets for 2" pipe.

**Weight.** 9.4 lbs.

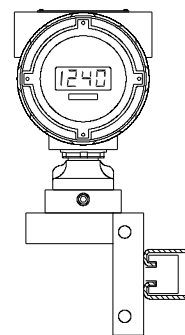
## Mounting Configurations with Standard Brackets



Angle Mount to Horizontal Pipe

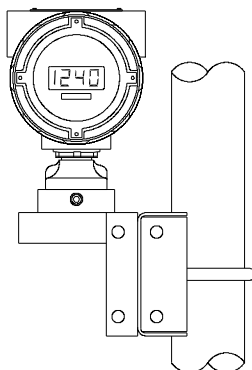


Vertical Mount to Horizontal Pipe

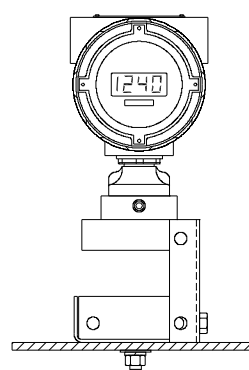


Mount to Horizontal Channel

Note: Mounting bracket kit includes 3/8-16 U-bolt, nuts, and washers for 2" Schedule 40 pipe, plus 4 bolts and washers to attach the transmitter to the mounting bracket.



Vertical Mount to Vertical Pipe



Mount to Flat Surface

## Suggested Specification

The transmitter shall be capable of receiving flow signals (total and static pressure) from an airflow station or probe array, and produce an output linear and proportional to static or velocity pressure.

(Optional) The transmitter will include a means of performing an internal square root of the process signal to provide an output signal linear to velocity or volume.

(Optional) The transmitter shall contain an integral LCD capable of indication of the process during normal operating mode.

The transmitter will be available in multiple Natural Spans covering the range of 0.10 IN w.c. to 10.0 IN w.c. with an accuracy of  $\pm 0.5\%$  of Natural Span. The transmitter shall be capable of maintaining linear output signals on applications requiring 5 to 1 velocity or pressure turndown.

The transmitter shall be the VELTRON DPT as manufactured by Air Monitor Corporation, Santa Rosa, California.

# VELTRON DPT-*plus*

Microprocessor Based Ultra-Low Range  
Pressure & Flow "Smart" Transmitter



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# VELTRON DPT-*plus*

## with Automatic Zeroing Circuit

The VELTRON DPT -*plus* transmitter is furnished with an automatic zeroing circuit capable of electronically adjusting the transmitter zero at predetermined time intervals while simultaneously holding the transmitter output signal.

The automatic zeroing circuit eliminates all output signal drift due to thermal, electronic or mechanical effects, as well as the need for initial or periodic transmitter zeroing. For transmitters operating in a moderately steady temperature location (thus no thermally induced span drift), this automatic

zeroing function essentially produces a "self-calibrating" transmitter. The automatic zeroing circuit will re-zero the transmitter to within 0.1% of its operating span; for a transmitter with a 0.02 IN w.c. operating span, this represents a zeroing capability within 0.00002 IN w.c.

To permit manual calibration of the VELTRON DPT-*plus*, an electronic switch is provided to permit manual positioning of the zeroing valve.

## Performance Specifications

### Transmitter

**Accuracy.** 0.1% of Natural Span, including hysteresis, deadband, non-linearity, and non-repeatability.

**Type.** Differential pressure, flow, and mass flow.

Ranges.	Natural Spans	Bi-Polar Natural Spans
	0 to 25.00 IN w.c.	
	0 to 10.00 IN w.c.	-10.00 to 10.00 IN w.c.
	0 to 5.00 IN w.c.	- 5.00 to 5.00 IN w.c.
	0 to 2.00 IN w.c.	- 2.00 to 2.00 IN w.c.
	0 to 1.00 IN w.c.	- 1.00 to 1.00 IN w.c.
	0 to 0.50 IN w.c.	- 0.50 to 0.50 IN w.c.
	0 to 0.25 IN w.c.	- 0.25 to 0.25 IN w.c.
	0 to 0.10 IN w.c.	- 0.10 to 0.10 IN w.c.
	0 to 0.05 IN w.c.	- 0.05 to 0.05 IN w.c.

**Span Rangeability.** The calibrated span can be down ranged to 40% of the Natural Span.

**Stability.**  $\pm 0.5\%$  of Natural Span for six months.

**Temperature Effect.** Zero. None; corrected by AUTO-zero. Span. 0.015% of Natural Span/ $^{\circ}$ F.

**Mounting Position Effect.** None; corrected through transmitter automatic zeroing.

**Span and Zero Adjustment.** Digital, via internally located pushbuttons.

**Low Pass Filtration.** Response time to reach 98% of a step change is adjustable from 2.0 to 250.0 seconds.

**Overpressure and Static Pressure Limit.** 25 psig.

### Automatic Zeroing.

Accuracy. Within 0.1% of calibrated span.  
Frequency. Every 1 to 24 hours on 1 hour intervals.

### Temperature Limits.

-20 to 180 $^{\circ}$ F Storage; +32 to 140 $^{\circ}$ F Operating.

**Humidity Limits.** 0-95% RH, non-condensing.

### Indication

**Display.** A backlit, graphical LCD providing three lines of data display. Also used for programming.

### Inputs/Outputs

**Analog Inputs.** Differential pressure (high and low), and 4-20mA, 2-wire, internally or externally loop powered temperature signal.

**Analog Outputs.** Dual 4-20mA outputs, individually configurable as internally powered/non-isolated, or externally powered/isolated.

**Digital Inputs.** Digital contacts for AUTO-purge external start.

**Digital Outputs.** Dual Form A dry contacts rated for 3 amps at 24VAC/VDC for optional HI/LO alarm; or dual Form A dry contacts for AUTO-purge activation and acknowledgment.

**Temperature Compensation Selection.** Pushbutton selection of linearized or non-linear temperature transmitter input for the following temperature sensing types:

Type E	-50 to 1750 $^{\circ}$ F	-50 to 950 $^{\circ}$ C
Type T	-50 to 750 $^{\circ}$ F	-50 to 400 $^{\circ}$ C
Type J	-50 to 2000 $^{\circ}$ F	-50 to 1090 $^{\circ}$ C
Type K	-50 to 2000 $^{\circ}$ F	-50 to 1090 $^{\circ}$ C
RTD	-50 to 1500 $^{\circ}$ F	-50 to 815 $^{\circ}$ C

### Power

#### Power Supply.

Standard 24VAC (20-28VAC) or 24VDC (20-40VDC).  
Optional 120VAC (100-132VAC), via external transformer.

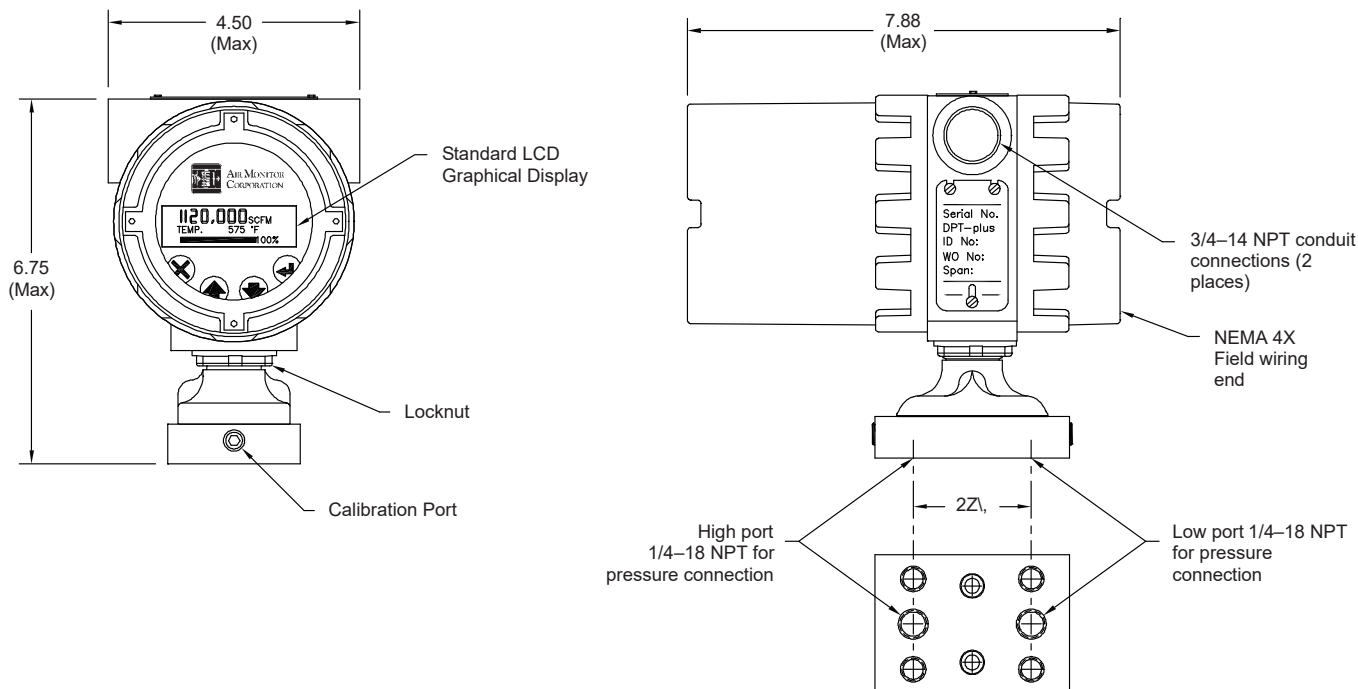
#### Power Consumption.

Standard: 18VA at 24VAC; 13VA at 24VDC; 36VA at 120VAC. With AUTO-purge Management: 54VA at 24VAC; 48VA at 24VDC; 108VA at 120VAC.

**Circuit Protection.** Power input is fused and reverse polarity protected.

# Ultra-Low Differential Pressure & Flow "Smart" Transmitter

## Construction Features



## Features

**Accuracy.** The VELTRON DPT-*plus* is designed to maintain an accuracy of 0.1% of Natural Span. For a span of 0 to 0.05 IN w.c., this accuracy is equivalent to an output accuracy of  $\pm 0.00005$  IN w.c. differential pressure or  $\pm 0.90$  FPM velocity.

**Microprocessor Based Functionality.** The VELTRON DPT-*plus* on-board microprocessor performs the functions of operating parameter selection, transmitter configuration, input/output and display signal scaling, and transducer calibration. Imbedded software performs span, flow, and 3-point "K" factor calculations. Input to the microprocessor is via pushbuttons.

**Electronic Respanning.** The VELTRON DPT-*plus* operating span can be electronically selected anywhere between the Natural Span and 40% of Natural Span, without having to perform recalibration involving an external pressure source.

**Air Density Correction.** The VELTRON DPT-*plus* is capable of accepting a process temperature input to perform density correction to volumetric or mass flow. Temperature input is a 4-20mA signal from a remote temperature transmitter; non-linear temperature inputs can be linearized by the microprocessor. Temperature sensor type is software selectable from the following choices: Thermocouple types E, T, J, and K; or Platinum RTD.

**High Turndown Ratio Operation.** The VELTRON DPT-*plus*, with its high level of accuracy and automatic zeroing circuitry can maintain linear output signals on applications requiring velocity turndown of 10 to 1 (equal to a velocity pressure turndown of 100 to 1).

**Continuous Display of Process.** The VELTRON DPT-*plus* comes equipped with a multi-line, backlit, graphical LCD for use during transmitter configuration and calibration, and to display multiple measured processes in engineering units. The LCD provides one line having 8 digits with double wide and double high characters, two 20 digit lines having standard size characters, and various descriptors for transmitter operating status.

**Primary Signal Noise Filter.** To eliminate background noise and pulsations from the flow signal, the VELTRON DPT-*plus* has a user selectable low pass digital filter.

**AUTO-purge Management** (optional). For "dirty air" applications requiring the use of an Air Monitor AUTO-purge system, the VELTRON DPT-*plus* provides the capabilities of establishing purge frequency and duration while giving the user a choice of either internally timed cycle frequency or externally triggered purge initiation. During the purge cycle all transmitter outputs are maintained at their last value prior to the start of the purge cycle.

**Hazardous Locations.** The VELTRON DPT-*plus* is Factory Mutual approved for the following:

- Explosion Proof: Class 1, Division 1, Groups B, C, D.
- Dust Ignition Proof: Class II, III, Division 1, Groups E, F, G.
- Suitable for indoor and outdoor NEMA Type 4X hazardous locations.

**Enclosure.** The VELTRON DPT-*plus* is packaged in a NEMA 4X enclosure with standard industrial process connections.



# VELTRON DPT-*plus*

## Physical Specifications

**Process Connections.** Industry standard 1/4"-NPT ports on 2-1/8" centers on flanges. 1/2"-NPT ports on bottom of base.

**Electrical Connections.** Dual 3/4" conduit connections. Terminal strip for field wiring and test points. External terminal strip with plug-in connectors.

**O-Rings.** BUNA N.

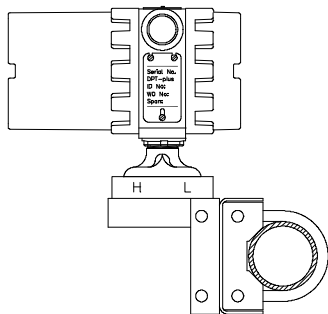
**Electrical Enclosure.** NEMA 4X aluminum body with Neoprene gaskets.

**Paint.** Polyurethane with epoxy primer.

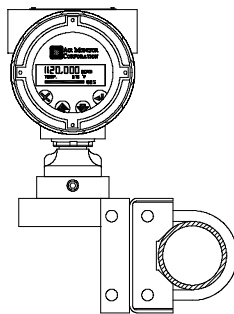
**Mounting.** Flat and angle mounting brackets for 2" pipe.

**Weight.** 10.5 lbs.

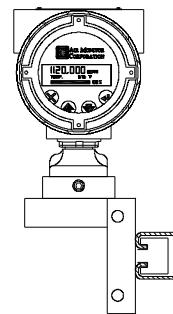
## Mounting Configurations with Optional Brackets



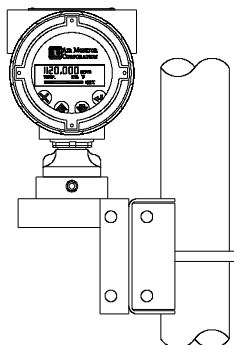
Angle Mount to Horizontal Pipe



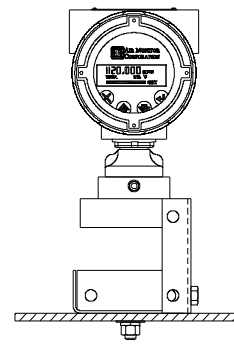
Vertical Mount to Horizontal Pipe



Mount to Horizontal Channel



Vertical Mount to Vertical Pipe



Mount to Flat Surface

Note: Mounting bracket kit includes 3/8-16 U-bolt, nuts, and washers for 2" Schedule 40 pipe, plus 4 bolts and washers to attach the transmitter to the mounting bracket.

## Suggested Specification

The mass flow transmitter shall be capable of receiving flow signals (total and static pressure) from an airflow station or probe array equipped with a temperature sensing means, internally perform density correction for the process temperature, and produce individual outputs linear and scaled for standard air volume or mass flow, and temperature.

The mass flow transmitter shall contain an integral graphic LCD for use during the configuration and calibration process, and be capable of indicating multiple process parameters (temperature, flow, dp, etc.) during normal operating mode. All transmitter parameter setting, zero and span calibration, and display scaling will be performed digitally in the on-board microprocessor via input pushbuttons.

The mass flow transmitter will be available in multiple natural spans covering the range of 0.05 IN w.c. to 10.0 IN w.c. with

an accuracy of 0.1% of natural span. The transmitter shall be furnished with a transducer automatic zeroing circuit and be capable of maintaining linear output signals on applications requiring 10 to 1 velocity (100 to 1 pressure) turndown. The transmitter shall be capable of having its operating span electronically selected without having to perform recalibration involving an external pressure source.

(Optional) The transmitter will provide the means of managing a system for automatic high pressure purge of the airflow station or probe array, with user selectable purge frequency and duration, while maintaining the last transmitter output during the purge cycle.

The mass flow transmitter shall be the VELTRON DPT-*plus* as manufactured by Air Monitor Corporation, Santa Rosa, California.



# VELTRON II

Microprocessor Based  
Pressure & Flow "Smart" Transmitter



CE

Accurate airflow measurement for demanding applications

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# VELTRON II

## with Automatic Zeroing Circuit

The VELTRON II transmitter is furnished with an automatic zeroing circuit capable of electronically adjusting the transmitter zero at predetermined time intervals while simultaneously holding the transmitter output signal.

The automatic zeroing circuit eliminates all output signal drift due to thermal, electronic or mechanical effects, as well as the need for initial or periodic transmitter zeroing. For transmitters operated in temperature controlled spaces (with no thermal effect upon span),

this automatic zeroing function essentially produces a "self-calibrating" transmitter. The automatic zeroing circuit will re-zero the transmitter to within 0.1% of its operating span; for a transmitter with a 0.02 IN w.c. operating span, this represents a zeroing capability within 0.00002 IN w.c.

To permit manual calibration of the VELTRON II, an electronic switch is provided to permit manual positioning of the zeroing valve.

## Performance Specification

Ranges.	Natural Spans	Bi-Polar Natural Spans
	0 to 25.00 IN w.c.	
	0 to 10.00 IN w.c.	-10.00 to 10.00 IN w.c.
	0 to 5.00 IN w.c.	- 5.00 to 5.00 IN w.c.
	0 to 2.00 IN w.c.	- 2.00 to 2.00 IN w.c.
	0 to 1.00 IN w.c.	- 1.00 to 3.00 IN w.c.
	0 to 0.50 IN w.c.	- 0.50 to 0.50 IN w.c.
	0 to 0.25 IN w.c.	- 0.25 to 0.25 IN w.c.
	0 to 0.10 IN w.c.	- 0.10 to 0.10 IN w.c.
	0 to 0.05 IN w.c.	- 0.05 to 0.05 IN w.c.

**Accuracy.** 0.1% of Natural Span, including non-linearity, hysteresis, deadband, and non-repeatability.

**Span Rangeability.** The calibrated span can be down ranged to 40% of the Natural Span.

**Stability.**  $\pm 0.5\%$  of Natural Span for six months.

**Transducer Response Time.** 0.5 second to reach 98% of a step change.

**Temperature Effect.** Zero. None; corrected by AUTO-zero. Span. 0.015% of Full Span/ $^{\circ}$ F.

**Mounting Position Effect.** None; corrected by AUTO-zero.

## Functional Specification

**Digital Outputs.** Form C dry contacts rated for 3 amps at 24VAC/VDC for optional HI/LO alarm. Dual Form A dry contacts rated for 3 amps at 24VAC/VDC for AUTO-purge activation and acknowledgment.

**Digital Inputs.** Dry contact for AUTO-purge external start.

**Analog Outputs.** Dual transmitter outputs are individually configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. Two additional outputs are optionally available.

**Analog Inputs.** A single input is field configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. For use with optional special function.

**Network Communication.** Optional ModBus TCP/IP over Ethernet or LonWorks.

**Power Supply.** Standard 24VAC (20-28VAC) or 24VDC (20-40VDC). Optional 120VAC (100-132VAC), via external transformer.

**Power Consumption.** Standard: 18VA at 24VAC; 13VA at 24VDC; 36VA at 120VAC. With AUTO-purge Management: 54VA at 24VAC; 48VA at 24VDC; 108VA at 120VAC.

**Overpressure and Static Pressure Limit.** 25 psig.

**Low Pass Filtration.** Response time to reach 98% of a step change is adjustable from 2.0 to 250.0 seconds.

**Automatic Zeroing.** Accuracy. Within 0.1% of calibrated span. Frequency. Every 1 to 24 hours on 1 hour intervals.

**Circuit Protection.** Power input is isolated, fused, and reverse polarity protected.

**Span and Zero Adjustment.** Electronic adjustment via keypad.

**Display.** Standard 2 line x 20 characters LCD provides one line of data display. Optional (standard on MASS-tron II) backlit, graphical LCD provides indication of up to four process variables. Triple-size digits for main process variable, standard size characters for the other process variables.

**Humidity Limits.** 0-95% RH, non-condensing.

**Temperature Limits.** -20 to 180 $^{\circ}$ F Storage. +40 to 140 $^{\circ}$ F Operating.

# Ultra-Low Differential Pressure & Flow "Smart" Transmitter

## Construction Features



## Features

**Accuracy.** The VELTRON II is designed to maintain an accuracy of 0.1% of Natural Span. For a span of 0 to 0.05 IN w.c., this accuracy is equivalent to an output accuracy of  $\pm 0.00005$  IN w.c. differential pressure or 0.45 FPM velocity at span.

**Continuous Display of Process.** All VELTRON II's are equipped with a 2x20 liquid crystal display (LCD) for use during the configuration and calibration process, and to display one transmitter output during normal operating mode. Standard on the MASS-tron and optional for both the VELTRON II and VEL-trol II is a multi-line backlit, graphical LCD providing up to four lines of data display, with each line individually scalable in user selectable format and units of measure. For high visibility, the main process variable (flow) is displayed with easy-to-read, triple-size digits. Other process variables are displayed with standard size digits.

**Analog Communication.** Each analog input and output signal can be individually configured for 0-5VDC, 0-10VDC, or 4-20mADC by means of a single jumper.

**Electronic Respanning.** The VELTRON II operating span can be electronically selected anywhere between the Natural Span and 40% of Natural Span, without having to perform recalibration involving an external pressure source.

**Primary Signal Noise Filter.** To eliminate background noise and pulsations from the flow signal, the VELTRON II is equipped with a user selectable digital low pass filter.

**High Turndown Ratio Operation.** The VELTRON II, with its high level of accuracy and automatic zeroing circuitry, can maintain linear output signals on applications requiring velocity turndown of 10 to 1 (equal to a velocity pressure turndown of 100 to 1).

**Microprocessor Based Functionality.** The VELTRON II's on-board microprocessor performs the functions of operating parameter selection, transmitter configuration, input/output and display signal scaling, and transducer calibration. Imbedded software performs span, flow, and 3-point "K" factor calculations. Input to the micro processor is via pushbutton.

**AUTO-purge Management (optional).** For "dirty air" applications requiring the use of an Air Monitor AUTO-purge system, the VELTRON II provides the capabilities of establishing purge frequency and duration while giving the user a choice of either internally timed cycle frequency or externally triggered purge initiation. During the purge cycle all transmitter outputs are maintained at their last value prior to the start of the purge cycle.

**Special Functions and Alarm Capability.** The VELTRON II is capable of performing one of five special application functions using a second transmitter as an input: Summed flow, flow differential, low signal select, high signal select, or percent deviation. The special function output can be both displayed and provided as an analog output signal. Alarms related to the measured process can be configured for one of three modes: Low/Low, High/Low, and High/High.

**Multiple Operating Power Selections.** Standard input power supplied to the VELTRON II can be either 24VAC or 24VDC via automatic selection. An optional 120VAC external power transformer (UL listed) can be provided.

**Enclosure.** The VELTRON II is furnished in a NEMA 1 aluminum enclosure with external, unitary plug in terminal strips for ease of installation and removal. An optional junction box is available for applications requiring enclosed field wiring.



## MASS-tron II

Via the addition of both process temperature and pressure compensation, the ultra high accuracy VEITRON II becomes the MASS-tron II multi-variable mass flow transmitter. The process temperature input is an analog signal from a remote 4-wire or loop powered temperature transmitter; with the MASS-tron II having the capability of performing the linearization. The process pressure is measured by means of an internal absolute pressure transducer connected to the transmitter's static pressure signal input.

### Performance Specifications

In addition to those available with the VEITRON II, the MASS-tron II includes these performance specifications:

**Analog Output.** 0-5VDC, 0-10VDC or 4-20mA for process differential pressure, temperature, and absolute pressure.

**Analog Input.** 0-5VDC, 0-10VDC or 4-20mA for process temperature.

**Temperature Compensation Selection.** Pushbutton selection of linearized or non-linearized input, thermocouple or 100 ohm platinum RTD temperature sensor type:

Type E	-50 to 1750°F	-50 to 950°C
Type T	-50 to 750°F	-50 to 400°C
Type J	-50 to 2000°F	-50 to 1090°C
Type K	-50 to 2000°F	-50 to 1090°C
RTD	-50 to 1500°F	-50 to 815°C

**Pressure Compensation.** Absolute pressure (atmospheric or duct static), up to 60 IN Hg.



\*Shown with standard 4-line graphic LCD

## VEL-trol II



\*Shown with optional 4-line graphic LCD

The VEL-trol II incorporates a controller into the ultra high accuracy VELTRON II transmitter, providing the three modes of proportional, integral reset, and inverse derivative to permit the controller to be tuned to the extreme dynamics of critical airflow and pressurization control processes. The selection of the P, I, 1/D tuning parameters is accomplished using the password protected membrane switch pushbuttons on the front of the enclosure. By means of a dry contact input, the controller operating set point can be switched from the internal fixed setpoint to an externally provided fixed or variable input.

### Performance Specifications

In addition to those available with the VEITRON II, the VEL-trol II includes these performance specifications:

**Analog Output.** 0-5VDC, 0-10VDC or 4-20mA for controller output.

**Analog Input.** 0-5VDC, 0-10VDC or 4-20mA for controller external setpoint.

**Digital Input.** Dry contact for soft start command.

# Specifications

## Physical Specifications

### Signal Connections.

High and low pressure, 1/8" FP T.

### Electrical Connections.

External terminal strip with plug-in connectors. Optional terminal strip enclosure with dual 3/4" (.875" actual) conduit connections.

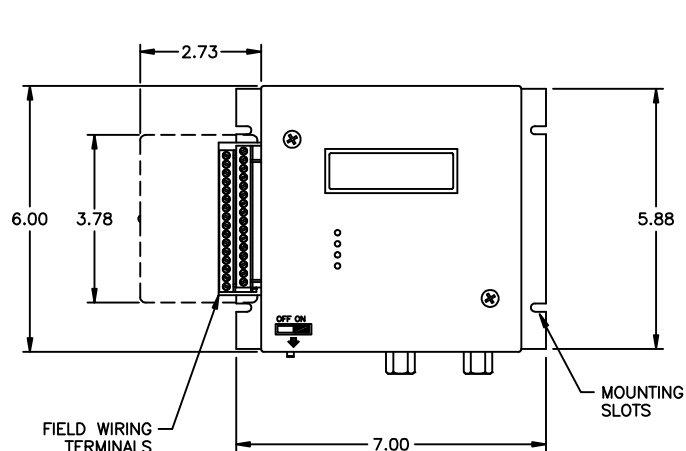
### Enclosure.

NEMA 1 aluminum enclosure.

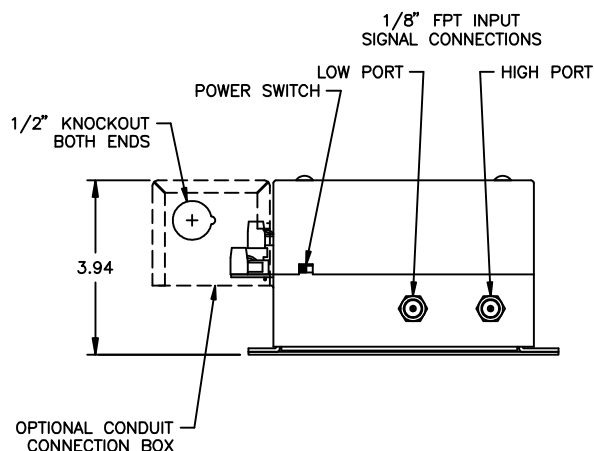
### Weight.

4.1 lbs.

## Dimensional Specifications



FRONT VIEW



BOTTOM VIEW

## Suggested Specification

The transmitter shall be capable of receiving flow signals (total and static pressure) from an airflow station or probe array and produce dual outputs linear and scaled for air volume, velocity, differential pressure, etc.

The transmitter shall contain an integral multi-line digital display for use during the configuration and calibration process, and to display one transmitter output during normal operating mode. All transmitter configuration, parameter setting, zero and span calibration, plus display formatting and scaling will be performed digitally in the on-board microprocessor via input pushbuttons.

The transmitter will be available in multiple natural spans covering the range of 0.05 INw.c. to 10.0 INw.c. with an accuracy of 0.1% of natural span. The transmitter shall be furnished with a transducer automatic zeroing circuit and be capable of maintaining linear output signals on applications requiring 10 to 1 velocity (100 to 1 pressure) turndown.

The transmitter shall be capable of having its operating span electronically selected without having to perform recalibration involving an external pressure source.

(Optional) The transmitter shall be capable of receiving an external temperature input, internally perform density correction for the process absolute pressure and temperature, and provide individual analog outputs linear and scaled for standard air volume or mass flow, temperature and absolute pressure.

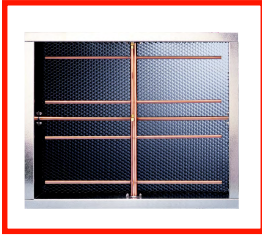
(Optional) The transmitter shall include an integraP,I,1/D three-mode controller capable of controlling at a user selectable internal or external setpoint, and providing an analog output control signal.

(Optional) The transmitter will provide the means of managing a system for automatic high pressure purge of the airflow station or probe array, with user selectable purge frequency and duration, while maintaining the last transmitter output during the purge cycle.

(Optional) Using a second transmitter as an input, the internal microprocessor can perform a summed flow, flow differential, low signal select, high signal select or percent deviation calculation, with the result being displayed and provided as an analog output signal.

The transmitter shall be the V&E TRON II [MASS-tron II or VEL-trol II] as manufactured by Air Monitor Corporation, Santa Rosa, California.

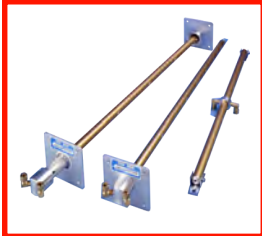
## Air Monitor's Product Families of Flow Measurement and Pressure Products



### **FAN-E AIRFLOW MEASURING STATION.**

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

**AMCA CERTIFIED** in accordance with Standard 610 for airflow measurement station performance.



### **VOLU-PROBE /1, 2, 3, 4 AIRFLOW TRAVERSE PROBES & STATIONS.**

Multi-point, self-averaging, Pitot Fechheimer airflow traverse probes and stations with integral airflow direction correcting design ensures accurate measurement. Various mounting configurations to fit every application.

**AMCA CERTIFIED** in accordance with Standard 610 for airflow measurement station performance.



### **VOLU-PROBE/FI FAN INLET AIRFLOW PROBES.**

Multi-point, self-averaging, Pitot Fechheimer airflow probes with integral airflow direction correcting design.

For mounting directly in the inlet cones or bellmouth of centrifugal or vane-axial fans to measure fan capacities within 3% of actual flow



### **VOLU-probe/SS STAINLESS STEEL AIRFLOW TRAVERSE PROBES.**

Multi-point, self-averaging, Pitot-Fechheimer airflow traverse probes with integral airflow direction correcting design. Constructed of type 316 stainless steel and available in externally and internally mounted versions for harsh, corrosive or high temperature applications such as fume hood, laboratory exhaust, pharmaceutical, and clean room production and dirty industrial process applications.



### **S.A.P. /B, P, S, R STATIC PRESSURE SENSORS.**

Available in four separate mounting configurations, the S.A.P family of static pressure sensors generate a steady non-pulsating output of room, space or plenum pressure.

S.A.P. sensors are available in aluminum or stainless steel construction.

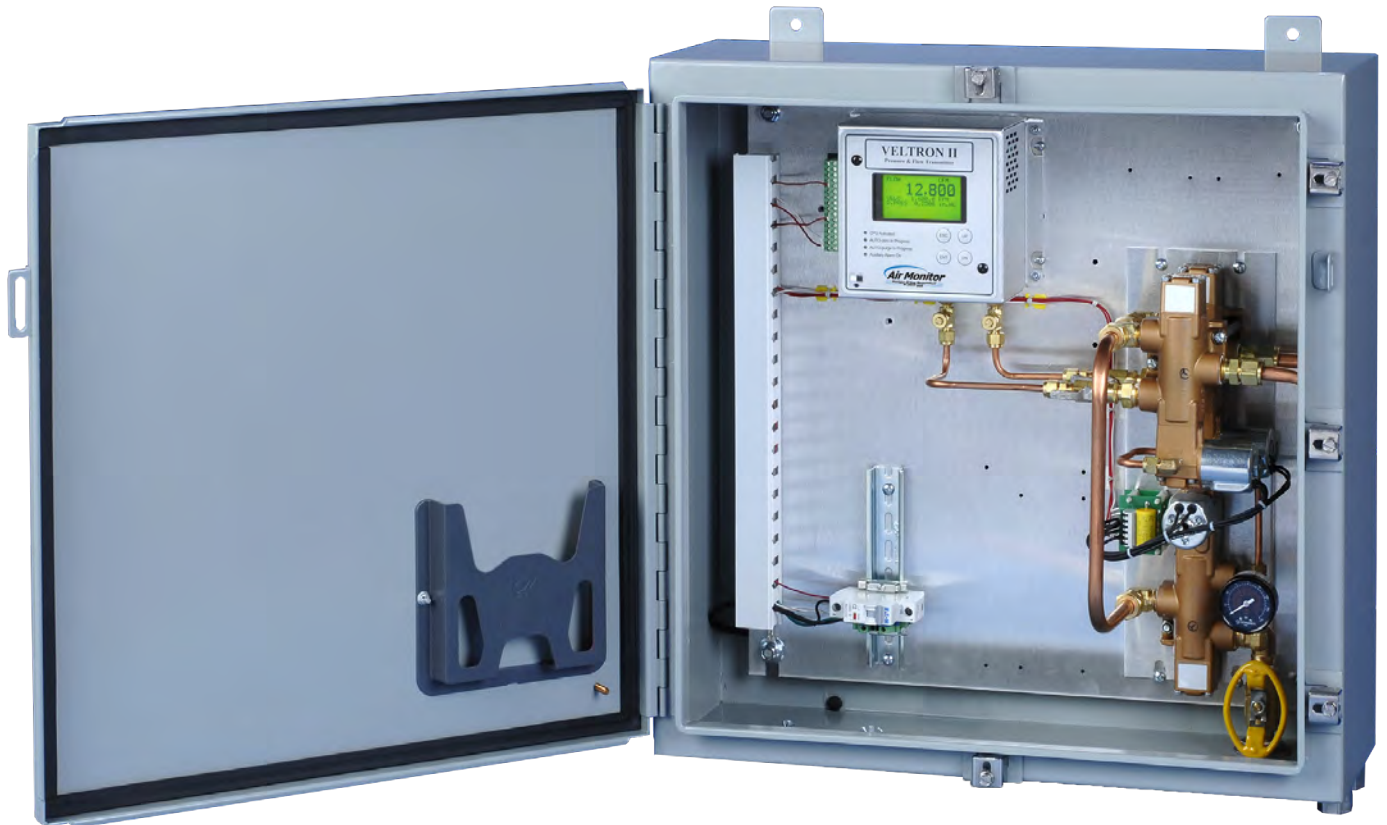


### **VOLU-flo/OAM OUTSIDE AIR MONITOR.**

Monitor/Controller designed to accurately measure outside air to assist in meeting air ventilation requirements of ASHRAE 62-99. Capable of accurate measurement throughout flow turndown range of 16:1 and unaffected by rain, wind, and airborne debris. Optional measurement station provides simple installation and commissioning.



# AUTO-purge III



*Proven solutions for a tough industry*

**Air Monitor**  
Precision Airflow Measurement  
An ONICON Brand

# AUTO-purge III

## Product Description

Air Monitor's AUTO-purge III is designed for applications where the continuous exposure to airborne particulate might impair the measurement accuracy of Air Monitor's Combustion Air (CA) Station or VOLU-probe/SS array. When activated by an Air Monitor "smart" flow transmitter (such as the VELTRON II, MASS-tron II or VELTRON DPT-*plus*) or a distributed control system, a combination of valves are

operated to introduce high pressure/high volume air to the flow measurement device's sensing ports for a short duration while simultaneously isolating the transmitter from over-pressurization. This periodic purging assists in maintaining the sensing ports of the total and static pressure manifolds in a clear, unobstructed condition.

## Standard Construction

### Brass and Copper Construction

- All wetted tubing, fittings, and valves constructed of copper and/or brass.
- Enclosure is NEMA 4 painted steel.
- External connection fittings are stainless steel FPT.

### Stainless Steel Construction

- All wetted tubing, fittings, and valves constructed of 316 stainless steel.
- Enclosure is NEMA 4 painted steel.
- External connection fittings are stainless steel FPT.

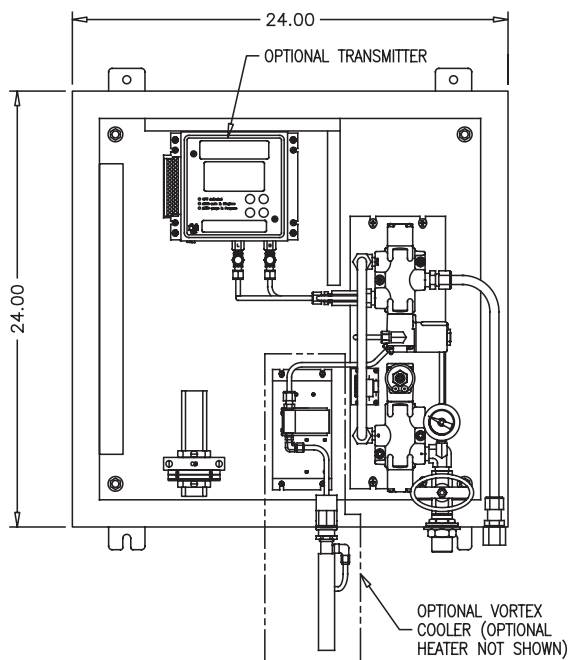
## Optional Construction

- NEMA 4X Stainless Steel Enclosure
- Vortex Cooler. Requires 80-100 psi air supply
- Enclosure Heater. Requires 120VAC power supply
- Viewing Window

- Power
- 24VAC
  - 24VDC
  - 120VAC

- Capacity
- Standard
  - Low – Model SP
  - High – Model HP

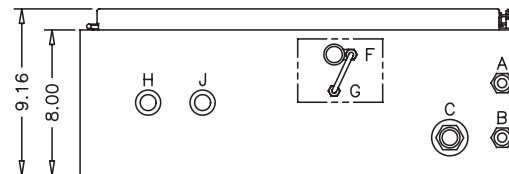
## Dimensional Specifications



FRONT INTERIOR VIEW

### CONNECTION CODE

A. STATIC PRESSURE (LO) SIGNAL FROM FLOW ELEMENT	1/2" (F)NPT
B. TOTAL PRESSURE (HI) SIGNAL FROM FLOW ELEMENT	1/2" (F)NPT
C. SUPPLY AIR 80 – 125 PSIG	1/2" (F)NPT
F. OPTIONAL VORTEX COOLER MOUNTING HOLE	N/A
G. OPTIONAL VORTEX COOLER AIR SUPPLY	N/A
H. ELECTRICAL CONNECTION POWER WIRING	1/2" CONDUIT SEAL
J. ELECTRICAL CONNECTION SIGNAL WIRING	1/2" CONDUIT SEAL



BOTTOM VIEW

# AUTO-purge III



The **VELTRON II** ultra-low differential pressure and flow “smart” transmitter, with its 0.1% of Natural Span accuracy, is intended for the most critical and demanding industrial applications that require the utmost accuracy and long-term stability. The VELTRON II’s long list of features include: AUTO-purge management; microprocessor based configuration and calibration; four lines of process data display via the graphical LCD; four analog outputs individually configurable for 0-10VDC or 4-20mA; AUTO-zero capability; electronic re-spanning; adjustable digital low pass filter; membrane keypad interface; 10:1 turndown capability; and nine different standard and bi-polar natural spans covering a range of 25.0 to 0.05 Inches w.c.



Via the addition of process temperature and pressure compensation, the ultra high accuracy VELTRON II becomes the MASS-tron II multi-variable flow transmitter. For process temperature the input is an analog signal from a remote 4-wire or loop powered temperature transmitter with the MASS-tron II having the capability of performing the linearization. The process pressure is measured by means of an internal absolute pressure transducer connected to the transmitter’s static pressure signal input.

The **VELTRON DPT-plus** transmitter combines most of the features and capability of the VELTRON II in a rugged, corrosion resistant NEMA 4X enclosure with standard industrial process connections that is Factory Mutual approved for hazardous locations – Explosion Proof for Class 1, Division 1, Groups B, C & D, and Dust Ignition Proof for Class II & III, Division I, Groups E, F & G. Other features include process temperature compensation, 3-line graphical LCD for display of process data, and dual 4-20mA isolated or non-isolated process outputs.

## Sequence of Operation

Automatic purging at regular field selectable intervals utilizes short duration, high pressure (up to 125 psig) air to maintain signal lines and the sensing ports of the total and static pressure manifolds in a clean, unobstructed condition. If accompanied with a VELTRON II, MASS-tron II or VELTRON DPT-*plus* transmitter, the last transmitted process outputs are maintained for the purge cycle. At the start of the purge cycle solenoid piloted spool valves are activated to isolate the transmitter from the process signal lines, followed by the energizing of a separate purge air solenoid valve that

allows high pressure purge air to flow to the measurement station or probe array, forcefully flushing out all particulate contaminants.

At the end of the timed purge cycle the purge air valve is de-energized to shut off the supply of compressed air. After a short period to allow the pressures in the signal lines to bleed down to process levels, the spool valves are shuttled to reconnect process signal lines to the attached transmitter and active process measurement resumes.

## Installation Guide

### Accumulator Tank (strongly recommended)

- Requires coalescing filter, pressure regulator, and check valve at the tank inlet.  
120 gallons – All CA stations.  
120 gallons – Multiple VOLU-probes having a combined length greater than 10'.  
80 gallons – One or more VOLU-probes having a combined length less than 10'.

### Line from Accumulator Tank to AUTO-purge Panel

- 25' maximum length, 1/2" pipe (minimum).
- Recommend locating accumulator tank as close as possible to AUTO-purge Panel.

### Electrical Power Requirement

- 74VA at 24VAC; 28W at 24VDC; 77VA at 120VAC.
- 120VAC, 5 amp when an optional enclosure heater is installed.

### Air Requirement

- 80 to 125 psig at 100 CFM, oil and dirt free.

### Line Size

- If the distance from the AUTO-purge Panel to the airflow measuring station or probe array is less than 25', tube size to be 1/2" O.D. with a wall thickness no greater than 0.065".
- If the distance from the AUTO-purge Panel to the airflow measuring station or probe array is 25' to 50', tube size to be 3/4" O.D. with a wall thickness no greater than 0.065".
- If the distance from the AUTO-purge Panel to the airflow measuring station or probe array is greater than 50', tube size to be 1.0" O.D. with a wall thickness no greater than 0.065".

### Ambient Temperature

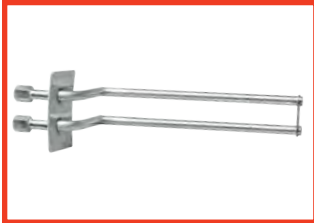
- 40°F to 140°F. For ranges above or below this ambient temperature, the use of an enclosure heater and/or cooler is required.

## Air Monitor's Product Families of Air & Coal Flow Measurement Systems



### **Pf-FLO™ – Pulverized Fuel Flow Management**

The Pf-FLO™ system performs continuous and accurate fuel flow measurement in pulverized coal fired combustion applications, providing boiler operators with the real-time data needed to balance coal mass distribution between burners. Balanced fuel improves combustion efficiency and lowers emissions while reducing in-furnace slagging, coal layout, fuel slagging, and coal pipe fires.



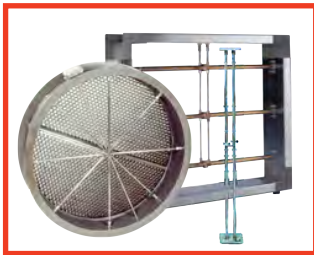
### **IBAM™ – Individual Burner Airflow Measurement**

The IBAM™ – Individual Burner Airflow Measurement probe is ideally suited for new or retrofit applications where a reduction in plant emissions and improvement in efficiency can be obtained through accurate measurement of burner secondary airflow. The IBAM™ probe has been designed to accurately measure in the particulate laden, high operating temperature conditions found in burner air passages.



### **VOLU-probe/SS™ Stainless Steel Airflow Traverse Probes**

Multi-point, self-averaging, Pitot-Fechheimer airflow traverse probes with integral airflow direction correcting design. Constructed of Type 316 stainless steel and available in externally and internally mounted versions for harsh, corrosive or high temperature applications such as fume hood, laboratory exhaust, pharmaceutical, and clean room production and dirty industrial process applications.



### **CA™ – Combustion Airflow Measuring Station & VOLU-probe/SS™ Traverse Probes.**

Air Monitor's duct mounted airflow measurement devices have been designed to accurately and repeatedly measure air mass flow in power plants. The Combustion Air (CA) Station™ includes honeycomb air straightener to accurately measure in shorter straight duct runs than any other flow measurement device. The VOLU-probe/SS™ delivers accurate airflow measurement performance in the form of an insertion probe. Both devices feature Type 316 stainless steel flow sensing arrays.



### **CEMS™ – Continuous Emissions Monitoring System**

Air Monitor's CEMS™ – Continuous Emissions Monitoring Systems assist in complying with the Clean Air Act's stringent emission measurement standards and the requirements of 40 CFR 75. Air Monitor has assembled a cost effective integrated system consisting of in-stack flow measurement equipment and companion instrumentation to provide continuous, accurate, and reliable volumetric airflow monitoring of stacks and ducts of any size and configuration.

**Engineering & Testing Services.** Air Monitor offers complete engineering and testing to analyze air and coal delivery systems. Air Monitor's field testing services use 3D airflow traversing and Pf-FLO coal flow measurement systems for the highest possible accuracy. To ensure cost effective and accurate solutions, Air Monitor has full scale physical flow modeling capability and in house Computational Fluid Dynamics (CFD). CFD analysis is used to analyze flow profiles and design/redesign ductwork to improve overall performance. Full scale model fabrication and certified wind tunnel testing is used to develop application specific products that will measure accurately where no standard flow measurement can.

# CAMS

## Combustion Airflow Management System



*Proven solutions for a tough industry*

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***Air Monitor***  
Precision Airflow Measurement  
An ONICON Brand



# CAMS™ – Combustion Airflow Management System

## Product Description

The Air Monitor Power CAMS™ – Combustion Airflow Management System is designed to fulfill the need for a reliable and accurate means of flow measurement in combustion airflow applications. Combined into a single engineered package are the CAMM™ – Combustion Airflow

Management Module containing the microprocessor based instrumentation to measure the airflow and manage the purge cycle, and AUTO-purge to protect against any degradation in performance of the duct mounted measurement device(s) due to the presence of airborne particulate.

## CAMM™ Performance Specification

**Accuracy.** ±0.1% of Natural Span, including non-linearity, hysteresis, and non-repeatability.

**Stability.** ±0.5% of Natural Span for six months.

**Temperature Effect.** Zero. None; corrected by AUTO-zero. Span. 0.015% of Full Span/°F.

**Mounting Position Effect.** None; corrected by AUTO-zero.

**Transducer Response Time.** 0.5 second to reach 98% of a step change.

**Power Consumption.** 35VA at 24VAC, 20VA at 24VDC, and 42VA at 120VAC.

## CAMM™ Functional Specification

**Digital Output.** Form "A" dry contacts (maintained) for AUTO-purge activation and acknowledgment.

**Digital Inputs.** External dry contact closure for AUTO-purge external start and purge interrupt commands.

**Analog Outputs.** Four outputs for flow, temperature, absolute pressure, and special function individually configurable via jumper for 0-5VDC, 0-10VDC or 4-20mADC.

**Analog Inputs.** Dual inputs are field configurable via jumper for 0-5VDC, 0-10VDC, or 4-20mADC. One is reserved for temperature input; the other for use with optional special function.

**Network Communication.** Optional ModBus TCP/IP over Ethernet.

**AUTO-purge Management.** The AUTO-purge cycle is initiated via an external dry contact input, or via the CAMM timer, with field selectable frequencies of 1 to 24 hours in 1 hour increments. A pair of CAMM dry contacts control the AUTO-purge System, and third dry contact provides remote purge activation acknowledgment.

**Power Supply.** Standard 24VAC (20-28VAC) or 24VDC (20-40VDC), with automatic selection. Optional 120VAC (100-132VAC) via external UL listed transformer.

**Overpressure and Static Pressure Limit.** 25 psig.

**Low Pass Filtration.** Response time to reach 98% of a step change is adjustable from 2.0 to 250.0 seconds.

**Automatic Zeroing.** Accuracy. Within 0.1% of calibrated span. Frequency. Every 1 to 24 hours selectable on 1 hour intervals.

**Circuit Protection.** Power input is fused and reverse polarity protected.

**Span and Zero Adjustment.** Electronic adjustment via keypad.

**Display.** Backlit, graphical LCD provides indication of up to four process variables. Triple-size digits for main process variable, standard size characters for the other process variables.

**Temperature Compensation Selection.** Push-button selection of linearized or nonlinear input. Choice of thermocouple (Type E, K, J, and T) or 100 ohm platinum RTD temperature sensor type.

**Pressure Compensation.** Absolute pressure (atmosphere or duct static), up to 60"Hg.

**Humidity Limits.** 0-95% RH, non-condensing.

**Temperature Limits.** –20°F to 180°F Storage. +40°F to 140°F Operating.

## CAMM™ Construction Options

### Special Functions

- Summed Flow
- Differential Flow

### Power

- 24VAC
- 24VDC
- 120VAC

### Certification

- Standard
- NIST Traceable

### Rapid Stop

- Yes
- No



# AUTO-purge

## Product Description

Air Monitor Power's AUTO-purge is designed for applications where the presence of airborne particulate might impair the measurement accuracy of Air Monitor Power's Combustion Air (CA) Station or VOLU-probe array. When activated by a CAMM™ or distributed control system, a combination of fail-safe valves are operated to introduce high pressure/high

volume air to the flow measuring device's sensing ports for a short duration while simultaneously isolating the CAMM™ from overpressurization. This periodic purging assists in maintaining the sensing ports of the total and static pressure manifolds in a clear, unobstructed condition.

## Standard Construction

### Brass and Copper Construction

- All wetted tubing, fittings, and valves constructed of copper and/or brass.
- Enclosure is NEMA 4 painted steel.
- External connection fittings are stainless steel FPT.

### Stainless Steel Construction

- All wetted tubing, fittings, and valves constructed of 316 stainless steel.
- Enclosure is NEMA 4 painted steel.
- External connection fittings are stainless steel FPT.

## Optional Construction

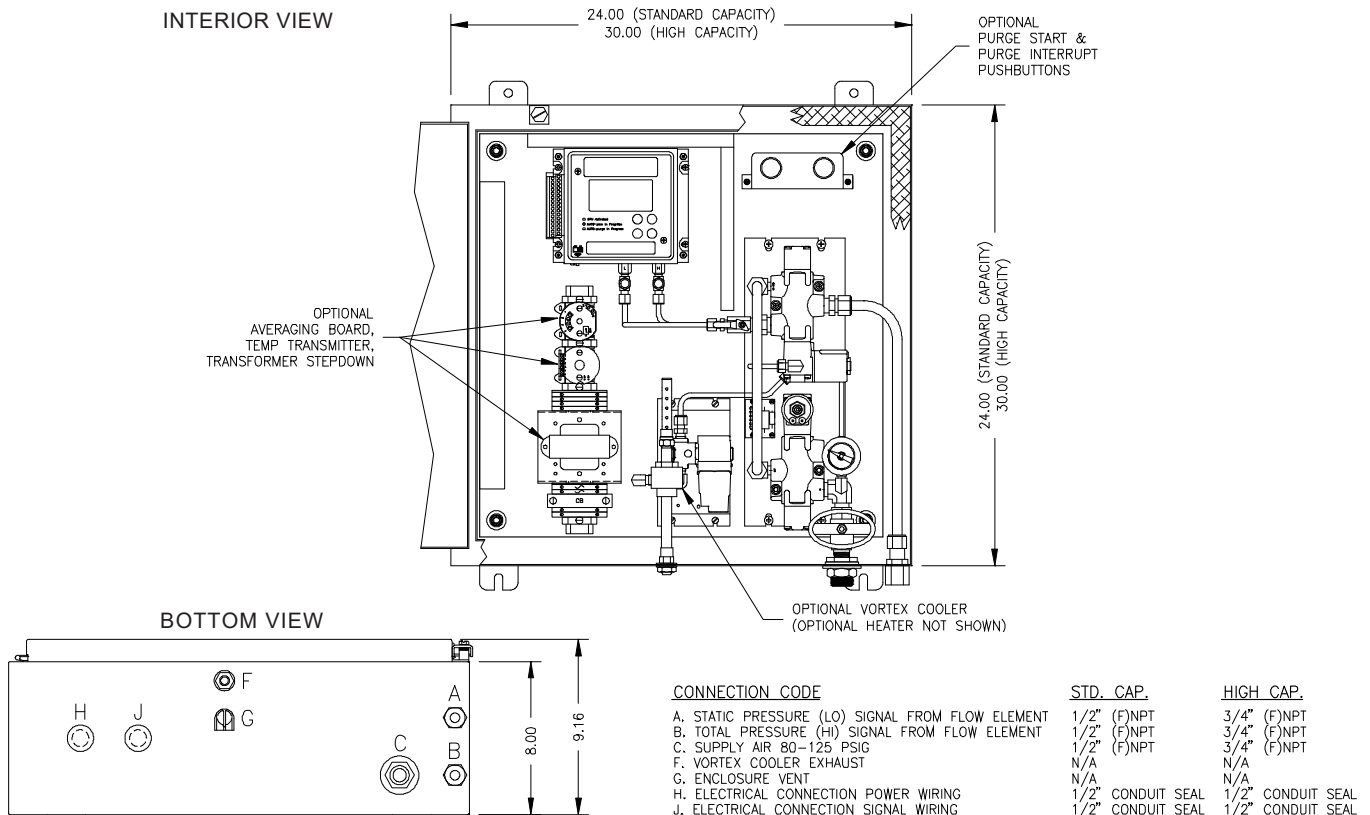
- NEMA 4X Stainless Steel Enclosure
- Vortex Cooler. Requires 80-100 psi air supply.
- Rapid Stop™
- Enclosure Heater. Requires 120VAC power supply.
- Viewing Window

- Power
- 24VAC
  - 24VDC
  - 120VAC

- Capacity
- Standard
  - Low – Model SP
  - High – Model HP

## Dimensional Specifications

### STANDARD CAPACITY



# AUTO-purge

## Sequence of Operation

Automatic purging at regular field selectable intervals utilizes short duration, high pressure (up to 125 psig) air to maintain signal lines and the sensing orifices of the total and static pressure manifolds in a clean, unobstructed condition. For the duration of the purge cycle the CAMM maintains the last transmitted process outputs. At the start of the purge cycle the CAMM first activates solenoid purge valves to isolate the transmitter from the signal lines, then energizes a separate main air purge valve, allowing the high pressure purge air to flow through the shuttle valves, flushing out all particulate contaminants in the signal ports of the airflow station or probe array.

At the end of the timed purge cycle or upon receipt of a purge interrupt signal the CAMM first de-energizes the main air valve to shut off the supply of compressed air, followed by a short period to allow the pressures in the signal lines to bleed down to process levels, then the purge valves are shuttled to reconnect the CAMM to the process signal lines. The final step in the sequence releases the output signal hold, allowing the resumption of transmitting active process information.

## Purge Frequency & Cycle Management

The CAMM can be configured to fully manage both the frequency and duration of the purge cycle, or allow the DCS to control either. When operating independently and depending upon the concentration of airborne particulate, the frequency of purge is user selectable via set-up menu to activate as infrequently as once every 24 hours, or as often as hourly. In a similar manner the active purge duration is adjustable from 30 to 150 seconds, while the combined purge plus recovery cycle is adjustable from 60 seconds to 10 minutes.

The CAMM can also be configured to allow the DCS to determine the frequency or scheduling of the purge cycle, by means of providing a dry contact purge start input to the CAMM. A separate purge interrupt dry contact input from the DCS will trigger the CAMM to terminate the purge cycle and return to normal operation. When equipped with optional Rapid Stop™ valving, the resumption of active process measurement can be reduced from a typical 30 seconds to as short as 5 seconds.

## Installation Guide

### Air Requirement

- 80 to 125 psig at 100 CFM, oil and dirt free.

### Line Size

- If the distance from the CAMS™ Panel to Flow Measuring Station or Probes is less than 25', tube size to be 1/2" O.D. Wall thickness no greater than 0.065".
- If the distance from the CAMS™ Panel to Flow Measuring Station or Probes is 25' to 50', tube size to be 3/4" O.D. Wall thickness no greater than 0.065".
- If the distance from the CAMS™ Panel to Flow Measuring Station or Probes is greater than 50', tube size to be 1.0" O.D. Wall thickness no greater than 0.065".

### Ambient Temperature

- 40°F to 140°F.
- For ranges above or below this ambient temperature, the use of an enclosure heater and/or cooler is required.

### Accumulator Tank (strongly recommended)

- Requires coalescing filter, pressure regulator, and check valve at the tank inlet.
  - 120 gallons– All CA stations.
  - 120 gallons– Multiple VOLU-probes having a combined length greater than 10'.
  - 80 gallons– One or more VOLU-probes having a combined length less than 10'.

### Line from Accumulator Tank to AUTO-purge Panel

- 25' maximum length, 1/2" pipe (minimum).
- Recommend locating accumulator tank as close as possible to CAMS™ Panel.

### Electrical Power Requirement

- 35VA at 24VAC; 20VA at 24VDC; 42VA at 120VAC.
- 120VAC, 10 amp when an optional enclosure heater is installed.

# CAMM™ – Combustion Airflow Management Module

## Construction Features



## Features

**Accuracy.** The CAMM™ is designed to maintain a measurement accuracy of  $\pm 0.1\%$  of Natural Span. For a span of 0 to 0.05 IN w.c., this accuracy is equivalent to an output accuracy of  $\pm 0.00005$  IN w.c. differential pressure or  $\pm 0.45$  FPM velocity at Natural Span.

**Continuous Display of Process.** All CAMMs™ are equipped with a large multi-line, backlit, graphical LCD for use during transmitter configuration and calibration, and to display multiple measured process variables (Flow, Temperature, Absolute Pressure, Differential Pressure, or Special Function). For high visibility, the main process variable (flow) is displayed with easy-to-read, triple-size digits. Other process variables are displayed with standard size digits. Each measured process variable is individually scalable in user selectable engineering units.

**Special Functions Capability.** Built into the CAMM™ microprocessor is the capability to perform special application functions involving two transmitters. Using a second transmitter as an input, the CAMM™ can compute the sum of, or differential between the two measured flows. The special function output can be both displayed and provided as an analog output signal.

**Microprocessor Based Functionality.** The CAMM's™ on-board microprocessor performs the functions of operating parameter selection, transmitter configuration, input/output and display signal scaling, density correction, and transducer calibration.

**Keypad.** A cover mounted keypad provides instant access to all CAMM configuration menus and calibration functions. The durable membrane keypad is user configurable for password protection

**ModBus Network Communication.** Each analog input and output signal can be individually configured for 0-5VDC, 0-10VDC or 4-20mA DC by means of a single jumper.

**High Turndown Ratio Operation.** The CAMM™, with its high level of accuracy and automatic zeroing circuitry, can maintain linear output signals on applications requiring flow measurement turndown of 10:1.

**Primary Signal Noise Filter.** To eliminate background noise and pulsations from the flow signal, the CAMM™ is equipped with a user selectable digital low pass filter.

**Air Density Correction.** The CAMM™ is capable of performing density compensation for both air temperature and air pressure variations. Temperature input is an analog signal from a remote temperature transmitter; non-linear temperature inputs can be linearized by the microprocessor. Process pressure is measured by means of an internal absolute pressure transducer connected to the transmitter static pressure signal input.

**Optional Rapid Stop™.** The Rapid Stop™ valving combined with purge sequence timing in the CAMM™ permits a reduction of the recovery portion of an AUTO-purge cycle from a typical 30 seconds to as short as 5 seconds.

**Built-In Characterization Function.** For installations requiring a field characterization factor (K-factor) the CAMM has an integral "K-factor" calculator with gain and/or bias, or multi-order polynomial function to accurately match field testing results throughout flow turndown.



### **Pf-FLO™ – Pulverized Fuel Flow Management**

The Pf-FLO™ system performs continuous and accurate fuel flow measurement in pulverized coal fired combustion applications, providing boiler operators with the real-time data needed to balance coal mass distribution between burners. Balanced fuel improves combustion efficiency and lowers emissions while reducing in-furnace slagging, coal layout, fuel slagging, and coal pipe fires.



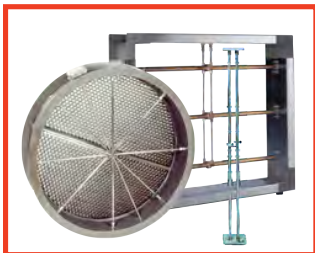
### **IBAM™ – Individual Burner Airflow Measurement**

The IBAM™ – Individual Burner Airflow Measurement probe is ideally suited for new or retrofit applications where a reduction in plant emissions and improvement in efficiency can be obtained through accurate measurement of burner secondary airflow. The IBAM™ probe has been designed to accurately measure in the particulate laden, high operating temperature conditions found in burner air passages.



### **VOLU-probe/SS™ Stainless Steel Airflow Traverse Probes.**

Multi-point, self-averaging, Pitot-Fechheimer airflow traverse probes with integral airflow direction correcting design. Constructed of Type 316 stainless steel and available in externally and internally mounted versions for harsh, corrosive or high temperature applications such as fume hood, laboratory exhaust, pharmaceutical, and clean room production and dirty industrial process applications.



**CA™ – Combustion Airflow Measuring Station & VOLU-probe/SS™ Traverse Probes.** Air Monitor Power's duct mounted airflow measurement devices have been designed to accurately and repeatedly measure air mass flow in power plants. The Combustion Air (CA) Station™ includes honeycomb air straightener to accurately measure in shorter straight duct runs than any other flow measurement device. The VOLU-probe/SS™ delivers accurate airflow measurement performance in the form of an insertion probe. Both devices feature Type 316 stainless steel flow sensing arrays.



### **CEMS™ – Continuous Emissions Monitoring System**

Air Monitor Power's CEMS™ – Continuous Emissions Monitoring Systems assist in complying with the Clean Air Act's stringent emission measurement standards and the requirements of 40 CFR 75. Air Monitor has assembled a cost effective integrated system consisting of in-stack flow measurement equipment and companion instrumentation to provide continuous, accurate, and reliable volumetric airflow monitoring of stacks and dust of any size and configuration.

**Engineering & Testing Services.** Air Monitor Power offers complete engineering and testing to analyze air and coal delivery systems. Air Monitor Power's field testing services use 3D airflow traversing and Pf-FLO coal flow measurement systems for the highest possible accuracy. To ensure cost effective and accurate solutions, Air Monitor Power has full scale physical flow modeling capability and in house Computational Fluid Dynamics (CFD). CFD analysis is used to analyze flow profiles and design/redesign ductwork to improve overall performance. Full scale model fabrication and certified wind tunnel testing is used to develop application specific products that will measure accurately where no standard flow measurement can.

# Airflow Meters

## Stationary and Panel Mounted



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### Performance Specifications

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**Accuracy.** Rated at 70°F,  $\pm 2.0\%$  for 1.0" to 6.0" w.c. range;  $\pm 3.0\%$  for 0.50" w.c. range;  $\pm 4.0\%$  for 0.25" w.c. range.

**Temperature Limits.** 20°F to 140°F Operating.

**Overpressurization Limit.** -20" Hg to 15  $\mu$ ig on either side of diaphragm.

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### Features

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**Ease of Installation.** Factory mounted, pre-tubed, and calibrated for ease of field installation. Customer specified signal connection fittings included.

**Indication.** Each meter serves as a visual monitor of the HVAC system and fan operation and can indicate slipping or broken fan belts, fan of due to overload, closed fire dampers, failing fan bearing, open access door, erratic controls performance, etc.

**Custom Scaling.** Meter faces custom scaled in user selectable volume, velocity, and/or pressure engineering units of measure.

**Identification Label.** Each meter is provided with an application specific, engraved, plastic data plate stating the system, the airflow station number, and the maximum meter range.

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*Accurate airflow measurement for demanding applications*

**Air Monitor**  
Precision Airflow Measurement  
An ONICON Brand

# Airflow Meters

## Construction Features

### Stationary Meter

**Type.** Stationary.

**Gauge.** Diaphragm activated, differential pressure.

**Enclosure.** Anodized aluminum, NEMA 1.

**Signal Fittings.** Standard barbed fittings for 1/4" O.D. tubing. Other fittings available.

**Display.** Custom, dual scaled display of process.

### Meter Panel

**Type.** Door mounted (minimum of two meters per panel).

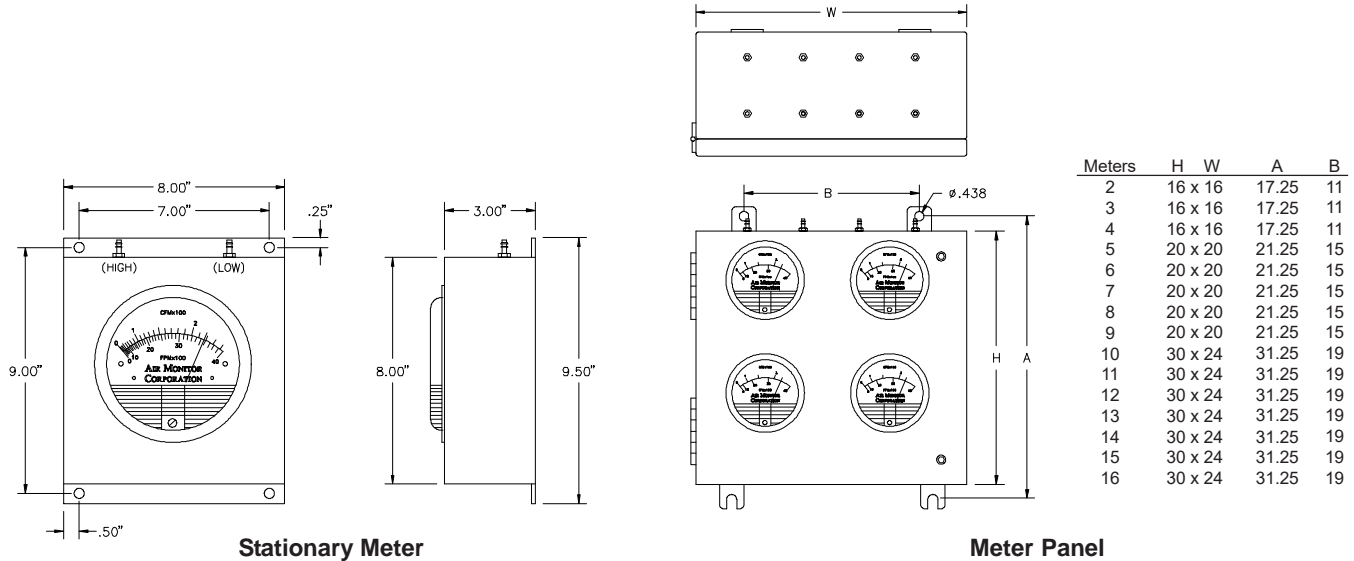
**Gauge.** Diaphragm activated, differential pressure.

**Enclosure.** NEMA 1 steel with polyurethane paint finish.

**Signal Fittings.** Standard barbed fittings for 1/4" O.D. tubing. Other fittings available.

**Display.** Custom, dual scaled display of process.

## Dimensional Specifications



**Stationary Meter.** Provide where indicated a stationary meter consisting of a dual-scale, diaphragm-actuated, differential pressure gauge mounted in an anodized aluminum enclosure. Gauges to be custom scaled to read in user selected volume, velocity, and/or pressure units of measure. Meter to be complete with internal tubing, [specify type] signal connection fittings, wall mounting brackets, and furnished with a plastic data plate listing the system, the airflow station number, and the maximum scheduled air volume.

The meter shall be the Stationary Meter as manufactured by Air Monitor Corporation, Santa Rosa, California.

**Meter Panel.** Provide where indicated a meter panel consisting of multiple dual-scale, diaphragm-actuated, differential pressure gauges mounted in a NEMA 1 steel enclosure. Gauges to be custom scaled to read in user selected volume, velocity, and/or pressure units of measure. Meter to be complete with internal tubing, [specify type] signal connection fittings, wall mounting brackets, and furnished with a plastic data plate listing for each gauge, the system, the airflow station number, and the maximum scheduled air volume.

The central panel shall be the Meter Panel as manufactured by Air Monitor Corporation, Santa Rosa, California.



# CONTINUOUS PROTECTIVE PURGE FLOW TRANSMITTER

**THEORY OF OPERATION**

A regulated constant volume of purge air is introduced in sensing lines. When any resistance to flow occurs, constant volume purge circuit will create an equal amount of back pressure to overcome this resistance. Velocity pressure sensed at airflow station is reproduced as a back pressure at flow transmitter by purge air. Sensing lines are filled with purge air, thereby keeping lines free of duct effluent.

Since each sensing line can have an unequal resistance, system requires initial zeroing to achieve zero differential pressure at the transmitter. This is accomplished by adjusting the amount of purge air in one of the two legs of the sensing lines. Adjustment is made until true differential is achieved at transmitter. No flow or pressure condition in duct must exist for initial zeroing.

**FLOW CALIBRATION PROCEDURE**

1. Verify high and low signal input lines are connected to flow element and have zero input pressures. (Zero flow condition.)
2. Connect a calibration gauge PI-CAL as shown.
3. Open HV-1 to provide pressure to purge generator PY-1. Set PRV-1 to obtain a reading of 5 PSI at PI-1.
4. Check calibration gauge for zero differential after 15 or more seconds to see if balancing of purge differential pressure is required.
5. Adjust the V.R. screw CW or CCW until you have a reading as close to zero as possible.

**Caution:** Hard tubing is recommended, as any blockage (pinching) of sensing lines can cause over-pressurization damage to the transmitter.

