AIR FLOW MEASURING STATION

Model: AFMS

DESCRIPTION

The AFMS is an accurate airflow measuring station and is furnished with a properly sized pressure transducer that outputs a signal proportional to CFM. It is designed to maintain a constant parallel airflow pattern over the static sensing ports for more accurate, steady signals under all duct conditions.

The AFMS is constructed so that strategically located sensing ports (based on duct size) continually sample the total and static pressures, when inserted normal to flow. The total pressures sensed by the upstream ports are continually averaged within the element in an isolated chamber. The static sensing ports (located where the influence of the velocity head is zero) are averaged in a second isolation chamber. Multiple elements are manifolded together for connection to a differential measurement device (gauge, transmitter, etc.) for flow measurement and indication purposes.

The COSMOS make Airflow Measurement Station consists of single or multiple airflow elements, factory mounted and pre-piped in a casing designed for flanged connection to the ductwork. Standard materials consist of a galvanized casing and aluminum flow sensors and galvanized airflow straightner suitable for most HVAC applications.

The airflow measuring station utilizes multiple averaging sensors for total (velocity) pressure and static pressure measurements. The sensors are distributed across the flow stream to conform to the industry standard rules for equal area averaging (the standard pitot traverse).

The COSMOS make AFMS airflow measurement station has been developed for use in duct systems having a highly turbulent condition at the point of measurement. The airflow averaging element generates a differential (velocity) pressure signal similar to the orifice, venture.

BASIC OPERATION

The airflow measuring station produces output signals referred to as total (high) and static (low) pressure. These two pressures are piped to the signal processor where the static pressure is subtracted from the total and the result indicated as velocity pressure. This measured differential pressure is equal to the average velocity of the air stream moving through the plane that the airflow measuring station is located in. This signal can be converted to air velocity and flow using the following equations:

$$V = 1096.7 (\sqrt{Pv} / \rho) \qquad Q = V \times A$$

Where:

ρ = Actual density of air, in lb/ft3 (0.075 lb/ft3 at sea level and 68°F)

Pv = Velocity pressure, in inches H2O

V = Velocity, in FPM

Q = Flow, in CFM

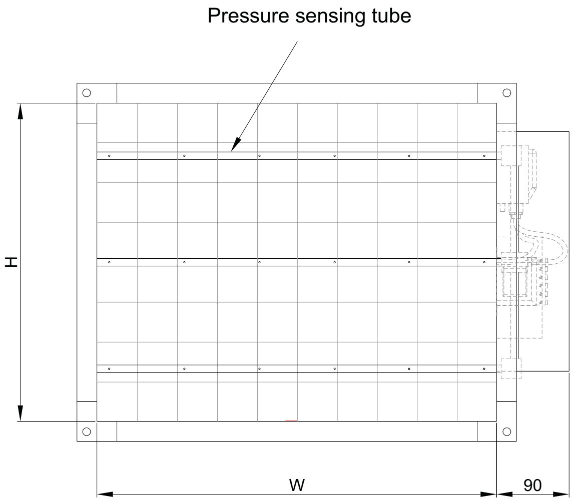
A = Area, in ft2

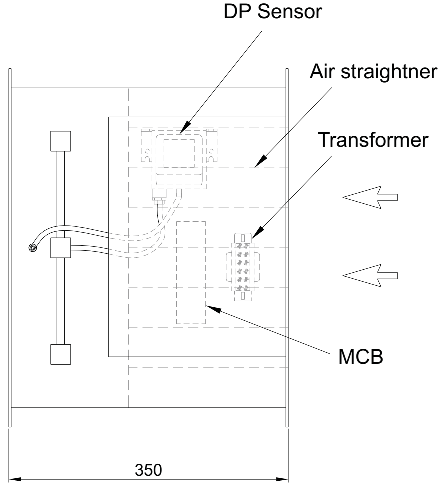
This signal is scaled and linearized before being displayed and transmitted out as a 4-20ma, 0-10vdc signal.

FEATURES

- Standard construction includes a galvanizes casing, aluminum flow sensor and galvanized airflow straightner.
- Factory mounted and pre piped in a flanged duct section (casing).
- Multiple total and static pressure sensing ports along the length of the element.
- Low signal to noise ratio.

EFFECTIVE AREA OF AIR FLOW MEASURING STATIONS (AFMS)





Note: Dimensions are in units of inches and areas are listed in units of ft^2

Width (inches)

Height (inches)		4	6	8	10	12	14	16	18	20
inches	mm	100	150	200	250	300	350	400	450	500
4	100	0.10	0.15	0.19	0.24	0.29	0.34	0.39	0.44	0.49
6	150		0.23	0.31	0.38	0.46	0.53	0.61	0.69	0.78
8	200			0.39	0.49	0.58	0.68	0.78	0.88	0.97
10	250				0.63	0.75	0.88	1.00	1.13	1.25
12	300					0.92	1.07	1.22	1.38	1.53
14	350						1.22	1.39	1.56	1.74
16	400							1.61	1.81	2.01
18	450								2.06	22.9
20	500									2.50

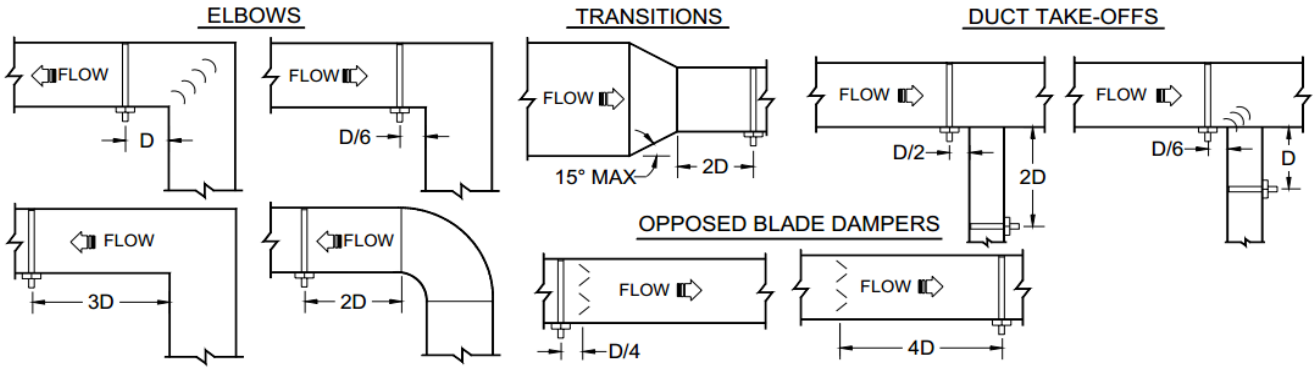
Height (inches)		22	24	26	28	30	32	34	36	38	40
inches	mm	550	600	650	700	750	800	850	900	950	1000
4	100	0.53	0.58	0.63	0.68	0.73	0.78	0.83	0.88	0.92	0.97
6	150	0.84	0.92	0.99	1.07	1.115	1.27	1.30	1.38	1.45	1.53
8	200	1.07	1.17	1.26	1.36	1.46	1.56	1.65	1.75	1.85	1.94
10	250	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25	2.38	2.50
12	300	1.68	1.83	1.99	2.14	2.29	2.44	2.60	2.75	2.90	3.06
14	350	1.91	2.08	2.26	2.43	2.60	2.78	2.95	3.13	3.30	3.47
16	400	2.22	2.42	2.62	2.82	3.02	3.22	3.42	3.63	3.83	4.03
18	450	2.52	2.75	2.98	3.21	3.44	3.67	3.90	4.13	4.35	4.58
20	500	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00
22	550	3.06	3.33	3.61	3.89	4.17	4.44	4.72	5.00	5.28	5.56
24	600		3.67	3.97	4.28	4.58	4.89	5.19	5.50	5.81	6.11
26	650			4.24	4.57	4.90	5.22	5.55	5.58	6.20	6.53
28	700				4.96	5.31	5.69	6.02	6.38	6.73	7.08
30	750					5.73	6.11	6.49	6.88	7.26	7.64
32	800						6.44	6.85	7.25	7.65	8.06
34	850							7.32	7.75	8.18	8.61
36	900								8.25	8.71	9.17
38	950									9.10	9.58
40	1000										10.14

Height (inches)		42	44	46	48	50	52	54	56	58	60
inches	mm	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500
4	100	1.02	1.07	1.12	1.17	1.22	1.26	1.31	1.36	1.41	1.46
6	150	1.60	1.68	1.76	1.83	1.91	2.06	2.14	2.14	2.22	2.29
8	200	2.04	2.14	2.24	2.33	2.43	2.53	2.63	2.72	2.82	2.92
10	250	2.63	2.75	2.88	3.00	3.13	3.25	3.38	3.50	3.63	3.75
12	300	3.21	3.36	3.51	3.67	3.82	3.97	4.13	4.28	4.43	4.58
14	350	3.65	3.82	3.99	4.17	1.34	4.51	4.69	4.88	5.03	5.21
16	400	4.23	4.43	4.63	4.83	5.03	5.24	5.44	5.64	5.84	6.04
18	450	4.81	5.04	5.27	5.50	5.73	6.69	6.19	6.42	6.65	6.88
20	500	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50
22	550	5.83	6.11	6.39	6.67	6.94	7.22	7.50	7.78	8.06	8.33
24	600	6.42	6.72	7.03	7.33	7.64	7.94	8.25	8.56	8.86	9.17
26	650	6.85	7.18	7.51	7.83	8.16	8.49	8.81	9.14	9.47	9.79
28	700	7.44	7.79	8.15	8.50	8.85	9.21	9.56	9.92	10.27	10.63
30	750	8.02	8.40	8.78	9.17	9.55	9.93	10.31	10.69	11.08	11.46
32	800	8.46	8.86	9.26	9.67	10.07	10.47	10.88	11.28	11.68	12.06
34	850	9.04	9.47	9.90	10.33	10.76	11.19	11.63	12.06	12.49	12.92
36	900	9.63	10.08	10.54	11.00	11.46	11.92	12.38	12.83	13.28	13.75
38	950	10.06	10.54	11.02	11.50	11.98	12.46	12.94	13.42	13.90	14.38
40	1000	10.65	11.15	11.66	12.17	12.67	13.18	13.69	14.19	14.70	15.21
42	1050	11.23	11.76	12.30	12.83	13.37	13.90	14.44	14.97	15.51	16.04
44	1100		12.22	12.78	13.33	13.89	14.44	15.00	15.56	16.11	16.67
46	1150			13.42	14.00	14.58	15.17	15.75	16.33	16.92	17.50
48	1200				14.67	15.28	15.89	16.50	17.11	17.72	18.33
50	1250					15.80	16.43	17.06	17.69	18.33	18.69
52	1300						17.15	17.81	18.47	19.13	19.79
54	1350							18.56	19.25	19.94	20.63
56	1400								19.83	20.54	21.25
58	1450									21.35	22.08
60	1500										22.92

Height (inches)		62	64	66	68	70
inches	mm	1550	1600	1650	1700	1750
4	100	1.51	1.56	1.60	1.65	1.70
6	150	2.37	2.44	4.52	2.60	2.67
8	200	3.01	3.11	3.21	3.31	3.40
10	250	3.88	4.00	4.13	4.25	4.38
12	300	4.74	4.89	5.04	5.19	5.35
14	350	5.38	5.56	5.73	5.90	6.08
16	400	6.24	6.44	6.65	6.85	7.05
18	450	7.10	7.33	7.56	7.79	8.02
20	500	7.75	8.00	8.25	8.50	8.75
22	550	8.61	8.89	9.17	9.44	9.72
24	600	9.47	9.78	10.08	10.39	10.69
26	650	10.12	10.44	10.77	11.10	11.42
28	700	10.98	11.33	11.69	12.04	12.40
30	750	11.84	12.22	12.60	12.99	13.37
32	800	12.49	12.89	13.29	13.69	14.10
34	850	13.35	13.78	14.12	14.64	15.07
36	900	14.21	14.67	15.13	15.58	16.04
38	950	14.85	15.33	15.81	16.29	16.77
40	1000	15.72	16.22	16.73	17.24	17.74
42	1050	16.58	17.11	17.65	18.18	18.72
44	1100	17.22	17.78	18.33	18.89	19.44
46	1150	18.08	18.67	19.25	19.83	20.42
48	1200	18.94	19.56	20.17	20.78	21.39
50	1250	19.59	20.22	20.85	21.49	22.12
52	1300	20.45	21.11	21.77	22.43	23.09
54	1350	21.31	22.00	22.69	23.38	24.06
56	1400	21.96	22.67	23.38	24.08	24.79
58	1450	22.82	23.56	24.29	25.03	25.76
60	1500	23.68	24.44	25.21	25.97	26.74
62	1550	24.33	25.11	25.90	26.88	27.47
64	1600		26.00	26.81	27.63	28.44
66	1650			27.73	28.57	29.41
68	1700				29.28	30.14
70	1750					31.11

INSTALLATION REQUIREMENTS

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

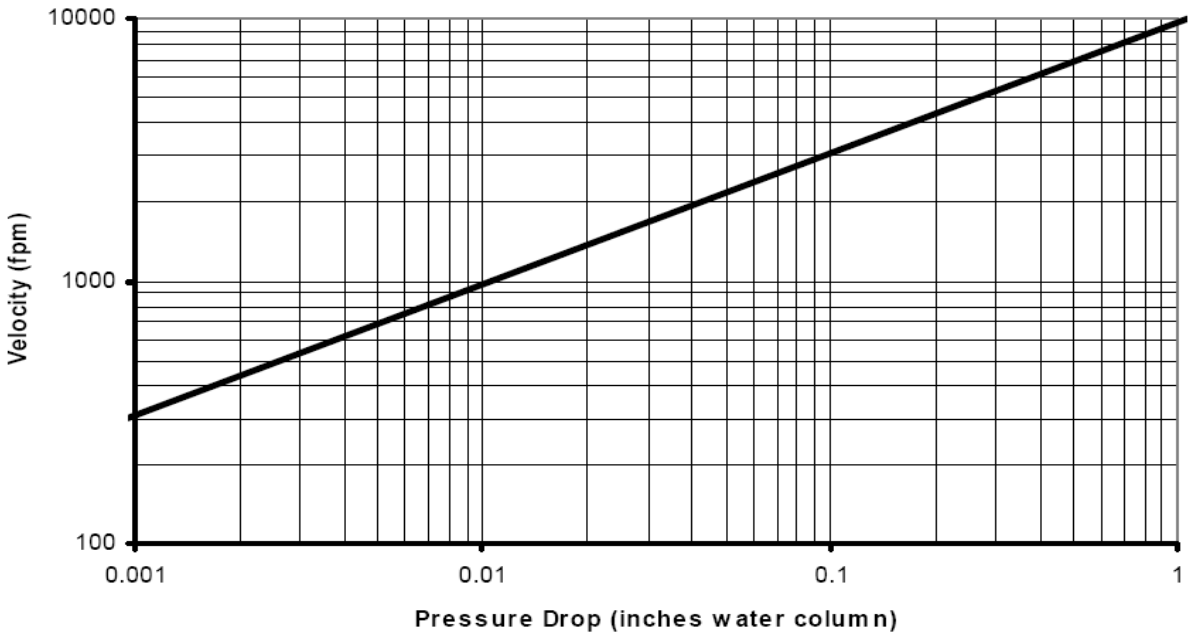


Notes:

Rectangular Ducts:

$$D = \sqrt{\frac{4HW}{\pi}}$$ H = Duct height W = Duct width

RESISTANCE TO AIRFLOW



ENGINEERING REFERENCE TABLE: CONVERSION CHART

Velocity Pressure (IN. W.C.) to Velocity (FPM)

VP	V	VP	V	VP	V	VP	V	VP	V	VP	V	VP	V	VP	V
.001	127	.061	989	.121	1393	.181	1704	.241	1966	.31	2230	.91	3821	1.51	4921
.002	179	.062	997	.122	1399	.182	1709	.242	1970	.32	2266	.92	3841	1.52	4938
.003	219	.063	1005	.123	1405	.183	1713	.243	1974	.33	2301	.93	3862	1.53	4954
.004	253	.064	1013	.124	1410	.184	1718	.244	1978	.34	2335	.94	3883	1.54	4970
.005	283	.065	1021	.125	1416	.185	1723	.245	1982	.35	2369	.95	3904	1.55	4986
.006	310	.066	1029	.126	1422	.186	1727	.246	1986	.36	2403	.96	3924	1.56	5002
.007	335	.067	1037	.127	1427	.187	1732	.247	1990	.37	2436	.97	3944	1.57	5018
.008	358	.068	1044	.128	1433	.188	1737	.248	1994	.38	2469	.98	3965	1.58	5034
.009	380	.069	1052	.129	1438	.189	1741	.249	1998	.39	2501	.99	3985	1.59	5050
.010	400	.070	1060	.130	1444	.190	1746	.250	2003	.40	2533	1.00	4005	1.60	5066
.011	420	.071	1067	.131	1450	.191	1750	.251	2007	.41	2564	1.01	4025	1.61	5082
.012	439	.072	1075	.132	1455	.192	1755	.252	2010	.42	2596	1.02	4045	1.62	5098
.013	457	.073	1082	.133	1461	.193	1759	.253	2014	.43	2626	1.03	4065	1.63	5113
.014	474	.074	1089	.134	1466	.194	1764	.254	2018	.44	2657	1.04	4084	1.64	5129
.015	491	.075	1097	.135	1472	.195	1769	.255	2022	.45	2687	1.05	4104	1.65	5145
.016	507	.076	1104	.136	1477	.196	1773	.256	2026	.46	2716	1.06	4123	1.66	5160
.017	522	.077	1111	.137	1482	.197	1778	.257	2030	.47	2746	1.07	4143	1.67	5176
.018	537	.078	1119	.138	1488	.198	1782	.258	2034	.48	2775	1.08	4162	1.68	5191
.019	552	.079	1126	.139	1493	.199	1787	.259	2038	.49	2803	1.09	4181	1.69	5206
.020	566	.080	1133	.140	1499	.200	1791	.260	2042	.50	2832	1.10	4200	1.70	5222
.021	580	.081	1140	.141	1504	.201	1796	.261	2046	.51	2860	1.11	4220	1.71	5237
.022	594	.082	1147	.142	1509	.202	1800	.262	2050	.52	2888	1.12	4238	1.72	5253
.023	607	.083	1154	.143	1515	.203	1804	.263	2054	.53	2916	1.13	4257	1.73	5268
.024	620	.084	1161	.144	1520	.204	1809	.264	2058	.54	2943	1.14	4276	1.74	5283
.025	633	.085	1168	.145	1525	.205	1813	.265	2062	.55	2970	1.15	4295	1.75	5298
.026	646	.086	1174	.146	1530	.206	1818	.266	2066	.56	2997	1.16	4314	1.76	5313
.027	658	.087	1181	.147	1536	.207	1822	.267	2069	.57	3024	1.17	4332	1.77	5328
.028	670	.088	1188	.148	1541	.208	1827	.268	2073	.58	3050	1.18	4351	1.78	5343
.029	682	.089	1195	.149	1546	.209	1831	.269	2077	.59	3076	1.19	4369	1.79	5358
.030	694	.090	1202	.150	1551	.210	1835	.270	2081	.60	3102	1.20	4387	1.80	5373
.031	705	.091	1208	.151	1556	.211	1840	.271	2085	.61	3128	1.21	4405	1.81	5388
.032	716	.092	1215	.152	1561	.212	1844	.272	2089	.62	3154	1.22	4424	1.82	5403
.033	728	.093	1221	.153	1567	.213	1848	.273	2093	.63	3179	1.23	4442	1.83	5418
.034	738	.094	1228	.154	1572	.214	1853	.274	2096	.64	3204	1.24	4460	1.84	5433
.035	749	.095	1234	.155	1577	.215	1857	.275	2100	.65	3229	1.25	4478	1.85	5447
.036	760	.096	1241	.156	1582	.216	1861	.276	2104	.66	3254	1.26	4496	1.86	5464
.037	770	.097	1247	.157	1587	.217	1866	.277	2108	.67	3278	1.27	4513	1.87	5477
.038	781	.098	1254	.158	1592	.218	1870	.278	2112	.68	3303	1.28	4531	1.88	5491
.039	791	.099	1260	.159	1597	.219	1874	.279	2115	.69	3327	1.29	4549	1.89	5506
.040	801	.100	1266	.160	1602	.220	1879	.280	2119	.70	3351	1.30	4566	1.90	5521
.041	811	.101	1273	.161	1607	.221	1883	.281	2123	.71	3376	1.31	4584	1.91	5535
.042	821	.102	1279	.162	1612	.222	1887	.282	2127	.72	3398	1.32	4601	1.92	5549
.043	830	.103	1285	.163	1617	.223	1891	.283	2131	.73	3422	1.33	4619	1.93	5564
.044	840	.104	1292	.164	1622	.224	1896	.284	2134	.74	3445	1.34	4636	1.94	5578
.045	850	.105	1298	.165	1627	.225	1900	.285	2138	.75	3468	1.35	4653	1.95	5593
.046	859	.106	1304	.166	1632	.226	1904	.286	2142	.76	3491	1.36	4671	1.96	5607
.047	868	.107	1310	.167	1637	.227	1908	.287	2146	.77	3514	1.37	4688	1.97	5621
.048	877	.108	1316	.168	1642	.228	1912	.288	2149	.78	3537	1.38	4705	1.98	5636
.049	887	.109	1322	.169	1646	.229	1917	.289	2153	.79	3560	1.39	4722	1.99	5650
.050	896	.110	1328	.170	1651	.230	1921	.290	2157	.80	3582	1.40	4739	2.00	5664
.051	904	.111	1334	.171	1656	.231	1925	.291	2160	.81	3604	1.41	4756	2.01	5678
.052	913	.112	1340	.172	1661	.232	1929	.292	2164	.82	3627	1.42	4773	2.02	5692
.053	922	.113	1346	.173	1666	.233	1933	.293	2168	.83	3649	1.43	4789	2.03	5706
.054	931	.114	1352	.174	1671	.234	1937	.294	2172	.84	3671	1.44	4806	2.04	5720
.055	939	.115	1358	.175	1675	.235	1941	.295	2175	.85	3692	1.45	4823	2.05	5734
.056	948	.116	1364	.176	1680	.236	1945	.296	2179	.86	3714	1.46	4839	2.06	5748
.057	956	.117	1370	.177	1685	.237	1950	.297	2183	.87	3736	1.47	4856	2.07	5762
.058	965	.118	1376	.178	1690	.238	1954	.298	2186	.88	3757	1.48	4872	2.08	5778
.059	973	.119	1382	.179	1694	.239	1958	.299	2190	.89	3778	1.49	4889	2.09	5790
.060	981	.120	1387	.180	1699	.240	1962	.300	2194	.90	3799	1.50	4905	2.10	5804