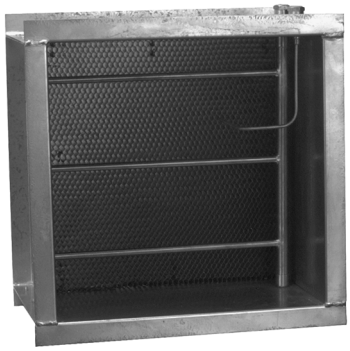
AIRFLOW MEASURING STATION
KMS SERIES

DESCRIPTION

The **KMS Series Airflow Measuring Station** utilizes multiple averaging sensors for static pressure measurements and a bullet-nose probe for total pressure. The sensors are distributed across the flow stream to conform to the industry standard rules for equal-area averaging (the standard pitot traverse). The standard unit includes a 16-gauge galvanized casing with flanged duct connection, 3/8" hexagon-celled aluminum flow straightening vanes, and internal copper sensors constructed to ASTM B88. Instrument connections are 1/2" FNPT. Other configurations are available on request.

KMS Front



KMS Back

APPLICATIONS

When used with a differential pressure transmitter, the **KMS Series** provides an accurate, repeatable airflow signal for building automation and HVAC applications. Air velocity may be determined by the formula: Velocity (fpm) = 4004 $\sqrt{\triangle P}$, where $\triangle P$ is differential pressure in "W.C. Flow rate may then be determined by the formula: CFM = $A_e V$, where A_e is the area of the flow measuring station in square feet, and V is the velocity obtained above. The proper range for a differential pressure transmitter to use with the **KMS Series** airflow measuring station may be determined by the formula: $\triangle P = (\text{Max Velocity}/4004)^2$.

SPECIFICATIONS

Accuracy	±2% to 6000 feet per minute (±0.5% @ 2000 feet per minute)
Temperature	400°F (240°C) maximum operating
Pressure	6 "W.C. maximum operating
Pressure drop	<0.13 "W.C. @ 2000 feet per minute with 3/8" cell
Flow straightening vanes	3/8" aluminum hexagon cell
Design flow	
Maximum	6000 feet per minute
Minimum	1000 feet per minute
Casing	16-gauge galvanized sheet steel 12" (30.48 cm) in overall
Pitot and static sensors	Rigid copper, hard drawn to ANSI H23.1 and ASTM B88 standards
Internal fittings	Copper, to ANSI B-16.22 standards
Process connections	1/2" NPT female

INSTRUMENT OR GAUGE CONNECTIONS

Connect the instrument tubing to the HI and LO station connections. The HI and LO ports are clearly labeled (HI is on the upstream side of the unit). Use two wrenches when installing the tubing fittings, taking care to hold the station fitting securely while tightening the tubing fitting. Avoid twisting the internal parts of the measuring assembly. Use thread sealer to prevent leaks, since small leaks may cause inaccuracies in measurements.

UNPACKING AND INSPECTION

Unpack the station carefully to avoid damaging the honeycomb, straightening-vane section. If any portion of the honeycomb is bent, it may be straightened using needle-nose pliers. Be sure to remove all cardboard protecting panels and packing materials from the unit. A careful visual inspection should reveal any shipping damage, such as bent or broken measuring tubing, damaged casing, etc. If shipping damage is evident, the unit must be repaired prior to placing it in service to avoid inaccurate signals. Please call Kele with any questions.

MODEL IDENTIFICATION

The model and serial number of each **KMS** airflow measuring station is inscribed on the identification tag, which is riveted to the casing adjacent to the instrument connections. The measuring area of the station (in square feet) is also engraved on the tag.The area information is necessary to establish actual cfm (cubic feet per minute) flow values since the output signals from the station will be fpm (feet per minute) velocity measurement as indicated by a pressure in inches of water column ("W.C.). Fpm equals cfm divided by the effective area in square feet.

INSTALLATION

KMS stations, in sizes up to 18 inches, may be readily installed by positioning them in the duct opening and bolting them securely in place. Take care not to damage the honeycomb when positioning the unit between the flanges of the duct. Orient the unit with the honeycomb section facing upstream. Check the flow direction arrow on the long side of the station. Install standard gaskets or apply sealant (suitable to the duct system) between the flanges to give a positive seal. Tighten the flange bolts securely, but do not over-tighten. Approximately 12 to 15 ft/lb torque is sufficient. Refer to the "Installation Diagram" on the next page for allowable distances from duct obstructions.

Larger stations may be lifted into position using a chain or cable sling placed around the perimeter of the station or by attaching hooks or eyebolts to the flanges. Stations 60-inches or larger may require eyebolts installed in a center balanced area in the "top" of the unit. (Note: The "top" may be any side of the station, depending on the desired location of the instrument connections. The KMS station will function equally well regardless of the installation angle or the inclination of the duct.) If eyebolts are installed, take care when drilling into the casing to avoid damage to the honeycomb or measuring assembly. The use of 3/8" eyebolts is suggested with a 4" x 4" washer inside to evenly distribute lifting stress. After installation of the unit, the eyebolt may be left in place or removed and the hole plugged with short bolt, washer, and nut to prevent air leakage.

SAMPLE CALCULATIONS

CALCULATION KEY

Flow Rate: 2119 ft^3/min = 1m^3/s
Velocity: 196.9 ft/mn = 1 m/s
Pressure: 1 "W.C. = 249.1 Pa
Area: 10.765 ft^2 = 1m

Formula: $V = 4004\sqrt{\Delta P}$ $\quad \Delta P = \left[\frac{V}{4004}\right]^2$ Where V is in units of fpm and ΔP is in units of "W.C.

Formula: $V = 1.289\sqrt{\Delta P}$ $\quad \Delta P = \left[\frac{V}{1.289}\right]^2$ Where V is in units of m/s and ΔP is in units of Pa

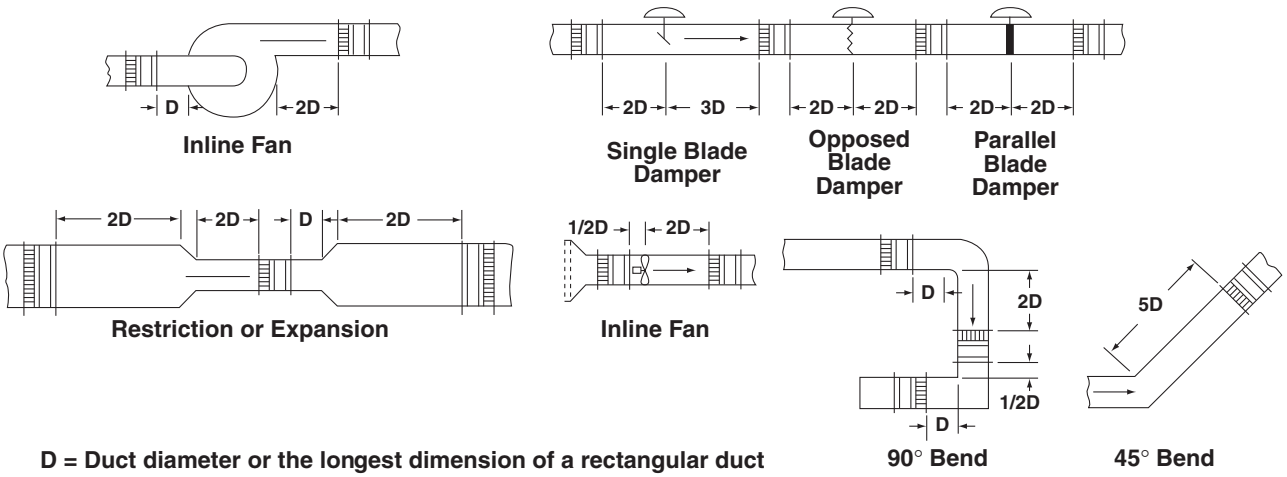
Example:
CFM = 4000 ft^3/min (1.89 m^3/s)
Duct Size = 24" x 24" therefore effective area (see chart on page 4) is 3.67 ft^2 (0.340m^2)

Velocity = CFM/A_e = 4000/3.67 = 1090 ft/min (5.536 m/s)

$$\Delta P = \left[\frac{1090}{4004}\right]^2 = \left[\frac{1{,}188{,}100}{16{,}032{,}016}\right] = 0.0741 \text{ "W.C. (18.5 Pa)}$$

An appropriate pressure transducer would be one with a range of 0-0.1 W.C. (24.91 Pa)
A_e = Effective area

INSTALLATION DIAGRAM



D = Duct diameter or the longest dimension of a rectangular duct

ORDERING INFORMATION

MODEL	DESCRIPTION	
KMS	Airflow measuring station	
	SHAPE	
	811	Round with flanges
	911	Rectangular with flanges
	DIMENSIONS	
	W x H	Diameter or width x height (inches)

KMS – 911 – 48 x 24 ***Example:*** **KMS-911-48 x 24** Rectangular airflow station with 16-gauge galvanized casing, 3/8" straightening vanes, and copper probes 48" wide x 24" high

Note: Standard location for flow connections is on the "long" dimensions side of a rectangular station. Stations can be rotated. If connections must be located on the "short" side, specify it on the order; a cost adder applies.

RELATED PRODUCTS

T30, T40	**Differential pressure transmitters**
M264, M267	**Differential pressure transmitters**
UMM-1-SQ	**Universal math module with square root output**
KMS-PAK-B	**KMS fitting reduction pack 1/2 FNPT to 1/4" barbed (one pack per KMS station)**

EFFECTIVE AREA OF KMS FLOW STATIONS

Width (inches)

Height (inches)

inches		4	6	8	10	12	14	16	18	20	22	24	26	28	30
	mm	100	150	200	250	300	350	400	450	500	550	600	650	700	750
4	100	0.10	0.15	0.19	0.24	0.29	0.34	0.39	0.44	0.49	0.53	0.58	0.63	0.68	0.73
6	150		0.23	0.31	0.38	0.46	0.53	0.61	0.69	0.78	0.84	0.92	0.99	1.07	1.115
8	200			0.39	0.49	0.58	0.68	0.78	0.88	0.97	1.07	1.17	1.26	1.36	1.46
10	250				0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
12	300					0.92	1.07	1.22	1.38	1.53	1.68	1.83	1.99	2.14	2.29
14	350						1.22	1.39	1.56	1.74	1.91	2.08	2.26	2.43	2.60
16	400							1.61	1.81	2.01	2.22	2.42	2.62	2.82	3.02
18	450								2.06	22.9	2.52	2.75	2.98	3.21	3.44
20	500									2.50	2.75	3.00	3.25	3.50	3.75
22	550										3.06	3.33	3.61	3.89	4.17
24	600											3.67	3.97	4.28	4.58
26	650												4.24	4.57	4.90
28	700													4.96	5.31
30	750														5.73

inches		32	34	36	38	40	42	44	46	48	50
	mm	800	850	900	950	1000	1050	1100	1150	1200	1250
4	100	0.78	0.83	0.88	0.92	0.97	1.02	1.07	1.12	1.17	1.22
6	150	1.27	1.30	1.38	1.45	1.53	1.60	1.68	1.76	1.83	1.91
8	200	1.56	1.65	1.75	1.85	1.94	2.04	2.14	2.24	2.33	2.43
10	250	2.00	2.13	2.25	2.38	2.50	2.63	2.75	2.88	3.00	3.13
12	300	2.44	2.60	2.75	2.90	3.06	3.21	3.36	3.51	3.67	3.82
14	350	2.78	2.95	3.13	3.30	3.47	3.65	3.82	3.99	4.17	1.34
16	400	3.22	3.42	3.63	3.83	4.03	4.23	4.43	4.63	4.83	5.03
18	450	3.67	3.90	4.13	4.35	4.58	4.81	5.04	5.27	5.50	5.73
20	500	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25
22	550	4.44	4.72	5.00	5.28	5.56	5.83	6.11	6.39	6.67	6.94
24	600	4.89	5.19	5.50	5.81	6.11	6.42	6.72	7.03	7.33	7.64
26	650	5.22	5.55	5.58	6.20	6.53	6.85	7.18	7.51	7.83	8.16
28	700	5.69	6.02	6.38	6.73	7.08	7.44	7.79	8.15	8.50	8.85
30	750	6.11	6.49	6.88	7.26	7.64	8.02	8.40	8.78	9.17	9.55
32	800	6.44	6.85	7.25	7.65	8.06	8.46	8.86	9.26	9.67	10.07
34	850		7.32	7.75	8.18	8.61	9.04	9.47	9.90	10.33	10.76
36	900			8.25	8.71	9.17	9.63	10.08	10.54	11.00	11.46
38	950				9.10	9.58	10.06	10.54	11.02	11.50	11.98
40	1000					10.14	10.65	11.15	11.66	12.17	12.67
42	1050						11.23	11.76	12.30	12.83	13.37
44	1100							12.22	12.78	13.33	13.89
46	1150								13.42	14.00	14.58
48	1200									14.67	15.28
50	1250										15.80

inches		52	54	56	58	60	62	64	66	68	70
	mm	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750
4	100	1.26	1.31	1.36	1.41	1.46	1.51	1.56	1.60	1.65	1.70
6	150	2.06	2.14	2.14	2.22	2.29	2.37	2.44	4.52	2.60	2.67
8	200	2.53	2.63	2.72	2.82	2.92	3.01	3.11	3.21	3.31	3.40
10	250	3.25	3.38	3.50	3.63	3.75	3.88	4.00	4.13	4.25	4.38
12	300	3.97	4.13	4.28	4.43	4.58	4.74	4.89	5.04	5.19	5.35
14	350	4.51	4.69	4.88	5.03	5.21	5.38	5.56	5.73	5.90	6.08
16	400	5.24	5.44	5.64	5.84	6.04	6.24	6.44	6.65	6.85	7.05
18	450	6.69	6.19	6.42	6.65	6.88	7.10	7.33	7.56	7.79	8.02
20	500	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75
22	550	7.22	7.50	7.78	8.06	8.33	8.61	8.89	9.17	9.44	9.72
24	600	7.94	8.25	8.56	8.86	9.17	9.47	9.78	10.08	10.39	10.69
26	650	8.49	8.81	9.14	9.47	9.79	10.12	10.44	10.77	11.10	11.42
28	700	9.21	9.56	9.92	10.27	10.63	10.98	11.33	11.69	12.04	12.40
30	750	9.93	10.31	10.69	11.08	11.46	11.84	12.22	12.60	12.99	13.37
32	800	10.47	10.88	11.28	11.68	12.06	12.49	12.89	13.29	13.69	14.10
34	850	11.19	11.63	12.06	12.49	12.92	13.35	13.78	14.12	14.64	15.07
36	900	11.92	12.38	12.83	13.28	13.75	14.21	14.67	15.13	15.58	16.04
38	950	12.46	12.94	13.42	13.90	14.38	14.85	15.33	15.81	16.29	16.77
40	1000	13.18	13.69	14.19	14.70	15.21	15.72	16.22	16.73	17.24	17.74
42	1050	13.90	14.44	14.97	15.51	16.04	16.58	17.11	17.65	18.18	18.72
44	1100	14.44	15.00	15.56	16.11	16.67	17.22	17.78	18.33	18.89	19.44
46	1150	15.17	15.75	16.33	16.92	17.50	18.08	18.67	19.25	19.83	20.42
48	1200	15.89	16.50	17.11	17.72	18.33	18.94	19.56	20.17	20.78	21.39
50	1250	16.43	17.06	17.69	18.33	18.69	19.59	20.22	20.85	21.49	22.12
52	1300	17.15	17.81	18.47	19.13	19.79	20.45	21.11	21.77	22.43	23.09
54	1350		18.56	19.25	19.94	20.63	21.31	22.00	22.69	23.38	24.06
56	1400			19.83	20.54	21.25	21.96	22.67	23.38	24.08	24.79
58	1450				21.35	22.08	22.82	23.56	24.29	25.03	25.76
60	1500					22.92	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

Note: Dimensions are in units of inches. Areas are listed in units of ft^2.
For sizes not shown consult Kele.