Model KSQA

VAV Terminals (with integral sound attenuator)

شركة خالد لـصـنـاعـة
Khalid Manufacturing Company

Flexibility

KSQA terminals are available in a wide array of control packages using pneumatic, electronic analog or factory-installed direct digital (DDC) controls.

KSQA units can be provided with an integral sound attenuator for ultra-quiet performance.

Low temperature unit construction is also available using 25mm thick matte-faced insulation and isolation of the air valve from the outer casing.

Numerous other optional features are available

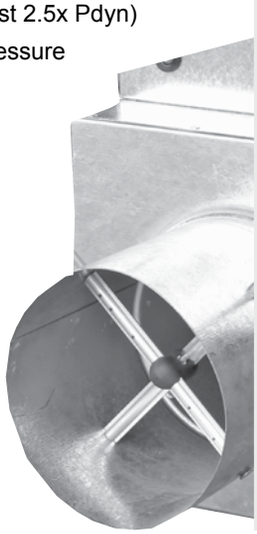
Performance

The lack of intruding fasteners, tabs or other obstructions in the air stream results in very quiet sound performance and low internal pressure losses. All units incorporate full 90° rotation round dampers (except the size 600 x 400) for precise control of the airflow.

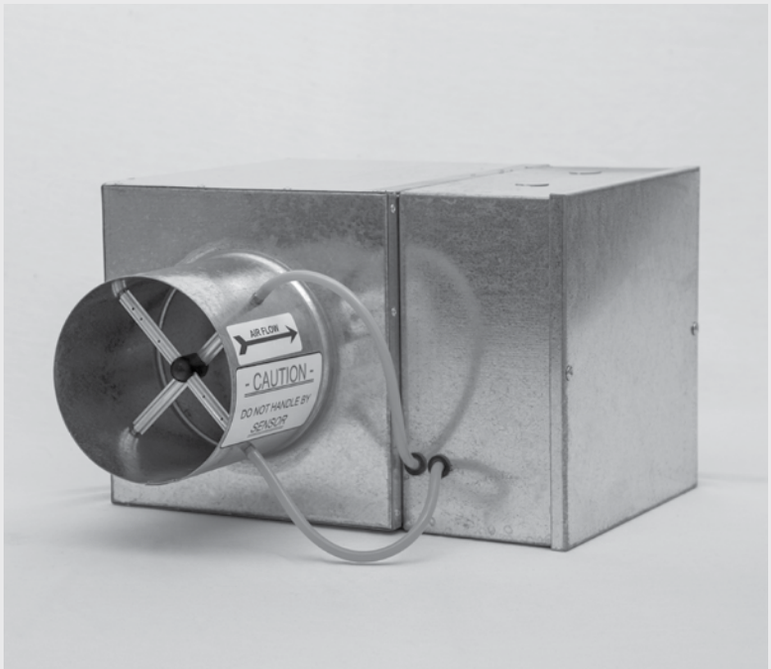
All units are available with pressure independent controls for precise control of the airflow. All units with these controls are factory calibrated for minimum and maximum airflow settings prior to shipment and are easily field adjusted.

FloXact-X ™ Air Velocity Sensor

- The unique shape, (patent pending) creates a linear amplified signal (at least 2.5x Pdyn) with a low noise level and pressure drop.
- Extruded aluminum profile measurement.
- Multi point averaging
- Measurement according to “Log Tchebycheff” method.
- Strengthen measurement signal with at least 2.5x.
- Accurate measurement from 1.5m/s air velocity.



- Rounded apertures make FloXact™ insensitive to skew or turbulent inflow to 30° in all directions relative to the profile axis.
- The units can be supplied with factory-setting with the calibrated analog or digital controllers.



FloXact sensor in primary air Inlet

Ease of Installation and Reliability

KSQA terminals are compact and utilize inlet collars over 125mm in length to allow easy attachment of rigid or flexible duct. The airflow sensor is recessed over 50mm into the air valve providing protection from damage. The discharge end of the terminal has slip and drive connections for easy attachment of downstream duct work.

KMC’s KSQA Single Duct terminals are constructed with zinc-coated steel for long life. The unit casings are assembled with a mechanical lock construction that insures a tight seam to minimize air leakage.

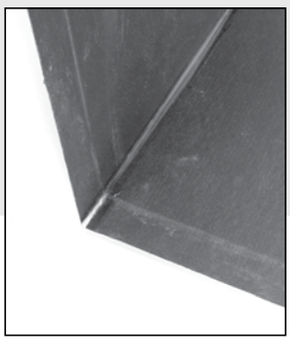
Casings are internally lined with a wide variety of insulation and treatment options that conform to NFPA and UL requirements. The leaving edge of the insulation is protected from erosion by return bends on the discharge end of the unit casing.

The damper blade is made of gasket material sandwiched between two round steel plates. The round damper blade in the air valve is affixed to the shaft using through-the-shaft machine applied rivets. The die-cast metal shaft rotates in self-lubricating bearings for easy turning and long operating life. The damper’s flexible gasket seats tightly on the cylinder’s internal bead for tight closure.

Product Selection Check List
- Select Unit size based on desired performance characteristics.
- Select inlet size based on design Airflow requirements.
- Select actuator control orientation.
- Select Insulation Requirement.
- Select Control Requirement.

Air Terminal Casing Treatments

KMC's complete line of casing treatments and insulation systems provide performance solutions to meet any design requirement. We only use insulating materials that meet industry standard classifications for fire, erosion, water vapor sorption, and microbiological resistance.



25mm Matte Face- Black Cloth Under Insulation.

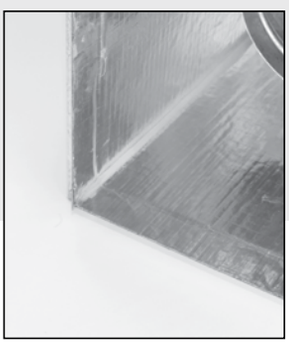
Features:

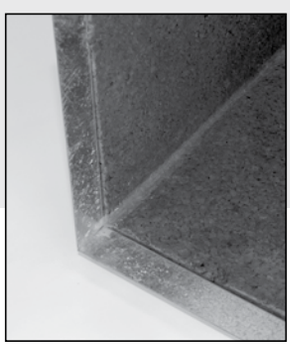
- High R-value & Matte face with black cloth Liner.
- Isolates glass fibers from the air stream
- R Value: 32m.K/W @ 25° C
- Density: 48kg/m^3

25mm Foil Laminated Fiberglass Insulation

Features:

- High R-value & impervious foil facing with aluminum taped edges
- Isolates glass fibers from the air stream
- R Value: 32m.K/W @ 25° C
- Density: 48kg/m^3





Fiber-Less Insulation

Features:

- Closed cell insulation – no glass fibers
- 12 mm/25mm Elastomeric Engineered Foam Insulation
- R Value: 22 m.K/W @ 20° C
- Density: 140-180 kg/m^3

Dual-Wall Casing Treatment

Features:

- Puncture-proof sheet metal interior skin
- Isolates glass fibers from the air stream
- 25mm fiberglass insulation between the walls
- R Value: 32m.K/W @ 25° C
- Density: 48 kg/m^3

Model KSQA
VAV Terminals (with integral sound attenuator)

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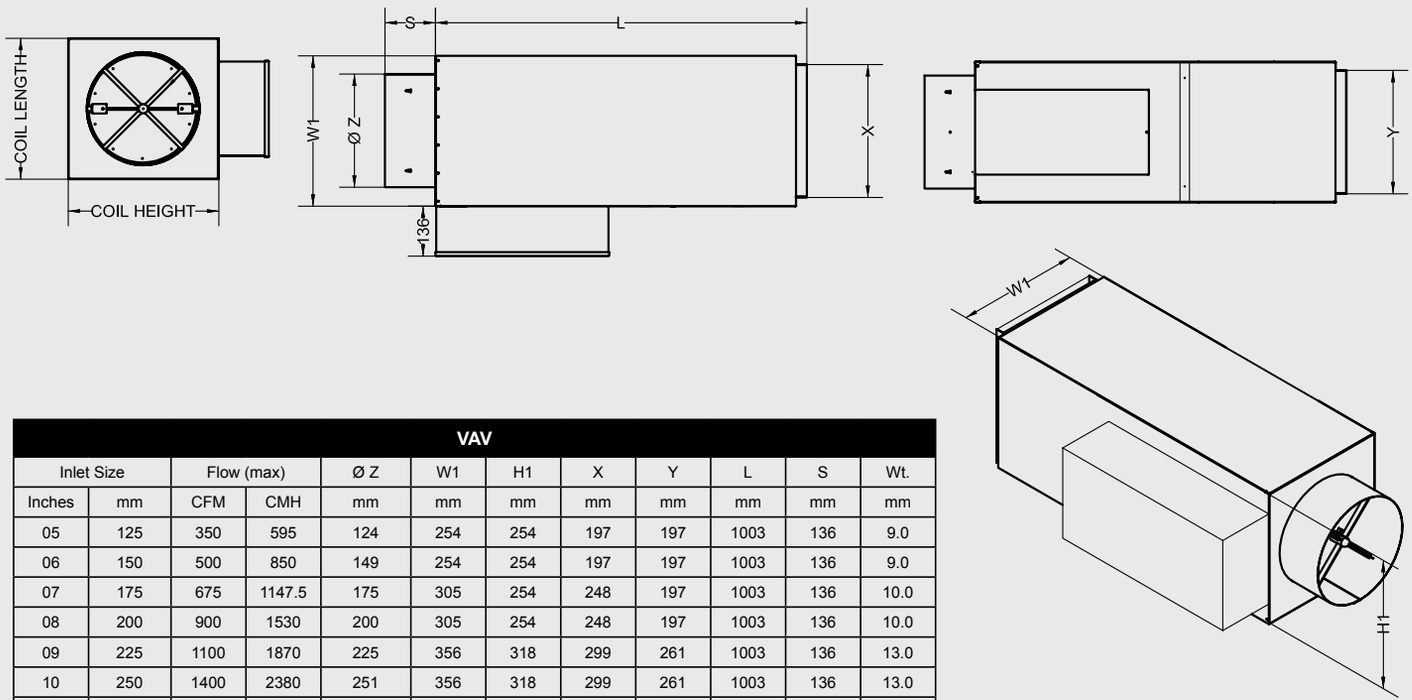
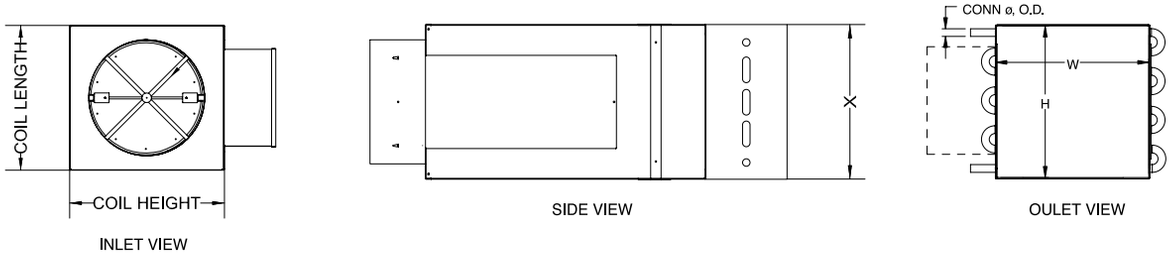
Dimensional Data

KSQA units



VAV											
Inlet Size		Flow (max)		Ø Z	W1	H1	X	Y	L	S	Wt.
Inches	mm	CFM	CMH	mm	mm	mm	mm	mm	mm	mm	mm
05	125	350	595	124	254	254	197	197	1003	136	9.0
06	150	500	850	149	254	254	197	197	1003	136	9.0
07	175	675	1147.5	175	305	254	248	197	1003	136	10.0
08	200	900	1530	200	305	254	248	197	1003	136	10.0
09	225	1100	1870	225	356	318	299	261	1003	136	13.0
10	250	1400	2380	251	356	318	299	261	1003	136	13.0
12	300	2000	3400	302	406	381	350	324	1003	136	14.5
14	350	3000	5100	352	508	445	451	388	1003	136	17.5
16	400	4100	6970	403	610	445	553	388	1003	136	20.0
24 x 16	600 x 400	7000	11900	610 X 406	965	457	940	432	1349	138	49.5

KSQA units with hot water heating coil



Inlet Size		Flow (max)		Outlet Size		1 Row			2 Row			4 Row		
Inches	mm	CFM	CMH	W (mm)	H (mm)	L (mm)	Conn. OD mm	Wt. (kg)	L (mm)	Conn. OD mm	Wt. (kg)	L (mm)	Conn. OD mm	Wt. (kg)
05	125	350	595	254	254	1099	12.7	11.3	1126	12.7	12.3	1180	22.2	14.5
06	150	500	850	254	254	1099	12.7	11.3	1126	12.7	12.3	1180	22.2	14.5
07	175	675	1147.5	305	254	1099	12.7	12.7	1126	12.7	14.1	1180	22.2	16.3
08	200	900	1530	305	254	1099	12.7	12.7	1126	12.7	14.1	1180	22.2	16.3
09	225	1100	1870	356	318	1099	12.7	15.9	1126	12.7	17.7	1180	22.2	21.3
10	250	1400	2380	356	318	1099	12.7	15.9	1126	12.7	17.7	1180	22.2	21.3
12	300	2000	3400	406	381	1099	22.2	18.6	1126	12.7	21.3	1180	22.2	25.4
14	350	3000	5100	508	445	1099	22.2	23.1	1126	22.2	26.8	1180	22.2	33.1
16	400	4100	6970	610	445	1099	22.2	26.3	1126	22.2	29.9	1180	22.2	37.2
24 x 16	600 x 400	7000	11900	965	457	1193.8	22.2	59.4	1193.8	22.2	64.4	1219	28.6	74.9

*In the interest of product development, KMC reserves the right to make changes without notice.

Model KSQA

VAV Terminals (with integral sound attenuator)

Type		Direct Digital Controller			
Inlet Size		Airflow (Min.)		Airflow (Max.)	
mm	inch	CMH	CFM	CMH	CFM
125	5”	85	50	426	251
150	6”	138	81	695	409
175	7”	180	106	907	534
200	8”	255	150	1286	757
225	9”	323	190	1627	958
250	10”	398	234	2006	1181
300	12”	530	312	2672	1573
350	14”	727	428	3661	2155
400	16”	990	583	4991	2938
600 X 400	24” X 16”	1870	1101	9428	5550

Notes

1. Minimum and maximum values shown are Cu.Mtr / H (CMH) & Cu.Ft. /min. (CFM)
2. Minimum and maximum airflow with pressure independent controls based on the following.
   Flow sensor signal :
   Direct Digital Controllers : 8 Pa (0.03” WG) - 190 Pa (0.76” WG)
3. Settings below the minimum are not recommended for accurate control when using pressure independent controls. Minimum airflow for pressure dependent applications is O cfm.
4. Pressure independ ent controls may be set for O cfm, at or above the minimum airflow show in table 4, but not between.
5. Direct Digital Controllers are factory programmed.
6. Airflow rates above maximum shown are available. Contact your KMC representative for application assistance.

Electric coil capacity Calculation :

kW = CMH x 1.204 x ΔTA / 3,600
ΔTA = 3,600 x kW / CMH
Definitions :
CMH = M3 / Hr
ΔTA = Differential Air Temperature, ˚C = LAT - EAT
LAT = Leaving Air Temperature, ˚C
EAT = Entering Air Temperature, ˚C

Example

Design Air Flow	1270	CMH
LAT	32	˚C
EAT	13	˚C
ΔTA	19	˚C
Electric Coil Capacity	(750*1.204*19)	/
=>	3600	kW
	=> 8.0	

Model KSQA
VAV Terminals (with integral sound attenuator)

Selection

When selecting KSQA single duct variable air volume terminals, several factors must be considered to make the proper selection including:

- Air Flow and Air Pressure Drop
- Sound
- Heating (if required)
- Controls

Air Flow and Air Pressure Drop

All KSQA units can operate over a wide range of airflow. The minimum airflow shown for each unit is the lowest airflow at which the airflow sensor can generate an adequately strong signal for the pressure independent controls to operate properly. The maximum airflow shown for each unit is based on the industry practice of limiting the inlet air velocity to reasonable levels.

The units selected should be sized where the design airflow is between the maximum and minimum airflows shown in table 4. Referring to table 6 if 2378 CMH (1400 CFM) is the maximum design airflow, a unit with a 300mm inlet can be selected with an air pressure drop of0.01 inches (2.5pa) w.g.

Sound Performance

Tables 7 thru 11 indicate the sound power levels of each unit at varying air flow rates and inlet static pressures. Disregarding other factors and/or equipment that could contribute to the noise in the occupied space, these ratings along with the acoustical environment in which the unit operates, will determine the perceived noise level.

Noise generated within the terminal and emitted through the discharge air (discharge sound) will be attenuated by any duct work downstream of the terminal. The noise emitted through the casing of the terminal (radiated sound) will be attenuated by the room's ceiling. Depending upon the application, either the radiated or discharge noise level will be the relative higher and determine the perceived noise level in the occupied space. The occupied space itself will provide further attenuation depending on the acoustical characteristics of the walls, floors and internal furnishings.

All manufacturers must make certain assumptions on the acoustical environment of the application and then apply these assumptions to the unit's sound power ratings to determine the resultant sound pressures and perceived noise level in the occupied space. While the ARI sound power ratings have been certified and can be accurately compared from one manufacturer to another, the NC values predicted will be dependent upon the acoustical assumptions made.

When selecting terminals, check the attenuation assumptions before comparing cataloged NC values. KMC uses the ARI Standard 885, Appendix E attenuation assumptions for determining the anticipated noise levels. The attenuation assumptions in this standard are outlined in Table-2.

Table 2: ARI-885 Attenuation Table

Octave Band							
	2	**3**	**4**	**5**	**6**	**7**	
Radiated	2	1	0	0	0	0	Environmental Effect
All Sizes	16	18	20	26	31	36	Type II Mineral Fiber
	18	**19**	**20**	**26**	**31**	**36**	**Total dB Reduction**
Octave Band							
	2	**3**	**5**	**4**	**6**	**7**	
Discharge	2	1	0	0	0	0	Environmental Effect
Sizes 5-7	2	4	20	10	20	14	5ft., Duct Lining (12x12)
(300 - 700)	9	5	0	2	0	0	End Reflection
	6	10	20	18	21	12	5 ft., 8in. Flex Duct
	5	6	8	7	9	10	Room Effect
	3	3	3	3	3	3	Sound Power Division
	27	**29**	**51**	**40**	**53**	**39**	**Total dB Reduction**
Octave Band							
	2	**3**	**4**	**5**	**6**	**7**	
Discharge	2	1	0	0	0	0	Environmental Effect
Sizes 8-24 x 16	2	3	9	18	17	12	5ft., Duct Lining (12x12)
>700)	9	5	2	0	0	0	End Reflection
	6	10	18	20	21	12	5 ft., 8in. Flex Duct
	5	6	7	8	9	10	Room Effect
	5	5	5	5	5	5	Sound Power Division
	29	**30**	**41**	**51**	**52**	**39**	**Total dB Reduction**

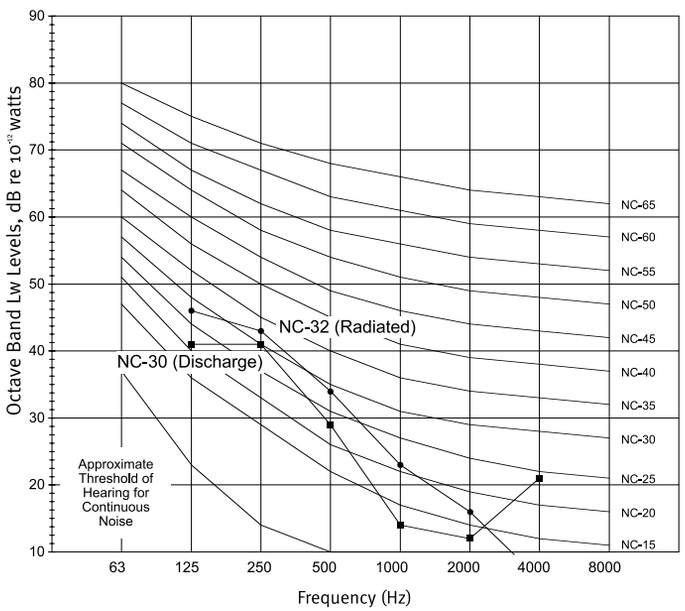
*In the interest of product development, KMC reserves the right to make changes without notice.

Sound Performance

The noise level desired in any given space is a function of the activity for which the space is intended. Typical NC design values for various applications are:

Table 3: Typical NC Design Values	
Hotel Rooms	25 - 35
Offices and conference rooms	25 - 35
Open Offices	30 - 40
Classrooms	35 - 40 (Max)
Churches	25 - 35
Hospital Wards	30 - 40
Gymnasiums	40 - 45
Libraries	30 - 40

The NC curves are intended to reflect a human's perceived noise comfort. Plotting the anticipated sound pressure by octave band and determining the tangent NC curve reached throughout all octave bands (using the acoustical assumptions) will indicate the NC value anticipated.



NC Curves for Specifying the Design Level in terms of the Maximum Permissible Sound Pressure Level for Each Frequency Band

	Radiated Lw - 1400 CFM @ 2.0" w.g. Inlet Ps							
	63	125	250	500	1000	2000	4000	8000
Lw Data	----	64	62	54	49	47	42	----
Attenuation	----	18	19	20	26	31	36	----
Plotted Data	----	46	43	34	23	16	6	----
NC	----	27	32	29	21	17	----	----
	Discharge Lw - 1400 CFM @ 2.0" w.g. Inlet Ps							
	63	125	250	500	1000	2000	4000	8000
Lw Data	----	70	71	70	65	64	60	----
Attenuation	----	29	30	41	51	52	39	----
Plotted Data	----	41	41	29	14	12	21	----
NC	----	21	30	24	----	----	24	----

Notes:
Size 12 KSQA
Radiated sound in the 250hz (third octave) is the Controlling Band

Heating (if Required)

Hot water heat

Select the hot water coil that provides at least as much heating output as required (based on the design conditions).

Using our example of a 300 mm (12") size unit, if the design heating airflow is 1360 CMH (800 CFM) for the heating coil selection, the heating capacity desired is 8.5 kW (29 MBH), the entering water temperature is 82.3˚C (180 ˚ F) and the entering air temperature is 12.7˚C (55 ˚ F), using Table 14 would indicate that a 1 row coil supplied with 0.25 LPS (4 GPM) of hot water would be required.

The air pressure loss for the heating coil selected at the maximum design airflow for the terminal (2380 CMH i.e 1400 CFM) must be added to the KSQA terminal's air pressure drop. The heating coil air pressure drops are also shown in Table 6. In our example, the air pressure drop across the coil is 60 Pa (0.24 inches w.g). This would be added to the termin al's air pressure drop of 2.5 Pa (0.01 inches w.g) at the design maximum airflow of 2380 CMH (1400 CFM) , which results in a

Total air pressure drop of 62.5 (0.25 inches w.g).

Electric Heat

The wattage of electric heat needed is determined by dividing the heating required in Mbh by 3.414, which results in the KW of heating required.

Using our example, it would require 8.5 KW of electric heat to provide the 29 Mbh heating capacity. Using table 25, the electric coil with 8.5 KW would be selected. Electric heat can be staged or modulated.

Note that the electric coil has an air proving switch, which requires a minimum of .07 inch w.g. Total pressure entering the coil to prove airflow.

Also note that it's prudent to check the air temperature leaving the heating coil at the design airflow. Using the previous example, the resulting leaving air temperature would be approximately 32°C (89°F), which would generally provide a comfortable environment and proper air distribution.

Control Sequences

A wide array of control sequences are available as standard on KMC's KSQA single duct variable air volume terminals.

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Table 4: Airflow Ranges (FloXact™ Sensor)

Type		Direct Digital Controller			
Inlet Size		Airflow (Min.)		Airflow (Max.)	
mm	inch	CMH	CFM	CMH	CFM
125	5” Dia	85	50	426	251
150	6” Dia	138	81	695	409
175	7” Dia	180	106	907	534
200	8” Dia	255	150	1286	757
225	9” Dia	323	190	1627	958
250	10” Dia	398	234	2006	1181
300	12” Dia	530	312	2672	1573
350	14” Dia	727	428	3661	2155
400	16” Dia	990	583	4991	2938
600 x 400	24 x 16	1870	1101	9428	5550

Notes
1. Minimum and maximum values shown are Cu.Mtr / H (CMH) & Cu.Ft. /min. (CFM)
2. Minimum and maximum airflow with pressure independent controls based on the following.
   Flow sensor signal :
   Direct Digital Controllers : 8 Pa (0.03” WG) - 190 Pa (0.76” WG)
3. Settings below the minimum are not recommended for accurate control when using pressure independent controls. Minimum airflow for pressure dependent applications is 0 cfm.
4. Pressure independent controls may be set for 0 CFM, at or above the minimum airflow show in table 4, but not between.
5. Direct Digital Controllers are factory programmed.
6. Airflow rates above maximum shown are available. Contact your KMC representative for application assistance.

Table 5: Airflow vs. FloXact™ Sensor Signal

SENSOR		INLET SIZE									
		5	6	7	8	9	10	12	14	16	24 x 16
ΔP		125	150	175	200	225	250	300	350	400	600 x 400
Pa	Inch. w.g	AIR FLOW (CMH)									
7	0.03	85	138	180	255	323	398	530	727	990	1870
10	0.04	97	160	207	294	374	460	612	839	1143	2161
15	0.06	119	195	255	360	457	562	749	1028	1400	2645
25	0.1	155	251	330	465	589	727	968	1327	1807	3416
50	0.2	217	357	465	659	834	1028	1369	1875	2557	4830
75	0.3	267	437	569	807	1021	1259	1677	2297	3133	5915
100	0.4	309	505	657	931	1179	1454	1937	2653	3617	6831
125	0.5	345	564	736	1041	1318	1609	2164	2966	4043	7638
149	0.6	377	617	805	1142	1446	1780	2371	3248	4429	8366
174	0.7	408	666	870	1232	1561	1923	2562	3510	4784	9036
199	0.8	437	712	929	1317	1668	2056	2738	3751	5115	9661
224	0.9	462	756	987	1398	1770	2181	2905	3979	5424	10247
249 (K)	1 (K)	488	797	1040	1473	1865	2298	3061	4194	5718	10801
374	1.5	598	975	1274	1804	2285	2815	3749	5137	7002	13228
Inlet Area	(sq.Mtr)	0.012	0.188	0.258	0.338	0.532	0.769	1.05	1.05	1.38	2.67
	(sq. ft)	0.130	0.188	0.258	0.338	0.532	0.769	1.05	1.05	1.38	2.67

Aiflow Calculations
Air Flow Sensors
Sensor ΔP= (CMH/K)2
CMH = K(ΔP)^0.5

Example: For a 300 mm (12”) inlet unit with a sensor ΔP signal of 149 Pa (0.60 inches w.g) the airflow is calculated to be 2371 CMH.
CMH = K(ΔP)^0.5= 3061 (0.6)^0.5 = 2371 ; For a 300mm (12”) inlet unit with 2371 CMH.
the sensor ΔP signal is calculated to be 0.60 inches w.g. ΔP= (CMH/K)^2 = (2371/3061)2 = 0.60” w.g.

Table 5A: K Factor for FloXact™ Sensor

	CMH									
Inlet Size (mm)	125	150	175	200	225	250	300	350	400	600 x 400
K Factor	488	797	1040	1473	1865	2298	3061	4194	5718	10801
Area (Sq.mtr)	0.012	0.017	0.024	0.031	0.040	0.049	0.071	0.098	0.128	0.248

Notes: K factors shown in 1.0 ΔP row

Table 6: Static Pressure Drop Data

INLET SIZE		AIRFLOW		MIN ΔPS							
				KSQA		1- row		2- row		4 - row	
mm	inches	CMH	CFM	Pa	inches w.g.	Pa	inches w.g.	Pa	inches w.g.	Pa	inches w.g.
125	5	212	125	12.5	0.05	6.2	0.025	7.5	0.03	16.2	0.065
		297	175	24.9	0.10	10.0	0.04	16.2	0.065	28.6	0.115
		425	250	37.4	0.15	12.5	0.05	27.4	0.110	52.3	0.210
		510	300	52.3	0.21	17.4	0.07	37.4	0.150	72.2	0.290
		595	350	64.7	0.26	24.9	0.100	47.3	0.190	94.6	0.380
150	6	340	200	2.5	0.01	10.0	0.040	17.4	0.070	34.9	0.140
		425	250	5.0	0.02	12.5	0.050	27.4	0.110	52.3	0.210
		510	300	7.5	0.03	17.4	0.070	37.4	0.150	72.2	0.290
		595	350	10.0	0.04	24.9	0.100	47.3	0.190	94.6	0.380
		680	400	12.5	0.05	29.9	0.120	59.8	0.240	119.5	0.480
		849	500	14.9	0.06	44.8	0.180	89.6	0.360	174.3	0.700
175	7	425	250	2.5	0.01	10.0	0.040	19.9	0.080	38.6	0.155
		510	300	5.0	0.02	12.5	0.050	27.4	0.110	52.3	0.210
		680	400	5.0	0.02	22.4	0.090	42.3	0.170	87.2	0.350
		849	500	7.5	0.03	32.4	0.130	64.7	0.260	129.5	0.520
		1019	600	12.5	0.05	44.8	0.180	89.6	0.360	179.3	0.720
		1147	675	14.9	0.06	54.8	0.220	109.6	0.440	216.6	0.870
200	8	595	350	2.5	0.01	17.4	0.070	34.9	0.140	69.7	0.280
		807	475	5.0	0.02	29.9	0.120	59.8	0.240	99.6	0.400
		1019	600	5.0	0.02	44.8	0.180	89.6	0.360	179.3	0.720
		1189	700	7.5	0.03	59.8	0.240	117.0	0.470	234.1	0.940
		1359	800	10.0	0.04	74.7	0.300	149.4	0.600	298.8	1.200
		1529	900	10.0	0.04	92.1	0.370	184.3	0.740	368.5	1.480
225	9	764	450	2.5	0.01	14.9	0.060	29.9	0.120	62.3	0.250
		892	525	5.0	0.02	18.7	0.075	37.4	0.150	74.7	0.300
		1019	600	5.0	0.02	23.7	0.095	49.8	0.200	97.1	0.390
		1189	700	7.5	0.03	29.9	0.120	62.3	0.250	122.0	0.490
		1529	900	10.0	0.04	47.3	0.190	94.6	0.380	186.8	0.750
		1869	1100	12.5	0.05	64.7	0.260	129.5	0.520	261.5	1.050
250	10	934	550	2.5	0.01	19.9	0.080	39.8	0.160	79.7	0.320
		1147	675	2.5	0.01	27.4	0.110	57.3	0.230	112.1	0.450
		1359	800	2.5	0.01	37.4	0.150	77.2	0.310	151.9	0.610
		1699	1000	2.5	0.01	57.3	0.230	114.5	0.460	224.1	0.900
		2039	1200	2.5	0.01	77.2	0.310	156.9	0.630	313.7	1.260
		2378	1400	2.5	0.01	104.6	0.420	211.7	0.850	423.3	1.700
300	12	1359	800	2.5	0.01	22.4	0.090	42.3	0.170	87.2	0.350
		1699	1000	2.5	0.01	32.4	0.130	64.7	0.260	129.5	0.520
		2039	1200	2.5	0.01	44.8	0.180	89.6	0.360	179.3	0.720
		2378	1400	2.5	0.01	59.8	0.240	117.0	0.470	234.1	0.940
		2888	1700	2.5	0.01	83.4	0.335	166.8	0.670	333.7	1.340
		3398	2000	2.5	0.01	112.1	0.450	296.3	1.190	443.2	1.780
350	14	1784	1050	2.5	0.01	18.7	0.075	37.4	0.150	74.7	0.300
		2378	1400	2.5	0.01	29.9	0.120	59.8	0.240	119.5	0.480
		3058	1800	2.5	0.01	47.3	0.190	94.6	0.380	189.2	0.760
		3737	2200	2.5	0.01	67.2	0.270	132.0	0.530	268.9	1.080
		4417	2600	2.5	0.01	89.6	0.360	181.8	0.730	361.1	1.450
		5096	3000	2.5	0.01	117.0	0.470	231.6	0.930	463.1	1.860
400	16	2378	1400	2.5	0.01	21.2	0.085	44.8	0.180	87.2	0.350
		3228	1900	2.5	0.01	39.8	0.160	74.7	0.300	149.4	0.600
		4077	2400	2.5	0.01	57.3	0.230	114.5	0.460	226.6	0.910
		4926	2900	2.5	0.01	79.7	0.320	159.4	0.640	318.7	1.280
		5946	3500	2.5	0.01	109.6	0.440	221.6	0.890	443.2	1.780
		6965	4100	2.5	0.01	146.9	0.590	293.8	1.180	587.6	2.360
600 x 400	24x16	5096	3000	2.5	0.01	37.4	0.150	74.7	0.300	149.4	0.600
		6795	4000	2.5	0.01	62.3	0.250	124.5	0.500	249.0	1.000
		8494	5000	2.5	0.01	92.9	0.373	186.8	0.750	368.5	1.480
		10193	6000	2.5	0.01	127.0	0.510	255.2	1.025	512.2	2.057
		11891	7000	2.5	0.01	169.3	0.68	336.2	1.350	674.8	2.710

Notes

1. Air Pressure drops shown for the hot water coils must be added to the terminal Air pressure drop.
2. Air pressure drop is the difference in the static pressure from the terminal Inlet and discharge with the damper in the fully open position.

Model KSQA
VAV Terminals (with integral sound attenuator)

شركة خالد لصناعة
Khalid Manufacturing Company

Table 7: Radiated Sound Power Data (dB) - KSQA units with integral
Sound attenuator and KSQAE units with integral electric heat

INLET SIZE		AIRFLOW		125 Pa (0.5") ΔPs						250 Pa (1.0") ΔPs						500 Pa (2.0") ΔPs						750 Pa (3.0") ΔPs					
				Sound Power Levels, dB						Sound Power Levels, dB						Sound Power Levels, dB						Sound Power Levels, dB					
mm	inches	CMH	CFM	Octave Band						Octave Band						Octave Band						Octave Band					
				2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
125	5	212	125	46	41	33	30	27	24	51	43	39	34	33	27	50	46	43	39	38	33	50	47	44	42	42	37
		297	175	49	44	35	31	28	25	52	48	41	37	35	28	54	51	47	42	40	34	54	52	49	45	44	38
		425	250	52	47	39	33	30	26	55	51	44	38	36	29	58	56	50	45	43	35	58	58	53	48	46	39
		510	300	53	49	41	35	32	27	56	53	46	40	37	30	60	57	52	46	44	36	60	60	55	50	48	40
		595	350	54	50	44	37	34	32	58	55	48	41	39	34	62	58	54	47	45	38	62	61	58	51	49	41
150	6	340	200	49	42	35	29	28	27	52	47	40	34	34	31	52	49	46	39	40	37	52	50	48	42	43	40
		425	250	50	43	36	30	30	28	53	48	41	35	35	32	55	53	48	41	41	38	55	53	51	44	44	41
		510	300	51	44	37	31	31	29	54	49	42	36	36	33	57	55	49	42	42	39	57	56	53	46	45	42
		595	350	52	45	39	32	32	30	55	50	43	37	37	34	58	56	50	43	43	40	58	59	55	48	46	43
		680	400	53	46	41	34	33	31	56	51	44	38	38	35	60	57	51	44	44	41	60	61	57	49	47	44
		849	500	56	50	45	38	37	35	58	53	48	40	40	38	62	58	53	46	45	42	62	62	57	50	49	45
175	7	425	250	50	46	38	33	30	26	52	51	44	39	36	31	52	52	48	43	41	36	52	53	49	46	44	41
		510	300	51	47	39	35	31	27	53	55	46	40	37	32	53	55	50	45	43	38	53	56	52	48	45	42
		680	400	52	48	40	36	33	28	56	56	48	42	39	33	56	62	54	49	45	40	56	61	56	51	48	43
		849	500	55	49	42	38	34	30	57	57	49	43	40	34	59	65	58	52	47	41	59	66	60	55	50	45
		1019	600	58	50	45	40	36	31	60	58	50	44	41	35	61	66	59	53	48	42	61	69	63	58	52	46
		1147	675	59	51	47	42	38	32	61	59	51	45	42	36	64	67	60	54	49	43	64	70	65	60	53	47
200	8	595	350	49	44	36	31	29	29	53	50	43	38	36	34	54	55	50	45	43	40	54	55	52	48	47	44
		807	475	50	45	37	33	32	30	54	51	44	39	37	35	56	60	51	46	44	41	56	60	56	51	48	44
		1019	600	51	46	39	35	33	31	55	52	45	40	38	36	58	61	52	47	45	41	58	64	58	52	49	45
		1189	700	53	47	41	37	36	32	56	53	46	41	39	37	60	62	53	48	45	42	60	65	59	53	59	46
		1359	800	54	49	44	40	38	33	57	54	47	43	41	38	61	63	54	49	46	43	61	66	60	54	50	47
		1529	900	56	50	47	43	40	35	59	55	49	45	43	39	63	64	55	50	47	44	63	67	61	55	51	47
225	9	764	450	47	44	37	33	31	26	51	52	43	38	36	31	55	58	51	45	43	38	55	63	55	49	47	42
		892	525	48	45	38	34	32	27	52	53	44	39	37	32	57	59	52	46	44	39	57	66	57	50	48	43
		1019	600	49	46	39	35	33	28	53	54	45	40	38	33	58	60	53	47	45	40	58	67	58	51	49	44
		1189	700	53	49	41	36	34	29	54	55	46	41	39	34	59	61	54	48	46	41	59	68	59	52	50	45
		1529	900	55	54	45	39	36	31	55	56	48	43	40	35	60	62	55	49	47	42	60	69	60	53	51	46
		1869	1100	56	55	48	42	38	33	56	57	50	44	41	36	61	63	56	50	48	44	61	70	61	54	52	47
250	10	934	550	49	43	38	34	33	28	52	51	43	40	39	35	54	57	50	46	45	40	54	61	53	51	48	43
		1147	675	50	44	40	36	34	29	53	52	44	41	40	36	56	58	51	47	46	41	56	62	54	51	49	44
		1359	800	51	46	41	37	35	30	54	53	45	42	41	37	57	59	52	48	47	42	57	63	55	52	50	45
		1699	1000	52	48	44	39	37	31	55	54	47	43	42	38	59	60	53	49	48	43	59	64	56	53	51	46
		2039	1200	55	51	46	41	39	34	57	55	49	45	43	39	61	61	54	50	49	44	61	65	57	53	52	47
		2378	1400	57	53	49	44	41	36	59	56	52	48	46	40	63	62	55	51	50	45	63	66	58	54	53	48
300	12	1359	800	51	44	37	34	33	27	56	50	43	39	39	33	60	59	51	46	44	39	60	60	57	50	48	43
		1699	1000	52	45	38	35	34	29	57	51	44	40	40	34	62	60	52	47	45	40	62	62	58	51	49	44
		2039	1200	53	47	40	37	35	30	58	52	45	41	41	35	63	61	53	48	46	41	63	63	59	52	50	45
		2378	1400	54	48	42	39	36	31	59	53	46	43	42	36	64	62	54	49	47	42	64	64	59	53	51	46
		2888	1700	56	51	45	42	39	32	60	55	48	45	43	37	65	63	55	50	48	43	65	65	60	54	52	47
		3398	2000	58	53	49	45	42	35	62	57	51	47	45	38	67	64	56	51	49	44	67	66	60	55	53	48
350	14	1784	1050	51	44	36	35	34	30	57	52	42	39	39	36	61	60	51	47	45	42	61	63	55	50	49	45
		2378	1400	52	45	39	36	36	31	58	53	43	40	40	37	63	61	52	48	46	43	63	64	56	51	50	46
		3058	1800	54	48	41	38	37	32	59	54	45	43	42	38	64	62	53	49	47	44	64	65	57	52	51	47
		3737	2200	56	51	45	41	39	35	60	55	47	44	44	39	65	63	54	50	49	45	65	66	58	53	52	48
		4417	2600	59	54	48	44	42	37	62	57	50	46	45	41	66	64	55	51	50	46	66	67	59	54	53	49
		5096	3000	61	56	51	47	45	40	64	59	53	49	47	43	68	64	56	52	52	47	68	68	60	55	54	50
400	16	2378	1400	50	45	38	36	37	32	57	53	44	41	40	37	61	61	51	48	46	42	61	64	55	51	50	46
		3228	1900	52	47	40	38	38	33	58	54	45	42	41	38	64	62	52	49	47	43	64	64	56	52	51	47
		4077	2400	55	50	43	41	40	36	60	55	46	45	44	39	65	63	53	50	48	44	65	65	57	53	52	48
		4926	2900	58	52	45	43	41	38	62	57	48	46	46	41	67	64	54	51	50	46	67	67	58	54	53	49
		5946	3500	61	55	48	45	43	40	64	59	51	48	47	42	68	65	55	52	51	47	68	68	59	55	54	50
		6965	4100	64	58	52	48	45	42	66	61	54	50	49	44	69	66	56	53	52	48	69	69	60	56	55	51
600 x 400	24x16	5096	3000	61	54	49	44	40	35	65	57	52	48	44	38	71	64	58	53	50	44	71	68	63	57	53	48
		6795	4000	66	59	55	48	44	38	69	62	56	51	46	41	74	67	60	55	51	45	74	70	64	58	54	49
		8494	5000	70	63	59	53	48	41	73	65	60	54	51	45	77	69	63	58	53	47	77	72	65	59	56	50
		10193	6000	73	67	63	56	51	44	75	69	63	56	52	47	79	70	64	59	54	48	79	73	66	60	57	51
		11891	7000	76	70	66	59	54	46	78	71	66	58	54	50	81	72	66	60	55	49	81	74	67	61	58	52

Notes
1. All sound data are measured in accordance with industry standard ARI-880.
2. Sound power levels are in decibels, re 10-12 watts.

Table 8 : Discharge Sound Power Data (dB)- KSQA units with integral sound attenuator

INLET SIZE		AIRFLOW		125 Pa (0.5") ΔPs						250 Pa (1.0") ΔPs						500 Pa (2.0") ΔPs						750 Pa (3.0") ΔPs					
				Sound Power Levels, dB						Sound Power Levels, dB						Sound Power Levels, dB						Sound Power Levels, dB					
mm	inches	CMH	CFM	Octave Band						Octave Band						Octave Band						Octave Band					
				2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7	2	3	4	5	6	7
125	5	212	125	59	53	46	40	31	28	59	56	56	47	46	45	58	53	49	45	38	36	58	53	50	46	41	41
		297	175	62	58	48	42	33	29	62	60	60	51	48	46	63	59	53	48	39	37	62	59	55	51	43	42
		425	250	65	61	51	45	36	31	65	63	63	53	50	48	68	64	57	50	40	37	67	65	59	53	44	42
		510	300	66	63	54	47	37	31	66	65	65	55	51	49	70	66	59	52	42	38	70	67	62	55	45	43
		595	350	68	65	57	49	40	38	69	66	66	56	54	53	71	67	61	54	44	43	73	69	64	57	47	44
150	6	340	200	62	55	48	42	33	28	63	63	6	53	51	48	63	57	55	49	40	36	62	57	56	52	44	41
		425	250	62	59	49	43	34	29	65	65	56	54	52	49	65	61	56	49	40	37	64	61	58	54	44	42
		510	300	63	61	51	45	35	30	66	67	57	56	54	50	66	63	57	50	41	37	67	65	60	54	44	42
		595	350	65	62	52	47	36	31	67	68	58	57	55	51	68	64	58	51	42	38	69	67	61	55	45	42
		680	400	65	62	53	48	37	31	68	69	60	59	56	53	69	65	58	52	42	38	69	68	62	55	45	43
		849	500	69	65	59	52	40	37	71	70	63	62	58	55	73	70	62	56	45	41	74	71	65	58	48	44
175	7	425	250	61	56	50	44	35	31	63	60	54	51	50	49	62	58	57	51	42	39	62	59	57	55	46	44
		510	300	62	58	50	44	35	32	64	62	55	52	51	51	64	60	58	51	42	40	65	61	60	56	46	45
		680	400	62	61	51	46	37	34	65	65	56	54	52	53	67	65	59	52	42	40	67	66	62	57	47	45
		849	500	64	62	53	48	38	35	66	66	57	56	53	54	68	67	59	53	44	41	70	68	63	58	47	46
		1019	600	66	63	56	52	40	37	67	67	60	58	54	55	71	67	61	55	45	43	72	70	65	59	48	47
		1147	675	68	64	59	54	41	38	69	68	63	61	56	56	72	68	62	56	46	43	74	70	66	60	49	48
200	8	595	350	61	53	49	44	37	34	66	64	56	55	53	50	63	59	55	50	42	40	65	60	60	56	48	44
		807	475	62	56	51	46	38	34	67	65	57	56	54	51	66	60	55	49	42	41	68	64	60	55	45	45
		1019	600	64	58	52	48	40	35	68	66	58	57	55	53	69	63	56	51	44	43	70	67	61	55	46	46
		1189	700	66	60	54	49	41	37	69	67	59	59	57	54	70	65	58	53	45	43	72	68	62	56	48	47
		1359	800	67	62	56	51	42	38	70	68	61	69	58	55	72	66	60	55	46	45	74	69	64	58	50	48
		1529	900	68	63	57	53	43	39	71	69	63	62	59	57	73	67	61	56	48	45	75	70	65	60	50	49
225	9	764	450	57	57	49	45	40	37	65	62	55	53	53	51	62	61	56	49	45	44	63	63	61	54	49	48
		892	525	59	58	51	45	41	38	66	63	56	54	54	52	63	63	57	50	46	45	64	64	62	54	50	49
		1019	600	61	59	52	47	42	39	67	64	57	55	55	53	65	65	58	51	47	46	67	66	63	56	51	50
		1189	700	63	62	53	48	43	40	68	65	58	57	56	55	67	66	60	53	48	47	68	68	64	56	52	51
		1529	900	65	64	55	51	44	42	68	66	59	58	57	56	68	68	62	55	50	49	71	71	66	59	53	53
		1869	1100	66	64	58	54	46	43	69	67	62	61	58	57	71	70	63	58	51	59	73	73	67	60	54	54
250	10	934	550	57	57	49	45	40	37	63	64	59	56	56	53	62	61	56	49	45	44	63	63	61	54	49	48
		1147	675	60	58	53	47	44	40	64	65	60	57	57	54	65	60	59	51	49	47	68	65	62	53	51	51
		1359	800	62	61	54	49	45	42	65	66	62	59	58	55	66	62	61	53	49	48	68	65	63	55	52	52
		1699	1000	63	63	55	51	46	44	66	67	62	60	59	57	69	67	64	56	51	50	70	68	66	58	54	54
		2039	1200	65	64	58	53	48	45	67	69	63	62	61	58	71	70	65	58	53	51	73	72	68	61	56	55
		2378	1400	67	66	60	56	49	46	68	70	65	64	62	59	72	71	66	60	55	5	74	74	69	63	58	56
300	12	1359	800	56	53	51	47	46	43	66	62	59	57	56	53	64	58	59	52	51	49	67	63	58	55	53	54
		1699	1000	60	56	53	49	47	45	68	63	60	58	57	54	65	60	62	54	52	51	68	64	61	57	54	55
		2039	1200	64	60	54	50	48	46	70	66	61	59	58	55	68	63	64	56	54	53	71	65	64	60	56	57
		2378	1400	65	61	56	51	49	47	69	67	62	60	59	57	71	67	66	57	55	53	73	67	66	62	58	57
		2888	1700	67	63	58	56	50	48	70	68	65	61	60	58	74	70	68	60	56	55	76	72	68	64	59	58
		3398	2000	69	65	61	57	52	50	70	70	66	64	61	59	76	71	69	61	57	56	78	74	70	65	61	59
350	14	1784	1050	61	58	53	50	49	47	68	63	60	57	58	56	64	60	59	55	54	52	67	63	61	58	58	57
		2378	1400	65	60	56	52	51	48	69	64	61	59	59	57	67	63	62	57	56	54	70	64	64	60	59	58
		3058	1800	68	63	58	55	52	49	71	65	62	60	60	59	72	68	64	60	57	55	74	69	67	62	61	59
		3737	2200	69	63	59	56	53	51	72	66	65	61	61	61	74	70	65	61	59	57	76	72	69	64	62	61
		4417	2600	71	65	61	56	54	51	74	67	67	63	62	62	76	71	67	62	60	58	78	75	70	66	63	62
		5096	3000	73	67	64	59	56	53	75	70	69	64	63	63	77	72	68	63	61	59	80	76	72	67	64	63
400	16	2378	1400	61	58	53	50	49	47	66	61	58	57	57	56	64	60	59	55	54	52	67	63	61	58	58	57
		3228	1900	65	61	56	53	53	51	67	62	60	59	59	57	70	67	64	60	58	56	72	69	68	62	60	60
		4077	2400	67	62	58	55	53	52	69	64	61	60	60	58	73	70	66	61	59	59	75	72	70	64	63	62
		4926	2900	70	64	60	56	54	53	71	65	63	61	61	59	75	71	67	62	60	59	77	75	71	66	64	63
		5946	3500	73	67	62	58	56	54	73	68	66	64	63	61	78	72	68	63	62	60	80	77	72	67	65	64
		6965	4100	75	69	67	60	58	56	76	70	70	66	65	62	80	74	70	64	63	61	82	78	74	68	66	65

Notes

1. All sound data are measured in accordance with industry standard ARI-880.
2. Sound power levels are in decibels, re 10-12 watts.

Tab Table 9: Hot Water Heating Coil Performance - Inlet Sizes 125 ,150mm (05", 06")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				85	170	255	340	425	510	595	680	765
125 , 150 mm (5",6") KSQA , 1 Row	0.03	0.6	kW	1.1	1.6	2.0	2.3	2.5	2.7	2.9	3.0	3.1
	0.06	1.8		1.1	1.8	2.2	2.6	2.9	3.2	3.4	3.6	3.8
	0.13	5.7		1.1	1.8	2.3	2.8	3.2	3.5	3.8	4.0	4.3
	0.19	11.7		1.2	1.9	2.4	2.9	3.3	3.6	3.9	4.2	4.5
	0.25	19.4		1.2	1.9	2.4	2.9	3.3	3.7	4.0	4.3	4.6
125 , 150 mm (5",6") KSQA , 2 Row	0.06	0.9	kW	1.6	2.6	3.4	4.0	4.5	4.9	5.2	5.5	5.8
	0.13	3.3		1.6	2.8	3.7	4.4	5.0	5.6	6.1	6.5	6.9
	0.19	7.2		1.7	2.8	3.8	4.6	5.3	5.9	6.4	6.9	7.4
	0.25	12.3		1.7	2.9	3.9	4.7	5.4	6.0	6.6	7.1	7.6
	0.32	18.5		1.7	2.9	3.9	4.7	5.5	6.2	6.7	7.3	7.8
125 , 150 mm (5",6") KSQA , 4 Row	0.19	1.5	kW	2.0	3.7	5.2	6.4	7.5	8.5	9.4	10.2	10.9
	0.25	2.4		2.0	3.8	5.3	6.6	7.7	8.8	9.8	10.6	11.4
	0.32	3.9		2.0	3.8	5.3	6.7	7.9	9.0	10.0	10.9	11.7
	0.38	5.4		2.0	3.8	5.4	6.7	8.0	9.1	10.1	11.1	12.0
	0.44	7.2		2.1	3.8	5.4	6.8	8.1	9.2	10.3	11.3	12.2

Table 10: Hot Water Heating Coil Performance - Inlet Sizes 175 ,200mm (07", 08")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				170	340	510	680	850	1019	1189	1359	1529
175 , 200 mm (7",8") KSQA , 1 Row	0.03	0.6	kW	1.7	2.4	2.9	3.3	3.5	3.8	3.9	4.1	4.2
	0.06	1.8		1.8	2.8	3.4	3.9	4.3	4.7	5.0	5.2	5.4
	0.13	6.3		1.9	3.0	3.8	4.4	4.9	5.3	5.7	6.1	6.4
	0.19	12.6		2.0	3.1	3.9	4.6	5.1	5.6	6.0	6.4	6.8
	0.25	20.9		2.0	3.1	4.0	4.7	5.3	5.8	6.2	6.7	7.0
175 , 200 mm (7",8") KSQA , 2 Row	0.06	0.9	kW	2.8	4.2	5.2	6.0	6.6	7.0	7.4	7.7	8.0
	0.13	3.3		2.9	4.7	6.0	7.0	7.8	8.5	9.1	9.7	10.1
	0.19	7.2		3.0	4.9	6.3	7.4	8.4	9.2	9.9	10.6	11.2
	0.25	12.6		3.0	5.0	6.4	7.7	8.7	9.6	10.4	11.1	11.7
	0.32	19.1		3.0	5.0	6.6	7.8	8.9	9.8	10.7	11.5	12.1
175 , 200 mm (7",8") KSQA , 4 Row	0.13	0.6	kW	3.8	6.4	8.4	10.0	11.3	12.3	13.2	13.9	14.6
	0.19	1.5		3.8	6.7	9.0	10.8	12.3	13.6	14.7	15.7	16.6
	0.25	2.7		3.8	6.8	9.2	11.2	12.9	14.4	15.6	16.8	17.8
	0.38	5.7		3.9	7.0	9.5	11.7	13.6	15.2	16.7	18.0	19.2
	0.50	9.6		3.9	7.1	9.7	12.0	13.9	15.7	17.3	18.7	20.0

Table 11: Hot Water Heating Coil Performance - Inlet Sizes 225 ,250mm (09", 10")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				510	722	934	1147	1359	1572	1784	1996	2209
225 , 250 mm (9",10") KSQA , 1 Row	0.03	0.6	kW	3.4	3.9	4.3	4.6	4.8	5.0	5.2	5.3	5.4
	0.06	2.4		4.0	4.7	5.3	5.8	6.2	6.5	6.9	7.1	7.4
	0.13	8.1		4.4	5.3	6.1	6.7	7.2	7.7	8.1	8.6	8.9
	0.19	16.7		4.5	5.5	6.4	7.1	7.7	8.2	8.7	9.2	9.6
	0.25	27.8		4.6	5.6	6.5	7.3	7.9	8.5	9.1	9.5	10.0
225 , 250 mm (9",10") KSQA , 2 Row	0.06	1.2	kW	6.0	7.1	7.9	8.6	9.1	9.5	9.9	10.2	10.5
	0.13	3.9		6.8	8.3	9.5	10.5	11.4	12.1	12.8	13.4	13.9
	0.19	8.4		7.1	8.8	10.2	11.4	12.4	13.3	14.1	14.9	15.5
	0.25	14.6		7.3	9.1	10.6	11.9	13.0	14.0	14.9	15.7	16.5
	0.32	22.1		7.4	9.3	10.8	12.2	13.4	14.5	15.4	16.3	17.1
225 , 250 mm (9",10") KSQA , 4 Row	0.13	0.9	kW	9.3	11.7	13.5	14.9	16.1	17.1	18.0	18.8	19.4
	0.25	3.3		10.1	13.0	15.4	17.5	19.3	20.8	22.2	23.5	24.6
	0.38	6.9		10.3	13.4	16.1	18.5	20.5	22.4	24.1	25.6	27.0
	0.50	11.7		10.5	13.7	16.5	19.0	21.2	23.3	25.1	26.8	28.3
	0.63	17.3		10.5	13.9	16.8	19.4	21.7	23.8	25.8	27.5	28.3

Note : all selections based on 82.3˚C (180 ˚F) EWT and 12.7 Deg.C (55 ˚F) EAT (69.4 ˚C ΔT). For other ΔT's adjust capacities by the following factors:-

ΔT	36	42	47	53	58	64	69	75	81	86	92
Factor	0.51	0.59	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25	1.33

Table 12: Hot Water Heating Coil Performance - Inlet Sizes 300 mm (12")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				680	1019	1359	1699	2039	2379	2718	3058	3398
300mm, (12") KSQA 1 Row	0.06	0.3	kW	4.7	5.5	6.1	6.6	6.9	7.2	7.5	7.7	7.9
	0.13	0.9		5.4	6.6	7.5	8.2	8.8	9.3	9.8	10.2	10.5
	0.19	1.5		5.7	7.1	8.1	9.0	9.7	10.4	10.9	11.4	11.9
	0.25	2.7		5.9	7.3	8.5	9.5	10.3	11.0	11.6	12.2	12.7
	0.32	4.2		6.0	7.5	8.8	9.8	10.7	11.4	12.1	12.7	13.3
300mm, (12") KSQA 2 Row	0.06	1.2	kW	7.7	9.2	10.2	11.0	11.5	12.0	12.4	12.7	13.0
	0.13	4.8		8.9	11.2	12.9	14.2	15.3	16.3	17.1	17.7	18.3
	0.19	9.9		9.4	12.0	14.0	15.7	17.1	18.3	19.4	20.3	21.1
	0.25	16.7		9.7	12.5	14.7	16.6	18.1	19.5	20.7	21.8	22.8
	0.32	25.4		9.8	12.7	15.1	17.1	18.8	20.3	21.7	22.9	23.9
300mm, (12") KSQA 4 Row	0.13	1.2	kW	12.2	15.5	17.9	19.7	21.1	22.3	23.2	24.0	24.7
	0.25	3.9		13.3	17.7	21.3	24.1	26.6	28.7	30.4	32.0	33.4
	0.38	8.1		13.7	18.6	22.6	26.0	28.9	31.5	33.7	35.7	37.6
	0.50	13.7		13.9	19.0	23.3	27.0	30.2	33.1	35.6	37.9	40.0
	0.63	20.9		14.1	19.3	23.7	27.6	31.0	34.1	36.8	39.3	41.6

Table 13: Hot Water Heating Coil Performance - Inlet Sizes 350 mm (14")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				850	1359	1869	2379	2888	3398	3908	4417	4927
350mm, (14") KSQA 1 Row	0.13	0.9	kW	7.0	8.8	10.2	11.2	12.0	12.7	13.3	13.9	14.3
	0.19	1.8		7.5	9.6	11.2	12.5	13.5	14.4	15.1	15.8	16.4
	0.25	3.3		7.7	10.0	11.7	13.2	14.4	15.4	16.3	17.1	17.8
	0.32	4.8		7.9	10.3	12.1	13.7	14.9	16.1	17.1	17.9	18.7
	0.38	6.9		8.0	10.5	12.4	14.0	15.4	16.6	17.6	18.5	19.4
350mm, (14") KSQA 2 Row	0.13	1.5	kW	11.1	14.2	16.3	18.0	19.2	20.3	21.1	21.8	22.5
	0.19	3.3		11.9	15.6	18.3	20.5	22.2	23.7	24.9	26.0	26.9
	0.25	5.4		12.3	16.4	19.5	22.0	24.0	25.8	27.3	28.6	29.8
	0.38	11.4		12.7	17.3	20.8	23.7	26.2	28.3	30.1	31.8	33.3
	0.50	19.1		13.0	17.7	21.5	24.6	27.4	29.7	31.8	33.7	35.4
350mm, (14") KSQA 4 Row	0.25	3.0	kW	16.8	23.2	28.0	31.8	34.8	37.3	39.4	41.2	42.7
	0.38	6.3		17.4	24.6	30.3	35.0	38.9	42.3	45.1	47.6	49.8
	0.50	10.5		17.7	25.3	31.6	36.8	41.2	45.1	48.5	51.5	54.1
	0.63	15.8		17.9	25.8	32.3	37.9	42.7	46.9	50.7	54.0	57.0
	0.76	22.1		18.0	26.1	32.9	38.7	43.7	48.2	52.2	55.8	59.1

Table 14: Hot Water Heating Coil Performance - Inlet Sizes 400 mm (16")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				1019	1741	2464	3186	3908	4630	5352	6074	6796
400mm, (16") KSQA 1 Row	0.13	0.9	kW	28.3	36.5	42.1	46.3	49.6	52.3	54.6	56.5	58.2
	0.19	2.1		30.2	39.9	46.8	52.1	56.4	60.0	63.1	65.8	68.2
	0.25	3.6		31.3	41.8	49.6	55.7	60.7	64.9	68.5	71.7	74.6
	0.32	5.1		32.0	43.1	51.4	58.1	63.5	68.2	72.3	75.9	79.1
	0.38	7.2		32.5	44.1	52.8	59.8	65.6	70.7	75.1	79.0	82.5
400mm, (16") KSQA 2 Row	0.13	1.8	kW	44.3	57.6	66.2	72.4	77	80.6	83.5	86.0	88.0
	0.19	3.6		47.8	64.4	75.9	84.5	91.2	96.7	101.3	105.2	108.6
	0.25	6.0		49.7	68.2	81.6	91.9	100.2	107.1	112.9	118.0	122.4
	0.38	12.3		51.8	72.5	88.1	100.6	110.9	119.6	127.2	133.8	139.7
	0.50	20.6		52.8	74.8	91.8	105.5	117	126.9	135.6	143.2	150.2
400mm, (16") KSQA 4 Row	0.25	3.3	kW	68.0	96.6	116.7	131.5	142.8	151.8	159.2	165.3	170.5
	0.38	6.6		70.7	103.8	128.6	148.0	163.7	176.7	187.6	197.0	205.1
	0.50	11.4		72.1	107.5	135.1	157.4	175.9	191.5	204.9	216.6	226.9
	0.63	17.0		73.0	109.8	139.3	163.4	183.8	201.3	216.5	230.0	241.9
	0.76	23.6		73.5	111.4	142.1	167.6	189.4	208.3	224.9	239.6	252.8

Note : all selections based on 82.3˚C (180 ˚F) EWT and 12.7 Deg.C (55 ˚F) EAT (69.4 ˚C ΔT). For other ΔT's adjust capacities by the following factors:-

ΔT	36	42	47	53	58	64	69	75	81	86	92
Factor	0.51	0.59	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25	1.33

Model KSQA
VAV Terminals (with integral sound attenuator)

شركة خالد لصناعة
Khalid Manufacturing Company

Table 15: Hot Water Heating Coil Performance - Inlet Sizes 300 mm (12")

	Water Flow (LPS)	Water PD (kPa)		AIR FLOW CMH								
				1699	2973	4248	5522	6796	8070	9345	10619	11893
600 x 400 mm, (24" x 16") KSQA 1 Row	0.13	3.3	kW	13.0	16.6	18.9	20.6	21.8	22.8	23.6	24.3	24.9
	0.19	7.2		14.1	18.6	21.6	23.9	25.7	27.2	28.4	29.4	30.4
	0.25	12.0		14.7	19.7	23.2	25.9	28.1	29.9	31.4	32.8	34.0
	0.32	17.6		15.1	20.5	24.3	27.3	29.8	31.8	33.6	35.2	36.5
	0.38	24.5		15.4	21.0	25.1	28.3	31.	33.3	35.2	36.9	38.4
600 x 400 mm, (24" x 16") KSQA 2 Row	0.13	1.2	kW	18.8	23.4	25.9	27.6	77	29.6	30.3	30.8	31.3
	0.19	2.4		21.1	27.5	31.5	34.3	91.2	37.9	39.2	40.3	41.1
	0.25	3.9		22.4	30.0	35.1	38.7	100.2	43.7	45.6	47.1	48.4
	0.38	8.1		23.8	33.0	39.4	44.3	110.9	51.3	54.0	56.3	58.3
	0.50	13.5		24.6	34.6	41.9	47.6	117	56.1	59.3	62.2	64.7
600 x 400 mm, (24" x 16") KSQA 4 Row	0.13	1.8	kW	25.5	30.8	33.1	34.3	142.8	35.5	35.9	36.1	36.2
	0.19	3.9		29.3	38.3	43.2	46.1	163.7	49.3	50.3	51.0	51.6
	0.25	6.3		31.2	42.8	49.8	54.3	175.9	60.0	61.8	63.2	64.3
	0.38	13.2		33.2	47.9	57.9	65.1	183.8	74.8	78.2	81.0	83.4
	0.50	21.8		34.2	50.6	62.4	71.5	189.4	84.3	89.0	93.0	96.4

Note : all selections based on 82.3˚C (180 ˚F) EWT and 12.7 Deg.C (55 ˚F) EAT (69.4 ˚C ΔT). For other ΔT's adjust capacities by the following factors:-

ΔT	36	42	47	53	58	64	69	75	81	86	92
Factor	0.51	0.59	0.67	0.75	0.83	0.92	1.00	1.08	1.17	1.25	1.33

Reheat Coil Definitions

CMH = Cubic Meter / Hour
LPS = Liters / Sec
EAT = Entering Air Temperature , ˚C
LAT = Leaving Air Temperature , ˚C
ΔTA = Differential Air Temperature, ˚C = LAT - EAT
EWT = Entering Water Temperature ˚C
LWT = Leaving Water Temperature , ˚C
ΔTw = Differential Water Temperature, ˚C = LWT - EWT
kW = Kilowatt
1 kW = 3412 BTU /Hr

Water Coil Calculation

KW = CMH x 1.204 x ΔTA / 3,600
ΔTA = kW x2990 / CMH
ΔTw = kW / (LPS x 4.187)

Sizing Reheat Coils :

1. Knowing the heating load of the space (kW), room set point, and the air flow rate (CMH) during heating (based on minimum ventilation rates,max recommended discharge temp. for best ADPI, etc) determine the supply air temperature required to satisfy the load :

Supply Air temperature = (kW X2990 /CMH) + Room Temp. set point

2. The supply Air temperature in to the space is the required Leaving Air Temperature from the coil (assuming no duct heat loss). Applying energy transfer equations for electric or Hot water coils determines performance characteristics required to select coil :

Hot Water / Electric Heater coils = CMH x 1.204 x ΔTA / 3,600

Table 16 - Model KSQA Radiated & Discharge Ratings as per AHRI 880 standard

"Inlet Size"	"Airflow (CFM)"	"Min Ps (in. w.g.)"	"Radiated Sound Power (dB) by octive band @ 1.5" "w.g."						"Discharge Sound Power (dB) by octive band @ 1.5" "w.g."					
			2	3	4	5	6	7	2	3	4	5	6	7
5	250	0.18	63	56	50	46	44	36	72	68	61	59	56	53
6	400	0.15	64	56	49	44	38	31	74	71	65	59	56	53
7	550	0.10	64	64	59	53	48	42	72	74	65	62	59	57
8	700	0.01	62	60	54	47	45	43	75	74	67	65	62	58
9	900	0.01	62	60	54	49	48	43	75	74	65	63	62	58
10	1100	0.01	64	59	51	46	38	30	80	73	66	63	60	57
12	1600	0.01	65	61	54	50	49	43	76	73	67	65	63	59
14	2100	0.01	66	61	54	50	49	44	75	72	67	65	64	62
16	2800	0.01	67	65	56	50	44	36	81	73	69	67	63	61
24x16	5300	0.01	79	72	66	61	57	49	81	79	74	73	72	69

Notes :

1. All sound data are measured in accordance with industry standard AHRI-880
2. Sound power levels are in decibels, re10^{-12} watts
3. Discharge Lw includes end reflection loss per AHRI requirements

Model KSQA

VAV Terminals (with integral sound attenuator)

KSQA Terminal

MODEL

KSQA - with integral Sound Attenuator

INLET SIZE

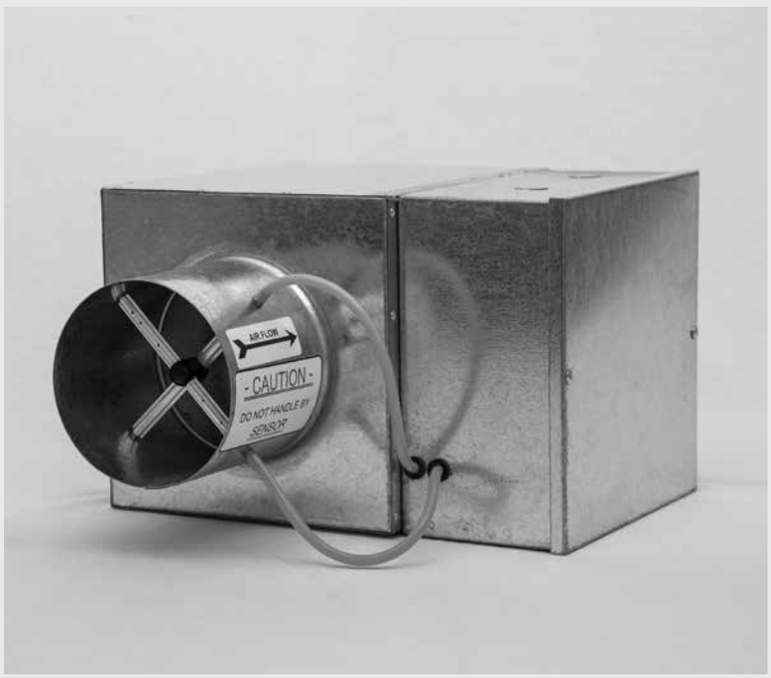
- 125 (5”Ø)
- 150 (6”Ø)
- 175 (7”Ø)
- 200 (8”Ø)
- 225 (9”Ø)
- 250 (10”Ø)
- 300(12”Ø)
- 350(14”Ø)
- 400 (16”Ø)
- 600 x 400 (24”x16”)

CASING CONSTRUCTION

- Galvanized Steel
- 304 Stainless Steel
- 316 Stainless Steel
- 22 Gauge (0.8mm) Standard
- 20 Gauge (1.0mm)

CASING TREATMENTS

- 25 (1”) Foil Faced Insulation
- 25 (1”) Matt Faced Insulation
- 25 (1”) Fiber-Less Insulation
- Dual Wall



CONTROL SYSTEM

- Electric Control

Control strategies available for all applications

CONTROL SIDE

- Right Side
- Left Side

ELECTRIC COILS

- 240 Volts
- 415 Volts
- 1Phase
- 3 Phase
- 1 Step
- 3 Step
- 2 Step
- Modulating
- Door Interlocking Disconnect Switch, Non - Fused
- Power Fusing
- Primary Fused Transformer

ELECTRIC CONTROLS

- Control Transformer
- Low Voltage Control Disconnect Switch.
- Low Voltage Fuse & Fuse Block
- Low Voltage Disconnect Switch
- Low Voltage Power-Fusing
- 24 VAC Actuator

*In the interest of product development, KMC reserves the right to make changes without notice.

Model KSQA

VAV Terminals (with integral sound attenuator)

شركة خالد لصناعة
Khalid Manufacturing Company

Typical Specification

Furnish and install KMC's KSQA Single Duct Variable Air Volume Terminals, KSQA Single Duct Variable Air Volume Terminals with integral sound attenuator, or KSQAE Single Duct Variable Air Volume Terminals with integral electric heating coil as shown on the plans. The performance of all Single Duct Terminals shall be Rated in accordance to ARI standard 880. Discharge and radiated sound power levels shall not exceed the values as shown on the terminal unit schedule.

Casing Construction:

The unit casing shall be fabricated from zinc coated steel and use mechanical locking seams to form a leak resistant assembly. Any sealant used in the unit's construction must be approved for duct use and conform to NFPA 90A. Leakage through the Air Terminal casing shall be less than 1% of the maximum rated air flow @ 750 Pa (3" w.g) static pressure. The terminal discharge connection shall be Slip & Drive type integral to the casing.

The casing shall be:

- 0.8mm (22G) (standard), and 1.0 mm (20 G)

The casing shall be provided with:

- Standard control enclosure
- Custom sized control enclosure
- Hinged front cover for control enclosure

Insulation and Treatment:

The unit casing shall be internally lined with:

- 25mm (1") thick aluminum foil-faced glass fiber insulation. The edges of the insulation shall be sealed with aluminum tape. The insulation shall conform to NFPA 90A, UL 181, and ASTM C665.
- 25mm (1") thick Matte faced insulation. The edges of the insulation shall be sealed with aluminum tape. The insulation shall conform to NFPA 90A, UL 181, and ASTM C665
- 25mm (1") thick (fiber-less) smooth skin surface closed cell foam insulation. The insulation shall conform to NFPA 255 and UL 181.
- No Insulation

Air Valve:

The damper assembly shall consist of a round blade that requires nominal 90-degree rotation from fully opened to fully closed positions on sizes 125 (5") through 16. The damper blade shall be mechanically attached to the die-cast metal damper shaft with through the shaft machine-applied rivets. The low leakage damper shall be constructed of a gasket material sandwiched between two 22-gauge zinc coated steel plates. Leakage through the damper shall be less than 1% of the maximum rated airflow at 750 Pa (3" w.g) static pressure. The damper gasket material is securely fastened between the two damper plates using machine applied rivets. The damper assembly shall rotate freely in Nylon bearings. Damper position shall be indicated on the end of the shaft on the outside of the casing. Inlet connection and damper on size 600 x 400 (24 x 16) shall be rectangular.

Airflow Sensor:

A multi-point airflow sensor (FloXact-X ™) of the multi-point averaging type shall be located in the terminal inlet. The airflow sensor shall be designed to have unique shape and creates a linear amplified signal with a low noise level and pressure drop. The sensor shall amplify (at least 2.5x Pdyn) the velocity pressure signal and provide feedback of actual flow to the controller to have stable measuring signal from 0.8 m/s Air velocity

Electronic analog controls:

The electronic analog controls shall be suitable for a 24-volt control system. The electronic actuator shall be mounted at factory (either KMC's standard actuators or furnished by Customer) to move the damper from fully open to fully closed positions. The actuator shall be directly coupled to the damper shaft with no linkages.

- The electronic pressure independent controller shall control flow within +/- 5% of the design airflow regardless of changes in system static pressure. The controller shall reset the flow as required by the thermostat. The maximum and minimum airflow set points shall be set at the factory. The electronic actuator and controller shall be combined in a single compact housing.

The terminal shall also be provided with:

- Transformer to step down incoming line voltage to 24 volts (standard on KSQAE units with electric heating coils)
- Service disconnect switch for 24 volt controls (pilot duty)
- Line voltage fusing and fuse block

The wall thermostat shall be furnished by KMC for installation by the temperature control contractor. Flow adjustments shall be made at the wall thermostat utilizing a digital voltmeter.

It shall be the responsibility of the temperature control contractor to coordinate these requirements with manufacturer (KMC).

Hot Water Coils:

Where shown on the plans, hot water heating coils shall be provided and mounted by the terminal manufacturer (KMC). The hot water coils shall be mounted at the discharge of the terminal unit, and the coil shall have a Slip & Drive type connection for attachment to the downstream ductwork.

Coils shall be 12.7mm (1/2") OD copper tubing mechanically expanded in aluminum fins. Coils shall be leak tested with dry nitrogen to 28 Bar (400 psi) with a minimum burst pressure of 175 Bar (2500 psi) . The performance of all hot water coils shall be rated in accordance with ARI standard 410. Refer to the terminal schedule on the plans for capacities and performance requirements. The water control valves shall be furnished and installed by others and not by the terminal manufacturer (KMC).

DDC Controls:

Terminal manufacturer (KMC) shall mount DDC controls provided by others. All mounting hardware should be provided by the DDC control supplier. It shall be the responsibility of the DDC supplier to coordinate and provide job specific wiring diagrams to the terminal manufacturer (\KMC).

Electric Heating Coils:

KMC's KSQAE units shall have the electric resistance type heating coils and coil controls. The electric coils shall be located a sufficient distance downstream of the primary air damper to prevent hot spots and nuisance tripping. The heating elements shall be installed as an integral part of the terminal unit. All terminals with electric heat shall include high grade nickel-chrome elements, a transformer, air proving switch, primary disc type automatic reset hi-limit (standard), secondary hi-limit manual reset cutout(optional), magnetic contractors and/or PE switches per step, grounding terminal, and circuit fusing on heaters exceeding 48 amps. Coil control enclosure panel and frame shall be constructed from galvanized steel. A wiring diagram shall be permanently affixed to the coil control enclosure panel. Refer to the terminal schedule on the plans for capacity and performance requirements.

- In Electronic analog control systems, the terminal manufacturer (KMC) shall interconnect the electronic controls with the electric coil for proper staging of heat. Power connection for the coil and associated flow controls shall be made at a single point. The coils shall also be provided with:
- Door interlocking disconnect switch – non-fused (Optional)
- Power-fusing (Fuses and fuse blocks)
- SSR proportional modulating controller
- Transformer