Model KSQE

VAV Terminal (with integral electric re-heat)

Flexibility

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

KSQE 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

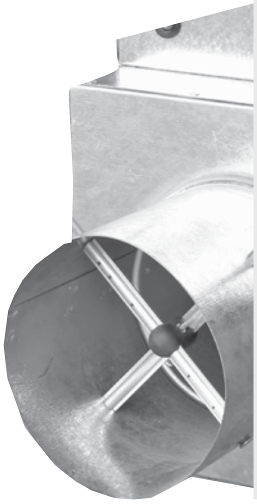
Performance

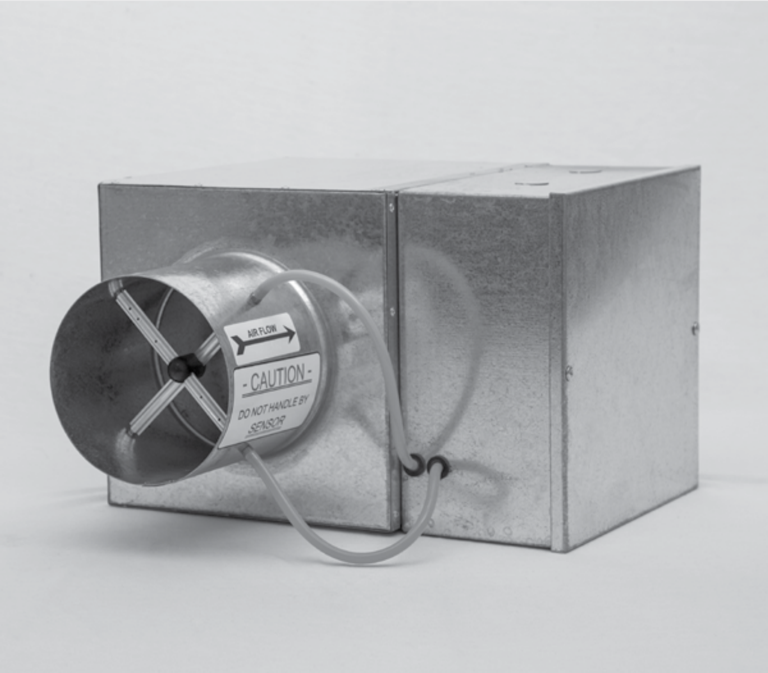
The lack of intruding fasteners, tabs or other obstructions in the air stream results in very quiet sound performance and low internal pressure losses. All units incorporate full 90° rotation round dampers (except the size 600 x 400) for precise control of the airflow.

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

KSQE 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 KSQE 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.

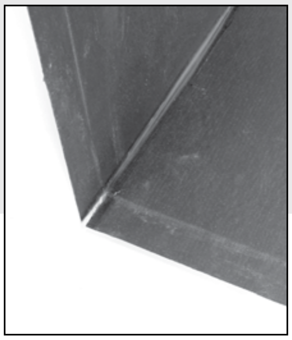
The damper blade is made of gasket material sandwiched between two round steel plates. The round damper blade in the air valve is affixed to the shaft using through-the-shaft machine applied rivets. The die-cast metal shaft rotates in self-lubricating bearings for easy turning and long operating life. 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.

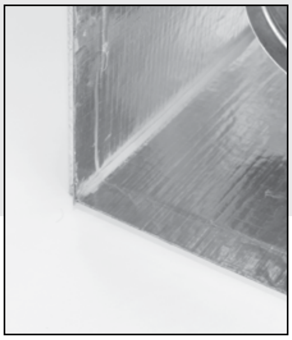
Features:

- 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

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

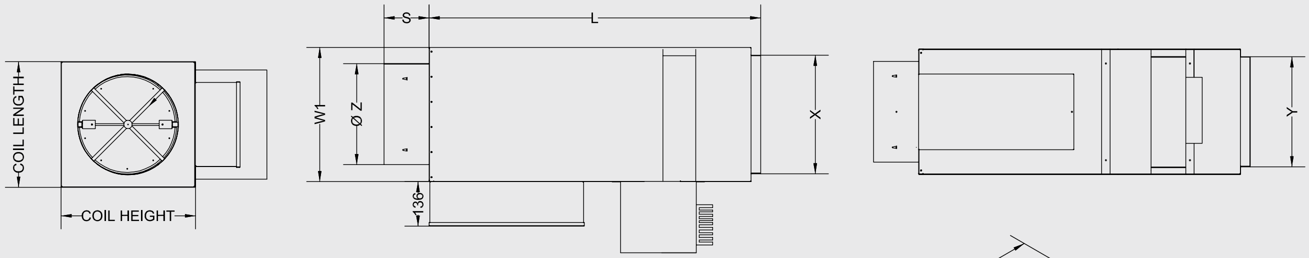
Model KSQE

VAV Terminal (with integral electric re-heat)

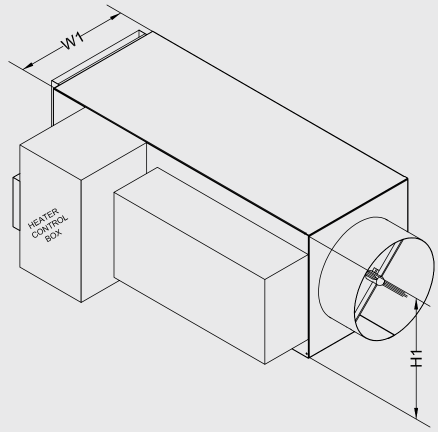
Khalid Manufacturing Company

Dimensional Data

KSQEE units with Electric heating coil.



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	15.0
06	150	500	850	149	254	254	197	197	1003	136	15.0
07	175	675	1147.5	175	305	254	248	197	1003	136	16.0
08	200	900	1530	200	305	254	248	197	1003	136	16.0
09	225	1100	1870	225	356	318	299	261	1003	136	19.0
10	250	1400	2380	251	356	318	299	261	1003	136	19.0
12	300	2000	3400	302	406	381	350	324	1003	136	21.0
14	350	3000	5100	352	508	445	451	388	1003	136	25.0
16	400	4100	6970	403	610	445	553	388	1003	136	28.0
24 x 16	600 x 400	7000	11900	610 X 406	965	457	940	432	1349	138	58.0



Type		Direct Digital Controller				Wattage (Max)	Volts (V)	Phase	Current (A)
Inlet Size		Airflow (Min.)		Airflow (Max.)					
mm	inch	CMH	CFM	CMH	CFM	kW	Volts	(Ø)	Amps
125	5”	85	50	426	251	3	220	1	13.64
150	6”	138	81	695	409	6	415	3	14.43
175	7”	180	106	907	534	6	415	3	14.43
200	8”	255	150	1286	757	6	415	3	14.43
225	9”	323	190	1627	958	8	415	3	19.24
250	10”	398	234	2006	1181	8	415	3	19.24
300	12”	530	312	2672	1573	8	415	3	19.24
350	14”	727	428	3661	2155	11	415	3	26.46
400	16”	990	583	4991	2938	12	415	3	28.87
600 X 400	24” X 16”	1870	1101	9428	5550	16	415	3	38.40

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	

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

Selection

When selecting KSQE 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 KSQE 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.

Model KSQE

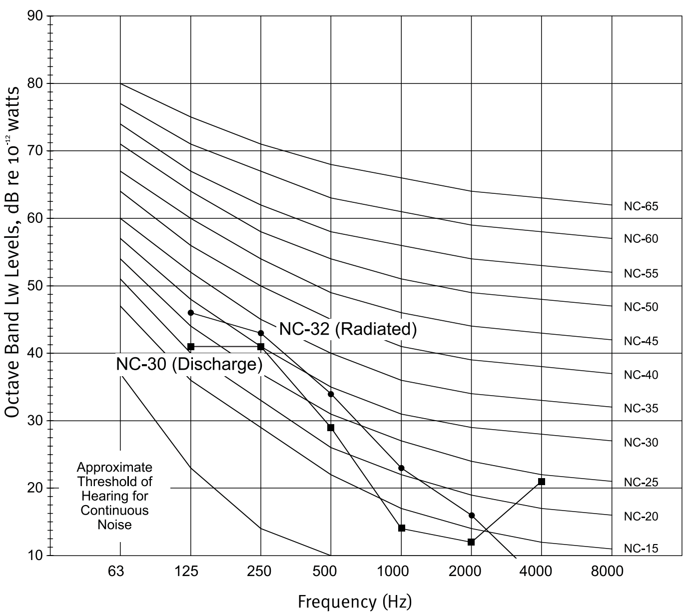
VAV Terminal (with integral electric re-heat)

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 KSQE 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 KSQE 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 KSQE single duct variable air volume terminals.

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 KSQEE	
mm	inches	CMH	CFM	Pa	inches w.g.
125	5	212	125	12.5	0.025
		297	175	24.9	0.04
		425	250	37.4	0.05
		510	300	52.3	0.07
		595	350	64.7	0.100
150	6	340	200	2.5	0.040
		425	250	5.0	0.050
		510	300	7.5	0.070
		595	350	10.0	0.100
		680	400	12.5	0.120
		849	500	14.9	0.180
175	7	425	250	2.5	0.040
		510	300	5.0	0.050
		680	400	5.0	0.090
		849	500	7.5	0.130
		1019	600	12.5	0.180
		1147	675	14.9	0.220
200	8	595	350	2.5	0.070
		807	475	5.0	0.120
		1019	600	5.0	0.180
		1189	700	7.5	0.240
		1359	800	10.0	0.300
		1529	900	10.0	0.370
225	9	764	450	2.5	0.060
		892	525	5.0	0.075
		1019	600	5.0	0.095
		1189	700	7.5	0.120
		1529	900	10.0	0.190
		1869	1100	12.5	0.260
250	10	934	550	2.5	0.080
		1147	675	5.0	0.110
		1359	800	5.0	0.150
		1699	1000	7.5	0.230
		2039	1200	10.0	0.310
		2378	1400	14.9	0.420
300	12	1359	800	2.5	0.090
		1699	1000	5.0	0.130
		2039	1200	5.0	0.180
		2378	1400	7.5	0.240
		2888	1700	12.5	0.335
		3398	2000	14.9	0.450
350	14	1784	1050	2.5	0.075
		2378	1400	5.0	0.120
		3058	1800	5.0	0.190
		3737	2200	7.5	0.270
		4417	2600	10.0	0.360
		5096	3000	12.5	0.470
400	16	2378	1400	2.5	0.085
		3228	1900	2.5	0.160
		4077	2400	5.0	0.230
		4926	2900	5.0	0.320
		5946	3500	7.5	0.440
		6965	4100	10.0	0.590
600 x 400	24x16	5096	3000	2.5	0.150
		6795	4000	5.0	0.250
		8494	5000	7.5	0.373
		10193	6000	10.0	0.510
		11891	7000	12.5	0.68

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

Table 19 - Model KSQE 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 KSQE

VAV Terminal (with integral electric re-heat)

Khalid Manufacturing Company

KSQE Terminal

MODEL

- KSQE - Basic Assembly
- KSQEA - with integral Sound Attenuator
- KSQEE - with integral Electric Heat

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.

Typical Specification

Furnish and install KMC's KSQE Single Duct Variable Air Volume Terminals, KSQEA Single Duct Variable Air Volume Terminals with integral sound attenuator, or KSQEE 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 KSQEE 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 KSQEE 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