



# VARIABLE AIR VOLUME TERMINAL UNITS



شركة خالد لصناعة  
**Khalid** Manufacturing Company



## Contents

<b>Introduction</b>	02
<b>Features</b>	04
<b>Casing Treatments</b>	05
<b>Product Selection Guide</b>	06
<b>Airflow Ranges</b>	08
<b>Air Pressure Drop Data</b>	09
<b>Model KSQ</b>	10
Sound Power Data -KSQ	11
NC Values -KSQ	14
Features at a glance -Model KSQ	15
<b>Model KSQA</b>	16
Sound Power Data -KSQA	17
NC Values-KSQA	20
Features at a glance -Model KSQA	21
<b>Model KSQE</b>	23
Sound Power Data -KSQE	24
NC Values -KSQE	25
Features at a glance - Model KSQE	26
<b>Typical Specifications</b>	27

Contents

# INTRODUCTION



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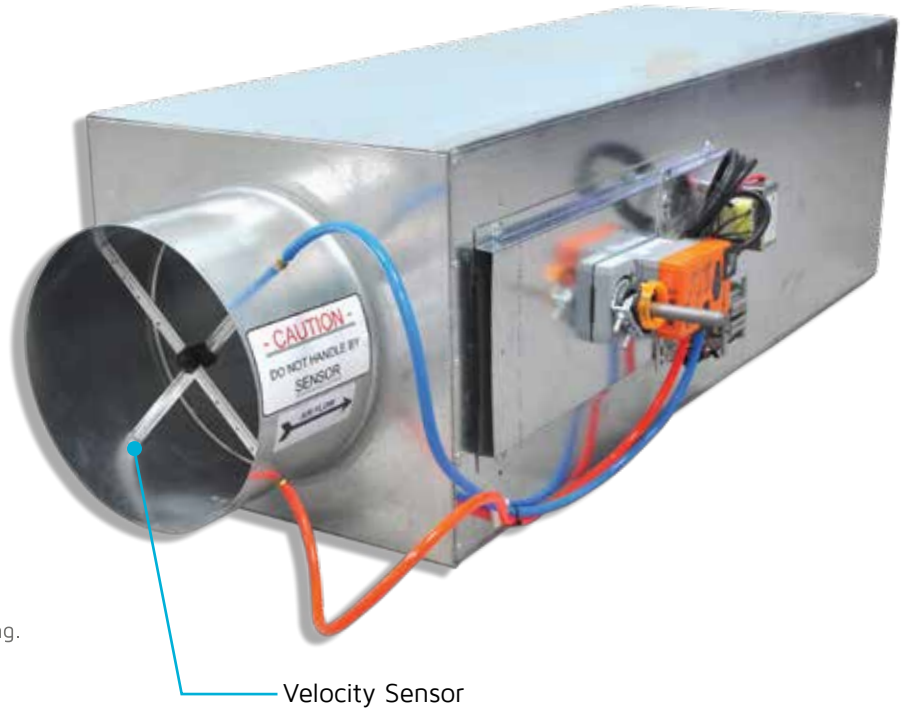
Khalid Manufacturing Company with its experience in the manufacture of air distribution products in Qatar for more than three decades has grown over the years by constantly upgrading its manufacturing process and has earned the reputation as a local manufacturing facility offering products complying with international standards.

Khalid Manufacturing Co. (KMC), having its manufacturing facility in Doha, Qatar, is pleased to announce its participation in the Air-Conditioning, Heating, and Refrigeration Institute's (AHRI) VAV certification program.

Pressure Independent VAVs manufactured by KMC in Qatar are now AHRI Certified.

Certificates downloaded from the directory may be used for rebates and other verification purposes.





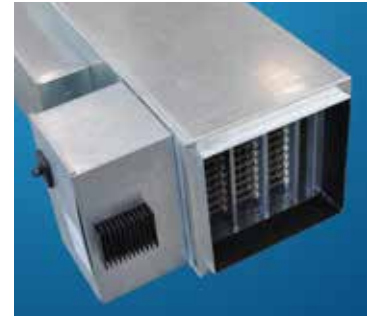
## AHRI Certified®

- ✓ Conforms to standard.
- ✓ Subject to rigorous and continuous testing.
- ✓ Manufacturers' performance ratings independently measured.
- ✓ Third-party verified.
- ✓ All products within program scope certified.
- ✓ Provides marketplace clarity.

Velocity Sensor



Look for the **AHRI certified®** mark to identify certified products, and see product listing in the AHRI Directory of certified product performance ([www.ahridirectory.org](http://www.ahridirectory.org)).



Model	Inlet size (mm)	Primary Air Flow Rate		Minimum Operating Pressure		Radiated sound power level, db by Octave band @1.5" WG						Discharge sound power level, db by Octave band @1.5" WG					
		CFM	LPS	IN H2O	PA	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
KSQ-5	125	250	118	0.18	45	63	56	50	46	44	36	72	68	61	59	56	53
KSQ-6	150	400	188	0.1	25	64	56	49	44	38	31	74	71	65	59	56	53
KSQ-7	175	550	259	0.1	25	64	64	59	53	48	42	72	74	65	62	59	57
KSQ-8	200	700	329	0.01	3	62	60	54	47	45	43	75	74	67	65	62	58
KSQ-9	225	900	423	0.01	3	62	60	54	49	48	43	75	74	65	63	62	58
KSQ-10	250	1100	517	0.01	3	64	59	51	46	38	30	80	73	66	63	60	57
KSQ-12	300	1600	752	0.01	3	65	61	54	50	49	43	76	73	67	65	63	59
KSQ-14	350	2100	987	0.01	3	66	61	54	50	49	44	75	72	67	65	64	62
KSQ-16	400	2800	1316	0.01	3	67	65	56	50	44	36	81	73	69	67	63	61
KSQ-24X16	600 x 400	5300	2491	0.01	3	79	72	66	61	57	49	81	79	74	73	72	69

### Notes

- All sound data are measured in accordance with industry standard AHRI-880
- Sound power levels are in decibels, re 10-12 watts
- Discharge Lw includes end reflection loss per AHRI requirement

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

## Flexibility

- KSQ terminals are available in a wide array of control packages using electronic analog or factory-installed direct digital (DDC) controls.
- KSQ units can be provided with an integral sound attenuator for ultra-quiet performance
- Model KSQ is available using 25mm thick matte-faced insulation as a standard.
- Optionally 25mm thick Closed cell (fiber-less) insulation and a double wall construction using a full metal liner is also available.
- Numerous other optional features are available

## Performance

- KMC model KSQ terminal ratings are AHRI Certified and all units are tested in accordance with AHRI Standard 880.
- 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 24 x16) 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.

## Air Velocity Sensor

The air velocity sensor is used to measure air velocity / air volume in HVAC systems. The KMC Air velocity sensor operates and measures the total and static pressure components of airflow.

## Amplification

The unique shape of the measuring profile creates a linear amplification (of at least 2.5x Pdyn) making accurate measurements from as low as 1,0 m/s air velocity possible. This means higher control pressure signals sent to the controller at much lower flow rates. This results in very stable flow control, even with high turn-down ratios

## Low Pressure Drop & Sound

The sleek, aerodynamic unique shape creates a linear amplified signal and very little pressure drop for quiet operation and accurate control.



## Ease of Installation and Reliability

KSQ 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 KSQ Single Duct terminals are constructed with zinc-coated steel for long life. The unit casings are assembled with a mechanical lock construction that ensures 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. A damper position indicator is located on the end of the damper shaft.

## Construction

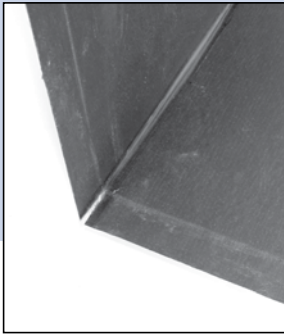
- The Air velocity sensor is manufactured from Extruded aluminium profiles for durability.
- Multi point averaging
- 2% accuracy starting from 1,0 m/s air velocity
- Strengthens measurement signal with at least 2.5x.
- Rounded apertures make the velocity sensor insensitive to skew or turbulent inflow 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



## 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.

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 vapour absorption, and microbiological resistance.



### 25mm Matte Face- Black Cloth Faced Insulation.

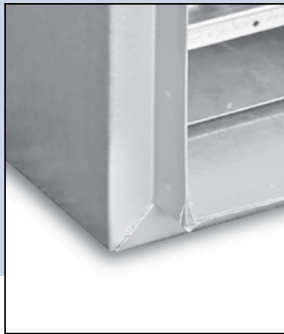
#### Features:

- Faced with black strong durable, woven glass fabric
- Air Erosion rating > 46m/s as per UL181
- Thermal conductivity 0.031 W/m K @ 25°C
- Fire Classification as per ASTM E84
- Density 48kg/m<sup>3</sup>

### Fiber-Less Insulation

#### Features:

- Closed Cell Insulation – no glass fibres
- 19mm /25mm – Elastomeric Engineered Foam Insulation
- Thermal conductivity 0.037 W/m K @ 25°C
- Fire Classification as per BS476



### Dual-Wall Casing Treatment

#### Features:

- Puncture Proof sheet metal interior skin
- GI Perforated interior skin also available (Model KSQA only)
- 25mm – fibreglass insulation between walls
- Isolates glass fibres from the air stream
- Thermal conductivity 0.031 W/m K @ 25°C
- Fire Classification as per ASTM E84

## CODES & STANDARDS

**ASTM C1071** Standard Specification for Fibrous Glass Duct Lining Insulation  
(This is a performance based standard that addresses acoustics as well as most of the performance criteria shown below)

### Microbiological Resistance

- UL 181** Factory-Made Air Ducts and Air Connectors (Mold Growth and Humidity)  
**ASTM C1071** Standard Specification for Fibrous Glass Duct Lining Insulation (Fungi Resistance Test)  
**ASTM G21** Practice for Determining Resistance of Synthetic Polymer Materials to Fungi  
**ASTM G22** Practice for Determining Resistance of Plastics to Bacteria

### Fire Hazard Classifications:

- ASTM E84** Test Method for Surface Burning Characteristics of Building Materials  
**UL 723** Test for Surface Burning Characteristics of Building Materials  
**BS476Part 7** Test for Surface spread of Flame  
**BS476Part 6** Test for Fire Propagation  
**NFPA 90A** Standard for the Installation of Air Conditioning and Ventilating Systems  
**NFPA 90B** Standard for the Installation of Warm Air Heating and Air Conditioning Systems  
**NFPA 255** Standard Method of Test of Surface Burning Characteristics of Building Materials

### Air Erosion

- UL 181** Factory-Made Air Ducts and Air Connectors

### Water Vapour Sorption

- ASTM C1104** Standard Test Method for Determining the Water Vapour Sorption of Unfaced Mineral Fibre Insulation

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

**Selection**

When selecting KSQ 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 KSQ 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 4 if 658 l/s (1400 cfm) is the maximum design airflow, a unit with a 300mm inlet (Model KSQ-12) can be selected with an air pressure drop of 2.5 Pa (0.01 inches w.g.)

**Sound Performance**

Tables 5 through 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 ductwork 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 AHRI 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 catalogued NC values. KMC uses the AHRI 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**

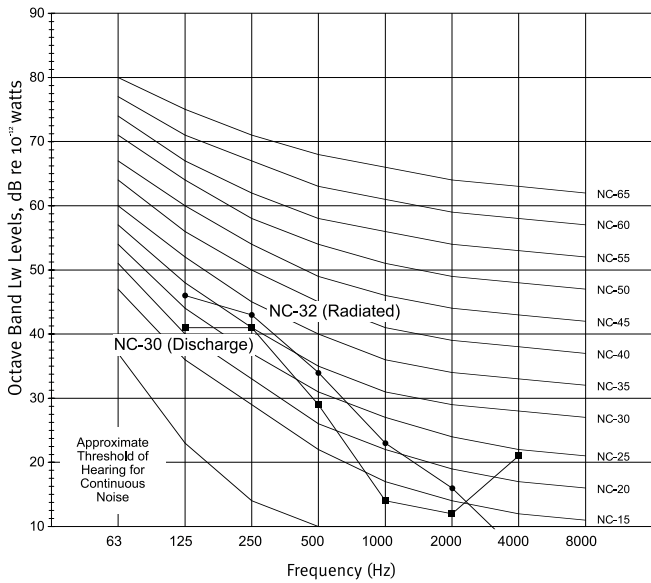
		Octave Band						
		2	3	4	5	6	7	
Radiated All Sizes		2	1	0	0	0	0	Environmental Effect Type II Mineral Fiber
		16	18	20	26	31	36	
		<b>18</b>	<b>19</b>	<b>20</b>	<b>26</b>	<b>31</b>	<b>36</b>	
		Octave Band						
		2	3	5	4	6	7	
Discharge Model (sizes) 5 - 7 140lps -340 lps (300cfm-700 cfm)		2	1	0	0	0	0	Environmental Effect 1.5M (5 ft), Duct Lining 300mm X 300mm (12"x12") End Reflection 1.7m (5 ft.,8 in). Flex Duct Room Effect Sound Power Division
		2	4	20	10	20	14	
		9	5	0	2	0	0	
		6	10	20	18	21	12	
		5	6	8	7	9	10	
	3	3	3	3	3	3		
	<b>27</b>	<b>29</b>	<b>51</b>	<b>40</b>	<b>53</b>	<b>39</b>	<b>Total dB Reduction</b>	
		Octave Band						
		2	3	4	5	6	7	
Discharge Model (Sizes) 8 - 24x16 >330 lps (>700 cfm)		2	1	0	0	0	0	Environmental Effect 1.5m (5 ft.), Duct Lining 375mm x375mm (15"x15") End Reflection 1.7m (5 ft.,8 in). Flex Duct Room Effect Sound Power Division
		2	3	9	18	17	12	
		9	5	2	0	0	0	
		6	10	18	20	21	12	
		5	6	7	8	9	10	
	5	5	5	5	5	5		
	<b>29</b>	<b>30</b>	<b>41</b>	<b>51</b>	<b>52</b>	<b>39</b>	<b>Total dB Reduction</b>	

**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 658L/S @ 500Pa (1400CFM@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 KSQ12  
Radiated sound in the 250hz (third octave) is the Controlling Band

**Electric Heat**

The wattage of electric heat needed is determined by the formula given below, which results in the KW of heating required.

$$P = \frac{Q \times (T_2 - T_1) \times 1.21}{3600}$$

- P : Power in kW
- Q : Air volume in m3/hour
- T2- Temperature of air leaving the heater in °C
- T1- Temperature of air entering the heater in °C

Using our example of a 300mm size inlet unit, if the design heating airflow is 375 lps (800 cfm /1360 cmh) for the heating coil selection, the heating capacity desired is 5.4 KW of electric heat.

- Q : Air volume in m3/hour 1360 cmh
- T2- Temperature of air leaving the heater in 30°C
- T1- Temperature of air entering the heater in 18°C

The electric coil with 5.5 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 17.5 Pa (0.07 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.

**Control Sequences**

A wide array of control sequences are available as standard on KMC – Model KSQ single duct variable air volume terminal

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



**Table 1: Airflow Ranges (Air Velocity Sensor)**

Type		Analog Electronic Controller				Direct Digital Controller			
Model	Inlet size	Air Flow (cfm)		Airflow (lps)		Air Flow (cfm)		Airflow (lps)	
	mm	Min	Max	Min	Max	Min	Max	Min	Max
KSQ-5	125	25	305	12	144	45	350	22	165
KSQ-6	150	45	470	22	221	75	575	36	271
KSQ-7	175	75	635	36	299	100	750	47	353
KSQ-8	200	100	835	47	393	135	1050	64	494
KSQ-9	225	125	1100	59	517	170	1350	80	635
KSQ-10	250	145	1355	69	637	210	1650	99	776
KSQ-12	300	190	1740	90	818	294	2200	139	1034
KSQ-14	350	275	2300	130	1081	398	3000	188	1410
KSQ-16	400	500	3390	235	1594	530	4100	250	1927
KSQ-24X16	600 x 400	750	6480	353	3046	1005	7700	473	3619

**Notes:**

1. Minimum and maximum values shown are lps (cfm)
2. Minimum and maximum airflow with pressure independent controls based on the following flow sensor signals:
3. DDC Controllers 6.25Pa – 375Pa(0.025” w.g. – 1.5” w.g.)
4. Settings below the minimum are not recommended for accurate control when using pressure independent controls.
5. Minimum airflow for pressure dependent applications is 0 cfm.
6. Pressure independent controls may be set for 0 CFM, at or above the minimum airflow shown in table 1, but not between.

**Table 2: Airflow vs. Velocity Sensor Signal**

Sensor ΔP		Inlet Size (model)									
		125mm (5)	150mm (6)	175mm (7)	200mm (8)	225mm (9)	250mm (10)	300mm (12)	350mm (14)	400mm (16)	600 x 400 (24 x 16)
(inch w.g)	Pa	CFM									
0.03	8	50	81	106	150	190	234	312	428	583	1101
0.04	10	57	94	122	173	220	271	360	494	673	1272
0.06	15	70	115	150	212	269	331	441	605	824	1557
0.10	25	91	148	194	274	347	428	570	781	1064	2011
0.20	50	128	210	274	388	491	605	806	1104	1505	2843
0.30	75	157	257	335	475	601	741	987	1352	1844	3482
0.40	100	182	297	387	548	694	856	1140	1562	2129	4021
0.50	125	203	332	433	613	776	957	1274	1746	2380	4496
0.60	150	222	363	474	672	851	1048	1396	1912	2607	4925
0.70	175	240	392	512	725	919	1132	1508	2066	2816	5319
0.80	200	257	419	547	775	982	1210	1612	2208	3011	5687
0.90	225	272	445	581	823	1042	1284	1710	2342	3193	6032
1 (K)	250	287	469	612	867	1098	1353	1802	2469	3366	6358
1.50	375	352	574	750	1062	1345	1657	2207	3024	4122	7787
Inlet Area	sq. ft	0.130	0.188	0.258	0.338	0.430	0.532	0.769	1.050	1.380	2.670
	sq. mt.	0.012	0.017	0.024	0.031	0.040	0.049	0.071	0.098	0.128	0.248

**Airflow Calculations**

Sensor ΔP = (CFM/K)<sup>2</sup>

CFM = K x √(ΔP)

**Example:**

For a 300mm (Size 12) inlet unit with a sensor ΔP signal of 0.60 inches w.g (150Pa), the airflow is calculated to be 1400 cfm (658 lps)

CFM = K x √(ΔP) = 1802 x √(0.60) = 1400 for a 300mm (size 12) inlet unit with 1400 CFM,

The sensor ΔP signal is calculated to be 0.60 inches w.g.

ΔP = (CFM/K)<sup>2</sup> = (1400/1802)<sup>2</sup> = 0.60” w.g.

**Table 3: Airflow vs. Velocity Sensor Signal**

Inlet Size (model)	125mm (5)	150mm (6)	175mm (7)	200mm (8)	225mm (9)	250mm (10)	300mm (12)	350mm (14)	400mm (16)	600 x 400 (24 x 16)
K Factor	287	469	612	867	1098	1353	1802	2469	3366	6358



Table 4: Static Pressure Drop Data

Inlet		Airflow		Min ΔPs (Pa)			
Model	Inlet size			Model KSQ / A		Model KSQE	
	mm	(CFM)	(l/s)	in	Pa	in	Pa
5	125	125	59	0.055	14	0.055	14
		175	83	0.100	25	0.100	25
		250	118	0.150	38	0.150	38
		300	141	0.200	50	0.210	53
		350	165	0.250	63	0.260	65
6	150	200	94	0.010	3	0.010	3
		250	118	0.020	5	0.020	5
		300	141	0.030	8	0.030	8
		350	165	0.030	8	0.040	10
		400	188	0.040	10	0.050	13
		500	235	0.050	13	0.060	15
7	175	250	118	0.010	3	0.010	3
		300	141	0.010	3	0.020	5
		400	188	0.010	3	0.020	5
		500	235	0.020	5	0.030	8
		600	282	0.040	10	0.050	13
		675	318	0.050	13	0.060	15
8	200	350	165	0.010	3	0.010	3
		475	224	0.010	3	0.020	5
		600	282	0.010	3	0.020	5
		700	329	0.010	3	0.030	8
		800	376	0.010	3	0.040	10
		900	423	0.010	3	0.040	10
9	225	450	212	0.010	3	0.010	3
		525	247	0.010	3	0.020	5
		600	282	0.010	3	0.020	5
		700	329	0.010	3	0.030	8
		900	423	0.010	3	0.040	10
		1100	517	0.010	3	0.050	13

Inlet		Airflow		Min ΔPs (Pa)			
Model	Inlet size			Model KSQ / A		Model KSQE	
	mm	(CFM)	(l/s)	in	Pa	in	Pa
10	250	550	259	0.010	3	0.010	3
		675	318	0.010	3	0.020	5
		800	376	0.010	3	0.020	5
		1000	470	0.010	3	0.030	8
		1200	564	0.010	3	0.040	10
		1400	658	0.010	3	0.060	15
		800	376	0.010	3	0.010	3
12	300	1000	470	0.010	3	0.020	5
		1200	564	0.010	3	0.020	5
		1400	658	0.010	3	0.030	8
		1700	799	0.010	3	0.050	13
		2000	940	0.010	3	0.060	15
		1050	494	0.010	3	0.010	3
		1400	658	0.010	3	0.020	5
14	350	1800	846	0.010	3	0.020	5
		2200	1034	0.010	3	0.030	8
		2600	1222	0.010	3	0.040	10
		3000	1410	0.010	3	0.050	13
		1400	658	0.010	3	0.010	3
		1900	893	0.010	3	0.010	3
		2400	1128	0.010	3	0.020	5
16	400	2900	1363	0.010	3	0.020	5
		3500	1645	0.010	3	0.030	8
		4100	1927	0.010	3	0.040	10
		3000	1410	0.010	3	0.010	3
		4000	1880	0.010	3	0.020	5
		5000	2350	0.010	3	0.030	8
		6000	2820	0.010	3	0.040	10
24 x 16	600 x 400	7000	3290	0.010	3	0.050	13

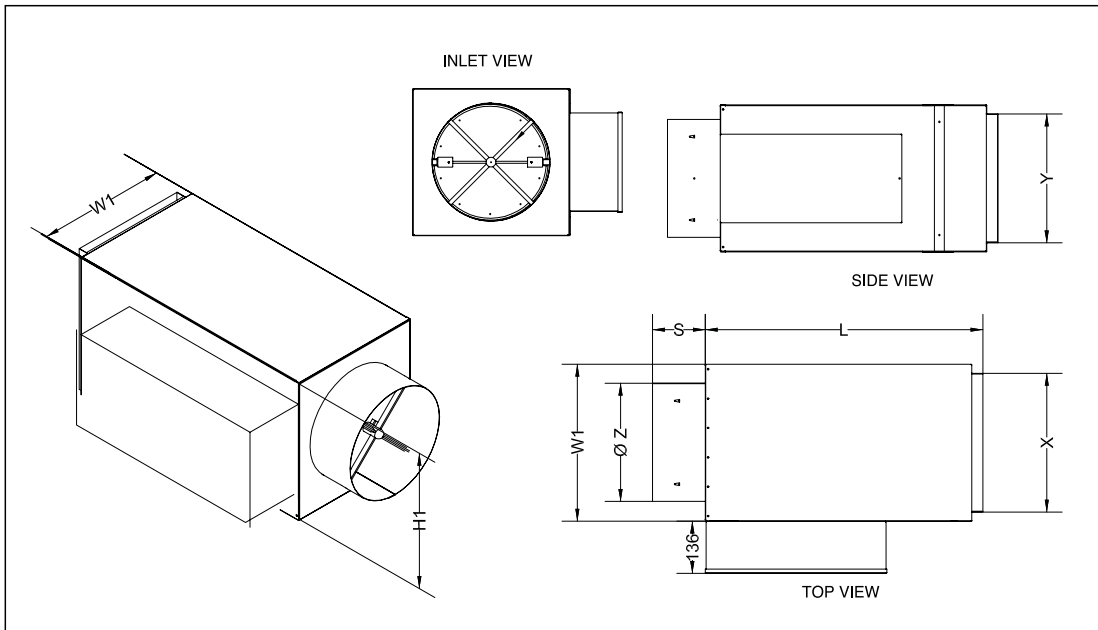
Variable Air Volume Terminals

Notes:

1. Air Pressure drops shown for KSQE Units with integral electric heating coil are for the terminal and the electric coil
2. Air Pressure drop is the difference in static pressure from the terminal inlet and discharge with the damper in the fully open position



Dimensional Data



Model	Box Air Flow (max)		ØZ mm	W1 mm	H1 mm	X mm	Y mm	L mm	S mm	Wt kg
	cfm	l/s								
KSQ-5	350	165	124	254	254	223	223	318	137	7
KSQ-6	575	271	150	254	254	223	223	318	137	7
KSQ-7	750	353	175	305	254	223	223	318	137	8
KSQ-8	1050	494	201	305	254	223	223	318	137	8
KSQ-9	1350	635	226	356	318	324	286	369	137	10
KSQ-10	1650	776	251	356	318	324	286	369	137	10
KSQ-12	2200	1034	302	407	381	375	350	470	137	11
KSQ-14	3000	1410	353	508	445	477	413	470	137	13
KSQ-16	4100	1927	404	610	445	578	413	470	137	15
KSQ-24X16	7700	3619	610 x 406	966	458	966	458	762	139	39

Sound Power Data

Table 5: Radiated Sound Power Data (dB) - KSQ

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					
			Octave Band						Octave Band						Octave Band						Octave Band					
	(CFM)	(lps)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
KSQ-5 (125mm)	125	59	52	44	36	33	31	28	57	46	42	37	37	31	56	49	46	42	42	37	56	50	47	45	46	41
	175	83	55	47	38	34	32	29	58	51	44	40	39	32	60	54	50	45	44	38	60	55	52	48	48	42
	250	118	58	50	42	36	34	30	61	54	47	41	40	33	64	59	53	48	47	39	64	61	56	51	50	43
	300	141	59	52	44	38	36	31	62	56	49	43	41	34	66	60	55	49	48	40	66	63	58	53	52	44
	350	165	60	53	47	40	38	36	64	58	51	44	43	38	68	61	57	50	49	42	68	64	61	54	53	45
KSQ-6 (150mm)	200	94	55	43	36	32	24	20	58	48	41	37	30	24	58	50	47	42	36	30	59	51	49	45	39	33
	250	118	56	44	37	33	26	21	59	49	42	38	31	25	61	54	49	44	37	31	61	54	52	47	40	34
	300	141	57	45	38	34	27	22	60	50	43	39	32	26	63	56	50	45	38	32	63	57	54	49	41	35
	350	165	58	46	40	35	28	23	61	51	44	40	33	27	64	57	51	46	39	33	65	60	56	51	42	36
	400	188	59	47	42	37	29	24	62	52	45	41	34	28	66	58	52	47	40	34	66	62	57	52	43	37
KSQ-7 (175mm)	500	235	62	51	46	41	33	28	64	54	49	43	36	31	68	59	54	49	41	35	69	63	58	53	45	38
	250	118	54	48	41	36	33	29	56	53	47	42	39	34	56	54	51	46	44	39	56	55	52	49	47	44
	300	141	55	49	42	38	34	30	57	57	49	43	40	35	57	57	53	48	46	41	58	58	55	51	48	45
	400	188	56	50	43	39	36	31	60	58	51	45	42	36	60	64	57	52	48	43	61	63	59	54	51	46
	500	235	59	51	45	41	37	33	61	59	52	46	43	37	63	67	61	55	50	44	63	68	63	58	53	48
KSQ-8 (200mm)	600	282	62	52	48	43	39	34	64	60	53	47	44	38	65	68	62	56	51	45	65	71	66	61	55	49
	675	318	63	53	50	45	41	35	65	61	54	48	45	39	68	69	63	57	52	46	67	72	68	63	56	50
	350	165	53	47	40	34	32	32	57	53	47	41	39	37	58	58	54	48	46	43	59	52	44	41	40	39
	475	224	54	48	41	36	35	33	58	54	48	42	40	38	60	63	55	49	47	44	61	57	48	44	41	39
	600	282	55	49	43	38	36	34	59	55	49	43	41	39	62	64	56	50	48	44	63	61	50	45	42	40
KSQ-9 (225mm)	700	329	57	50	45	40	39	35	60	56	50	44	42	40	64	65	57	51	48	45	64	62	51	46	43	41
	800	376	58	52	48	43	41	36	61	57	51	46	44	41	65	66	58	52	49	46	66	63	52	47	43	42
	900	423	60	53	51	46	43	38	63	58	53	48	46	42	67	67	59	53	50	47	67	64	53	48	44	42
	450	212	51	47	40	36	34	29	55	55	46	41	39	34	59	61	54	48	46	41	61	66	58	52	50	45
	525	247	52	48	41	37	35	30	56	56	47	42	40	35	61	62	55	49	47	42	62	69	60	53	51	46
KSQ-10 (250mm)	600	282	53	49	42	38	36	31	57	57	48	43	41	36	62	63	56	50	48	43	63	70	61	54	52	47
	700	329	57	52	44	39	37	32	58	58	49	44	42	37	63	64	57	51	49	44	64	71	62	55	53	48
	900	423	59	57	48	42	39	34	59	59	51	46	43	38	64	65	58	52	50	45	65	72	63	56	54	49
	1100	517	60	58	51	45	41	36	60	60	53	47	44	39	65	66	59	53	51	47	67	73	64	57	55	50
	550	259	55	45	39	33	25	17	58	53	44	39	31	24	60	59	51	45	37	29	61	63	54	50	40	32
KSQ-12 (300mm)	675	318	56	46	41	35	26	18	59	54	45	40	32	25	62	60	52	46	38	30	62	64	55	50	41	33
	800	376	57	48	42	36	27	19	60	55	46	41	33	26	63	61	53	47	39	31	64	65	56	51	42	34
	1000	470	58	50	45	38	29	20	61	56	48	42	34	27	65	62	54	48	40	32	66	66	57	52	43	35
	1200	564	61	53	47	40	31	23	63	57	50	44	35	28	67	63	55	49	41	33	68	67	58	52	44	36
	1400	658	63	55	50	43	33	25	65	58	53	47	38	29	69	64	56	50	42	34	70	68	59	53	45	37
KSQ-14 (350mm)	800	376	54	47	40	37	36	30	59	53	46	42	42	36	63	62	54	49	47	42	63	63	60	53	51	46
	1000	470	55	48	41	38	37	32	60	54	47	43	43	37	64	63	55	50	48	43	65	65	61	54	52	47
	1200	564	56	50	43	40	38	33	61	55	48	44	44	38	65	64	56	51	49	44	67	66	62	55	53	48
	1400	658	57	51	45	42	39	34	62	56	49	46	45	39	65	63	57	52	50	45	69	67	62	56	54	49
	1700	799	59	54	48	45	42	35	63	58	51	48	46	40	66	64	58	53	51	46	71	68	63	57	55	50
KSQ-16 (400mm)	2000	940	61	56	52	48	45	38	65	60	54	50	48	41	66	64	59	54	52	47	72	69	63	58	56	51
	1050	494	55	46	40	38	37	32	61	54	46	42	42	38	65	62	55	50	48	44	65	65	59	53	52	47
	1400	658	56	47	43	39	39	33	62	55	47	43	43	39	65	63	56	51	49	45	68	66	60	54	53	48
	1800	846	58	50	45	41	40	34	63	56	49	46	45	40	66	64	57	52	50	46	70	67	61	55	54	49
	2200	1034	60	53	49	44	42	37	64	57	51	47	47	41	69	65	58	53	52	47	71	68	62	56	55	50
KSQ-24x16 (600 x 400)	2600	1222	63	56	52	47	45	39	66	59	54	49	48	43	70	66	59	54	53	48	73	69	63	57	56	51
	3000	1410	65	58	55	50	48	42	68	61	57	52	50	45	70	66	60	55	55	49	74	70	64	58	57	52
	1400	658	50	45	38	36	37	32	57	53	44	41	40	37	61	61	51	48	46	42	63	64	55	51	50	46
	1900	893	52	47	40	38	38	33	58	54	45	42	41	38	64	62	52	49	47	43	65	64	56	52	51	47
	2400	1128	55	50	43	41	40	36	60	55	46	45	44	39	65	63	53	50	48	44	67	65	57	53	52	48
KSQ-24x16 (600 x 400)	2900	1363	58	52	45	43	41	38	62	57	48	46	46	41	67	64	54	51	50	46	69	67	58	54	53	49
	3500	1645	61	55	48	45	43	40	64	59	51	48	47	42	68	65	55	52	51	47	70	68	59	55	54	50
	4100	1927	64	58	52	48	45	42	66	61	54	50	49	44	69	66	56	53	52	48	71	69	60	56	55	51
	3000	1410	61	54	49	44	40	35	65	57	52	48	44	38	71	64	58	53	50	44	73	68	63	57	53	48
	4000	1880	66	59	55	48	44	38	69	62	56	51	46	41	74	67	60	55	51	45	76	70	64	58	54	49
5000	2350	70	63	59	53	48	41	73	65	60	54	51	45	77	69	63	58	53	47	79	72	65	59	56	50	
6000	2820	73	67	63	56	51	44	75	69	63	56	52	47	79	70	64	59	54	48	81	73	66	60	57	51	
7000	3290	76	70	66	59	54	46	78	71	66	58	54	50	80	70	66	60	55	49	83	74	67	61	58	52	

Variable Air Volume Terminals

Notes

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



**Sound Power Data**

**Table 6: Discharge Sound Power Data (dB) - KSQ**

Matte Faced Insulation - 25mm (1") Thk.

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					
			Octave Band						Octave Band						Octave Band						Octave Band					
	(CFM)	(lps)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
KSQ-5 (125mm)	125	59	69	59	47	45	41	37	71	63	53	50	48	46	71	64	57	55	56	54	71	65	59	57	59	59
	175	83	71	63	50	47	43	39	74	67	55	53	50	47	76	71	61	58	57	55	76	71	63	61	60	60
	250	118	66	62	53	51	46	42	69	66	57	55	52	49	73	70	63	61	58	56	73	72	66	65	62	61
	300	141	75	67	56	53	49	45	78	72	61	57	53	50	83	76	66	63	59	57	84	78	69	66	63	62
	350	165	76	68	58	57	53	49	81	73	63	59	55	52	84	77	68	64	60	59	86	79	71	67	64	63
KSQ-6 (150mm)	200	94	76	69	56	53	55	48	74	67	57	50	47	44	75	68	63	55	53	52	75	69	64	58	56	56
	250	118	77	71	58	54	56	51	76	70	58	52	49	46	79	73	66	58	55	53	79	73	67	61	58	57
	300	141	78	73	60	56	57	52	77	71	59	53	50	47	80	76	67	59	57	54	81	77	70	63	60	58
	350	165	80	75	62	58	58	53	78	72	60	54	51	48	82	77	68	61	58	55	83	80	72	65	62	59
	400	188	82	77	65	60	59	55	79	73	62	56	52	49	83	78	69	62	59	56	84	82	74	66	63	60
KSQ-7 (175mm)	500	235	85	79	68	65	61	58	82	75	66	59	53	51	86	81	71	64	60	57	87	84	75	67	65	61
	250	118	76	71	59	54	54	53	73	66	58	53	51	49	75	69	65	59	57	56	76	69	66	63	61	60
	300	141	77	72	60	55	55	54	75	68	59	54	52	50	78	72	66	61	58	57	78	72	68	64	62	61
	400	188	78	75	62	58	56	56	76	71	60	57	53	52	80	76	68	63	60	59	81	77	71	67	64	63
	500	235	79	77	65	61	58	58	77	72	61	58	54	53	81	78	69	65	61	60	83	80	73	69	65	64
KSQ-8 (200mm)	600	282	81	78	68	64	60	60	78	73	64	61	55	54	83	79	70	66	62	61	85	82	74	70	66	65
	675	318	84	80	71	67	61	61	80	74	67	63	57	55	84	80	71	67	63	61	86	83	75	71	67	66
	350	165	72	62	52	50	48	43	75	70	60	57	54	50	78	75	67	64	61	58	79	75	71	68	65	61
	475	224	73	64	54	52	49	44	76	71	61	58	56	51	82	77	68	65	62	59	83	80	73	70	66	62
	600	282	74	66	56	55	51	46	77	72	62	60	57	52	83	80	69	66	63	60	84	84	75	71	68	63
KSQ-9 (225mm)	700	329	75	68	58	57	52	47	77	73	63	61	58	53	84	81	70	67	64	61	85	85	76	72	69	64
	800	376	77	70	61	60	53	49	78	73	65	63	59	54	85	82	71	68	65	61	87	86	77	73	70	65
	900	423	79	71	64	62	55	51	78	74	66	64	60	55	86	83	72	69	66	62	88	87	78	74	71	66
	450	212	72	72	62	60	58	58	74	69	58	55	54	50	73	75	66	62	60	57	79	76	71	67	64	61
	525	247	74	73	63	61	59	59	75	70	59	56	55	51	75	77	67	63	61	58	81	78	72	68	65	62
KSQ-10 (250mm)	600	282	75	75	64	62	61	60	76	71	60	57	56	52	77	78	68	64	62	59	82	79	73	69	66	63
	700	329	75	75	65	63	62	61	77	72	61	58	57	53	77	79	69	65	63	60	83	82	74	70	67	64
	900	423	76	77	67	65	63	62	78	73	62	60	58	54	78	79	70	66	64	61	85	83	75	71	68	65
	1100	517	78	78	68	69	64	65	79	74	65	63	59	55	78	79	71	68	66	62	87	85	76	72	70	67
	550	259	73	68	60	56	56	51	69	70	59	54	53	50	74	72	68	62	60	57	85	81	72	66	64	61
KSQ-12 (300mm)	675	318	74	69	61	57	57	52	70	71	60	55	54	51	75	74	69	63	61	58	87	82	73	67	65	62
	800	376	74	69	63	58	58	53	70	72	61	57	55	52	75	77	70	64	62	59	88	83	74	68	66	63
	1000	470	75	69	65	61	60	56	71	73	62	58	56	53	77	78	71	65	63	60	90	84	75	69	67	64
	1200	564	76	70	68	64	62	59	73	74	64	60	57	54	78	80	72	66	64	61	91	85	76	70	68	65
	1400	658	78	71	71	67	63	61	73	75	66	62	59	55	79	80	73	67	65	62	92	86	76	71	69	66
KSQ-14 (350mm)	800	376	75	68	59	58	61	55	74	66	60	57	55	52	76	72	71	64	63	59	82	79	73	69	67	64
	1000	470	75	69	61	59	62	57	75	67	61	58	56	53	76	74	72	65	64	60	84	80	74	70	68	65
	1200	564	76	70	63	61	63	58	76	69	62	59	57	54	77	74	73	66	65	61	85	81	75	71	69	66
	1400	658	77	73	65	63	64	60	77	70	63	60	58	55	78	75	74	67	66	62	86	82	76	72	70	66
	1700	799	77	74	68	66	66	62	77	71	65	62	60	56	78	76	75	68	67	63	87	83	77	73	71	67
KSQ-16 (400mm)	2000	940	78	75	71	68	68	65	79	73	68	64	61	58	79	79	76	69	68	64	88	84	78	74	72	68
	1050	494	65	58	52	52	51	48	73	67	59	58	57	56	78	74	67	65	63	61	79	78	71	69	68	65
	1400	658	67	60	54	53	52	49	74	68	60	59	58	57	79	75	68	66	64	62	83	79	72	70	69	66
	1800	846	70	62	57	56	53	50	75	69	62	60	59	58	79	76	69	67	65	63	83	80	73	71	70	67
	2200	1034	72	65	59	57	54	51	76	70	63	62	60	59	80	77	70	68	66	64	84	81	74	72	71	68
KSQ-24x16 (600 x 400)	2600	1222	74	67	63	59	57	53	78	72	65	63	61	59	81	78	71	69	68	66	85	82	75	73	72	69
	3000	1410	76	70	66	62	59	56	80	74	68	64	63	60	81	79	72	70	69	67	87	83	76	74	73	70
	1400	658	70	58	55	55	50	46	76	66	61	59	57	55	79	74	69	66	62	61	84	78	74	70	66	65
	1900	893	72	60	57	57	51	47	78	67	62	61	58	56	80	75	70	67	63	62	86	79	75	71	67	66
	2400	1128	75	63	59	58	53	49	79	69	64	63	59	57	82	76	71	68	64	63	88	80	76	72	68	67
KSQ-24x16 (600 x 400)	2900	1363	78	66	62	60	54	51	79	71	66	64	60	58	82	77	72	70	66	64	90	81	77	73	69	68
	3500	1645	79	69	66	63	57	54	80	73	69	66	62	59	83	78	74	71	67	65	92	82	78	74	71	69
	4100	1927	81	72	71	65	59	56	81	75	72	68	63	60	84	80	76	72	69	66	93	84	79	76	72	70
	3000	1410	68	65	61	60	56	52	72	70	65	64	63	60	79	76	70	69	69	67	82	80	74	73	73	71
	4000	1880	73	70	65	62	60	56	76	73	68	67	65	62	80	78	72	72	71	69	85	82	76	75	75	73
5000	2350	77	75	70	67	64	61	79	77	71	70	68	65	81	78	75	74	73	70	88	84	78	77	77	74	
6000	2820	78	80	74	71	69	66	80	79	75	72															



**Table 7: Discharge Sound Power Data (dB) - KSQ**  
Dual Wall Metal Liner

Inlet Size	Airflow		0.5" ΔPs							1.0" ΔPs							2.0" ΔPs							3.0" ΔPs						
			Sound Power Levels, dB							Sound Power Levels, dB							Sound Power Levels, dB							Sound Power Levels, dB						
	Octave Band		Octave Band							Octave Band							Octave Band							Octave Band						
	(CFM)	(lps)	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz				
KSQ-5 (125mm)	125	59	57	52	45	42	40	36	59	56	50	47	46	45	59	57	54	53	55	53	59	58	56	56	59	59				
	175	83	59	56	48	45	42	39	62	60	54	51	48	46	64	64	58	55	55	54	64	64	60	59	60	59				
	250	118	62	59	52	49	46	43	65	63	56	53	50	48	69	67	61	58	56	55	69	69	64	60	60	60				
	300	141	63	60	53	51	49	45	66	65	59	55	51	49	71	69	63	59	56	56	72	71	66	62	60	61				
	350	165	64	61	56	54	51		69	66	60	56	54	53	72	70	65	61	58	59	74	72	68	64	61	62				
KSQ-6 (150mm)	200	94	59	56	48	47	44	41	63	61	54	53	51	48	64	63	60	59	58	55	64	64	61	62	61	59				
	250	118	60	58	50	49	46	42	65	65	55	54	52	49	68	68	63	60	59	56	68	68	64	64	62	60				
	300	141	61	60	52	51	47	43	66	66	57	56	52	49	69	71	64	61	60	57	70	72	67	65	63	61				
	350	165	63	62	53	53	49	45	67	67	59	57	55	51	71	72	65	62	61	58	72	75	69	66	64	62				
	400	188	65	64	56	55	50	47	68	68	60	59	56	53	72	73	66	64	62	59	73	77	71	67	65	63				
KSQ-7 (175mm)	500	235	68	66	60	59	54	52	71	70	63	62	58	55	75	76	68	66	63	60	76	79	72	69	66	64				
	250	118	59	55	47	45	42	39	63	60	54	51	50	49	64	63	61	58	57	57	65	63	62	62	62	62				
	300	141	60	56	48	46	44	41	64	62	55	52	51	51	67	66	62	59	58	58	67	66	64	63	62	63				
	400	188	61	59	50	49	46	44	65	65	56	54	52	53	69	70	64	60	59	59	70	71	67	64	63	64				
	500	235	62	61	54	52	48	48	66	66	58	56	53	54	70	72	65	62	59	60	72	74	69	66	63	65				
KSQ-8 (200mm)	600	282	64	62	58	55	50	49	67	67	61	58	54	55	72	73	66	63	60	60	74	76	70	67	63	65				
	675	318	67	64	61	58	52	50	69	68	64	61	56	56	73	74	67	64	60	61	75	77	71	68	63	66				
	350	165	61	56	48	48	45	41	66	64	56	55	53	50	67	69	63	63	61	58	68	69	67	67	66	63				
	475	224	62	57	50	50	48	44	67	65	57	56	54	51	71	71	64	63	62	59	72	74	69	68	66	64				
	600	282	63	60	53	52	50	47	68	66	58	57	55	53	72	74	65	63	62	60	73	78	71	68	67	65				
KSQ-9 (225mm)	700	329	64	62	56	55	52	49	69	67	60	59	57	54	73	75	66	64	62	60	74	79	72	69	67	65				
	800	376	66	64	59	57	54	50	70	68	61	60	58	55	74	76	67	65	63	61	76	80	73	70	67	65				
	900	423	68	65	62	59	56	52	71	69	64	62	59	57	75	77	68	66	64	62	77	81	74	71	67	66				
	450	212	58	53	49	49	48	44	65	62	54	53	53	51	68	68	61	58	58	58	69	69	66	64	63	63				
	525	247	59	55	50	50	49	45	66	63	55	54	54	52	69	70	62	59	59	59	71	71	67	64	63	63				
KSQ-10 (250mm)	600	282	60	56	51	51	50	46	67	64	56	55	55	53	71	71	63	60	60	60	72	72	68	65	64	64				
	700	329	61	57	52	52	51	47	68	65	57	57	56	55	72	72	64	61	61	60	73	75	69	66	64	65				
	900	423	62	60	54	54	52	48	68	66	59	58	57	56	73	73	65	62	62	62	75	76	70	67	65	66				
	1100	517	66	63	59	59	53	51	69	67	62	61	58	57	74	74	66	65	64	63	77	78	71	67	67	67				
	550	259	57	56	51	51	50	46	63	64	57	56	56	53	67	71	65	62	62	60	68	75	69	67	67	65				
KSQ-12 (300mm)	675	318	59	58	53	53	51	45	64	65	58	57	57	54	69	72	66	63	63	61	70	76	70	67	67	65				
	800	376	60	60	54	54	52	47	65	66	60	59	58	55	70	73	67	64	64	62	71	77	71	68	68	66				
	1000	470	62	63	56	56	53	50	66	67	61	60	59	57	71	74	68	65	64	62	73	78	72	69	68	67				
	1200	564	63	65	59	58	55	52	67	69	63	62	61	58	72	75	69	66	66	64	74	79	73	70	69	68				
	1400	658	65	67	62	61	57	54	68	71	65	64	62	59	73	76	70	68	67	65	75	80	73	71	70	68				
KSQ-14 (350mm)	800	376	59	55	51	52	51	45	66	61	59	57	56	53	72	70	68	62	63	59	73	73	70	68	68	67				
	1000	470	60	56	52	52	53	46	68	63	60	58	57	54	73	71	69	63	64	60	75	74	71	69	69	68				
	1200	564	61	57	54	54	52	47	70	66	61	59	58	55	74	72	70	64	65	61	76	76	72	70	70	69				
	1400	658	62	61	58	56	55	48	69	66	62	60	59	57	75	73	71	65	66	62	77	77	73	70	71	69				
	1700	799	64	64	61	59	57	50	70	67	63	61	60	58	76	75	72	66	67	63	78	78	74	71	72	70				
KSQ-16 (400mm)	2000	940	67	66	64	61	59	55	70	69	66	64	61	59	77	75	73	67	68	64	79	79	75	72	72	70				
	1050	494	58	54	51	53	54	47	68	62	57	57	58	56	71	69	67	66	63	62	72	73	70	68	68	67				
	1400	658	59	57	56	56	55	50	69	63	59	59	59	57	72	70	68	67	64	63	75	74	71	70	69	69				
	1800	846	63	60	57	57	56	52	71	64	62	60	60	59	73	72	69	68	65	64	76	75	72	71	70	69				
	2200	1034	65	62	59	58	57	54	72	67	65	61	61	61	75	73	69	69	66	65	77	76	73	72	71	71				
KSQ-24x16 (600 x 400)	2600	1222	67	63	63	60	59	56	74	69	66	63	62	62	76	74	70	70	67	66	78	77	74	73	72	72				
	3000	1410	69	65	66	63	62	58	75	71	68	64	63	63	78	75	71	71	68	67	80	78	75	74	73	73				
	1400	658	59	53	51	52	52	48	66	61	58	57	57	56	72	69	67	64	64	63	74	73	70	68	68	68				
	1900	893	61	55	54	54	54	51	67	62	60	59	59	57	73	70	68	65	65	64	75	74	72	69	69	68				
	2400	1128	65	59	56	55	55	52	69	65	61	60	60	58	74	71	69	66	66	65	77	75	73	70	70	69				
KSQ-24x16 (600 x 400)	2900	1363	67	62	59	57	56	53	71	67	63	61	61	59	76	73	70	67	67	66	79	76	74	71	71	70				
	3500	1645	71	66	63	60	59	56	73	70	66	64	63	61	79	75	71	68	68	67	81	78	75	72	72	71				
	4100	1927	73	69	69	64	62	59	76	73	70	66	65	62	80	77	73	70	70	68	82	81	77	74	73	72				
	3000	1410	61	54	49	44	40	35	65	57	52	48	44	38	71	64	58	53	50	44	73	68	63	57	53	48				
	4000	1880	66	59	55	48	44	38	69	62	56	51	46	41	74	67	60	55	51	45	76	70	64	58	54	49				
KSQ-24x16 (600 x 400)	5000	2350	70	63	59	53	48	41	73	65	60	54	51	45	77	69	63	58	53	47	79	72	65	59	56	50				
	6000	2820	73	67	63	56	51	44	75	69	63	56	52	47	79	70	64	59	54	48	81	73	66	60	57	51				
KSQ-24x16 (600 x 400)	7000	3290	76	70	66	59	54	46	78	71	66	58	54	50	80	70	66	60	55	49	83	74	67	61	58	52				

Variable Air Volume Terminals

**Notes**

- All sound data

NC Values

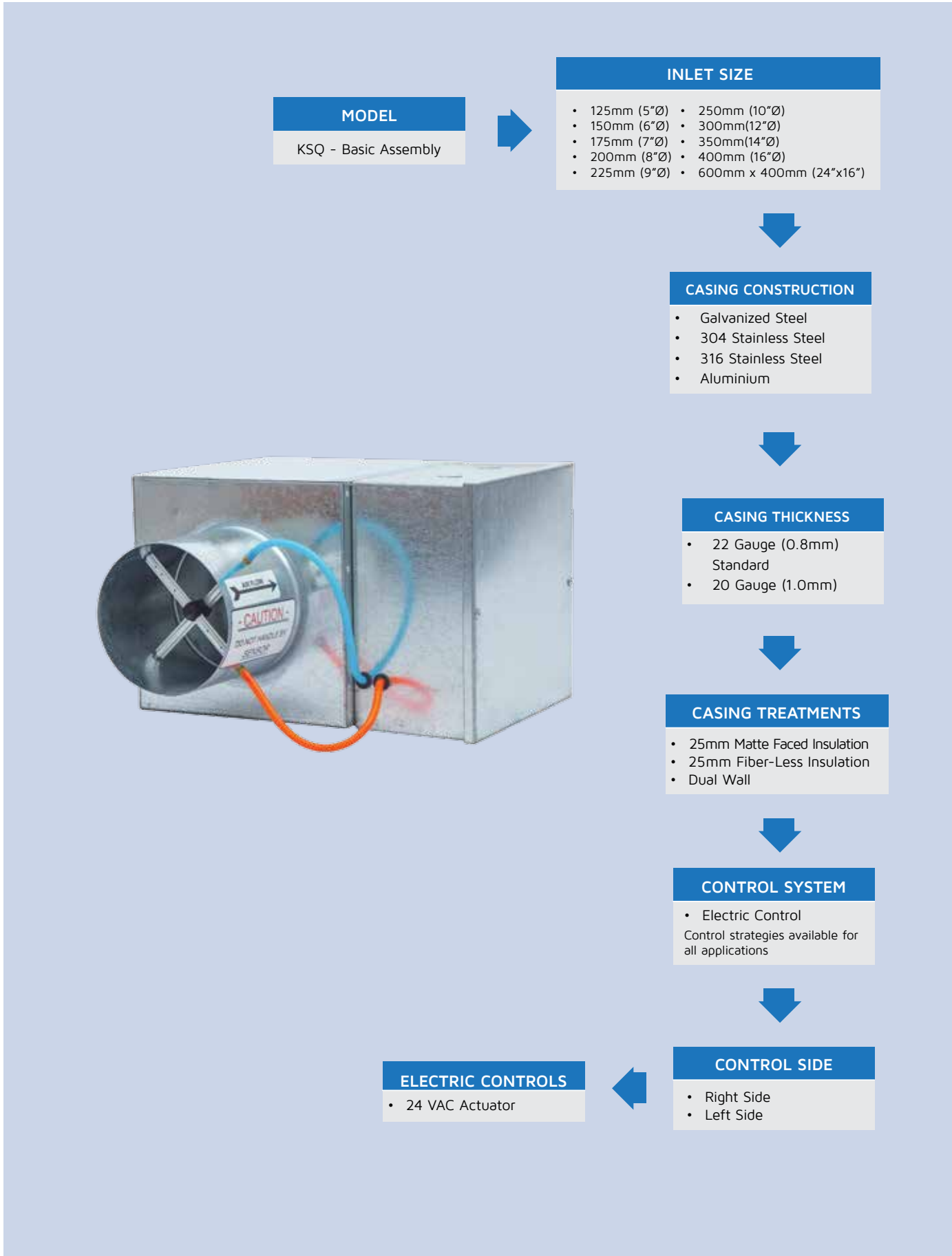
**Table 8: NC Values KSQ**  
With 25mm thick Matte Faced Insulation

Inlet Size	Airflow		ΔPs (Pa)				ΔPs (Pa)			
			125 Pa	250 Pa	500 Pa	750 Pa	125 Pa	250 Pa	500 Pa	750 Pa
	(CFM)	(lps)	Radiated Noise Criteria (NC)				Discharge Noise Criteria (NC)			
			125 Hz	250 Hz	500 Hz	1000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz
KSQ-5 (125mm)	125	59	---	---	---	---	---	---	---	---
	175	83	---	---	21	23	---	---	---	---
	250	118	---	---	25	27	---	---	21	24
	300	141	---	21	26	30	---	---	24	26
	350	165	---	24	29	33	---	20	25	27
KSQ-6 (150mm)	200	94	---	---	20	22	---	---	---	---
	250	118	---	---	22	25	---	---	22	22
	300	141	---	---	24	27	---	20	26	27
	350	165	---	---	25	30	---	21	27	31
	400	188	---	---	26	31	---	23	29	34
KSQ-7 (175mm)	500	235	---	22	27	32	---	25	32	36
	250	118	---	---	22	23	---	---	---	---
	300	141	---	24	24	26	---	---	21	21
	400	188	---	25	32	31	---	20	26	27
	500	235	---	26	36	37	---	21	29	31
KSQ-8 (200mm)	600	282	20	27	37	40	---	22	30	34
	675	318	21	29	38	41	---	24	31	35
	350	165	---	---	24	24	---	---	24	24
	475	224	---	---	30	30	---	---	26	30
	600	282	---	20	31	35	---	20	30	35
KSQ-9 (225mm)	700	329	---	21	32	36	---	22	31	36
	800	376	---	22	34	37	---	22	32	37
	900	423	21	24	35	38	---	24	34	38
	450	212	---	20	27	34	---	---	22	24
	525	247	---	21	29	37	---	---	25	26
KSQ-10 (250mm)	600	282	---	22	30	38	---	---	26	27
	700	329	---	24	31	39	---	---	27	31
	900	423	22	25	32	40	---	20	29	32
	1100	517	24	26	34	41	---	21	30	35
	550	259	---	---	26	31	---	---	26	31
KSQ-12 (300mm)	675	318	---	20	27	32	---	---	27	32
	800	376	---	21	29	34	---	20	29	34
	1000	470	---	22	30	35	---	21	30	35
	1200	564	20	24	31	36	20	24	31	36
	1400	658	23	26	32	37	21	25	32	37
KSQ-14 (350mm)	800	376	---	---	29	32	---	---	26	31
	1000	470	---	---	30	33	---	---	27	32
	1200	564	---	20	31	34	---	---	29	34
	1400	658	---	21	32	35	---	20	30	35
	1700	799	---	24	34	36	---	21	31	36
KSQ-16 (400mm)	2000	940	23	26	35	37	---	24	32	37
	1050	494	---	20	30	32	---	---	26	31
	1400	658	---	21	31	35	---	---	27	32
	1800	846	---	22	32	36	---	20	29	34
	2200	1034	---	24	34	37	---	21	30	35
KSQ-24x16 (600 x 400)	2600	1222	22	26	35	38	---	24	31	36
	3000	1410	25	29	35	39	21	26	32	37
	1400	658	---	21	31	35	---	---	26	31
	1900	893	---	22	32	35	---	---	27	32
	2400	1128	---	24	34	36	---	20	29	34
KSQ-24x16 (600 x 400)	2900	1363	20	26	35	38	---	22	30	35
	3500	1645	24	29	36	39	20	25	31	36
	4100	1927	27	31	37	40	24	28	34	38
	3000	1410	24	29	36	39	---	24	31	36
	4000	1880	30	34	40	42	24	27	34	38
KSQ-24x16 (600 x 400)	5000	2350	35	39	44	46	30	32	37	40
	6000	2820	39	41	46	49	36	37	40	42
	7000	3290	42	45	49	51	38	39	41	44

Notes

1. NC values are calculated based on procedures outlined in AHRI standard 885, appendix E as shown in table 2
2. Where no NC value is shown (---), NC values are less than 20

Features at a Glance



Variable Air Volume Terminals

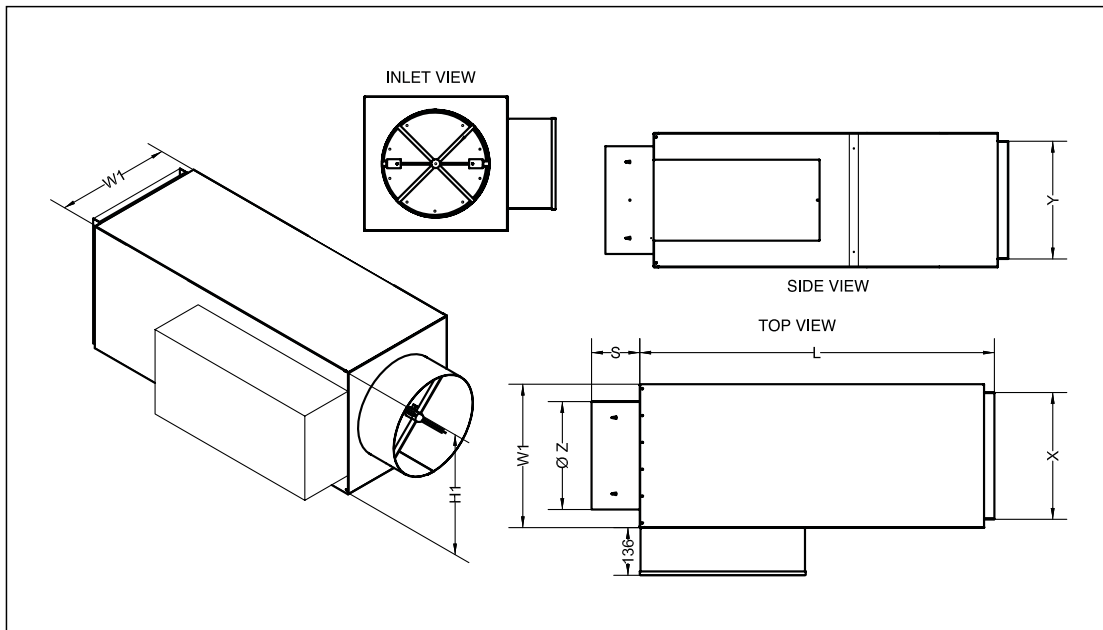
\*In the interest of product development, KMC reserves the right to make changes without notice.



Pressure Independent VAV with Integral Sound Attenuator



Dimensional Data



Model	Box Air Flow (max)		ØZ mm	W1 mm	H1 mm	X mm	Y mm	L mm	S mm	Wt kg
	cfm	l/s								
KSQA-5	350	165	124	254	254	223	223	1004	137	12
KSQA-6	575	271	150	254	254	223	223	1004	137	12
KSQA-7	750	353	175	305	254	223	223	1004	137	13
KSQA-8	1050	494	201	305	254	223	223	1004	137	13
KSQA-9	1350	635	226	356	318	324	286	1004	137	15
KSQA-10	1650	776	251	356	318	324	286	1004	137	15
KSQA-12	2200	1034	302	407	381	375	350	1004	137	17
KSQA-14	3000	1410	353	508	445	477	413	1004	137	20
KSQA-16	4100	1927	404	610	445	578	413	1004	137	23
KSQA-24X16	7700	3619	610 x 406	966	458	966	458	1067	139	52





**Table 11: NC Values - KSQA with Integral Sound Attenuator**  
25mm thick Matte Faced Insulation

Inlet Size	Airflow		ΔPs (Pa)				ΔPs (Pa)			
			125 Pa	250 Pa	500 Pa	750 Pa	125 Pa	250 Pa	500 Pa	750 Pa
			Radiated Noise Criteria (NC)				Discharge Noise Criteria (NC)			
	(CFM)	(lps)	125 Hz	250 Hz	500 Hz	1000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz
KSQA-5 (125mm)	125	59	---	---	---	---	---	---	---	---
	175	83	---	---	21	23	---	---	---	---
	250	118	---	---	25	27	---	---	---	---
	300	141	---	21	26	30	---	---	20	21
	350	165	---	24	29	33	---	---	21	23
KSQA-6 (150mm)	200	94	---	---	20	22	---	---	---	---
	250	118	---	---	22	25	---	---	---	---
	300	141	---	---	24	27	---	---	---	---
	350	165	---	---	25	30	---	---	---	21
	400	188	---	---	26	31	---	---	---	22
KSQA-7 (175mm)	500	235	---	22	27	32	---	---	25	26
	250	118	---	---	22	23	---	---	---	---
	300	141	---	24	24	26	---	---	---	---
	400	188	---	25	32	31	---	---	20	21
	500	235	---	26	36	37	---	---	22	24
KSQA-8 (200mm)	600	282	20	27	37	40	---	---	23	26
	675	318	21	29	38	41	---	---	24	26
	350	165	---	---	24	24	---	---	---	---
	475	224	---	---	30	30	---	---	---	---
	600	282	---	20	31	35	---	---	---	21
KSQA-9 (225mm)	700	329	---	21	32	36	---	---	---	22
	800	376	---	22	34	37	---	---	20	24
	900	423	21	24	35	38	---	---	21	25
	450	212	---	20	27	34	---	---	---	---
	525	247	---	21	29	37	---	---	---	---
KSQA-10 (250mm)	600	282	---	22	30	38	---	---	---	20
	700	329	---	24	31	39	---	---	20	22
	900	423	22	25	32	40	---	---	22	26
	1100	517	24	26	34	41	---	---	25	29
	550	259	---	---	26	31	---	---	---	---
KSQA-12 (300mm)	675	318	---	20	27	32	---	---	---	---
	800	376	---	21	29	34	---	---	---	---
	1000	470	---	22	30	35	---	---	21	22
	1200	564	20	24	31	36	---	---	25	27
	1400	658	23	26	32	37	---	20	26	30
KSQA-14 (350mm)	800	376	---	---	29	32	---	---	---	---
	1000	470	---	---	30	33	---	---	---	---
	1200	564	---	20	31	34	---	---	---	20
	1400	658	---	21	32	35	---	---	22	22
	1700	799	---	24	34	36	---	---	26	29
KSQA-16 (400mm)	2000	940	23	26	35	37	---	20	27	31
	1050	494	---	20	30	32	---	---	---	---
	1400	658	---	21	31	35	---	---	---	20
	1800	846	---	22	32	36	---	---	25	26
	2200	1034	---	24	34	37	---	---	27	30
KSQA-24x16 (600 x 400)	2600	1222	22	26	35	38	---	21	29	34
	3000	1410	25	29	35	39	20	24	30	35
	1400	658	---	21	31	35	---	---	20	22
	1900	893	---	22	32	35	---	---	24	26
	2400	1128	---	24	34	36	---	---	27	30
KSQA-24x16 (600 x 400)	2900	1363	20	26	35	38	---	20	29	34
	3500	1645	24	29	36	39	---	24	30	36
	4100	1927	27	31	37	40	22	26	32	37
	3000	1410	24	29	36	39	---	21	29	33
	4000	1880	30	34	40	42	21	25	32	36
KSQA-24x16 (600 x 400)	5000	2350	35	39	44	46	27	30	36	38
	6000	2820	39	41	46	49	35	35	39	40
	7000	3290	42	45	49	51	37	37	39	41

**Notes**

1. NC values are calculated based on procedures outlined in AHRI standard 885, appendix E as shown in table 2
2. Where no NC value is shown (---), NC values are less than 20

Features at a Glance

Variable Air Volume Terminals

20



**MODEL**  
KSQA  
(Integral Sound attenuator)



**INLET SIZE**

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



**CASING CONSTRUCTION**

- Galvanized Steel
- 304 Stainless Steel
- 316 Stainless Steel
- Aluminium



**CASING THICKNESS**

- 22 Gauge (0.8mm) Standard
- 20 Gauge (1.0mm)



**CASING TREATMENTS**

- 25mm Matte Faced Insulation
- 25mm Fiber-Less Insulation
- Dual Wall



**CONTROL SYSTEM**

- Electric Control  
Control strategies available for all applications



**CONTROL SIDE**

- Right Side
- Left Side

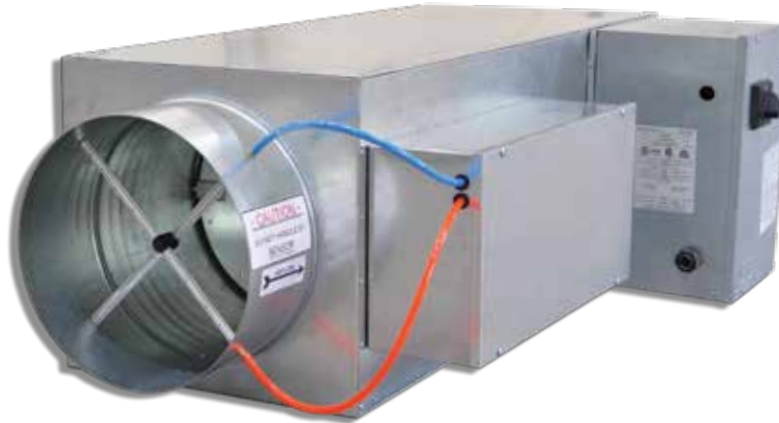


**ELECTRIC CONTROLS**

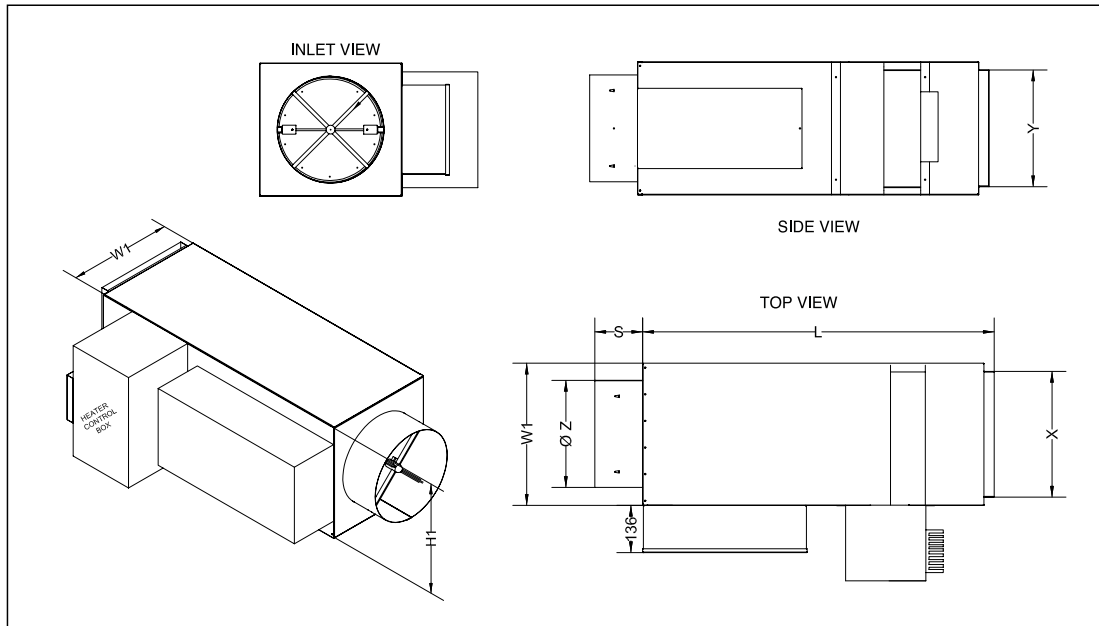
- 24 VAC Actuator



Pressure Independent VAV with Electric Reheat



Dimensional Data



Model	Box Air Flow (max)		ØZ mm	W1 mm	H1 mm	X mm	Y mm	L mm	S mm	Wt kg
	cfm	l/s								
KSQE-5	350	165	124	254	254	223	223	1004	137	17
KSQE-6	575	271	150	254	254	223	223	1004	137	17
KSQE-7	750	353	175	305	254	223	223	1004	137	19
KSQE-8	1050	494	201	305	254	223	223	1004	137	19
KSQE-9	1350	635	226	356	318	324	286	1004	137	22
KSQE-10	1650	776	251	356	318	324	286	1004	137	22
KSQE-12	2200	1034	302	407	381	375	350	1004	137	24
KSQE-14	3000	1410	353	508	445	477	413	1004	137	24
KSQE-16	4100	1927	404	610	445	578	413	1004	137	30
KSQE-24X16	7700	3619	610 x 406	966	458	966	458	1350	139	60







**Table 14: NC Values KSQE with Integral Electric Reheat**  
25mm thick Matte Faced Insulation

Inlet Size	Airflow		$\Delta P_s$ (Pa)				$\Delta P_s$ (Pa)			
			125 Pa	250 Pa	500 Pa	750 Pa	125 Pa	250 Pa	500 Pa	750 Pa
			Radiated Noise Criteria (NC)				Discharge Noise Criteria (NC)			
	(CFM)	(lps)	125 Hz	250 Hz	500 Hz	1000 Hz	125 Hz	250 Hz	500 Hz	1000 Hz
KSQE-5 (125mm)	125	59	---	---	---	---	---	---	---	---
	175	83	---	---	21	23	---	---	---	---
	250	118	---	---	25	27	---	---	---	---
	300	141	---	21	26	30	---	---	20	21
	350	165	---	24	29	33	---	---	21	23
KSQE-6 (150mm)	200	94	---	---	20	22	---	---	---	---
	250	118	---	---	22	25	---	---	---	---
	300	141	---	---	24	27	---	---	---	---
	350	165	---	---	25	30	---	---	---	21
	400	188	---	---	26	31	---	---	---	22
KSQE-7 (175mm)	500	235	---	22	27	32	---	---	25	26
	250	118	---	---	22	23	---	---	---	---
	300	141	---	24	24	26	---	---	---	---
	400	188	---	25	32	31	---	---	20	21
	500	235	---	26	36	37	---	---	22	24
KSQE-8 (200mm)	600	282	20	27	37	40	---	---	23	26
	675	318	21	29	38	41	---	---	24	26
	350	165	---	---	24	24	---	---	---	---
	475	224	---	---	30	30	---	---	---	---
	600	282	---	20	31	35	---	---	---	21
KSQE-9 (225mm)	700	329	---	21	32	36	---	---	---	22
	800	376	---	22	34	37	---	---	20	24
	900	423	21	24	35	38	---	---	21	25
	450	212	---	20	27	34	---	---	---	---
	525	247	---	21	29	37	---	---	---	---
KSQE-10 (250mm)	600	282	---	22	30	38	---	---	---	20
	700	329	---	24	31	39	---	---	20	22
	900	423	22	25	32	40	---	---	22	26
	1100	517	24	26	34	41	---	---	25	29
	550	259	---	---	26	31	---	---	---	---
KSQE-12 (300mm)	675	318	---	20	27	32	---	---	---	---
	800	376	---	21	29	34	---	---	---	---
	1000	470	---	22	30	35	---	---	21	22
	1200	564	20	24	31	36	---	---	25	27
	1400	658	23	26	32	37	---	20	26	30
KSQE-14 (350mm)	800	376	---	---	29	32	---	---	---	---
	1000	470	---	---	30	33	---	---	---	---
	1200	564	---	20	31	34	---	---	---	20
	1400	658	---	21	32	35	---	---	22	22
	1700	799	---	24	34	36	---	---	26	29
KSQE-16 (400mm)	2000	940	23	26	35	37	---	20	27	31
	1050	494	---	20	30	32	---	---	---	---
	1400	658	---	21	31	35	---	---	---	20
	1800	846	---	22	32	36	---	---	25	26
	2200	1034	---	24	34	37	---	---	27	30
KSQE-24x16 (600 x 400)	2600	1222	22	26	35	38	---	21	29	34
	3000	1410	25	29	35	39	20	24	30	35
	1400	658	---	21	31	35	---	---	20	22
	1900	893	---	22	32	35	---	---	24	26
	2400	1128	---	24	34	36	---	---	27	30
KSQE-24x16 (600 x 400)	2900	1363	20	26	35	38	---	20	29	34
	3500	1645	24	29	36	39	---	24	30	36
	4100	1927	27	31	37	40	22	26	32	37
	3000	1410	24	29	36	39	---	21	29	33
	4000	1880	30	34	40	42	21	25	32	36
KSQE-24x16 (600 x 400)	5000	2350	35	39	44	46	27	30	36	38
	6000	2820	39	41	46	49	35	35	39	40
	7000	3290	42	45	49	51	37	37	39	41

**Notes**

1. NC values are calculated based on procedures outlined in AHRI standard 885, appendix E as shown in table 2
2. Where no NC value is shown (---), NC values are less than 20

Features at a Glance

**MODEL**  
KSQE - Basic Assembly

- INLET SIZE**
- 125mm (5"Ø) • 250mm (10"Ø)
  - 150mm (6"Ø) • 300mm(12"Ø)
  - 175mm (7"Ø) • 350mm(14"Ø)
  - 200mm (8"Ø) • 400mm (16"Ø)
  - 225mm (9"Ø) • 600mm x 400mm (24"x16")

- CASING CONSTRUCTION**
- Galvanized Steel
  - 304 Stainless Steel
  - 316 Stainless Steel
  - Aluminium

- CASING THICKNESS**
- 22 Gauge (0.8mm) Standard
  - 20 Gauge (1.0mm)

- CASING TREATMENTS**
- 25mm Matte Faced Insulation
  - 25mm 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
  - Modulating Heaters
  - Stage Heaters
  - Door Interlocking Disconnect Switch, Non - Fused
  - Power Fusing
  - Primary Fused Transformer

- ELECTRIC CONTROLS**
- Control Transformer
  - Low Voltage Fuse & Fuse Block
  - Low Voltage Disconnect Switch
  - Low Voltage Power-Fusing
  - 24 VAC Actuator





Furnish and install KMC's KSQ Single Duct Variable Air Volume Terminals, KSQA Single Duct Variable Air Volume Terminals with integral sound attenuator, or KSQE 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 (22Ga) (standard), and 1.0 mm (20Ga)

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 Metal 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 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 KSQE 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).

**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 KSQE 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

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





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