

VAV terminal units

Type TVB



For the most diverse application at standard volume flow with demanding acoustic requirements.

VAV terminal units for standard applications of supply air or extract air control in variable air volume systems with demanding acoustic requirements

- Suitable for the control of volume flow rate, room pressure or duct pressure
- Electronic control components for different applications (Easy, Compact, Universal)
- Accurate air flow control even with upstream radius bend ($R = 1D$)
- Suitable for air velocities up to 2559 fpm
- Operation pressure 20 to 1000 Pa (0,08 to 4,02 In w.g.)
- Closed blade air leakage to EN 1751, Class 2 (size 4 – 10), Class 3 (size 12,14,16)
- Integral attenuator
- Box style construction for the reduction of the airflow velocity
- Tested and certified to AHRI Standard 880-2017

TROX[®] TECHNIK

The art of handling air

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Variants

Product examples

VAV terminal unit, variant TVB-A



VAV terminal unit, variant TVB-C



Description

Application

- VAV terminal units of Type TVB for supply air or extract air flow control in variable air volume systems
- Closed-loop volume flow control using an external power supply
- Integral attenuator for demanding acoustic requirements
- Shut-off by means of switching (equipment supplied by others)

Variants

- TVB-A: VAV terminal unit
- TVB-B: VAV terminal unit with extended casing for better acoustics performance
- TVB-C: VAV terminal unit with multiple outlets
- TVB-E: VAV terminal unit with electric reheat unit
- TVB-EC: VAV terminal unit with multiple outlets and reheat unit

Nominal sizes

- 4, 5, 6, 7, 8, 10, 12, 14, 16

Attachments

- Easy controller: Compact unit consisting of controller with potentiometers, differential pressure transducer and actuator
- Compact controller: Compact unit consisting of controller, differential pressure transducer and actuator
- Universal controller: Controller, differential pressure transducer and actuators for special applications

Construction features

- Rectangular casing
- Spigot on the inlet suitable for circular ducts to DW144, 1998
- Connection on the room end suitable for air duct profiles
- Position of the damper blade indicated externally at shaft extension
- Thermal and acoustic insulation (lining)

Materials and surfaces

- Casing and damper blade made of galvanized sheet steel
- Damper blade seal made of Chloroprene rubber
- Lining is fiber glass
- Differential pressure sensor made of aluminum
- Plastic bearings

Mineral wool

- Internal fiber glass insulation lining.
- Faced with woven glass fabric as protection against fiber erosion for airflow velocities up to 20 m/s
- Resistant to fungal and bacterial growth

Installation and commissioning

- Any installation orientation (except units with static differential pressure transducer)
- Return edges of the casing with drilled holes suitable for M8 threaded rods

Standards and guidelines

- Closed blade air leakage to EN 1751, Class 2 (4 – 10), Class 3 (12, 14, 16)

Maintenance

- Maintenance-free as construction and materials are not subject to wear

Useful additions

- Hot water heat exchanger
 - Electrical heater
- For more details contact TROX Malaysia

Special characteristics

- Factory set-up or programming and aerodynamic function testing
- Volume flow rate can later be measured and adjusted on site; additional adjustment device may be necessary

Parts and characteristics

- Ready-to-commission unit which consists of mechanical parts and control components
- Averaging differential pressure sensor for volume flow rate measurement
- Damper blade
- Integral attenuator
- Factory assembled control components complete with wiring and tubing
- Aerodynamic functional testing on a special test rig prior to shipping of each unit
- Set-up data is given on a label or volume flow rate scale affixed to the unit

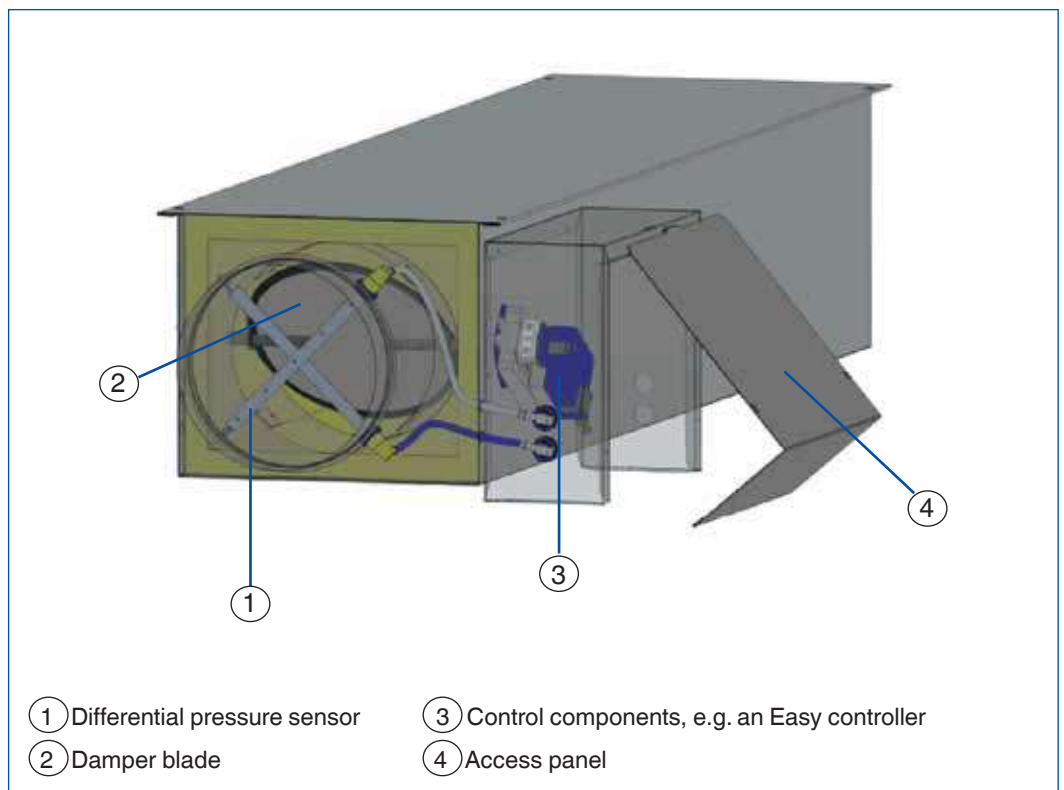
Function

Functional description

The VAV terminal unit is fitted with a differential pressure sensor for measuring the volume flow rate. The control components (attachments) include a differential pressure transducer that transforms the differential pressure (effective pressure) into an electric signal, a controller, and an actuator; the control functions can be achieved with an Easy controller, with a Compact controller, or with individual components.

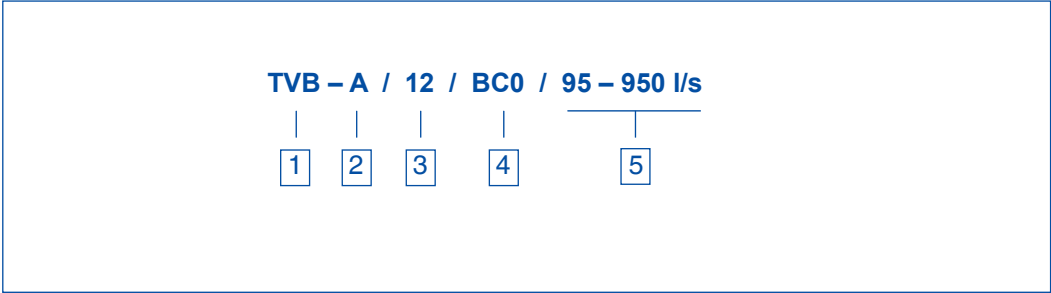
For most applications, the setpoint value comes from a room temperature controller. The controller compares the actual value with the setpoint value and alters the control signal of the actuator if there is a difference between the two values. An integral attenuator reduces the noise that is created by the restriction of the airflow. The airflow velocity at the room end is, due to the larger rectangular cross section, about half the velocity in the circular duct

Schematic illustration of the TVB



Order code
VARYCONTROL

TVB, TVB-/-.../Easy



- 1

TVB

Type

VAV terminal unit
- 4

Attachments (control component)

Specific controller name
- 2

A

Construction variation

short casing
- B

long casing
- C

with multiple outlets
- E

with electric heater
- EC

with electric heater and multiple outlets
- 5

Design flow range [l/s or CFM], differential pressure [Pa or In.w.g]

Ṽmin and Ṽmax for factory setting or Δpmin for factory setting
- 3

Nominal size [inch]

4

5

6

7

8

10

12

14

16

Order example
VARYCONTROL

TVB-A/12/BC0/95-950 l/s	
Construction variation	short casing
Nominal size	12 inch
Attachment	Controller
Volume flow rate	95-950 l/s (201-2013 CFM)

Volume flow rate ranges

Quick selection tables provide a good overview of the room sound pressure levels that can be expected. Approximate intermediate values can be interpolated. For precise intermediate values please contact TROX Malaysia.

The first selection criteria for the nominal size are the actual volume flow rates $\dot{V}_{\min}$ and $\dot{V}_{\max}$ in ft³/min (CFM) and in l/s (LPS). The quick sizing tables are based on normally accepted attenuation levels. If the sound pressure level exceeds the required level, a larger VAV terminal unit and/or a silencer is required.

Radiated sound pressure level

Terminal size	Airflow		Radiated Sound Pressure Level																	
	CFM	LPS	ΔP_{st} in H ₂ O (Pa)																	
			TVB-A								TVB-B				TVB-E & C					
			0.5" (125Pa)		1" (250Pa)		1.5" (375Pa)		3" (750Pa)		0.5" (125Pa)		1" (250Pa)		1.5" (375Pa)		3" (750Pa)		0.5" (125Pa)	
			NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)
4	21	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	95	45	-	-	-	21	-	23	22	28	-	-	-	-	20	-	24	-	20	-
	150	71	-	21	20	26	23	28	29	33	-	21	-	24	-	26	21	30	21	26
	212	100	-	24	25	29	28	32	33	37	-	25	21	29	23	31	26	34	25	30
5	31	15	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-
	148	70	-	-	-	23	-	26	25	31	-	-	-	-	23	20	28	-	-	-
	250	118	-	21	20	26	24	30	30	35	-	21	-	26	21	29	27	34	-	24
	327	155	-	23	22	28	26	32	32	37	-	24	22	29	25	32	31	37	20	27
6	53	25	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-
	232	110	-	-	-	24	20	28	26	33	-	-	-	23	20	26	24	29	-	22
	400	189	-	24	22	29	26	33	32	38	21	26	25	30	28	33	32	36	22	29
	497	235	-	26	24	31	28	35	35	40	24	29	28	33	31	35	35	39	26	32
7	63	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	295	140	-	22	-	27	21	30	27	35	-	21	-	25	21	28	25	31	-	23
	550	260	22	28	28	33	31	36	35	41	24	29	29	33	32	35	35	39	26	31
	655	310	24	29	30	35	33	38	38	43	27	31	32	35	35	37	38	41	28	33
8	85	40	-	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-	-
	401	190	-	22	20	28	24	31	31	37	-	20	-	26	23	29	30	35	-	22
	700	331	21	26	28	33	32	36	39	42	21	26	28	32	32	35	38	41	22	27
	866	410	23	28	31	34	35	38	42	44	24	28	31	34	35	37	41	43	25	29
10	137	65	-	-	-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	-
	613	290	-	-	-	27	24	31	35	39	-	-	-	25	21	29	29	35	-	22
	1100	521	-	25	26	32	31	37	42	45	-	24	25	31	29	35	36	42	22	29
	1331	630	20	26	29	34	34	39	44	47	20	27	28	33	33	37	40	44	26	31
12	201	95	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	20	-	-
	930	440	-	23	21	29	26	33	33	39	-	22	20	28	24	31	31	37	-	26
	1600	757	-	28	28	34	33	38	41	44	-	27	26	33	30	36	37	42	24	31
	2007	950	22	30	31	36	35	40	43	46	22	29	29	35	33	38	40	44	27	33
14	264	125	-	-	-	-	-	-	20	24	-	-	-	-	-	-	-	23	-	-
	1214	575	-	-	-	27	24	31	33	39	-	23	22	27	26	30	33	36	-	22
	2100	994	-	24	24	32	29	36	38	44	24	29	26	32	30	34	37	40	-	27
	2641	1250	-	26	26	34	31	38	41	46	27	31	27	34	31	36	39	42	22	30
16	380	180	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	21	-	-
	1732	820	-	21	21	29	27	34	38	42	23	28	24	31	28	33	35	38	-	25
	2800	1325	20	27	31	35	38	40	48	48	33	35	33	36	33	38	38	43	26	32
	3750	1775	26	31	37	39	44	44	54	52	38	39	38	40	38	41	40	45	32	35

Note

- Dash (-) indicates values lower than 20.
- All values calculated based upon attenuation according to AHRI standard 885:2008 Appendix E1. See appendix for detail.

Regenerated discharge sound pressure level

Terminal size	Airflow		Regenerated Discharge Sound Pressure Level																	
	CFM	LPS	ΔP_{st} in H ₂ O (Pa)																	
			TVB-A								TVB-B				TVB-E & C					
			0.5" (125Pa)		1" (250Pa)		1.5" (375Pa)		3" (750Pa)		0.5" (125Pa)		1" (250Pa)		1.5" (375Pa)		3" (750Pa)		0.5" (125Pa)	
			NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)	NC	dB (A)
4	21	10	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-
	95	45	22	29	29	34	32	37	38	42	-	24	22	27	24	28	27	30	-	-
	150	71	27	33	33	38	37	41	43	46	26	30	29	32	31	34	34	36	-	-
	212	100	30	36	37	41	40	44	47	49	32	34	35	37	36	38	39	40	-	21
5	31	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	148	70	22	28	27	32	30	34	34	37	21	26	25	29	27	30	31	33	-	-
	250	118	29	34	35	38	38	41	42	44	29	32	33	35	35	37	39	40	-	25
	327	155	33	37	38	41	41	44	46	47	33	35	37	38	39	40	43	43	24	28
6	53	25	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-
	232	110	22	29	28	34	31	36	36	40	22	26	26	30	29	32	33	35	-	20
	400	189	30	35	36	40	39	42	44	46	30	33	35	37	37	39	42	42	23	28
	497	235	33	37	39	42	42	45	48	49	34	36	38	39	41	41	45	45	27	31
7	63	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	295	140	32	35	35	38	37	39	39	41	20	25	25	29	28	31	32	35	-	24
	550	260	41	42	45	45	47	47	50	50	30	33	35	37	38	39	43	43	30	33
	655	310	44	44	48	47	50	49	53	52	33	35	38	39	41	41	45	45	33	35
8	85	40	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-
	401	190	22	29	27	33	30	36	35	40	20	26	26	30	29	32	33	36	21	27
	700	331	30	34	35	39	38	42	44	46	28	31	33	36	36	38	41	42	30	34
	866	410	33	36	38	41	42	44	47	49	31	34	36	38	39	40	44	44	33	36
10	137	65	-	-	-	-	-	-	24	-	-	-	-	-	20	-	24	-	-	-
	613	290	22	29	27	33	30	36	35	40	-	24	25	29	29	32	35	37	20	26
	1100	521	29	34	35	39	38	41	43	46	24	29	31	34	34	37	41	42	30	33
	1331	630	31	36	37	41	40	43	45	47	26	30	32	35	36	38	42	44	33	36
12	201	95	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-
	930	440	20	27	25	31	28	34	33	38	-	21	-	25	23	28	28	32	-	24
	1600	757	26	32	32	36	35	39	40	43	20	26	26	30	29	33	35	38	29	32
	2007	950	28	34	34	38	37	41	42	45	23	28	29	33	32	35	38	40	33	36
14	264	125	-	-	-	-	-	-	23	-	-	-	-	-	-	-	21	-	-	-
	1214	575	-	26	24	31	27	33	32	38	-	20	-	25	23	28	30	33	-	25
	2100	994	24	31	30	36	33	38	40	43	-	24	24	29	28	32	35	38	27	32
	2641	1250	26	32	32	38	36	41	43	45	-	26	26	31	30	34	37	39	30	34
16	380	180	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-
	1732	820	-	25	24	30	27	33	32	37	-	-	-	23	-	25	24	30	-	25
	2800	1325	24	30	30	34	33	37	38	42	-	22	21	27	25	30	31	35	28	32
	3750	1775	27	32	33	37	37	40	42	44	-	25	24	30	28	33	34	38	34	36

Note

- Dash (-) indicates values lower than 20.
- All values calculated based upon attenuation according to AHRI standard 885:2008 Appendix E1. See appendix for detail.

The minimum differential pressure of VAV terminal units is an important factor in designing the ductwork and in rating the fan including speed control.

Sufficient duct pressure must be ensured for all operating conditions and for all control units.

The measurement points for fan speed control must be selected accordingly.

Volume flow rate ranges and minimum differential pressure values

Nominal Size	Airflow, $\dot{V}$		Minimum working pressure $\Delta P_{st min}$ (Pa)		
	LPS	CFM	TVB-A	TVB-B TVB-E	TVB-C
4	10	21	20	20	20
	45	95	20	25	40
	70	148	40	65	90
	100	212	75	130	185
5	15	32	20	20	20
	70	148	20	20	30
	115	244	20	40	70
	155	328	30	70	115
6	25	53	20	20	20
	110	233	20	20	20
	170	360	20	20	20
	235	498	20	20	40
7	30	64	20	20	20
	140	297	20	20	20
	225	477	20	20	20
	310	657	20	20	35
8	40	85	20	20	20
	190	403	20	20	20
	300	636	20	20	20
	410	869	20	20	20
10	65	138	20	20	20
	290	614	20	20	20
	460	975	20	20	20
	630	1335	20	20	20
12	95	201	20	20	20
	440	932	20	20	20
	695	1476	20	20	20
	950	2013	20	20	20
14	125	265	20	20	20
	575	1218	20	20	20
	910	1928	20	20	20
	1250	2649	20	20	20
16	180	381	20	20	20
	820	1737	20	20	20
	1295	2744	20	20	20
	1775	3761	20	20	20

Note

- The volume flow rates given for VAV terminal units depend on the nominal size and on the control component (attachment) that is installed. The table gives the minimum and maximum values for a VAV terminal unit.
- Some control components may only have a limited volume flow rate range. For volume flow rate ranges for all control components refer to TROX Malaysia

All performance data based on test conducted in accordance with AHRI 880-2017.
Sound levels are in decibels, dB ref: 1×10^{-12} watts.

Dash (-) indicates values lower than 15.

Terminal size	Airflow		Sound Power Level, dB at Octave band freq. Hz																							
	CFM	LPS	$\Delta P_{st} = 0.5"$ H ₂ O (125Pa)						$\Delta P_{st} = 1"$ H ₂ O (250Pa)						$\Delta P_{st} = 1.5"$ H ₂ O (375Pa)						$\Delta P_{st} = 3"$ H ₂ O (750Pa)					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	21	10	51	46	33	21	27	30	54	50	37	26	32	37	56	51	39	29	35	41	59	55	43	34	40	47
	95	45	66	63	48	32	32	30	71	68	54	39	39	39	74	71	58	43	43	44	78	76	63	50	50	52
	150	71	70	67	52	35	33	29	75	72	58	42	40	38	78	76	61	46	44	43	82	81	67	53	51	51
	212	100	72	70	54	36	33	28	77	75	60	43	40	37	80	79	64	48	44	42	85	84	70	55	51	51
5	31	15	48	39	30	22	23	23	51	42	34	28	29	28	52	43	36	31	32	32	54	45	40	35	36	37
	148	70	66	61	47	35	34	32	70	64	53	42	40	39	72	66	56	45	44	43	75	70	60	51	50	50
	250	118	72	67	52	39	37	35	76	71	58	46	43	42	78	73	61	49	47	46	82	77	66	56	54	53
	327	155	74	70	55	40	38	36	79	74	60	47	45	43	81	77	64	51	49	48	85	81	69	58	55	55
6	53	25	49	45	35	28	27	26	52	49	40	35	33	32	54	51	43	38	37	35	57	54	48	44	42	41
	232	110	66	63	49	40	37	35	71	67	55	47	44	43	73	70	58	51	48	47	77	73	64	58	55	53
	400	189	72	69	53	43	41	38	77	73	59	51	48	46	79	76	63	55	52	50	83	80	69	62	59	57
	497	235	74	71	55	45	42	40	79	76	61	52	49	47	82	78	65	57	54	51	86	83	71	64	61	59
7	63	30	53	45	37	32	32	29	54	48	41	38	37	35	55	50	43	41	40	38	56	52	47	46	45	44
	295	140	74	65	52	43	42	39	76	69	57	50	49	46	77	71	60	54	53	50	79	74	64	60	58	56
	550	260	81	71	56	47	45	42	84	76	62	54	53	49	85	78	65	58	56	53	88	82	70	65	63	60
	655	310	83	73	58	48	46	42	86	78	63	55	53	50	88	80	67	59	57	54	90	84	72	66	64	61
8	85	40	50	46	42	38	36	32	54	50	47	44	42	38	56	53	50	48	45	42	59	57	54	54	52	48
	401	190	69	63	53	47	44	41	73	68	58	53	51	48	75	71	61	57	55	52	79	75	67	64	62	59
	700	331	75	68	56	49	47	44	79	73	62	56	54	51	82	76	65	60	58	55	86	81	71	67	65	62
	866	410	77	70	57	50	48	45	82	75	63	57	55	52	84	79	66	61	59	57	88	84	72	68	66	64
10	137	65	54	48	40	37	35	34	57	52	46	43	41	40	59	54	49	47	44	43	62	58	54	52	50	49
	613	290	69	63	52	46	44	41	73	68	58	53	50	48	76	70	61	56	54	52	79	74	67	62	59	58
	1100	521	75	68	56	49	46	44	79	73	62	56	53	51	81	76	66	59	57	55	85	80	72	66	63	61
	1331	630	76	70	57	50	47	44	81	75	64	56	54	51	83	78	67	60	58	56	87	82	73	67	64	62
12	201	95	56	46	39	38	37	33	59	50	44	44	43	40	61	52	47	47	46	44	64	56	52	52	51	50
	930	440	70	62	52	47	45	43	74	66	58	53	52	50	76	69	61	56	55	54	80	73	66	62	61	60
	1600	757	74	67	56	49	48	45	79	72	62	55	54	53	81	74	65	59	58	57	85	78	71	65	64	64
	2007	950	76	69	58	50	49	46	80	74	64	57	56	54	83	76	67	60	59	58	87	81	73	66	66	65
14	264	125	51	47	42	40	38	35	56	51	48	46	45	42	58	54	51	50	48	47	62	58	57	56	54	53
	1214	575	67	62	52	48	46	44	72	67	58	55	53	52	75	69	62	59	56	56	79	74	68	65	63	63
	2100	994	72	66	55	51	48	47	77	71	62	58	55	55	80	74	66	61	59	59	85	79	72	68	66	66
	2641	1250	74	68	56	52	49	48	79	73	63	59	56	56	82	76	67	62	60	60	87	81	73	69	67	67
16	380	180	53	43	37	40	39	37	56	48	44	45	45	43	58	51	48	49	48	47	62	55	54	54	53	53
	1732	820	69	59	49	47	46	44	73	64	56	53	52	51	75	67	60	57	55	55	79	72	67	62	61	61
	2800	1325	73	64	52	49	47	45	77	69	60	55	54	53	80	72	64	59	57	57	84	77	70	64	63	63
	3750	1775	75	66	54	50	48	46	80	71	61	56	55	53	82	75	65	60	58	58	86	80	72	66	64	64

Duct End Correction as per AHRI 880-2017 is added in sound power level based on the below:

$$E_1 = 10 \log \left[1 + \left(\frac{0.7 C_o}{\pi f D_e} \right)^2 \right]$$

$$D_e = -\sqrt{4 \cdot \frac{A}{\pi}}$$

Where A = Internal cross section of duct, ft²
 C_o = Speed of sound in air, ft/s
 D_e = Equivalent diameter, ft
 E_1 = Duct end correction, dB
 f = One- third octave band centre frequency, Hz

VAV terminal units

Radiated sound power level for TVB-A

TVB

All performance data based on test conducted in accordance with AHRI 880-2017.
Sound levels are in decibels, dB ref: 1×10^{-12} watts.

Dash (-) indicates values lower than 15.

Terminal size	Airflow		Sound Power Level, dB at Octave band freq. Hz																							
	CFM	LPS	$\Delta P_{st} = 0.5''\text{H}_2\text{O}$ (125Pa)						$\Delta P_{st} = 1''\text{H}_2\text{O}$ (250Pa)						$\Delta P_{st} = 1.5''\text{H}_2\text{O}$ (375Pa)						$\Delta P_{st} = 3''\text{H}_2\text{O}$ (750Pa)					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	21	10	16	26	-	-	-	-	23	31	18	-	-	-	27	33	22	17	-	-	33	37	27	24	-	17
	95	45	31	43	26	16	-	-	39	48	33	24	18	15	43	50	37	28	23	21	49	54	43	36	31	30
	150	71	36	48	31	19	-	-	43	53	37	27	23	18	47	55	41	31	28	24	54	60	48	39	36	34
	212	100	39	52	34	21	19	-	47	56	41	29	27	21	51	59	45	34	32	27	58	64	51	41	40	37
5	31	15	29	31	23	-	-	-	33	36	31	17	-	-	35	38	35	22	15	-	38	42	42	29	21	-
	148	70	43	43	29	19	16	-	48	49	37	28	23	16	50	52	42	33	28	22	54	56	50	42	35	30
	250	118	47	47	31	23	19	-	52	52	39	32	27	22	55	56	44	37	32	28	59	61	52	46	39	36
	327	155	50	49	32	24	21	16	55	55	40	34	29	25	58	58	45	39	34	31	62	63	53	47	41	39
6	53	25	25	27	26	23	19	-	29	33	32	28	25	15	32	36	35	31	29	19	37	42	41	37	35	26
	232	110	41	43	37	36	35	29	46	49	43	42	41	35	49	52	46	45	44	39	54	57	52	50	50	46
	400	189	47	48	41	41	40	36	52	54	46	46	46	42	55	57	50	49	50	46	59	63	55	55	55	53
	497	235	50	51	42	43	42	38	54	56	48	48	48	45	57	59	51	51	52	49	62	65	57	56	58	56
7	63	30	34	24	27	23	19	12	35	29	33	29	25	18	36	31	36	33	28	22	37	35	42	39	34	29
	295	140	54	43	34	28	28	22	58	50	42	37	37	31	60	53	46	41	41	36	62	58	53	48	48	43
	550	260	60	49	35	29	30	24	65	56	44	38	39	34	67	60	49	43	44	39	70	65	56	51	52	47
	655	310	62	51	35	29	31	25	66	58	44	38	40	35	69	61	49	43	45	40	72	67	57	51	53	48
8	85	40	34	31	26	26	24	19	37	37	33	33	31	28	40	41	37	38	34	32	43	46	43	45	41	40
	401	190	54	40	37	30	32	26	59	48	45	39	40	35	62	52	49	44	44	40	66	59	56	52	51	49
	700	331	59	42	39	30	33	26	65	50	48	39	42	36	68	55	53	45	47	42	73	62	60	53	54	51
	866	410	61	42	40	30	33	26	67	51	49	39	42	36	70	56	54	45	47	42	76	63	62	54	55	52
10	137	65	29	22	20	20	21	-	35	32	29	28	29	22	38	37	34	32	34	27	44	46	42	41	42	36
	613	290	50	41	33	29	30	23	57	50	41	38	38	32	60	56	46	43	43	37	66	65	54	51	51	45
	1100	521	57	46	36	32	32	24	64	56	45	41	41	34	67	62	50	46	45	39	73	71	58	54	53	48
	1331	630	59	48	37	32	32	25	66	58	46	41	41	34	69	63	51	46	46	40	75	73	59	55	54	48
12	201	95	38	33	26	20	16	-	44	38	33	28	24	20	48	41	38	32	28	25	53	46	44	39	36	33
	930	440	53	47	38	30	28	22	59	53	45	38	36	32	63	56	50	43	41	37	69	61	57	51	49	46
	1600	757	58	51	42	34	32	26	65	57	49	42	40	36	68	61	54	47	45	41	74	67	61	54	53	50
	2007	950	60	53	43	35	34	28	67	59	51	43	42	37	70	63	55	48	47	43	77	69	63	56	55	52
14	264	125	28	26	25	19	19	16	36	32	33	26	25	22	40	36	38	31	29	26	48	43	46	38	34	32
	1214	575	46	43	37	30	31	26	54	50	46	38	37	33	59	54	50	42	41	36	66	60	58	49	47	43
	2100	994	52	48	41	34	35	30	60	55	50	41	41	36	65	59	54	46	45	40	72	66	63	53	51	46
	2641	1250	54	51	43	35	37	31	62	58	51	43	43	38	67	62	56	47	46	41	75	68	64	54	52	47
16	380	180	22	20	23	16	17	-	30	28	31	24	23	19	35	32	36	28	26	22	43	40	44	35	32	29
	1732	820	51	42	38	34	34	28	59	50	47	42	40	35	64	55	52	46	44	39	72	63	60	54	50	46
	2800	1325	59	48	42	38	38	32	67	56	51	46	45	39	72	61	55	51	48	43	80	69	64	58	54	50
	3750	1775	63	51	44	41	40	34	72	59	53	49	47	41	77	64	58	53	51	45	85	72	66	61	57	52

All performance data based on test conducted in accordance with AHRI 880-2017.

Sound levels are in decibels, dB ref: 1 x 10⁻¹² watts.

Dash (-) indicates values lower than 15.

Terminal size	Airflow		Sound Power Level, dB at Octave band freq. Hz																							
	CFM	LPS	$\Delta P_{st} = 0.5''\text{H}_2\text{O}$ (125Pa)						$\Delta P_{st} = 1''\text{H}_2\text{O}$ (250Pa)						$\Delta P_{st} = 1.5''\text{H}_2\text{O}$ (375Pa)						$\Delta P_{st} = 3''\text{H}_2\text{O}$ (750Pa)					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	21	10	45	28	-	-	-	-	47	30	16	-	-	-	48	32	17	-	-	-	50	33	19	-	-	-
	95	45	64	51	36	-	-	-	66	53	39	15	-	-	68	55	41	19	15	18	70	57	43	24	21	24
	150	71	69	58	43	15	-	-	72	60	46	21	15	16	73	61	48	24	18	20	76	64	50	30	23	27
	212	100	74	62	48	19	-	-	76	65	51	24	17	18	77	66	53	28	20	22	80	68	55	33	26	29
5	31	15	45	30	14	-	-	-	48	34	17	-	-	-	50	35	19	-	-	-	53	38	23	-	-	15
	148	70	65	52	37	-	-	-	68	55	41	18	15	18	70	57	43	22	18	22	73	60	46	28	23	28
	250	118	71	59	45	18	15	16	75	62	49	25	20	22	76	64	51	28	23	26	79	67	54	35	28	32
	327	155	75	63	49	22	18	18	78	66	52	28	23	24	80	67	54	32	26	28	83	70	58	38	31	34
6	53	25	47	32	19	-	-	-	50	35	23	-	-	-	52	36	26	-	-	16	54	39	29	16	-	22
	232	110	66	53	38	18	15	17	69	57	42	24	20	23	71	58	45	27	23	27	74	62	49	33	28	33
	400	189	73	61	44	23	21	21	76	64	49	30	26	27	78	66	51	33	29	30	81	69	56	39	34	37
	497	235	75	64	47	26	23	22	79	67	51	32	28	28	81	69	54	35	31	32	84	73	58	42	36	38
7	63	30	45	33	21	-	-	-	48	37	26	-	-	15	50	39	29	-	-	18	53	42	34	18	-	24
	295	140	65	53	37	21	17	19	68	57	43	27	22	26	71	60	47	30	26	30	74	64	53	36	31	37
	550	260	72	60	44	27	25	23	76	65	50	33	30	30	78	67	53	37	34	35	82	72	59	43	39	41
	655	310	74	62	45	29	27	24	78	67	52	35	33	32	81	70	55	39	36	36	84	74	61	45	41	43
8	85	40	52	41	23	16	12	16	56	45	30	22	17	22	58	48	33	25	20	26	61	52	39	31	26	32
	401	190	68	57	39	27	25	26	72	61	46	34	31	33	74	64	50	37	35	36	78	69	56	43	40	43
	700	331	74	62	45	31	30	30	78	67	52	38	36	36	80	70	55	41	39	40	84	74	62	47	45	46
	866	410	76	64	47	33	32	31	80	69	54	39	38	38	82	72	58	43	41	41	86	76	64	49	47	48
10	137	65	55	41	32	17	15	20	59	46	38	24	21	27	62	50	42	28	25	31	66	55	48	35	31	38
	613	290	66	55	41	28	26	28	71	60	47	35	32	35	74	64	51	39	36	39	79	69	58	46	43	46
	1100	521	71	60	44	31	30	31	76	66	51	39	37	38	79	69	55	43	40	42	83	75	62	50	47	49
	1331	630	72	61	45	33	31	31	77	67	52	40	38	39	80	71	56	44	42	43	85	76	63	51	48	50
12	201	95	49	34	30	13	12	16	54	39	36	19	18	22	56	41	39	23	21	26	60	46	45	29	26	32
	930	440	65	52	41	28	28	27	69	57	47	35	34	34	72	60	51	38	37	38	76	64	57	45	43	44
	1600	757	70	58	45	33	33	31	74	63	51	40	39	38	77	66	55	43	42	42	81	70	61	50	48	48
	2007	950	72	60	46	35	35	33	76	65	53	42	41	39	79	68	56	45	44	43	83	73	63	52	50	50
14	264	125	52	40	32	20	18	18	57	45	39	27	23	25	60	48	43	31	27	28	64	52	49	37	32	35
	1214	575	64	53	41	31	30	29	69	58	48	38	36	36	72	61	52	42	40	40	77	66	59	48	46	46
	2100	994	67	57	44	34	35	33	73	62	51	41	41	40	76	65	55	45	44	43	81	71	62	52	50	50
	2641	1250	69	59	46	36	36	34	74	64	53	43	42	41	78	67	57	47	46	45	83	72	64	54	52	52
16	380	180	45	36	29	14	18	19	49	40	36	19	23	24	52	42	39	22	25	27	55	46	46	26	30	32
	1732	820	61	52	38	29	30	29	66	57	45	34	35	35	68	59	50	37	38	38	73	64	57	43	43	44
	2800	1325	65	56	40	33	34	32	70	61	48	39	39	38	73	64	52	42	42	41	78	69	60	47	47	47
	3750	1775	68	59	42	36	35	33	73	64	49	41	41	39	76	67	54	44	44	43	81	72	61	50	49	49

Duct End Correction as per AHRI 880-2017 is added in sound power level based on the below:

$$E_1 = 10 \log \left[1 + \left(\frac{0.7C_o}{\pi f D_e} \right)^2 \right]$$

$$D_e = \sqrt{4 \cdot \frac{A}{\pi}}$$

Where A = Internal cross section of duct, ft²
 C_o = Speed of sound in air, ft/s
 D_e = Equivalent diameter, ft
 E_1 = Duct end correction, dB
 f = One- third octave band centre frequency, Hz

VAV terminal units

Radiated sound power level for TVB-B

TVB

All performance data based on test conducted in accordance with AHRI 880-2017.
Sound levels are in decibels, dB ref: 1×10^{-12} watts.

Dash (-) indicates values lower than 15.

Terminal size	Airflow		Sound Power Level, dB at Octave band freq. Hz																							
	CFM	LPS	$\Delta P_{st} = 0.5''H_2O$ (125Pa)						$\Delta P_{st} = 1''H_2O$ (250Pa)						$\Delta P_{st} = 1.5''H_2O$ (375Pa)						$\Delta P_{st} = 3''H_2O$ (750Pa)					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	21	10	19	22	-	-	-	-	24	25	-	-	-	-	27	26	15	-	-	-	32	28	17	16	-	-
	95	45	38	40	33	-	-	-	44	43	36	19	-	-	47	45	38	23	-	-	52	48	40	29	22	19
	150	71	44	46	39	16	-	-	50	49	43	22	-	-	53	51	44	26	17	-	58	54	47	32	26	22
	212	100	48	50	44	19	-	-	54	53	48	25	-	-	57	55	49	28	20	-	63	58	52	34	28	23
5	31	15	27	20	14	-	-	-	31	25	19	-	-	-	34	28	23	-	-	-	38	32	28	17	-	-
	148	70	46	37	32	16	-	-	50	42	38	23	15	-	53	44	41	27	19	-	57	49	46	34	26	19
	250	118	52	42	38	21	-	-	57	47	44	28	20	15	59	50	47	32	24	18	64	55	53	39	31	25
	327	155	56	45	41	24	16	-	60	50	47	31	23	18	63	53	50	35	27	21	67	58	56	42	33	28
6	53	25	25	19	21	-	4	-	29	24	25	17	-	-	31	26	27	20	-	-	34	30	31	24	17	-
	232	110	46	40	40	30	26	19	50	44	44	35	31	26	52	46	46	38	34	30	55	50	50	42	39	36
	400	189	54	47	47	37	34	27	57	51	51	41	39	34	59	54	53	44	42	37	63	58	57	49	47	44
	497	235	57	50	50	39	37	30	60	54	54	44	43	37	62	57	56	47	46	40	66	61	60	51	50	47
7	63	30	34	17	20	-	-	-	36	20	27	-	-	-	37	22	30	-	-	-	37	25	36	19	14	-
	295	140	54	38	31	19	-	-	58	43	40	27	21	17	60	46	44	31	27	23	62	50	51	37	34	32
	550	260	62	46	36	24	18	-	66	51	44	32	28	24	68	55	49	36	33	30	70	59	56	43	41	39
	655	310	64	48	37	25	20	15	68	54	45	33	29	25	70	57	50	38	35	31	73	62	58	45	43	41
8	85	40	31	21	22	16	19	-	36	27	30	23	24	21	38	30	34	27	27	26	42	35	41	33	32	33
	401	190	53	36	35	25	28	19	58	43	44	33	34	28	61	46	48	37	37	33	65	52	56	44	42	42
	700	331	59	40	39	27	30	20	65	47	47	35	36	30	68	51	52	39	39	35	72	57	60	47	45	44
	866	410	61	42	40	27	30	20	67	48	48	36	36	30	70	52	53	40	40	35	75	59	61	48	46	44
10	137	65	20	17	21	-	16	-	24	24	27	17	23	-	27	28	31	22	27	17	32	35	37	29	34	24
	613	290	48	40	36	23	23	17	54	47	43	31	31	25	57	52	47	35	35	29	62	59	54	43	43	37
	1100	521	56	46	39	25	23	19	62	54	47	34	31	27	66	58	51	38	36	32	71	66	59	46	44	40
	1331	630	59	48	40	26	23	19	65	56	48	34	31	28	68	60	52	39	36	32	74	68	60	47	44	40
12	201	95	33	27	28	16	20	20	38	31	33	23	26	26	40	34	37	27	29	30	45	38	42	33	34	36
	930	440	52	44	40	27	26	24	57	50	46	34	33	31	61	53	50	38	36	35	66	58	56	46	43	42
	1600	757	58	49	43	29	27	24	63	55	49	37	34	31	66	58	53	41	38	36	72	63	60	49	44	43
	2007	950	60	51	44	30	28	24	65	57	51	38	34	32	69	60	55	42	38	36	74	65	61	50	45	43
14	264	125	33	16	24	15	24	-	33	24	33	24	29	13	33	29	38	29	32	17	33	36	45	37	36	22
	1214	575	55	38	41	27	32	24	55	45	48	34	36	28	55	49	52	38	38	31	55	55	59	46	42	35
	2100	994	61	45	44	29	33	28	61	51	51	36	37	32	61	55	55	40	39	35	61	61	62	47	42	39
	2641	1250	64	47	46	29	33	29	64	53	53	37	37	33	64	57	57	41	39	36	64	63	63	48	42	40
16	380	180	31	14	25	-	22	-	31	22	33	20	27	15	31	27	37	24	30	18	31	35	44	31	34	23
	1732	820	61	41	43	32	34	27	61	48	50	38	38	31	61	52	54	42	40	34	61	59	60	48	43	38
	2800	1325	68	46	47	35	35	30	68	54	53	42	39	34	68	58	57	45	41	36	68	65	63	51	44	40
	3750	1775	73	50	48	37	35	31	73	57	55	43	39	35	73	61	59	47	41	38	73	68	65	53	44	42

All performance data based on test conducted in accordance with AHRI 880-2017.
Sound levels are in decibels, dB ref: 1 x 10⁻¹² watts.

Dash (-) indicates values lower than 15.

Terminal size	Airflow		Sound Power Level, dB at Octave band freq. Hz																							
	CFM	LPS	$\Delta P_{st} = 0.5''\text{H}_2\text{O}$ (125Pa)						$\Delta P_{st} = 1''\text{H}_2\text{O}$ (250Pa)						$\Delta P_{st} = 1.5''\text{H}_2\text{O}$ (375Pa)						$\Delta P_{st} = 3''\text{H}_2\text{O}$ (750Pa)					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	21	10	33	23	15	-	-	-	35	25	16	-	-	-	36	25	17	-	-	-	37	25	18	-	16	17
	95	45	49	44	35	-	-	-	52	46	37	15	-	17	54	47	38	18	-	21	56	49	40	24	19	28
	150	71	54	50	41	-	-	-	57	52	43	18	-	19	58	53	44	22	-	23	61	55	46	28	19	30
	212	100	58	55	46	15	-	-	60	57	48	21	-	21	62	58	49	25	13	25	64	60	51	31	19	32
5	31	15	36	22	-	-	-	-	39	26	13	-	-	-	40	28	15	-	-	-	42	31	18	-	-	-
	148	70	57	45	33	-	-	-	59	49	36	18	17	15	61	51	38	20	19	18	63	54	42	24	21	24
	250	118	64	53	41	22	23	-	66	56	44	26	26	19	68	58	46	29	28	22	70	62	50	33	31	28
	327	155	67	57	45	26	28	15	70	60	48	30	31	21	71	62	50	33	33	24	74	66	54	37	35	30
6	53	25	37	24	15	8	-	-	40	27	20	12	-	-	42	29	22	-	-	-	44	33	27	18	-	16
	232	110	59	48	34	23	15	-	62	51	39	27	20	20	64	53	41	29	23	23	67	57	46	33	28	29
	400	189	67	56	41	28	23	18	70	60	45	32	28	24	72	62	48	34	31	28	75	66	53	38	36	33
	497	235	70	60	43	30	26	20	73	63	48	34	31	26	75	65	51	36	34	29	78	69	56	40	39	35
7	63	30	40	32	20	-	-	-	43	36	24	-	-	-	45	38	26	-	-	-	48	42	30	14	-	-
	295	140	63	53	43	37	31	24	66	57	47	39	34	28	68	59	49	41	36	30	71	63	53	44	39	34
	550	260	72	61	52	48	46	39	75	65	56	51	49	43	77	67	58	52	51	46	80	71	61	55	54	49
	655	310	74	63	54	51	50	44	78	67	58	54	53	47	79	69	60	56	55	50	83	73	64	58	58	54
8	85	40	48	40	25	-	-	-	51	45	29	16	-	-	53	47	32	18	-	-	56	52	36	21	-	-
	401	190	69	59	47	43	39	33	72	64	51	46	43	37	74	66	54	48	46	39	77	71	58	51	50	42
	700	331	75	65	54	53	51	46	79	70	59	56	55	50	80	72	61	58	58	52	83	77	65	61	61	56
	866	410	78	67	57	56	56	51	81	72	61	59	60	55	83	74	64	61	62	57	86	79	68	65	66	61
10	137	65	47	36	28	23	14	12	52	41	33	27	18	17	55	45	36	29	21	20	60	50	41	32	24	25
	613	290	68	56	47	45	43	39	73	62	52	49	47	45	75	65	55	51	49	48	80	71	60	54	53	53
	1100	521	75	64	54	53	53	50	80	70	59	57	57	55	83	73	62	59	60	58	88	78	67	62	64	64
	1331	630	77	66	56	56	57	53	82	72	61	59	61	58	85	75	64	62	63	62	90	81	70	65	67	67
12	201	95	42	31	27	17	17	-	47	36	31	20	20	-	49	38	34	21	22	15	53	43	38	25	25	20
	930	440	68	55	48	44	45	39	72	60	52	47	49	44	74	63	55	49	51	46	79	67	59	52	54	51
	1600	757	76	64	55	53	55	50	81	68	60	56	59	55	83	71	62	58	61	57	87	75	66	61	64	61
	2007	950	80	67	58	57	59	55	84	72	63	60	63	59	87	74	65	62	65	62	91	79	69	65	68	66
14	264	125	47	37	22	21	13	-	52	41	27	24	16	-	54	44	31	25	18	12	59	48	36	28	22	16
	1214	575	68	58	45	46	45	40	73	63	51	49	48	43	76	65	54	51	50	46	81	69	60	54	53	49
	2100	994	75	65	52	55	55	51	80	69	58	58	59	54	83	72	62	60	61	57	88	76	68	63	64	61
	2641	1250	78	68	55	58	59	55	83	72	61	61	63	59	86	75	65	63	65	61	91	79	71	66	68	65
16	380	180	43	37	24	21	17	13	47	41	29	23	20	16	50	43	32	24	21	17	54	47	38	26	23	20
	1732	820	68	59	46	47	47	43	73	63	51	49	50	46	75	65	54	50	51	48	79	69	60	52	53	50
	2800	1325	76	65	52	55	56	52	80	69	58	57	59	55	83	71	61	58	60	57	87	75	66	60	62	59
	3750	1775	80	68	56	60	61	57	85	73	62	62	64	60	87	75	65	63	65	62	91	79	70	65	68	65

Duct End Correction as per AHRI 880-2017 is added in sound power level based on the below:

$$E_1 = 10 \log \left[1 + \left(\frac{0.7C_o}{\pi f D_e} \right)^2 \right]$$

$$D_e = \sqrt{4 \cdot \frac{A}{\pi}}$$

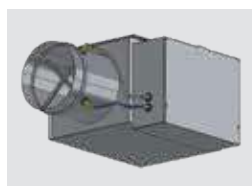
Where A = Internal cross section of duct, ft²
 C_o = Speed of sound in air, ft/s
 D_e = Equivalent diameter, ft
 E_1 = Duct end correction, dB
 f = One- third octave band centre frequency, Hz

All performance data based on test conducted in accordance with AHRI 880-2017.
Sound levels are in decibels, dB ref: 1×10^{-12} watts.

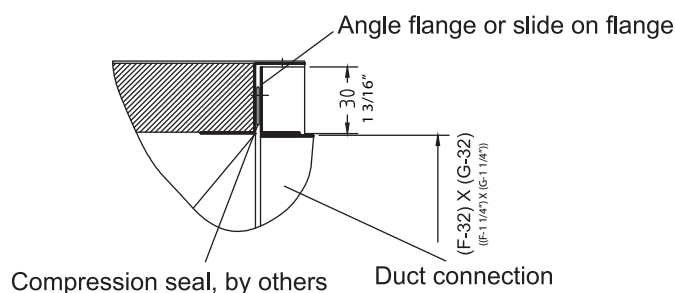
Dash (-) indicates values lower than 15.

Terminal size	Airflow		Sound Power Level, dB at Octave band freq. Hz																							
	CFM	LPS	$\Delta P_{st} = 0.5''H_2O$ (125Pa)						$\Delta P_{st} = 1''H_2O$ (250Pa)						$\Delta P_{st} = 1.5''H_2O$ (375Pa)						$\Delta P_{st} = 3''H_2O$ (750Pa)					
			125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
4	21	10	20	29	-	-	-	-	25	32	-	-	-	-	28	33	-	15	-	-	33	35	16	20	-	-
	95	45	39	47	32	17	-	-	45	50	35	23	-	-	48	52	37	27	-	-	53	55	39	33	22	19
	150	71	45	53	38	20	-	-	51	56	42	26	13	-	54	58	43	30	17	-	59	61	46	36	26	22
	212	100	49	57	43	23	-	-	55	60	47	29	15	-	58	62	48	32	20	-	64	65	51	38	28	23
5	31	15	28	27	-	-	-	-	32	32	18	-	-	-	35	35	22	-	-	-	39	39	27	21	-	-
	148	70	47	44	31	20	-	-	51	49	37	27	-	-	54	51	40	31	19	13	58	56	45	38	26	19
	250	118	53	49	37	25	-	-	58	54	43	32	20	-	60	57	46	36	24	18	65	62	52	43	31	25
	327	155	57	52	40	28	16	-	61	57	46	35	23	18	64	60	49	39	27	21	68	65	55	46	33	28
6	53	25	26	26	20	16	-	-	30	31	24	21	-	-	32	33	26	24	-	-	35	37	30	28	17	14
	232	110	47	47	39	34	26	19	51	51	43	39	31	26	53	53	45	42	34	30	56	57	49	46	39	36
	400	189	55	54	46	41	34	27	58	58	50	45	39	34	60	61	52	48	42	37	64	65	56	53	47	44
	497	235	58	57	49	43	37	30	61	61	53	48	43	37	63	64	55	51	46	40	67	68	59	55	50	47
7	63	30	35	24	19	-	-	-	37	27	26	-	-	-	38	29	29	18	-	-	38	32	35	23	-	-
	295	140	55	45	30	23	-	-	59	50	39	31	21	17	61	53	43	35	27	23	63	57	50	41	34	32
	550	260	63	53	35	28	18	-	67	58	43	36	28	24	69	62	48	40	33	30	71	66	55	47	41	39
	655	310	65	55	36	29	20	15	69	61	44	37	29	25	71	64	49	42	35	31	74	69	57	49	43	41
8	85	40	32	28	21	20	19	-	37	34	29	27	24	21	39	37	33	31	27	26	43	42	40	37	32	33
	401	190	54	43	34	29	28	19	59	50	43	37	34	28	62	53	47	41	37	33	66	59	55	48	42	42
	700	331	60	47	38	31	30	20	66	54	46	39	36	30	69	58	51	43	39	35	73	64	59	51	45	44
	866	410	62	49	39	31	30	20	68	55	47	40	36	30	71	59	52	44	40	35	76	66	60	52	46	44
10	137	65	24	24	20	14	16	-	28	31	26	21	23	-	31	35	30	26	27	17	36	42	36	33	34	24
	613	290	52	47	35	27	23	17	58	54	42	35	31	25	61	59	46	39	35	29	66	66	53	47	43	37
	1100	521	60	53	38	29	23	19	66	61	46	38	31	27	70	65	50	42	36	32	75	73	58	50	44	40
	1331	630	63	55	39	30	23	19	69	63	47	38	31	28	72	67	51	43	36	32	78	75	59	51	44	40
12	201	95	37	34	27	20	20	20	42	38	32	27	26	26	44	41	36	31	29	30	49	45	41	37	34	36
	930	440	56	51	39	31	26	24	61	57	45	38	33	31	65	60	49	42	36	35	70	65	55	50	43	42
	1600	757	62	56	42	33	27	24	67	62	48	41	34	31	70	65	52	45	38	36	76	70	59	53	44	43
	2007	950	64	58	43	34	28	24	69	64	50	42	34	32	73	67	54	46	38	36	78	72	60	54	45	43
14	264	125	26	23	23	19	24	-	35	31	32	28	29	-	39	36	37	33	32	17	47	43	44	41	36	22
	1214	575	50	45	40	31	32	24	57	52	47	38	36	28	61	56	51	42	38	31	68	62	58	50	42	35
	2100	994	57	52	43	33	33	28	63	58	50	40	37	32	67	62	54	44	39	35	74	68	61	51	42	39
	2641	1250	59	54	45	33	33	29	66	60	52	41	37	33	70	64	56	45	39	36	76	70	62	52	42	40
16	380	180	24	21	23	17	22	10	32	29	31	24	27	15	37	34	35	28	30	18	44	42	42	35	34	23
	1732	820	56	48	41	36	34	27	63	55	48	42	38	31	67	59	52	46	40	34	74	66	58	52	43	38
	2800	1325	63	53	45	39	35	30	70	61	51	46	39	34	74	65	55	49	41	36	81	72	61	55	44	40
	3750	1775	68	57	46	41	35	31	75	64	53	47	39	35	79	68	57	51	41	38	85	75	63	57	44	42

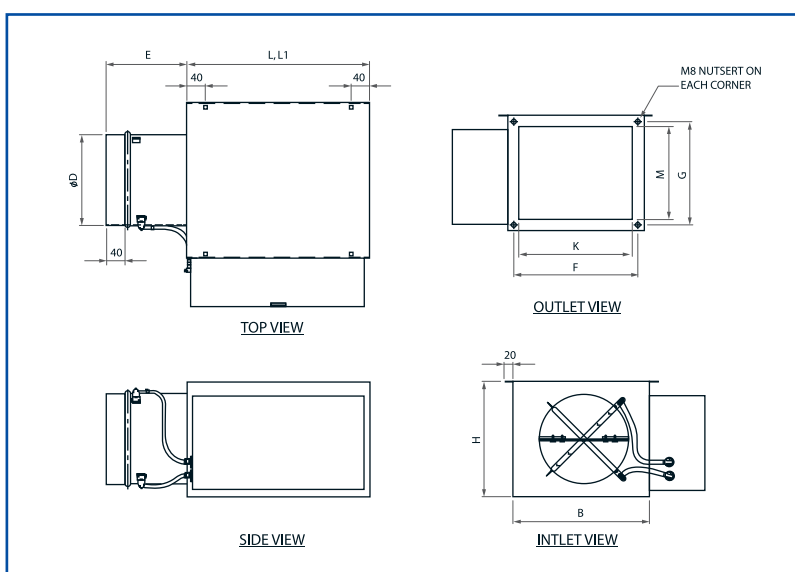
Duct Connection Detail



VAV terminal unit,
variant TVB



TVB-A/B Dimensions



Note
L : For type TVB-A
L1 : For type TVB-B

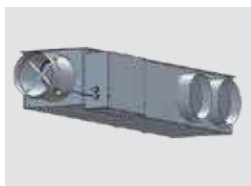
Dimensions [mm] and weight [kg]

Nominal Size	ØD	B	H	L*	L ₁ *	E	F	G	K	M	TVB-A	TVB-B
	mm										kg	
4	99	300	203	400	1320	147	268	171	248	151	6	13
5	124	300	203	400	1320	154	268	171	248	151	6	13
6	149	300	203	400	1320	163	268	171	248	151	6	13
7	174	300	254	400	1320	170	268	222	248	202	7	16
8	199	300	254	400	1320	176	268	222	248	202	7	16
10	249	355	311	400	1320	216	323	279	303	259	9	21
12	299	400	381	655	1570	260	368	349	348	329	15	27
14	349	500	450	655	1570	315	468	418	448	398	19	37
16	399	600	450	765	1680	360	568	418	548	398	23	45

Dimensions [in] and weight [lb]

Nominal Size	ØD	B	H	L*	L ₁ *	E	F	G	K	M	TVB-A	TVB-B
	in										lb	
4	3 7/4	11 13/16	8	15 3/4	51 15/16	5 13/16	10 9/16	6 3/4	9 3/4	5 15/16	13	29
5	4 7/8	11 13/16	8	15 3/4	51 15/16	6 1/16	10 9/16	6 3/4	9 3/4	5 15/16	13	29
6	5 7/8	11 13/16	8	15 3/4	51 15/16	6 7/16	10 9/16	6 3/4	9 3/4	5 15/16	13	29
7	6 7/8	11 13/16	10	15 3/4	51 15/16	6 11/16	10 9/16	8 3/4	9 3/4	7 15/16	15	35
8	7 13/16	11 13/16	10	15 3/4	51 15/16	6 15/16	10 9/16	8 3/4	9 3/4	7 15/16	21	39
10	9 13/16	14	12 1/4	15 3/4	51 15/16	8 1/2	12 11/16	11	11 15/16	10 3/16	20	46
12	11 3/4	15 3/4	15	25 13/16	61 13/16	10 1/4	14 1/2	13 3/4	13 11/16	12 15/16	26	54
14	13 3/4	19 11/16	17 11/16	25 13/16	61 13/16	12 3/8	18 7/16	16 7/16	17 1/2	15 11/16	33	82
16	15 11/16	23 5/8	17 11/16	30 1/8	66 1/8	14 3/16	22 1/4	16 7/16	21 9/16	15 11/16	51	99

Description

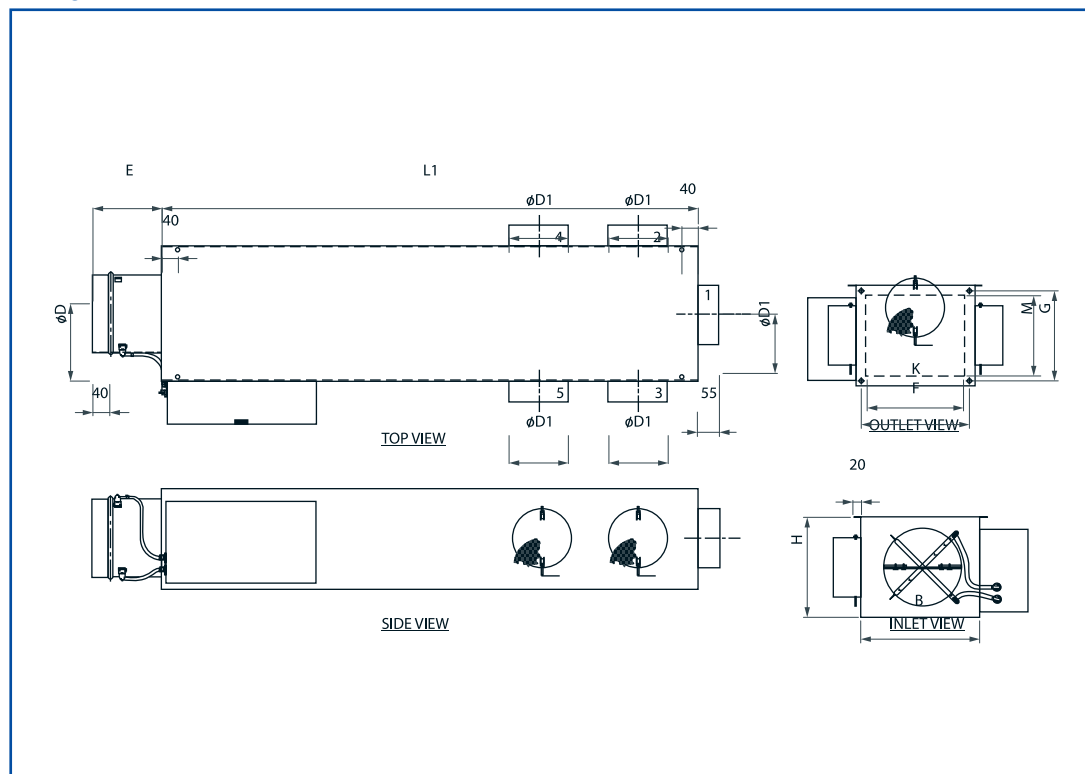


VAV terminal unit,
variant TVB-C

- VAV terminal unit with acoustic cladding for the control of variable supply air volume flows
- For rooms where the case-radiated noise of the unit is not sufficiently reduced by a false ceiling
- The circular ducts for the room under consideration must have adequate acoustic insulation (provided by others) on the fan end.
- Acoustic cladding cannot be retrofitted
- Outlet spigot with adjustable perforated damper

Dimensions

TVB-C



Dimensions [mm] and weight [kg]

Nominal size	$\varnothing D$	B	H	L_1	E	Pos. spigot	$\varnothing D_1$	TVB-C
	mm						mm	kg
4	99	300	203	1320	147	1-3	149	14
5	124	300	203	1320	154	1-3	149	14
6	149	300	203	1320	163	1-3	149	14
7	174	300	254	1320	170	2-5	199	17
8	199	300	254	1320	176	2-5	199	17
10	249	355	311	1320	216	1-5	199	22
12	299	400	381	1570	260	1-5	199	28
14	349	500	450	1570	315	1-5	199	38
16	399	600	450	1680	360	1-5	199	46

Dimensions [in] and weight [lb]

Nominal size	$\varnothing D$	B	H	L_1	E	Pos. spigot	$\varnothing D_1$	TVB-C
	in						in	lb
4	3 7/8	11 13/16	8	52	5 25/32	1-3	5 7/8	31
5	4 7/8	11 13/16	8	52	6 1/16	1-3	5 7/8	31
6	5 7/8	11 13/16	8	52	6 7/16	1-3	5 7/8	31
7	6 7/8	11 13/16	10	52	6 15/16	2-5	7 13/16	37
8	7 7/8	11 13/16	10	52	6 15/16	2-5	7 13/16	37
10	9 25/32	13 15/16	12 1/4	52	8 1/2	1-5	7 13/16	49
12	11 3/4	15 3/4	15	61 13/16	10 1/4	1-5	7 13/16	62
14	13 3/4	19 5/8	17 11/16	61 13/16	12 3/8	1-5	7 13/16	84
16	15 7/8	23 5/8	17 11/16	66 1/8	14 3/16	1-5	7 13/16	101

AHRI STANDARD 885-2008 (formerly ARI STANDARD 885-2008)

APPENDIX E. TYPICAL SOUND ATTENUATION VALUES – NORMATIVE

E1 The following Table E1 values are required for use by manufacturers to calculate NC values for use in catalogs.

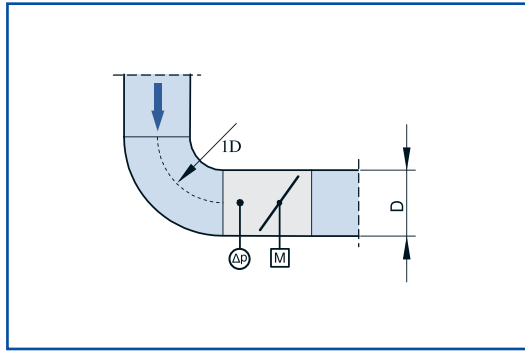
In product catalogs the end use environments are not known and the following factors are provided as uniform attenuation values. Use of these values will allow better comparison between manufacturers.

Table E1. Typical Sound Attenuation Values, dB							
Diffusers:							
Deduct 10 dB in all Octave Bands to compute diffuser NC							
VAV Terminals: Radiated Sound Ceiling Plenum Noise Sources: Total deduct from Sound Power to Predict Room Sound Pressure (Includes Environmental Effect), dB							
Assumes, 3 ft [0.9 m] deep plenums with non-bounded sides							
	Octave Band Mid Frequency, Hz						
	125	250	500	1000	2000	4000	
Type - Mineral Fiber	18	19	20	26	31	36	
From Table D15							
VAV Terminals: Discharge Sound, Noise Source in Occupied Space:							
	Octave Band Mid Frequency, Hz						
	125	250	500	1000	2000	4000	8000
Small Box (8 x 8 in) [(0.2 x 0.2 m)] < 300 cfm [$<0.1 \text{ m}^3/\text{s}$]	24	28	39	53	59	40	28
Medium Box (12 x 12 in) [(0.30 x 0.30 m)] 300 - 700 cfm [$0.1 - 0.3 \text{ m}^3/\text{s}$]	27	29	40	51	53	39	30
Large Box (15 x 15 in) [(0.40 x 0.40 m)] > 700 cfm [$0.3 \text{ m}^3/\text{s}$]	29	30	41	51	52	39	32
From Table D18							

Upstream conditions

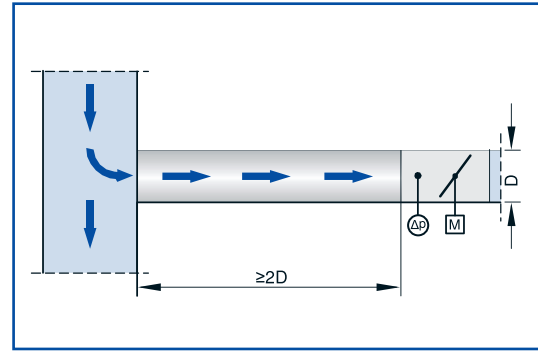
The volume flow rate accuracy Δp applies to a straight up stream section of the duct. Bends, junctions or a narrowing or widening of the duct cause turbulence that may affect measurement. Duct connections, e.g. branches off the main duct, must comply with EN1505. Some installation situations require straight duct sections upstream.

Bend



A radius bend with at least 1D radius at a centre line curvature-without an additional straight duct section up stream of the VAV terminal unit - has only a negligible effect on the volume flow rate accuracy

Junction



A junction causes strong turbulence. The started volume flow rate accuracy ΔV can only be achieved with a straight duct section of at least 2D length upstream. Shorter upstream sections require a perforated plate in the branch and before the VAV terminal unit. If there is no straight upstream section at all, the control will not be stable, even with a perforated plate

Standard text

This specification describes the general properties of the product

VAV terminal units for variable and constant air volume systems, suitable for supply or extract air, available in 9 nominal sizes. Ready-to-commission unit which consists of the mechanical parts and the electronic control components. Each unit contains an averaging differential pressure sensor for volume flow rate measurement and a damper blade.

Factory assembled control components complete with wiring and tubing.
Spigot suitable for circular ducts to DW 144, 1998
Position of the damper blade indicated externally at shaft extension.
Closed blade air leakage to EN 1751, Class 2 (4 - 10), Class 3 (12, 14, 16)

Special characteristics

- Factory set-up or programming and function testing
- Volume flow rate can later be measured and adjusted on site; additional adjustment device may be necessary

Materials and surfaces

- Casing and damper blade made of galvanized sheet steel
- Damper blade seal made of Chloroprene rubber
- Lining is mineral wool
- Differential pressure sensor made of aluminum
- ABS bearings

Mineral wool

- Internal fiber glass insulation lining.
- Faced with woven glass fabric as protection against erosion through airflow velocities of up to 3937 fpm
- Resistant to fungal and bacterial growth

Technical data

- Nominal sizes: 4 to 16 inches
- Volume flow rate range: 10 to 1775 l/s or 21 to 3761 CFM
- Volume flow rate range with electric heater: 56 to 1775 l/s or 119 to 3761 CFM
- Volume flow rate control range (unit with dynamic differential pressure measurement): approx. 10 to 100 % of the nominal volume flow rate
- Minimum differential pressure: 20 Pa (0,08 in w.g)
- Maximum differential pressure: 1000 Pa (4,02 in w.g)

Attachments

Variable volume flow control with electronic Easy controller to connect an external control signal; actual value signal can be integrated into the central BMS.

- Supply voltage to controller 24 V AC
- Transformer step down from 230 V AC to 24 V AC
- Signal voltages 0(2) – 10 V DC
- Possible override controls with external switches using volt-free contacts: CLOSED, OPEN, $\dot{V}_{min}$ and $\dot{V}_{max}$
- Potentiometers with percentage scales to set the volume flow rates $\dot{V}_{min}$ and $\dot{V}_{max}$
- The actual value signal relates to the nominal volume flow rate such that commissioning and subsequent adjustment are simplified
- Volume flow rate control range: approx. 10 – 100 % of the nominal volume flow rate
- Clearly visible external indicator light for signaling the functions:
Set, not set, and power failure
Electrical connections with screw terminal

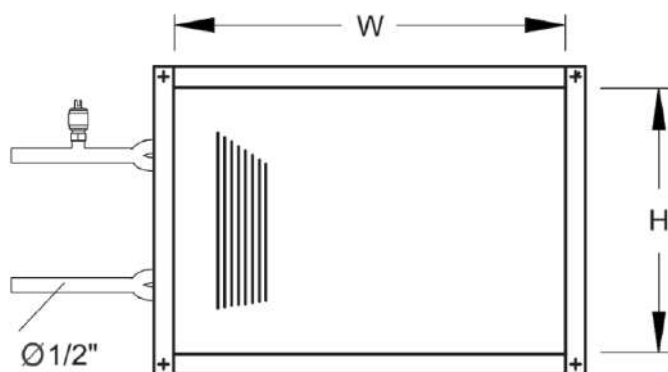
Construction and Dimensions

Hot Water Reheat Coil

- For terminal reheat of primary air;
- Has flanged connections on both ends of the hot water coil;
- Hot water coil is made from copper tubes with aluminum fin plates;
- Available with one to four rows of heating coil;
- Hot water connections on the side of the coil;
- Refer to the selection data for hot water coil.

No. of Rows	Size	4	5	6	7	8	10	12	14	16
1	kg	5,9	5,9	5,9	6,4	6,4	7,3	8,6	10,4	12,2
	lb	13	13	13	14	14	16	19	23	27
2	kg	6,8	6,8	6,8	7,3	7,3	9,1	10,9	14,5	18,1
	lb	15	15	15	16	16	20	24	32	40
3	kg	8,2	8,2	8,2	9,1	9,1	11,3	14,5	20,9	23,1
	lb	18	18	18	20	20	25	32	46	51
4	kg	9,1	9,1	9,1	10,4	10,4	14,1	17,2	24,9	29,5
	lb	20	20	20	23	23	31	38	55	65

Table 1: Weight (dry) of hot water coils



Dimension	Size	4	5	6	7	8	10	12	14	16
W	mm	248	248	248	248	248	303	348	448	548
	in	9,76	9,76	9,76	9,76	9,76	11,93	13,70	17,64	21,57
H	mm	152,4	152,4	152,4	203,2	203,2	254	330,2	406,4	406,4
	in	6,25	6,25	6,25	7,50	7,50	10,00	12,50	15,00	15,00

Table 2: Dimensions.

Reheat Coil Selection

TVB Size	Coil Rows	Air Flow		Air DT		Air Press. Drop		Water Flow		Water DT		Water Press. Drop		Capacity	
		m³/h	CFM	°C	°F	Pa	in w.g.	L/s	gpm	°C	°F	kPa	ft w.g.	kW	MBH
4" 5" 6"	1	12	21	33,7	60,7	2	0,01	0,01	0,1	11	20	0,03	0,01	0,41	1,4
		268	456	10,8	19,4	37	0,15	0,06	1,0	11	20	1,46	0,49	2,83	9,7
	2	12	21	52,3	94,1	2	0,01	0,01	0,2	11	20	0,18	0,06	0,63	2,2
		268	456	22,0	39,7	75	0,30	0,13	2,0	11	20	11,06	3,70	5,79	19,7
	3	12	21	56,9	102,4	5	0,02	0,02	0,2	11	20	0,12	0,04	0,69	2,4
		268	456	28,6	51,5	112	0,45	0,17	2,6	11	20	4,69	1,57	7,51	25,6
	4	12	21	59,9	107,8	5	0,02	0,02	0,3	11	20	0,09	0,03	0,72	2,5
		268	456	32,3	58,1	149	0,60	0,19	3,0	11	20	2,09	0,70	8,48	28,9
7" 8"	1	38	64	26,7	48,1	2	0,01	0,02	0,3	11	20	0,24	0,08	0,98	3,4
		474	805	9,3	16,8	72	0,29	0,10	1,5	11	20	3,89	1,30	4,31	14,7
	2	38	64	41,7	75,0	2	0,01	0,03	0,5	11	20	0,39	0,13	1,54	5,2
		474	805	17,1	30,7	142	0,57	0,17	2,8	11	20	4,51	1,51	7,91	27,0
	3	38	64	51,5	92,6	5	0,02	0,04	0,7	11	20	0,66	0,22	1,90	6,5
		474	805	25,2	45,3	214	0,86	0,26	4,1	11	20	10,91	3,65	11,65	39,8
	4	38	64	54,5	98,1	5	0,02	0,04	0,7	11	20	0,42	0,14	2,01	6,9
		474	805	29,0	52,2	284	1,14	0,30	4,7	11	20	3,41	1,14	13,43	45,8
10"	1	81	138	23,6	42,6	2	0,01	0,04	0,7	11	20	0,57	0,19	1,88	6,4
		798	1.356	8,8	15,8	75	0,30	0,15	2,4	11	20	4,18	1,40	6,87	23,4
	2	81	138	41,0	73,8	2	0,01	0,07	1,1	11	20	1,67	0,56	3,26	11,1
		798	1.356	18,3	32,9	149	0,60	0,31	5,0	11	20	15,36	5,14	14,25	48,6
	3	81	138	48,2	86,8	5	0,02	0,08	1,3	11	20	1,29	0,43	3,83	13,1
		798	1.356	24,2	43,5	224	0,90	0,42	6,6	11	20	6,82	2,28	18,86	64,4
	4	81	138	54,8	98,7	7	0,03	0,10	1,5	11	20	1,64	0,55	4,35	14,9
		798	1.356	30,9	55,6	299	1,20	0,53	8,4	11	20	11,57	3,87	24,09	82,2
12"	1	125	212	24,3	43,8	2	0,01	0,07	1,0	11	20	1,35	0,45	2,97	10,1
		1.247	2.119	9,0	16,3	87	0,35	0,24	3,9	11	20	8,52	2,85	11,01	37,6
	2	125	212	41,3	74,4	2	0,01	0,11	1,8	11	20	4,33	1,45	5,05	17,2
		1.247	2.119	15,9	28,6	174	0,70	0,43	6,8	11	20	4,72	1,58	19,38	66,1
	3	125	212	48,1	86,6	5	0,02	0,13	2,1	11	20	2,57	0,86	5,87	20,0
		1.247	2.119	23,7	42,7	261	1,05	0,64	10,1	11	20	9,54	3,19	28,90	98,6
	4	125	212	55,3	99,6	7	0,03	0,15	2,4	11	20	3,92	1,31	6,75	23,0
		1.247	2.119	27,3	49,1	348	1,40	0,73	11,6	11	20	4,27	1,43	33,30	113,6
14"	1	187	318	24,6	44,4	2	0,01	0,10	1,6	11	20	2,15	0,72	4,51	15,4
		1.871	3.178	9,2	16,6	82	0,33	0,37	5,9	11	20	7,50	2,51	16,82	57,4
	2	187	318	42,6	76,6	2	0,01	0,17	2,7	11	20	9,71	3,25	7,79	26,6
		1.871	3.178	16,9	30,4	167	0,67	0,68	10,8	11	20	7,05	2,36	30,92	105,5
	3	187	318	47,4	85,4	5	0,02	0,20	3,1	11	20	2,60	0,87	8,90	30,4
		1.871	3.178	23,2	41,7	249	1,00	0,96	15,2	11	20	6,34	2,12	43,44	148,2
	4	187	318	56,5	101,7	7	0,03	0,23	3,6	11	20	6,49	2,17	10,34	35,3
		1.871	3.178	30,0	54,1	331	1,33	1,21	19,2	11	20	11,39	3,81	54,94	187,5
16"	1	237	403	25,0	44,9	2	0,01	0,13	2,0	11	20	3,23	1,08	5,79	19,8
		2.357	4.005	9,4	16,8	87	0,35	0,48	7,5	11	20	12,37	4,14	21,57	73,6
	2	237	403	42,6	76,7	2	0,01	0,22	3,5	11	20	16,08	5,38	9,88	33,7
		2.357	4.005	17,2	31,0	174	0,70	0,88	13,9	11	20	11,51	3,85	39,73	135,6
	3	237	403	48,3	86,9	5	0,02	0,25	3,9	11	20	3,65	1,22	11,20	38,2
		2.357	4.005	23,9	43,0	259	1,04	1,21	19,2	11	20	10,04	3,36	55,03	187,8
	4	237	403	56,6	101,8	7	0,03	0,29	4,6	11	20	7,86	2,63	13,12	44,8
		2.357	4.005	29,4	52,9	346	1,39	1,49	23,7	11	20	8,64	2,89	67,80	231,3

Table 3: Standard coil selection data for minimum and maximum air flow for each TVB size