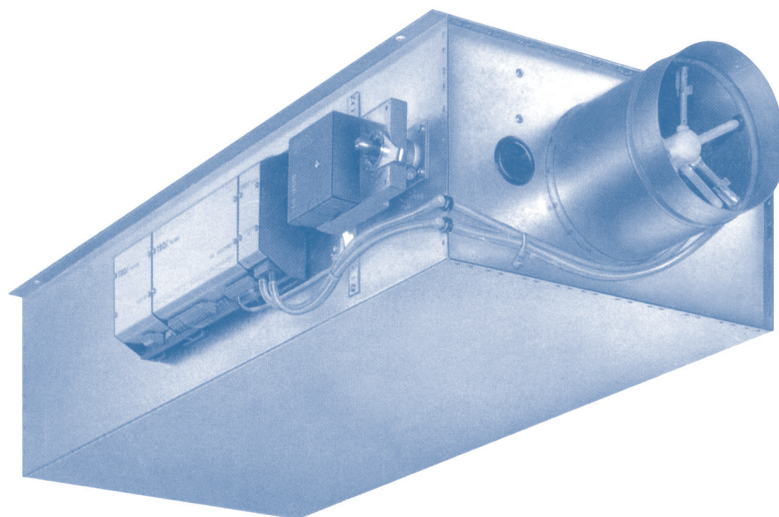


VARYCONTROL VAV Terminal Boxes

for variable volume systems

Type TVZ • TVA



EGAT - TROX[®] TECHNIK

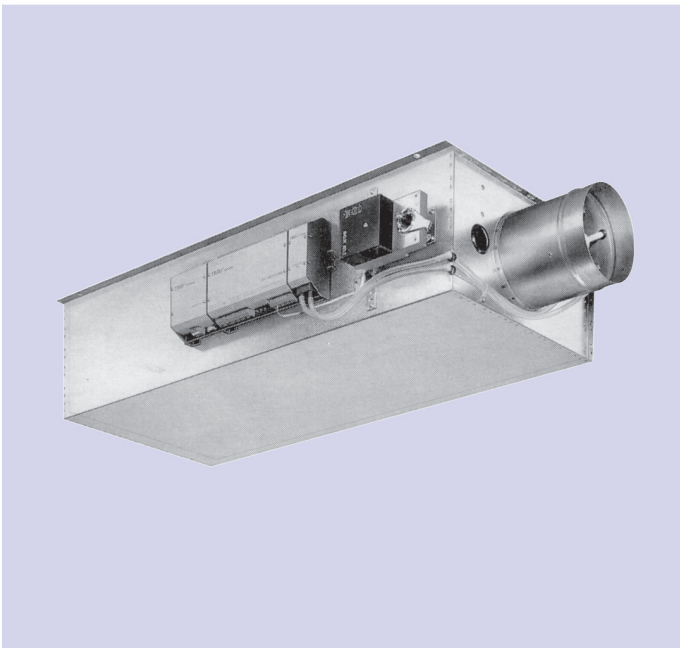


ISO 9001

Contents • Description

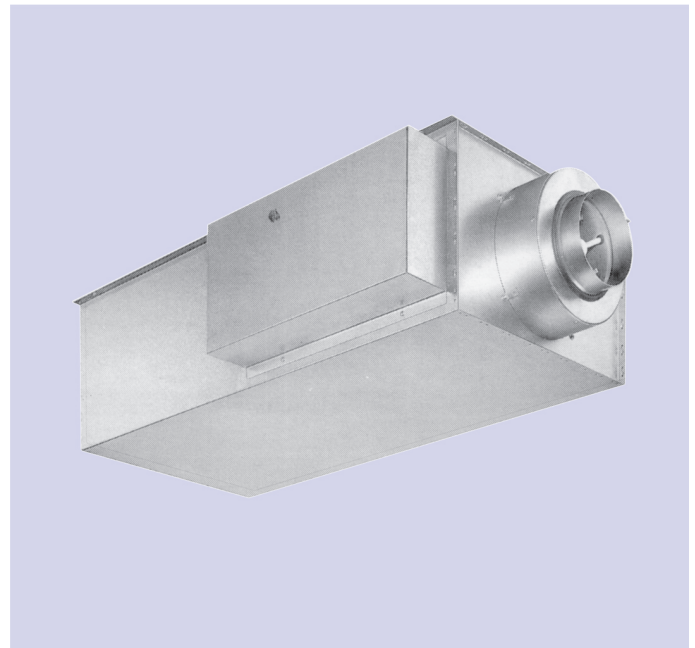
Description	2	TVZ case radiated noise	12
Construction and dimensions.....	3	TVZD case radiated noise	13
Air volume control.....	5	TVZ air regenerated noise in	
Entry flow conditions	5	the high pressure duct	14
Nomenclature.....	6	TVA air regenerated noise in	
Volume flow range	6	the high pressure duct	15
TVZ air regenerated noise, without TS.....	8	TVA air regenerated noise, without TS	16
Diagrammatic layout of the test laboratory	8	TVA air regenerated noise, with TS	17
TVZ air regenerated noise, with TS	9	TVA case radiated noise	18
Acoustic insertion loss	9	TVAD case radiated noise	19
TVZ air regenerated noise with reheat coil,		Reheat coil selection	20
without TS	10	TVZ Order details	21
TVZ air regenerated noise with reheat coil,		TVA Order details	22
with TS	11	TS Order details	23

TVZ VAV Terminal Box



Trox VARYCONTROL VAV terminal boxes type TVZ · TVA provide volume control for variable air volume systems, for both supply and extract air. The box consists of a casing with circular high pressure duct connection and rectangular low pressure duct connection, integral acoustic silencer, averaging differential pressure grid for volume flow measurement control damper with actuator and control components. The control system can be pneumatic or

TVZD VAV Terminal Box



electronic. Each VAV box is tested and the desired volume flow rates set in the factory. The control damper with plastic elastomer seal has a closed leakage complying with DIN 1946, Part 4. For additional acoustic performance a TS secondary silencer is available, additionally acoustic cladding on the casing can be supplied. TVZ boxes are available with one to four row reheat coils.

Construction • Dimensions

Design features

Casing

- Circular spigot connection on high pressure side to DIN 24145 and DIN 24146
- Low pressure side suitable for slide-on flange or angle flange connection
- Holes in the edge of the casing for support rods. Casing air leakage rate complies with class II, VDI 3803 and DIN 24194
- Conforms with clean room class 3, VDI 2083, and class 100, US standard 209b

Volume flow control

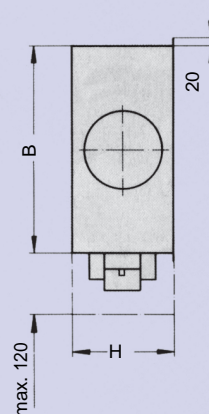
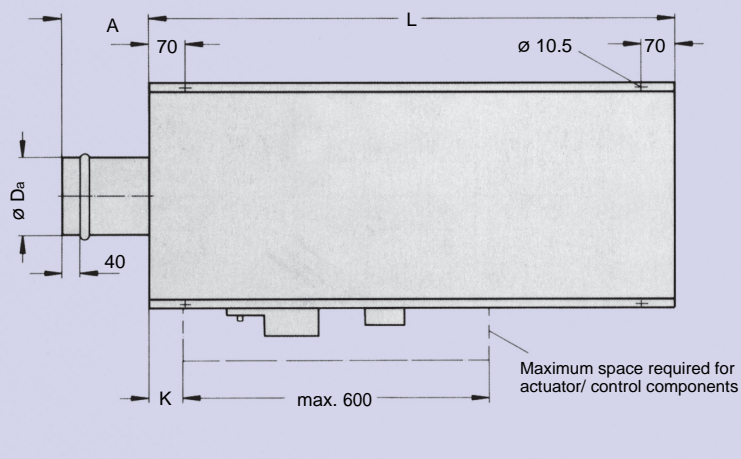
- Either pneumatic or electronic
- Suitable for supply or extract air
- Volume control range up to 10: 1, depending on the type of controller
- Set volume controlled with high level of accuracy, even under adverse upstream conditions, by means of averaging differential pressure sensor (see page 5)
- Differential pressure range 20 to 1500 Pa

- Full shut off using the control damper wiring by others
- Control damper leakage complies with DIN 1946, Part 4
- Actuated baffle plates to optimise acoustic and aerodynamic performance located behind the control damper
- Horizontal or vertical mounting (when using diaphragm pressure sensors, mount according to the labels on the box)
- Volume flow set and airflow tests conducted on each box at the factory
- Volume flow can be measured and adjusted on the box at site
- Maintenance-free
- Operating temperature range 10 to 50 °C

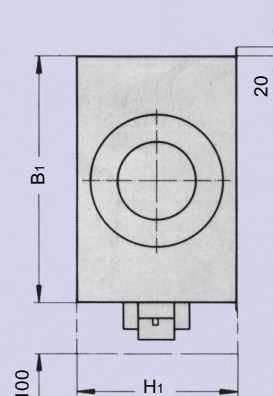
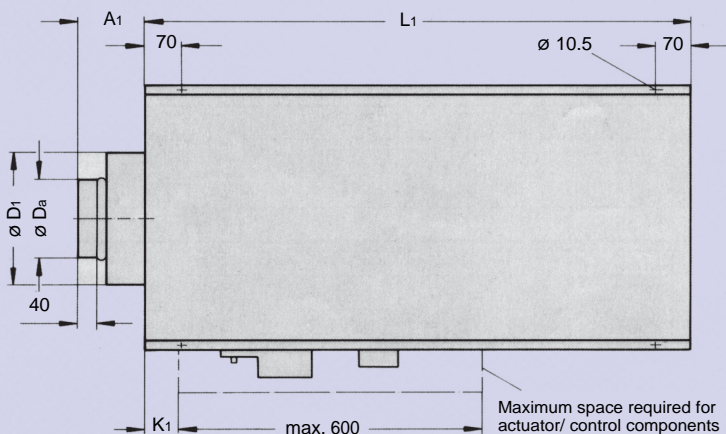
Additional Acoustic Cladding

- Reduces the radiated noise from the casing
- Outer casing from galvanised sheet steel
- Sound absorbent lining
- Rubber isolators for insulation of structure borne noise.

TVZ - TVA



TVZD - TVAD



Ensure adequate access is provided to control components

Reheat Coil

- For terminal reheat of primary air volume
- Casing from galvanised sheet steel
- Flanged on both ends
- Copper tubes and aluminium fins
- One or two row (three and four-row formed by combination)
- Available factory fitted or supplied separately
- For LPHW or MPHw or steam, up to 130 °C
- Maximum operating pressure 16 bar

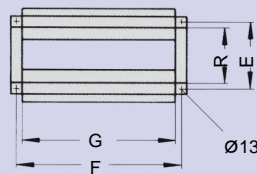
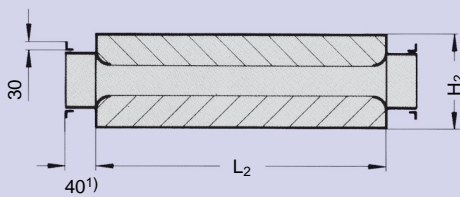
TS Secondary Silencer

- For reduction of ductborne noise
- Casing from galvanised sheet steel
- Mineral wool lining
- With angle flange or slide-on duct flanges

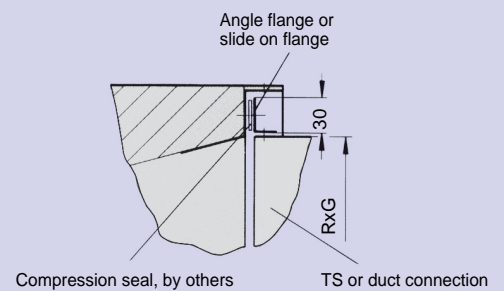
Materials

- Casing from galvanised sheet steel
- Lining in the attenuator section and in the control damper chamber with material fire rating A2, DIN 4102
- Mineral wool with glass fibre facing in the attenuator section suitable for air velocities up to 20 m/s
- Control damper from galvanised sheet steel with thermoplastic elastomer seal
- Sensor hub in plastic
- Sensor tubes in aluminium
- Plain bearings in polyurethane

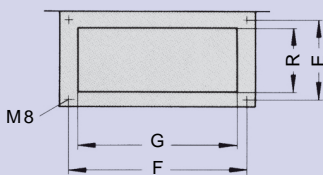
TS secondary silencer



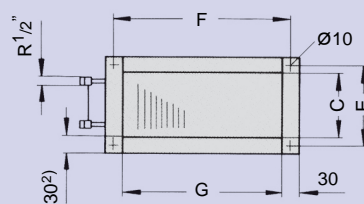
TS or duct connection



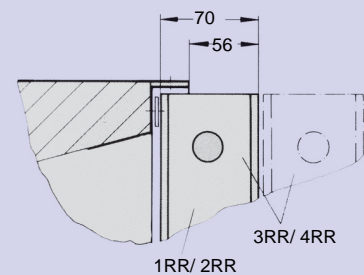
Rectangular duct connection



Reheat coil ³)



Reheat coil connection



Three and four-row heaters have 2 inlet and 2 return water connections. Joining of these connections by others

Size	Duct connections					Casing													
	ø Da	E	F	R	G	ø D ₁	A	A ₁	B	B ₁	C	H	H ₁	H ₂	K ⁴⁾	K ₁ ⁵⁾	L	L ₁	L ₂
12	124	186	232	152	198	220	160	120	300	380	152	236	316	190	0	40	1035	1075	830
14	139	186	292	152	258	240	165	125	360	440	152	236	316	220	5	45	1035	1075	1030
16	159	186	342	152	308	265	170	130	410	490	152	236	316	220	10	50	1035	1075	1030
20	199	244	492	210	458	300	190	150	560	640	203	281	361	280	20	60	1320	1360	1130
25	249	235	632	201	598	355	235	195	700	780	203	311	391	275	35	75	1440	1480	1400
31	314	286	832	252	798	420	300	260	900	980	254	361	441	290	40	80	1440	1480	1400
40	399	388	932	354	898	500	385	345	1000	1080	356	446	526	410	60	100	1820	1860	1400

Size	TVZ TVA	TVZD TVAD	TS	Reheat coil (2 RR)
12	21	41	10	2.4
14	23	43	13	2.5
16	25	50	15	3.3
20	33	63	22	4.8
25	55	95	37	6.0
31	73	133	42	8.7
40	118	193	50	12.7

1) 50 on sizes 25 to 40
2) 25 on size 40

3) Duct connection dimensions R x G
4) With pneumatic controls K - 20 (gives projection on sizes 12 to 16)

5) With pneumatic controls K₁ - 20

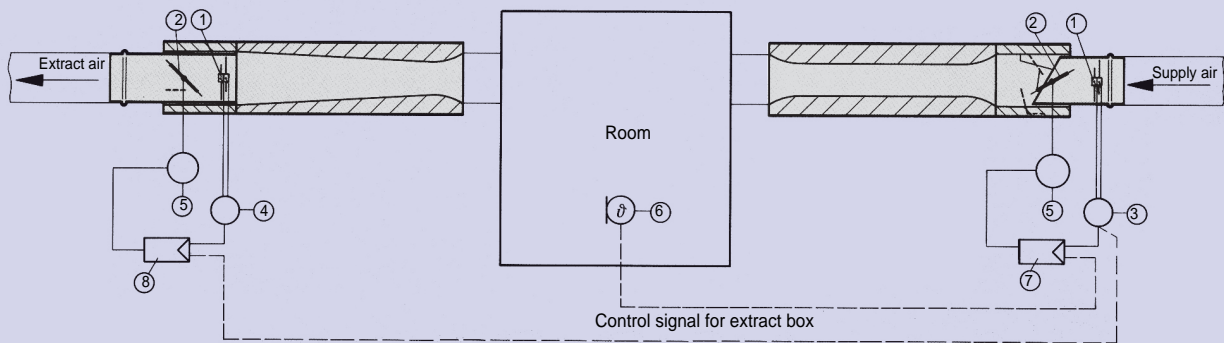
Air Volume Control • Entry Flow Conditions

Air volume control for the example of a supply box with combined extract box

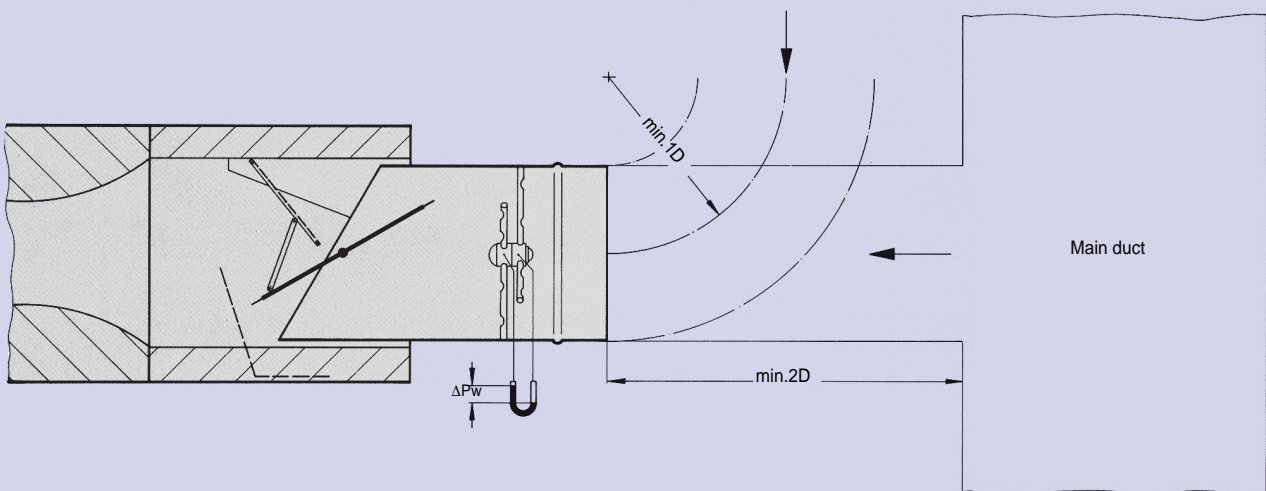
The room temperature controller ⑥ signals the velocity controller ⑦ on the supply box and adjusts its set point between the minimum and maximum volume values set at the factory, as a function of the room temperature. The differential pressure Δp_w measured at the differential pressure grid ① is transmitted via the supply air transducer ③ to the velocity controller ⑦. This signal is compared with the set point value. If there is any variance, the control damper ② is adjusted accordingly via the actuator ⑤, so that the air volume is held constant within a small tolerance over the entire static differential pressure range. To control the extract air volume, the output signal from the supply air transducer ③ is connected to the extract air velocity controller ⑧. This ensures that the extract air volume follows changes in the supply air volume. Ratio or differential extract volume control can be used, depending on the type of controller used.

- ① Dif ferential pressure grid
- ② Control damper
- ③ Supplying air transducer
- ④ Extract air transducer
- ⑤ Actuator
- ⑥ Room temperature controller (by others)
- ⑦ Supply velocity controller
- ⑧ Extract velocity controller
- - - Site wiring by others

Volume control



Entry flow conditions



Nomenclature • Volume Flow Range

Nomenclature

f_m	in Hz: Octave centre frequency	Δp_{st}	in Pa: Static pressure differential
L_w	in dB/Oct.: Air regenerated noise: Sound power level from low pressure side measured in a reverberation chamber (re 1 pW)	$\Delta p_{st\ min}$	in Pa: Minimum static pressure differential
L_{WR}	in dB/Oct.: Air regenerated noise: Sound power level in the high pressure duct (re 1 pW)	Δp_w	in Pa: Differential pressure across the differential pressure grid
L_{WRA}	in dB(A): A-weighting of L_{WR}	\dot{V}	in l/s or in m ³ /h: Volume flow
L_{PA}	in dB(A): Air regenerated noise: A-weighting of sound pressure level including 8 dB room attenuation	\dot{V}_P	in l/s or in m ³ /h: Volume flow range with pneumatic controller
NC	: Noise criteria including room attenuation of 8 dB/ Oct.	\dot{V}_E	in l/s or m ³ /h: Volume flow range with electronic controller
NC ₁	: Noise criteria rating of L_{WR}	$\Delta \dot{V}$	in ± %: Volume flow tolerances on volume set value
D_E	in dB/ Oct.: Insertion loss	$\Delta \dot{V}_{min}$	in l/s or m ³ /h: Minimum difference between minimum and maximum volume settings (not applicable to Trox-DDC and Honeywell. For Belimo and Johnson Controls 20 % of maximum design value)
		ΔL	in dB or NC: Correction values for TVZ with reheat coil

Table 3: Pneumatic control

Size	Manufacturer TROX										Manufacturer Sauter														
	V_P					$V_P (0,5/1)$					V_P														
											RLP 10 or RLP 20					RLP 100 or RLP 200									
	$\Delta p_{st\ min}$ Pa	TVZ	TVA	l/s	m ³ /h	ΔV ± %	$\Delta p_{st\ min}$ Pa	TVZ	TVA	l/s	m ³ /h	ΔV ± %	$\Delta p_{st\ min}$ Pa	TVZ	TVA	l/s	m ³ /h	ΔV ± %	$\Delta p_{st\ min}$ Pa	TVZ	TVA	l/s	m ³ /h	ΔV ± %	
12	20	20	30	108	10	20	20	15	54	25	20	20	30	108	10	20	20	15	54	10	20	20	30	108	7
	20	30	65	234	7	20	20	30	108	9	20	30	65	234	7	20	20	30	108	7					
	45	80	105	378	5	20	25	50	180	7	45	80	105	378	5	20	25	50	180	5					
	90	150	145	522	5	25	35	70	252	6	90	150	145	522	5	25	35	70	252	5					
14	20	20	40	144	10	20	20	20	72	25	20	20	40	144	10	20	20	20	72	10	20	20	40	144	7
	20	45	90	324	7	20	20	45	162	9	20	45	90	324	7	20	20	45	162	7					
	45	100	145	522	5	20	30	70	252	7	45	100	145	522	5	20	30	70	252	5					
	80	190	195	702	5	25	50	95	342	6	80	190	195	702	5	25	50	95	342	5					
16	20	20	50	180	10	20	20	25	90	25	20	20	50	180	10	20	20	25	90	10	20	20	50	180	7
	20	30	115	414	7	20	20	60	216	9	20	30	115	414	7	20	20	60	216	7					
	45	80	180	648	5	20	25	90	324	7	45	80	180	648	5	20	25	90	324	5					
	80	150	250	900	5	25	40	125	450	6	80	150	250	900	5	25	40	125	450	5					
20	20	20	90	324	10	20	20	45	162	25	20	20	90	324	10	20	20	45	162	10	20	20	90	324	7
	25	45	210	756	7	20	25	105	378	9	25	45	210	756	7	20	25	105	378	7					
	45	110	330	1188	5	20	30	165	594	7	45	110	330	1188	5	20	30	165	594	5					
	80	190	445	1602	5	25	50	220	792	6	80	190	445	1602	5	25	50	220	792	5					
25	20	20	135	486	10	20	20	70	252	25	20	20	135	486	10	20	20	70	252	10	20	20	135	486	7
	25	35	310	1116	7	20	20	155	558	9	25	35	310	1116	7	20	20	155	558	7					
	45	85	490	1764	5	20	25	245	882	7	45	85	490	1764	5	20	25	245	882	5					
	80	150	665	2394	5	25	45	330	1188	6	80	150	665	2394	5	25	45	330	1188	5					
31	20	20	210	756	10	20	20	105	378	25	20	20	210	756	10	20	20	105	378	10	20	20	210	756	7
	25	40	490	1764	7	20	25	245	882	9	25	40	490	1764	7	20	25	245	882	7					
	45	100	775	2790	5	20	30	390	1404	7	45	100	775	2790	5	20	30	390	1404	5					
	80	180	1055	3798	5	25	50	525	1890	6	80	180	1055	3798	5	25	50	525	1890	5					
40	20	20	355	1278	10	20	20	180	648	25	20	20	355	1278	10	20	20	180	648	10	20	20	355	1278	7
	25	35	830	2988	7	20	20	415	1494	9	25	35	830	2988	7	20	20	415	1494	7					
	40	75	1300	4680	5	20	25	650	2340	7	40	75	1300	4680	5	20	25	650	2340	5					
	80	150	1780	6408	5	25	35	890	3204	6	80	150	1780	6408	5	25	35	890	3204	5					

- RR : Number of rows
 K : Number of circuits
 \dot{m}_w in kg/s: Mass flow (water)
 \dot{m}_{wk} in kg/s: Mass flow per circuit
 \dot{Q} in kW: Heat output
 t_e in°C: Air on coil temperature
 t_a in°C: Air off coil temperature
 t_{wm} in°C: Mean water temperature
 v in m/s: Air velocity in the duct connection
 ΔP_v in kPa: Water pressure drop
 Δt in K: Air temperature rise
 Δt_w in K: Water temperature drop

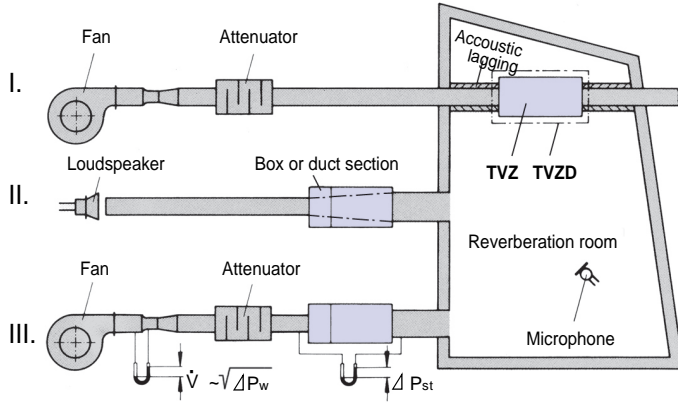
Table 4: Electronic control

Size	Manufacturer TROX-DDC, Belimo, Honeywell, Johnson Controls					Manufacturer Landis & Gyr					Manufacturer Staefa														
	\dot{V}_E					Transducer range 250 Pa					\dot{V}_E					FKA - P1 (100 Pa)					FKA - P2 (300 Pa)				
	ΔP_{stmin} Pa		l/s	m ³ /h	$\Delta \dot{V}$ ±%	ΔP_{stmin} Pa		l/s	m ³ /h	$\Delta \dot{V}_{min}$ l/s m ³ /h	$\Delta \dot{V}$ ±%	ΔP_{stmin} Pa		l/s	m ³ /h	$\Delta \dot{V}$ ±%	ΔP_{stmin} Pa		l/s	m ³ /h	\dot{V} ±%				
	TVZ	TVA				TVZ	TVA					TVZ	TVA				TVZ	TVA				TVZ	TVA		
12	20	20	15	54	20	20	20	15	54	38	137	20	20	20	25	90	10	20	25	40	144	10			
	20	25	60	216	7	20	25	60	216			7	20	25	50	180	8	25	45	75	270	8			
	45	80	105	378	5	45	80	105	378			5	25	35	70	252	5	55	90	110	396	5			
	90	150	145	522	5	90	150	145	522			5	30	50	85	306	5	90	150	145	522	5			
14	20	20	20	72	20	20	20	20	72	48	173	20	20	20	30	108	10	20	25	50	180	10			
	20	30	80	288	7	20	30	80	288			7	20	25	60	216	8	25	50	100	360	8			
	40	100	140	504	5	40	100	140	504			5	20	45	90	324	5	50	120	150	540	5			
	80	190	195	702	5	70	165	185	666			5	30	75	120	432	5	80	190	195	702	5			
16	20	20	25	90	20	20	20	25	90	63	227	20	20	20	35	126	10	20	20	65	234	10			
	20	25	80	288	7	20	25	80	288			7	20	25	75	270	8	25	45	130	468	8			
	25	50	145	522	5	25	50	145	522			5	20	30	115	414	5	50	90	190	684	5			
	80	150	250	900	5	80	150	240	864			5	30	55	155	558	5	80	150	250	900	5			
20	20	20	45	162	20	20	20	45	162	105	378	20	20	20	60	216	10	20	20	105	378	10			
	20	30	180	648	7	20	30	180	648			7	20	25	130	468	8	25	50	220	792	8			
	40	95	310	1116	5	40	95	310	1116			5	25	40	200	720	5	45	110	330	1188	5			
	80	190	445	1602	5	65	160	400	1440			5	30	65	255	918	5	80	190	440	584	5			
25	20	20	70	252	20	20	20	70	252	163	585	20	20	20	95	342	10	20	20	160	576	10			
	20	25	270	972	7	55	105	270	1972			7	20	25	200	720	8	25	45	330	188	8			
	40	75	470	1692	5	40	75	470	1692			5	25	35	305	1098	5	45	85	500	800	5			
	80	150	670	2412	5	65	125	610	2196			5	30	55	385	1386	5	80	150	665	394	5			
31	20	20	105	378	20	20	20	105	378	290	1044	20	20	20	165	594	10	20	25	284	022	10			
	20	30	425	1530	7	20	30	425	1530			7	20	30	355	1278	8	25	40	545	962	8			
	40	90	740	2664	5	40	90	740	2664			5	25	40	545	1962	5	45	105	800	880	5			
	80	180	1060	3816	5	80	180	1060	3816			5	30	70	675	2430	5	80	180	106	816	5			
40	20	20	180	648	20	20	20	180	648	445	1602	20	20	20	255	918	10	20	20	440	584	10			
	20	25	715	2574	7	20	25	715	2574			7	20	25	545	1962	8	25	40	890	204	8			
	40	75	1250	4500	5	40	75	1250	4500			5	25	35	835	3006	5	45	85	133	806	5			
	80	150	1780	6408	5	70	130	1645	5922			5	30	50	1040	3744	5	80	150	178	408	5			

TVZ Air Regenerated Noise

without TS

Diagrammatic layout of the test laboratory



- I. Determination of the case radiated sound power level
- II. Determination of the insertion loss difference in the sound level measured when substituting straight piece of duct for box
- III. Determination of the ductborne regenerated sound power level

Table 5

Size	$\dot{V}L$		$\Delta p_{st} = 200 \text{ Pa}$										$\Delta p_{st} = 500 \text{ Pa}$										$\Delta p_{st} = 1000 \text{ Pa}$										
			L_w in dB/oct.										L_w in dB/oct.										L_w in dB/oct.										
			f_m in Hz										f_m in Hz										f_m in Hz										
			63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	
12	15	54	39	22	20	<	<	<	<	19	<	15	40	21	20	<	<	<	<	22	15	18	44	27	28	18	<	<	19	26	20	22	
	35	126	41	33	30	16	<	<	<	21	18	17	44	31	31	21	<	<	<	23	19	19	47	32	34	24	<	<	21	30	24	26	
	60	216	35	37	32	20	<	<	<	22	19	18	37	36	36	24	<	<	15	22	22	18	43	37	38	28	17	17	23	31	26	26	
	95	342	40	41	38	26	18	<	<	<	19	24	16	41	48	42	30	19	<	18	28	29	24	46	45	43	33	23	19	26	36	31	31
	145	522	43	44	46	40	36	33	19	20	35	27	44	49	49	36	27	20	18	29	34	29	49	50	47	38	31	25	27	37	35	33	
14	20	72	32	28	22	16	<	<	<	20	15	16	38	24	22	17	<	<	<	20	<	16	42	30	30	21	16	16	17	26	21	22	
	50	180	25	35	31	18	<	<	<	<	17	<	33	35	34	25	<	<	<	19	20	15	42	36	36	28	16	16	19	28	24	24	
	80	288	35	40	34	20	<	<	<	<	20	<	38	41	38	28	<	<	<	22	24	18	44	42	39	31	19	18	20	30	27	26	
	140	504	40	46	43	30	23	15	<	18	29	22	46	51	46	35	23	16	16	26	32	25	50	50	47	38	26	21	24	34	34	29	
	195	702	45	48	48	38	32	26	17	19	34	28	48	53	52	41	36	30	22	30	38	33	52	54	53	42	35	29	27	37	39	34	
16	25	90	39	36	25	16	<	<	<	19	16	15	41	28	25	19	<	<	<	19	15	15	45	31	31	22	<	<	16	23	20	19	
	65	234	38	39	36	22	<	<	<	20	22	16	40	40	37	27	16	<	<	23	24	19	44	41	39	29	17	17	20	30	27	26	
	100	360	41	44	37	24	15	<	19	21	24	17	42	45	41	33	26	23	21	23	29	20	46	47	43	35	27	24	25	31	31	26	
	170	612	43	47	48	32	25	17	17	20	33	28	46	51	48	36	28	20	18	27	34	28	50	53	49	39	30	25	25	34	36	29	
	250	900	51	52	49	39	35	29	21	22	36	29	52	57	52	43	38	33	25	31	39	33	55	58	54	45	39	34	30	37	41	35	
20	45	162	40	26	24	<	<	<	15	20	15	16	31	27	27	18	16	<	<	23	17	19	43	31	31	22	18	<	20	27	22	23	
	110	393	36	35	32	19	<	<	<	18	<	44	38	35	27	<	<	<	22	22	18	47	40	37	30	18	<	16	31	26	26		
	180	648	39	39	34	20	<	<	<	20	<	47	43	39	29	15	<	<	25	26	21	50	44	42	33	22	16	19	33	27	29		
	280	1008	44	42	38	30	23	17	<	19	26	16	47	47	45	33	25	18	<	28	31	24	53	50	47	38	28	22	22	35	34	30	
	445	1602	53	50	47	39	35	30	24	22	35	27	53	51	48	43	39	34	27	31	37	30	57	54	52	45	39	35	30	38	40	34	
25	70	252	32	31	23	<	<	<	18	<	<	36	35	26	<	<	<	<	20	16	16	45	36	33	22	19	<	<	26	22	22		
	170	612	38	34	28	17	<	<	<	15	<	39	39	35	25	<	<	<	18	22	<	45	42	38	28	20	17	17	24	25	20		
	280	1008	40	40	31	21	15	<	18	20	<	45	45	39	28	22	20	21	26	27	22	48	48	43	32	26	23	24	29	30	25		
	470	1692	46	45	39	35	31	27	24	28	30	24	49	52	44	36	32	28	27	31	33	27	55	56	50	40	36	32	31	35	38	31	
	665	2394	53	51	46	42	39	36	34	36	38	32	56	55	50	45	42	39	36	39	41	34	59	59	55	48	45	42	39	42	44	37	
31	105	378	33	33	30	15	<	<	<	16	<	41	34	34	23	17	<	<	22	21	18	47	36	37	25	21	<	18	29	25	24		
	265	954	45	43	39	22	<	<	<	25	25	21	44	47	44	27	25	22	27	34	31	52	47	45	31	28	25	27	37	33	33		
	420	1512	45	45	40	22	<	<	15	29	27	25	53	54	48	33	31	29	30	37	36	32	55	53	50	37	34	31	32	40	38	36	
	720	2592	52	48	42	30	26	20	27	37	32	32	57	56	50	39	37	35	35	42	39	37	60	60	55	43	40	36	38	44	43	39	
	1055	3798	59	54	52	41	37	34	34	38	39	34	64	61	53	47	45	42	41	45	45	40	65	64	59	50	46	43	45	48	48	43	
40	180	648	35	35	31	<	<	<	17	<	35	40	36	24	16	<	20	25	23	21	45	43	40	27	21	<	27	33	29	29			
	445	1602	45	45	36	21	18	18	20	24	25	20	49	50	48	29	26	26	31	35	34	31	50	51	49	35	32	30	38	44	39	39	
	710	2556	48	48	38	27	24	23	26	30	29	26	52	53	49	34	31	30	34	38	36	33	55	56	52	38	35	34	41	46	42	41	
	1250	4500	61	53	46	39	37	33	34	39	37	34	63	58	51	40	38	36	39	44	41	39	64	61	55	44	41	39	44	49	45	44	
	1775	6390	72	62	49	45	42	41	41	45	44	40	72	64	56	50	49	46	46	50	49	45	72	67	60	52	50	47	50	54	51	49	

< indicates values below 15

TVZ Air Regenerated Noise with Reheat Coil

without TS

Example

Data given: TVZ size 16 with reheat coil 3 RR
 $\dot{V} = 65$ to 250 l/s or 234 to 900 m³/hr
 $\Delta p_{st} = 500$ Pa
 $\Delta L = 3$ dB
 Specified sound pressure level in the room
 50 dB (A) with 8 dB/oct. room attenuation
 Required: Regenerated noise in the room as dB (A) value
 at $\dot{V} = 250$ l/s or 900 m³/hr
 Calculation: $L_{pA} = 44$ dB (A) + 3 dB = 47 dB(A),
 specification is met

Correction values

Number of rows (RR)	1RR	2 RR	3 RR	4 RR
ΔL in dB or NC	-2	0	3	3

Table 8

Size	\dot{V}	$\Delta p_{st} = 200$ Pa										$\Delta p_{st} = 500$ Pa										$\Delta p_{st} = 1000$ Pa											
		L_w in dB/oct.								L_{pA} in dB(A)	NC	L_w in dB/oct.								L_{pA} in dB(A)	NC	L_w in dB/oct.								L_{pA} in dB(A)	NC		
		f_m in Hz										f_m in Hz										f_m in Hz											
		63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000								
12	15	54	39	22	20	<	<	<	<	<	19	<	15	40	21	20	<	<	<	<	22	15	18	44	27	28	18	<	<	19	26	20	22
	35	126	41	33	30	16	<	<	<	21	18	17	44	31	31	21	<	<	<	<	23	19	19	47	32	34	24	<	<	21	30	24	26
	60	216	35	37	32	22	16	15	15	22	20	18	37	36	36	25	18	17	17	22	23	18	43	37	38	29	21	20	23	31	27	27	
	95	342	41	41	39	31	29	27	25	23	28	19	42	48	42	33	30	28	26	29	31	25	46	45	43	35	31	29	29	28	32	24	
	145	522	45	46	47	43	41	39	35	33	38	31	46	50	50	42	40	38	37	35	39	31	50	51	48	44	41	39	38	39	40	34	
14	20	72	32	28	22	16	<	<	<	22	15	18	38	24	22	17	<	<	<	20	<	16	42	30	32	21	16	16	17	26	21	22	
	50	180	25	35	31	18	<	<	<	<	17	<	33	35	34	25	<	<	<	19	20	15	42	36	36	28	16	16	19	28	24	24	
	80	288	35	40	34	22	17	15	<	<	21	<	38	41	38	29	19	17	16	22	25	18	44	42	39	31	22	20	21	30	27	26	
	140	504	41	46	44	35	32	30	28	26	32	23	46	51	46	38	33	31	29	29	35	26	50	50	47	40	35	33	31	35	36	30	
	195	702	47	49	49	43	41	39	37	35	40	32	49	54	53	45	43	41	39	37	42	33	53	55	54	46	43	42	40	40	43	35	
16	25	90	39	36	25	16	<	<	<	19	16	15	41	28	25	19	16	<	<	19	16	15	45	31	31	22	16	15	16	23	20	19	
	65	234	38	39	36	22	<	<	<	20	22	16	40	40	37	27	17	<	<	23	24	19	44	41	39	29	18	17	20	30	27	26	
	100	360	41	44	37	26	21	19	20	21	25	17	42	45	41	33	27	24	22	23	29	20	46	47	43	35	28	25	26	31	31	27	
	170	612	44	47	48	36	33	31	29	27	35	28	46	51	48	39	35	32	30	30	36	28	50	53	49	41	36	34	32	35	37	30	
	250	900	52	53	51	46	44	42	40	38	42	35	53	57	53	48	46	44	41	40	44	36	56	58	55	49	46	44	43	42	45	37	
20	45	162	40	26	24	16	15	<	<	15	<	<	31	27	27	18	19	<	<	23	18	19	43	31	31	22	20	17	21	27	22	23	
	110	393	36	35	32	21	15	<	<	<	19	<	44	38	35	27	17	<	<	22	23	18	47	40	37	30	20	17	17	31	27	27	
	180	648	40	40	35	29	27	25	22	19	25	17	47	43	40	32	28	26	23	26	29	22	50	44	42	35	30	27	25	33	31	29	
	280	1008	46	45	43	40	39	37	34	31	36	29	48	48	47	42	40	38	36	34	38	30	54	51	49	43	41	39	37	37	39	33	
	445	1602	56	55	54	52	51	49	47	45	49	42	56	56	55	54	52	51	49	46	50	43	59	58	57	55	53	52	50	48	51	44	
25	70	252	32	31	24	19	20	17	15	19	18	15	36	35	26	16	21	20	17	21	19	17	45	36	33	23	23	18	16	26	23	22	
	170	612	38	34	29	22	20	17	15	15	19	<	39	39	35	27	21	19	17	19	23	<	45	42	38	29	24	21	19	24	26	20	
	280	1008	41	41	36	33	31	30	27	24	29	22	46	46	41	35	33	31	29	28	32	24	48	48	44	37	34	32	30	30	34	26	
	470	1692	51	51	49	48	47	45	43	40	44	37	52	54	51	49	48	46	44	42	45	39	56	57	54	51	49	47	45	43	47	40	
	665	2394	58	59	58	57	56	54	52	50	53	47	60	60	59	58	57	55	54	51	55	48	62	62	61	59	58	56	55	53	56	49	
31	105	378	33	33	30	19	22	19	17	<	19	<	41	34	34	25	19	16	<	22	21	18	47	36	37	26	22	15	18	29	25	25	
	265	954	45	43	39	26	22	19	17	25	26	21	44	47	44	29	27	24	27	34	31	30	52	47	45	32	29	26	27	37	33	32	
	420	1512	46	46	42	35	33	32	29	30	32	26	53	54	48	38	36	34	33	37	37	33	55	53	50	40	38	35	35	40	39	36	
	720	2592	54	53	51	49	48	46	44	42	45	38	58	57	54	50	49	47	45	45	47	40	61	61	57	52	50	48	47	47	49	42	
	1055	3798	62	61	60	59	58	56	54	52	55	49	65	64	62	60	59	57	56	54	57	50	66	66	64	61	60	58	57	55	58	51	
40	180	648	35	35	32	21	22	20	17	<	20	<	35	40	36	27	19	16	20	25	24	21	45	43	40	28	22	15	27	33	29	29	
	445	1602	45	45	37	28	26	24	23	24	27	20	49	50	48	32	29	28	31	35	35	31	50	51	49	36	33	31	38	44	39	39	
	710	2556	49	49	42	39	38	36	34	33	36	29	53	53	50	41	39	38	37	39	39	34	55	56	52	43	41	39	42	46	43	42	
	1250	4500	62	57	55	54	53	51	49	47	50	43	64	60	57	55	54	52	50	49	52	45	65	63	59	56	55	53	52	52	53	47	
	1775	6390	72	66	64	63	62	60	59	57	60	53	73	68	66	64	63	62	60	58	61	54	73	70	67	65	64	63	61	60	62	55	

< indicates values below 15

TVZ Case Radiated Noise

Example

Data given: TVZ size 20
 $\dot{V} = 100$ to 278 l/s or 360 to 1000 m³/hr
 $\Delta p_{st} = 500$ Pa
 Specified sound pressure level in the room
 35 dB(A) with 4 dB/oct. room attenuation and
 4 dB/oct. ceiling reduction
 Required: Case radiated noise in the room using sound
 spectrum data where
 $\dot{V} = 278$ l/s or 1000 m³/hr

Calculation (figures in dB/oct.):

f_m in Hz	63	125	250	500	1000	2000	4000	8000
L_w (without additional acoustic cladding)	55	52	50	44	39	37	35	37
Ceiling noise reduction	4	4	4	4	4	4	4	4
Room attenuation	4	4	4	4	4	4	4	4
A-W eighting*	47	44	42	36	31	29	27	29
Corrected level	-26	-16	-9	-3	0	+1	+1	-1
Corrected level	21	28	33	33	31	30	28	28

* see e.g. VDI 2081

Result: L_{pA} approx. 39 dB(A) according to logarithmic addition. Specification is not met. Additional acoustic cladding necessary (see page 13 for calculation).

Table 10

Size	\dot{V}		$\Delta p_{st} = 200$ Pa										$\Delta p_{st} = 500$ Pa										$\Delta p_{st} = 1000$ Pa									
			L_w in dB/oct.										L_w in dB/oct.										L_w in dB/oct.									
			f_m in Hz										f_m in Hz										f_m in Hz									
			63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC
12	15	54	27	31	27	26	27	20	<	<	22	17	20	35	28	27	28	25	24	22	25	19	36	37	29	27	29	27	27	27	27	23
	35	126	34	40	32	30	27	21	<	16	24	17	29	41	36	34	32	29	26	23	29	22	37	42	37	35	36	34	33	30	33	27
	60	216	38	42	35	30	27	23	16	20	26	18	38	46	40	37	34	31	27	25	32	24	42	47	41	40	40	37	35	26	36	30
	95	342	42	46	40	33	29	26	21	21	29	20	46	50	43	40	36	33	29	27	35	26	47	51	46	43	42	39	37	34	39	32
	145	522	47	49	45	40	34	31	25	25	34	27	51	54	46	43	38	34	32	29	37	30	52	56	49	46	44	40	40	37	42	34
14	20	72	27	30	26	27	27	20	<	<	22	17	25	35	26	26	29	27	26	18	26	21	35	36	29	28	30	29	29	27	28	24
	50	180	35	40	33	28	26	21	<	19	24	17	32	41	37	35	33	30	26	22	30	23	40	43	38	37	38	36	34	30	35	29
	80	288	37	43	35	29	27	24	16	19	26	18	42	46	40	37	34	32	28	24	32	25	45	47	42	40	40	38	35	31	37	31
	140	504	46	41	41	33	29	28	21	<	29	20	49	52	44	41	36	33	30	25	35	27	50	54	47	45	42	39	38	34	40	32
	195	702	49	44	47	42	35	31	26	31	35	28	53	55	50	46	39	35	34	32	40	33	55	57	52	49	44	40	40	38	43	36
16	25	90	25	28	25	26	24	18	<	16	20	<	21	33	28	28	29	28	24	24	26	21	29	31	29	28	32	27	27	30	28	25
	65	234	34	38	34	30	26	22	15	22	25	19	35	41	37	35	33	31	27	27	31	24	39	42	39	37	39	35	33	33	35	29
	100	360	39	42	37	31	27	25	19	22	27	18	44	46	41	38	35	32	28	29	33	25	46	47	43	41	41	38	36	35	38	31
	170	612	48	45	42	35	29	28	23	27	30	22	49	50	46	42	37	35	32	32	36	28	52	52	48	46	43	41	40	38	41	34
	250	900	51	49	48	42	35	32	28	32	36	28	55	54	51	47	40	36	35	35	40	34	58	56	53	51	45	42	42	40	44	38
20	45	162	31	32	30	29	25	21	18	22	23	18	27	34	34	36	33	30	26	26	30	23	30	32	33	34	38	30	28	31	32	28
	110	393	40	42	38	32	28	24	21	25	27	20	45	43	41	40	36	32	29	30	34	26	40	44	42	42	40	38	35	36	38	31
	180	648	46	44	41	33	29	27	27	29	30	25	49	48	46	42	37	34	32	33	36	29	52	50	48	46	44	40	33	39	41	35
	280	1008	51	47	46	36	31	30	28	30	33	26	55	52	50	44	39	37	35	37	39	32	58	55	53	50	46	42	35	42	44	37
	445	1602	56	53	53	46	38	36	35	38	40	33	60	56	54	51	43	40	40	42	44	38	63	59	57	54	48	44	45	46	48	42
25	70	252	28	33	32	30	27	21	<	<	24	17	36	36	35	34	33	31	26	23	30	24	35	37	39	38	37	36	33	32	35	28
	170	612	46	42	39	32	28	24	17	19	27	18	47	46	44	41	36	33	29	27	35	27	50	48	46	44	42	40	38	36	40	32
	280	1008	52	46	40	33	29	26	21	23	29	19	53	51	47	42	37	35	32	32	37	28	56	54	51	48	48	41	40	40	44	39
	470	1692	54	51	44	37	31	30	27	28	33	24	58	56	51	44	39	38	36	37	40	32	61	59	55	50	49	43	43	44	46	40
	665	2394	58	54	51	45	35	36	32	34	39	31	62	59	55	50	42	40	40	41	44	37	65	63	59	54	51	45	46	47	50	43
31	105	378	35	36	31	29	26	20	<	<	23	16	40	38	38	37	34	32	28	22	32	25	39	38	41	39	37	36	36	32	36	31
	265	954	49	44	38	33	29	24	20	<	28	19	50	49	46	42	38	35	33	29	37	28	49	51	50	48	44	42	41	39	43	36
	420	1512	52	46	42	34	29	27	24	20	30	21	56	53	50	45	40	38	36	33	40	32	59	56	55	51	48	44	44	42	46	39
	720	2592	58	51	47	42	33	33	29	30	36	28	61	58	55	48	42	41	40	37	44	36	64	61	59	54	50	46	47	44	49	42
	1055	3798	64	55	53	44	36	39	35	34	41	34	68	62	57	51	43	42	43	39	46	38	71	65	62	56	50	47	49	46	51	44
40	180	648	40	40	36	33	30	26	19	15	27	20	44	42	42	39	37	36	32	22	35	39	47	44	46	44	41	41	40	36	40	35
	445	1602	52	45	43	35	30	28	23	15	31	22	57	53	52	46	39	39	38	30	41	33	57	54	56	54	48	46	46	39	47	41
	710	2556	56	47	43	35	32	32	27	30	33	25	59	56	55	47	41	40	40	31	43	36	62	59	59	55	49	46	48	40	49	43
	1250	4500	67	52	47	39	34	37	32	30	38	32	67	59	55	48	42	42	43	31	44	37	69	63	61	56	50	47	50	41	51	44
	1775	6390	77	62	55	48	37	41	37	36	46	48	79	63	58	51	42	44	46	36	49	51	79	66	62	57	48	47	50	43	52	51

< indicates values below 15

TVZD Case Radiated Noise

Example

Data given: TVZD size 20
 \dot{V} = 100 to 278 l/s or 360 to 1000 m³/hr
 Δp_{st} = 500 Pa
 Specified sound pressure level in the room
 35 dB(A) with 4 dB/oct. room attenuation and
 4 dB/oct. ceiling reduction
 Required: Case radiated noise in the room using sound
 spectrum data where
 \dot{V} = 278 l/s or 1000 m³/hr

Calculation (figures in dB/oct.):

f _m in Hz	63	125	250	500	1000	2000	4000	8000
L _w (with additional acoustic cladding)	53	49	43	33	25	24	20	23
Ceiling noise reduction	4	4	4	4	4	4	4	4
Room attenuation	4	4	4	4	4	4	4	4
A-W eighting*	45	41	35	25	17	16	12	15
Corrected level	-26	-16	-9	-3	0	+1	+1	-1
Corrected level	19	25	26	22	17	17	13	14

* see e.g. VDI 2081

Result: L_{pA} approx. 30 dB(A) according to logarithmic addition. Specification is met.

Table 11

Size	ṽ	ΔP _{st} = 200 Pa											ΔP _{st} = 500 Pa											ΔP _{st} = 1000 Pa																	
		L _w in dB/oct.									L _{pA} in dB(A)	NC	L _w in dB/oct.									L _{pA} in dB(A)	NC	L _w in dB/oct.									L _{pA} in dB(A)	NC							
		f _m in Hz											f _m in Hz											f _m in Hz																	
		63	125	250	500	1000	2000	4000	8000	<			63	125	250	500	1000	2000	4000	8000	<			63	125	250	500	1000	2000	4000	8000	<									
12	15	54	25	22	20	16	15	<	<	<	<	<	<	<	<	<	<	<	18	26	21	17	16	<	<	<	<	<	<	28	28	22	17	17	<	<	<	<	<	<	
	35	126	32	31	25	20	15	<	<	<	<	<	<	<	<	<	<	<	<	27	32	29	24	20	16	<	<	<	<	18	<	35	33	30	25	24	21	18	16	22	15
	60	216	36	33	28	20	15	<	<	<	<	16	<	36	37	33	27	22	18	<	<	<	<	<	<	<	<	<	<	22	40	38	34	30	28	24	20	<	25	18	
	95	342	40	37	33	23	17	<	<	<	<	<	20	<	44	41	36	30	24	20	<	<	<	<	<	<	<	<	<	15	45	42	39	33	30	26	22	20	28	20	
	145	522	45	40	38	30	22	18	<	<	<	<	25	16	49	45	39	33	26	21	17	15	28	19	50	47	42	36	32	27	25	23	31	22							
14	20	72	24	20	19	16	<	<	<	<	<	<	<	23	26	21	17	17	15	<	<	<	<	<	<	<	<	<	32	26	22	17	15	15	<	<	<	<	<	<	
	50	180	33	31	28	19	14	<	<	<	15	<	30	32	32	26	21	18	<	<	<	20	<	38	34	33	28	26	24	19	16	24	16								
	80	288	35	34	30	20	15	<	<	<	17	<	40	37	35	28	22	20	<	<	<	23	<	43	38	37	31	28	26	20	17	26	19								
	140	504	44	32	36	24	17	16	<	<	<	22	<	47	43	39	32	24	21	15	<	<	27	18	48	45	42	36	30	27	23	20	30	22							
	195	702	47	35	42	33	23	19	<	17	28	21	51	46	45	37	27	23	19	18	32	24	53	48	47	40	32	28	25	24	34	26									
16	25	90	23	22	19	17	<	<	<	<	<	<	<	19	27	22	19	16	16	<	<	<	<	<	<	<	<	27	25	23	19	15	<	<	16	16	<				
	65	234	32	32	28	21	<	<	<	<	<	16	<	33	35	31	26	20	19	<	<	<	<	<	<	<	<	37	36	33	28	26	23	18	19	24	16				
	100	360	37	36	31	22	<	<	<	<	18	<	42	40	35	29	22	20	<	15	24	<	44	41	37	32	28	26	21	21	27	18									
	170	612	46	39	36	26	16	16	<	<	23	<	47	44	40	33	24	23	17	18	28	19	50	46	42	37	30	29	25	24	31	23									
	250	900	49	43	42	33	22	20	<	18	28	21	53	48	45	38	27	24	20	21	32	24	56	50	47	42	32	30	27	26	35	28									
20	45	162	29	29	23	19	<	<	<	<	<	<	25	31	27	25	19	17	<	<	18	<	29	29	26	23	24	17	<	17	19	<									
	110	393	38	39	31	21	<	<	<	<	19	<	43	40	34	29	22	19	<	16	23	<	38	41	35	31	26	25	20	22	26	18									
	180	648	44	41	34	22	15	<	<	15	21	<	47	45	39	31	23	21	17	19	27	17	50	47	41	35	30	27	18	25	30	21									
	280	1008	49	44	39	25	17	17	<	16	25	17	53	49	43	33	25	24	20	23	30	22	56	52	46	39	32	29	20	28	34	25									
	445	1602	54	50	46	35	24	23	20	24	32	25	58	53	47	40	29	27	25	28	35	27	61	56	50	43	34	31	30	32	38	30									
25	70	252	26	28	24	21	16	<	<	<	<	<	34	31	27	24	21	19	<	<	19	<	33	32	31	28	26	24	21	21	24	17									
	170	612	44	37	31	22	16	<	<	19	<	45	41	36	31	24	21	16	15	25	16	48	43	38	34	30	28	25	24	29	20										
	280	1008	50	41	32	23	17	<	<	22	<	51	46	39	32	25	23	19	20	28	18	54	49	43	38	36	29	27	28	33	26										
	470	1692	52	46	36	27	19	18	<	16	26	16	56	51	43	34	27	26	23	25	32	23	59	54	47	40	37	31	30	32	37	28									
	665	2394	56	49	43	35	23	24	19	22	31	22	60	54	47	40	30	28	27	29	36	27	63	58	51	44	39	33	33	35	40	32									
31	105	378	32	30	22	18	15	<	<	<	<	<	37	32	29	26	23	21	18	<	31	<	36	32	32	28	26	25	22	25	21										
	265	954	46	38	29	22	18	<	<	<	19	<	47	43	37	31	27	24	23	19	27	18	46	45	41	37	33	31	31	29	32	26									
	420	1512	49	40	33	23	18	16	<	<	22	<	53	47	41	34	29	27	26	23	30	21	56	50	46	40	37	33	34	32	36	28									
	720	2592	55	45	38	31	22	22	19	20	28	16	58	52	46	37	31	30	30	27	34	25	61	55	50	43	39	36	37	34	39	31									
	1055	3798	61	49	44	33	25	28	25	24	33	24	65	56	48	40	32	31	33	29	38	30	68	59	53	45	39	36	39	36	42	34									
40	180	648	38	34	26	21	21	17	<	<	18	<	41	36	32	27	28	27	24	<	25	20	44	38	36	32	32	32	33	28	31	27									
	445	1602	49	39	33	23	21	19	15	<	22	<	54	47	42	34	30	30	30	22	32	25	54	48	46	42	39	37	38	31	38	33									
	710	2556	53	41	33	23	23	23	19	22	25	18	56	50	45	35	32	31	32	31	32	27	59	53	49	43	40	37	40	32	40	34									
	1250	4500	64	46	37	27	25	28	24	22	32	28	64	53	45	36	33	33	35	23	36	29	66	57	51	44	41	38	42	33	42	36									
	1775	6390	74	56	45	36	28	32	29	28	41	43	76	57	48	39	33	35	38	28	43	46	76	60	52	45	39	38	42	35	45	46									

< indicates values below 15

TVZ Air Regenerated Noise in the High Pressure Duct

Table 12

Size	\dot{V}		$\Delta P_{st} = 200 \text{ Pa}$										$\Delta P_{st} = 500 \text{ Pa}$										$\Delta P_{st} = 1000 \text{ Pa}$									
			L_w in dB/oct.										L_w in dB/oct.										L_w in dB/oct.									
			f_m in Hz										f_m in Hz										f_m in Hz									
			63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC ₁	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC ₁	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC ₁
12	15	54	59	41	45	46	45	44	34	27	50	45	56	42	42	43	46	51	46	39	54	51	59	40	43	43	46	52	52	47	57	54
	35	126	58	54	53	51	48	46	37	30	53	47	57	52	52	53	52	55	49	42	59	55	62	51	51	50	51	56	56	50	61	58
	60	216	64	63	58	54	48	48	41	33	56	50	63	62	61	59	56	56	53	45	63	56	64	60	60	58	57	60	60	53	66	62
	95	342	67	70	67	57	51	51	46	40	62	60	70	71	70	64	58	58	55	49	67	63	70	68	69	65	62	63	63	57	70	64
	145	522	72	72	72	67	59	57	51	45	68	66	75	75	76	70	63	61	59	53	72	70	75	73	75	72	67	65	65	60	74	70
14	20	72	53	50	47	42	42	41	34	28	47	41	48	44	44	41	46	48	45	39	53	49	59	45	43	39	43	47	47	43	53	49
	50	180	56	56	54	53	46	46	38	32	54	49	63	60	58	54	53	55	50	44	60	55	65	59	59	55	54	58	58	52	63	59
	80	288	60	67	59	54	47	48	41	35	57	54	60	63	62	59	55	56	52	47	62	56	65	65	64	60	58	60	61	55	67	62
	140	504	68	71	70	60	53	52	47	42	64	63	69	72	75	65	58	59	56	51	69	69	69	69	72	66	62	64	64	59	71	66
	195	702	72	73	75	67	60	58	52	45	70	69	75	77	80	71	63	61	60	56	74	75	75	74	79	72	67	65	66	62	75	74
16	25	90	49	49	49	51	42	40	35	27	50	47	48	47	47	50	46	49	43	38	54	50	49	45	43	45	45	49	47	44	54	49
	65	234	53	58	57	53	45	44	37	32	54	50	54	59	60	60	54	53	49	44	61	57	54	57	57	57	56	57	57	52	63	58
	100	360	53	63	60	54	47	46	41	36	56	52	54	64	63	62	55	55	52	47	63	59	58	65	63	63	60	61	60	55	68	62
	170	612	62	68	70	58	50	50	45	41	63	64	67	69	70	66	57	58	56	52	67	63	68	68	70	68	64	64	64	60	71	65
	250	900	70	70	78	68	59	57	52	48	72	73	75	75	81	72	62	61	60	57	75	76	74	74	78	73	67	67	67	63	76	73
20	45	162	43	52	52	48	44	41	35	27	50	44	44	47	48	48	51	50	48	41	56	51	54	47	47	47	52	53	53	48	59	55
	110	393	62	60	57	53	47	46	40	36	55	49	56	58	58	57	54	53	51	47	60	53	58	57	55	55	58	58	58	55	64	60
	180	648	64	64	59	52	48	48	45	41	57	51	68	67	64	61	56	55	54	50	64	58	64	64	62	60	62	60	60	57	67	62
	280	1008	68	67	67	56	51	52	49	47	62	60	71	70	70	63	58	59	58	55	67	63	74	73	72	67	66	63	64	61	72	66
	445	1602	74	70	76	67	60	59	54	50	70	70	77	74	77	71	63	63	63	61	73	72	77	75	78	73	69	67	68	66	76	73
25	70	252	45	48	48	44	44	40	35	29	48	43	53	49	47	46	52	50	46	39	56	51	54	46	46	46	52	52	51	46	58	53
	170	612	66	59	60	49	47	45	40	33	55	51	64	62	61	58	56	54	52	48	62	55	62	59	58	57	62	60	59	55	67	61
	280	1008	70	64	60	51	48	47	43	39	56	51	71	68	65	60	56	55	55	50	64	57	68	66	64	62	64	61	63	58	69	64
	470	1692	70	61	61	54	51	50	46	41	58	52	77	69	70	63	58	58	58	53	67	63	76	72	73	68	66	63	66	63	73	67
	665	2394	66	56	56	58	58	49	45	37	60	57	81	72	71	67	63	61	61	56	70	66	80	76	76	71	68	65	67	64	75	71
31	105	378	51	49	47	44	45	42	34	27	49	44	42	48	46	48	50	49	45	40	55	50	48	48	45	48	52	51	49	45	57	52
	265	954	67	63	60	52	46	46	40	37	56	51	66	64	61	61	58	55	52	48	63	58	63	61	58	62	63	60	60	56	68	62
	420	1512	65	63	57	48	47	48	43	39	55	50	74	70	66	63	58	56	55	51	65	60	70	68	65	67	66	62	63	59	71	65
	720	2592	71	67	61	52	51	52	47	43	59	54	75	71	68	63	58	60	59	55	67	61	78	75	72	71	67	64	66	63	74	68
	1055	3798	71	70	67	62	57	56	49	44	64	60	80	75	71	67	61	61	62	57	70	65	83	78	75	73	68	66	69	65	76	71
40	180	648	59	52	50	45	46	44	38	33	51	45	54	49	50	52	53	52	48	43	58	52	54	49	51	53	56	55	54	51	61	56
	445	1602	67	62	55	48	47	48	43	40	55	48	68	63	63	59	56	57	54	51	63	57	67	62	64	65	64	62	62	60	70	64
	710	2556	68	63	56	49	50	51	46	46	57	51	73	68	65	61	57	59	57	55	66	59	72	68	67	67	65	63	65	63	72	66
	1250	4500	73	63	58	50	51	52	49	45	58	54	78	72	66	61	58	61	60	58	68	62	80	75	72	69	65	65	68	66	74	69
	1775	6390	76	61	59	61	60	51	46	39	63	59	83	74	70	65	61	62	63	60	70	69	83	78	75	72	67	66	69	67	76	70

TVA Air Regenerated Noise in the High Pressure Duct

Table 13

Size	\dot{V}		$\Delta P_{st} = 200 \text{ Pa}$										$\Delta P_{st} = 500 \text{ Pa}$										$\Delta P_{st} = 1000 \text{ Pa}$									
			L_w in dB/oct.										L_w in dB/oct.										L_w in dB/oct.									
			f_m in Hz										f_m in Hz										f_m in Hz									
			63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC ₁	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC ₁	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC ₁
12	15	54	56	42	39	32	28	30	27	22	38	30	55	36	39	34	32	33	36	34	42	38	60	41	41	37	38	40	41	43	48	46
	35	126	61	56	50	44	41	42	37	30	49	42	64	59	55	50	47	47	43	38	54	47	68	58	58	53	50	47	46	45	57	49
	60	216	66	63	57	49	47	48	45	38	55	49	70	65	61	55	53	53	52	47	61	54	71	66	65	59	57	57	57	53	65	59
	95	342	70	66	67	55	52	52	52	45	62	60	74	71	69	61	59	58	60	55	67	62	76	72	71	65	63	62	64	61	71	66
	145	522	67	66	65	60	54	50	53	44	62	57	77	75	73	68	65	60	65	59	72	67	78	75	71	69	65	69	66	65	74	69
14	20	72	54	45	42	36	33	34	29	20	41	34	48	42	42	38	34	33	32	30	41	34	61	44	41	39	37	38	40	41	47	44
	50	180	62	58	52	47	44	46	42	36	52	46	66	58	55	52	49	51	49	44	57	51	67	58	58	54	51	50	50	48	58	52
	80	288	65	65	58	51	48	51	48	42	57	52	68	66	61	57	54	57	56	51	63	58	71	67	64	60	59	59	60	56	66	62
	140	504	69	66	66	57	53	56	56	59	64	62	75	73	71	64	61	62	64	58	70	66	77	75	72	68	66	66	68	65	74	69
	195	702	68	65	64	62	56	54	55	46	64	59	79	75	72	68	65	62	68	62	73	69	80	78	75	72	70	68	72	68	78	73
16	25	90	48	36	41	33	26	25	22	19	36	29	54	42	44	37	32	32	31	29	41	33	61	47	49	43	37	39	40	39	48	42
	65	234	53	60	56	50	43	48	44	37	54	48	60	61	60	57	49	51	48	43	59	53	66	60	61	57	52	51	49	47	60	53
	100	360	60	65	59	53	47	54	52	46	60	54	71	68	65	61	54	57	58	54	65	60	73	70	68	65	60	60	62	57	69	64
	170	612	68	67	66	56	52	56	59	52	64	61	75	72	70	65	59	61	65	61	70	67	78	76	74	69	65	64	69	66	74	70
	250	900	59	64	63	58	57	54	56	48	63	58	80	76	72	70	64	62	68	66	74	69	81	80	77	74	70	67	73	71	79	74
20	45	162	46	50	45	41	34	29	24	18	42	36	62	53	50	47	43	39	36	34	49	43	59	51	51	48	46	45	44	43	53	46
	110	393	62	58	51	50	46	46	40	34	53	46	62	63	55	53	52	48	45	40	57	51	63	63	60	56	57	54	52	49	62	56
	180	648	65	62	55	52	48	54	50	46	59	54	68	68	61	59	57	59	54	51	64	59	68	70	64	61	61	59	56	52	66	60
	280	1008	69	65	59	57	51	60	58	54	65	60	73	71	65	63	59	63	63	61	69	65	75	74	71	67	65	65	65	64	73	67
	445	1602	68	64	63	62	56	57	55	51	64	59	81	73	69	69	63	66	68	68	74	70	80	79	75	73	69	69	71	72	78	74
25	70	252	60	48	43	39	39	37	30	23	44	38	58	43	40	37	35	34	34	33	42	36	61	45	42	37	40	42	42	43	49	46
	170	612	67	58	52	49	50	53	48	43	57	53	65	59	56	55	53	56	53	49	61	56	65	61	58	57	55	55	52	50	61	55
	280	1008	70	66	56	54	53	59	53	50	63	59	72	69	62	61	57	62	61	58	68	63	74	69	65	64	61	63	65	61	70	67
	470	1692	73	66	60	60	55	63	59	56	67	63	78	73	70	67	62	66	69	65	74	70	81	77	75	73	69	70	75	72	79	76
	665	2394	75	68	65	67	61	65	62	59	70	65	83	76	71	73	66	68	74	70	78	75	84	81	79	78	72	73	79	77	84	80
31	105	378	46	49	44	41	43	42	36	30	48	42	45	50	45	42	40	38	38	36	46	40	53	52	46	43	43	44	45	51	48	
	265	954	66	59	52	51	52	55	51	46	59	55	67	63	59	58	56	58	58	54	64	60	69	66	62	60	59	59	58	56	66	60
	420	1512	70	63	55	55	56	61	56	53	65	61	74	69	54	63	60	63	65	61	70	67	76	72	68	68	65	65	69	66	74	70
	720	2592	72	66	60	61	57	66	62	58	70	66	79	74	68	68	64	68	74	68	77	75	82	78	74	74	70	71	77	75	81	78
	1055	3798	76	68	64	70	61	68	65	61	73	68	84	76	71	73	67	70	79	72	82	80	89	82	78	78	74	74	82	80	86	83
40	180	648	61	50	47	41	41	39	35	30	47	40	59	52	51	46	44	42	42	40	51	44	60	53	51	48	49	48	48	55	51	
	445	1602	68	57	55	50	52	54	54	50	60	56	70	62	62	57	55	58	58	55	64	60	72	65	64	61	59	59	58	57	66	60
	710	2556	72	60	59	55	56	59	61	58	66	63	75	67	66	62	60	63	66	64	71	67	78	71	70	67	64	65	69	67	74	70
	1250	4500	78	64	65	60	58	63	67	64	71	68	82	72	72	67	65	68	73	73	78	75	85	77	78	74	70	71	77	78	82	80
	1775	6390	86	70	71	68	63	67	71	70	76	74	88	75	76	72	68	69	76	77	81	79	91	80	81	78	74	74	81	83	86	85

TVA Air Regenerated Noise

without TS

Table 14

Size	V̇		$\Delta P_{st} = 200 \text{ Pa}$														$\Delta P_{st} = 500 \text{ Pa}$														$\Delta P_{st} = 1000 \text{ Pa}$													
			L_w in dB/oct.														L_w in dB/oct.														L_w in dB/oct.													
			f_m in Hz														f_m in Hz														f_m in Hz													
			63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC												
12	15	54	35	29	25	15	<	<	<	20	15	16	38	29	22	<	<	<	19	<	15	36	28	23	15	<	<	<	19	<	15													
	35	126	27	35	27	<	<	<	<	19	16	15	37	36	31	18	<	<	<	19	18	15	37	36	32	20	<	<	<	20	19	16												
	60	216	40	38	30	16	<	<	<	<	17	<	38	40	34	23	16	<	<	21	21	17	42	39	35	26	21	18	15	23	23	19												
	95	342	41	41	36	23	15	<	<	20	23	16	40	48	43	29	20	16	16	25	29	22	47	48	43	32	26	22	21	30	30	26												
14	145	522	43	39	34	26	24	18	<	22	23	18	44	49	44	34	25	21	20	30	31	26	45	51	49	38	29	24	26	35	35	30												
	20	72	35	29	25	15	<	<	<	20	15	16	38	29	22	<	<	<	19	<	15	36	28	23	15	<	<	<	19	<	15													
	50	180	27	35	27	<	<	<	<	19	16	15	37	36	31	18	<	<	<	19	18	15	37	36	32	20	<	<	<	20	19	16												
	80	288	40	38	30	16	<	<	<	<	17	<	38	40	34	23	16	<	<	21	21	17	42	39	35	26	21	18	15	23	23	19												
	140	504	41	41	26	23	15	<	<	20	22	16	40	48	43	29	20	16	16	25	29	22	47	48	43	32	26	22	21	30	30	26												
16	195	702	43	39	34	26	24	18	<	22	23	18	44	49	44	34	25	21	20	30	31	26	45	51	49	38	29	24	26	35	35	30												
	25	90	28	21	24	16	<	<	<	18	<	<	43	29	22	<	<	<	16	18	16	<	32	27	26	17	<	<	<	18	<	<												
	65	234	33	40	32	22	<	<	<	18	20	<	30	41	37	28	<	<	<	18	23	15	30	41	38	31	18	<	<	19	25	16												
	100	360	29	44	37	25	<	<	<	18	24	15	31	48	43	32	18	<	15	22	29	22	32	49	45	36	23	18	19	27	32	24												
	170	612	31	45	41	27	17	<	17	23	27	19	35	52	47	36	24	18	22	32	34	28	36	55	51	41	28	22	28	37	38	32												
20	250	900	32	40	37	30	26	19	16	21	25	17	42	56	47	41	30	24	26	37	37	32	48	58	52	45	34	27	32	43	41	38												
	45	162	37	23	21	19	<	<	<	17	15	<	35	27	24	21	19	17	18	24	19	19	42	34	31	28	26	24	25	30	26	25												
	110	393	40	32	27	19	15	<	<	18	17	<	39	34	29	23	19	17	18	24	20	20	42	36	32	29	26	24	26	33	27	29												
	180	648	40	40	30	22	19	18	18	23	21	19	45	41	34	28	24	23	25	35	28	30	45	41	37	31	28	26	27	38	31	33												
	280	1008	44	40	36	26	25	23	23	31	27	27	49	47	42	31	28	27	27	37	32	32	50	49	43	36	32	30	31	38	34	33												
25	445	1602	42	38	36	34	35	32	28	32	32	28	53	47	44	38	37	34	32	38	36	33	55	53	50	41	38	36	35	41	39	36												
	70	252	37	24	22	18	15	<	15	21	16	17	36	26	26	22	19	18	19	24	20	19	41	34	30	27	25	25	25	29	26	24												
	170	612	36	36	28	21	17	16	17	22	19	18	39	38	33	26	21	21	21	25	23	21	42	38	35	29	26	25	26	31	27	27												
	280	1008	43	42	31	24	20	20	20	24	23	20	46	46	38	30	24	24	25	29	28	25	47	45	41	34	29	28	29	35	32	30												
	470	1692	41	42	34	30	28	25	23	27	27	23	51	51	43	36	32	29	31	35	34	30	53	54	48	40	34	32	36	41	38	36												
31	665	2394	45	40	42	37	34	35	31	33	34	29	52	51	45	40	36	37	35	38	37	33	56	55	50	44	37	38	41	43	41	38												
	105	378	37	33	25	<	<	<	<	17	<	<	41	35	27	15	<	<	<	16	<	40	32	28	22	19	<	15	19	18	15													
	265	954	41	46	36	22	20	<	17	20	25	17	58	47	38	31	25	20	24	24	29	20	53	46	40	35	30	23	26	28	30	24												
	420	1512	51	51	40	29	25	21	25	33	31	29	57	54	44	36	29	25	32	33	34	29	58	54	47	41	35	29	36	37	37	32												
	720	2592	53	51	44	36	31	26	30	35	34	30	63	57	49	41	35	29	40	39	40	34	65	61	54	47	30	34	45	46	45	41												
40	1055	3798	57	45	41	43	40	36	36	38	38	33	64	57	51	47	42	37	45	44	44	39	69	63	57	51	46	41	52	51	49	46												
	180	648	39	34	24	18	16	<	16	22	18	18	41	35	29	23	20	19	21	26	22	21	44	35	31	27	25	26	29	33	28	28												
	445	1602	47	40	30	21	20	19	23	26	23	22	50	46	38	28	25	24	29	32	29	28	51	48	41	33	30	28	33	38	33	33												
	710	2556	49	45	34	26	24	24	27	32	28	28	55	51	41	31	29	28	36	38	34	33	57	54	46	37	34	32	40	43	39	38												
	1250	4500	64	49	40	35	34	33	34	38	36	33	64	55	46	37	35	34	43	44	41	39	65	60	52	44	41	40	50	51	47	46												
1775	6390	74	59	46	44	41	42	43	47	45	43	74	60	49	45	42	42	47	49	46	44	76	65	55	50	45	41	51	54	50	49													

< indicates values below 15

TVA Case Radiated Noise

Table 16

Size	\dot{V}		$\Delta P_{st} = 200 \text{ Pa}$										$\Delta P_{st} = 500 \text{ Pa}$										$\Delta P_{st} = 1000 \text{ Pa}$									
			L_w in dB/oct.										L_w in dB/oct.										L_w in dB/oct.									
			f_m in Hz										f_m in Hz										f_m in Hz									
			63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L_{pA} in dB(A)	NC
12	15	54	<	26	18	<	<	19	<	20	16	16	27	24	24	23	23	23	22	25	22	21	36	32	32	26	29	29	30	31	29	27
	35	126	24	36	29	22	21	22	22	26	23	22	38	38	32	29	27	29	28	30	28	26	43	40	35	32	32	34	32	34	32	29
	60	216	34	41	35	30	26	28	27	30	28	26	42	45	37	32	29	33	30	32	31	28	47	45	38	36	35	38	35	37	36	32
	95	342	40	45	40	35	29	32	31	32	32	28	45	50	42	35	32	36	33	34	34	29	50	51	43	39	37	41	38	40	39	35
	145	522	45	48	43	40	32	34	31	33	33	34	29	48	53	46	41	35	38	38	37	38	32	52	55	46	42	39	43	42	42	41
14	20	72	18	20	16	15	<	18	<	19	15	15	26	26	24	21	19	22	20	24	21	20	38	33	30	27	27	29	28	30	28	26
	50	180	28	38	29	24	22	23	20	24	23	20	38	40	32	28	27	29	26	29	27	25	42	39	33	31	30	34	31	33	31	29
	80	288	40	43	33	28	25	28	25	27	27	23	40	44	35	31	29	32	29	31	30	27	47	45	38	36	34	38	35	37	35	32
	140	504	45	48	41	38	29	34	31	32	33	28	45	53	44	38	33	37	36	36	36	31	49	54	47	43	39	42	40	40	41	35
	195	702	46	48	42	41	33	34	31	33	35	29	52	54	48	48	37	39	39	39	41	35	52	57	51	49	41	44	44	43	44	38
16	25	90	23	29	20	15	<	15	<	19	15	15	24	28	22	20	20	22	20	24	21	20	34	32	27	24	26	27	27	30	26	26
	65	234	36	39	29	24	21	22	20	24	22	20	36	39	32	27	26	28	26	28	27	24	42	40	35	31	30	33	32	34	31	29
	100	360	42	43	34	28	24	27	25	27	27	23	42	45	37	31	29	32	30	31	31	27	47	45	40	35	33	37	35	37	35	33
	170	612	47	47	38	33	28	31	29	32	31	28	49	51	42	37	33	36	34	36	35	31	52	52	45	40	35	40	39	40	39	35
	250	900	48	50	42	38	32	33	32	34	34	29	55	56	47	42	36	39	39	40	40	35	55	57	49	44	40	43	42	43	42	38
20	45	162	32	34	24	18	17	19	16	20	18	16	22	31	25	22	20	21	19	23	20	19	37	33	28	26	26	28	28	31	27	27
	110	393	42	41	30	24	22	22	21	23	32	19	42	43	34	29	26	26	26	28	27	24	45	43	35	33	31	33	32	36	32	31
	180	648	47	46	34	28	26	28	26	26	28	22	51	48	39	33	30	32	32	34	32	29	51	49	41	38	35	35	36	39	36	34
	280	1008	48	48	39	32	29	32	31	33	32	29	55	52	45	37	34	36	38	38	37	33	56	57	47	41	38	39	42	42	41	37
	445	1602	48	46	42	39	32	33	31	32	34	28	61	53	48	44	38	39	44	43	42	38	62	60	54	47	42	43	47	47	46	42
25	70	252	25	32	<	<	<	<	<	<	<	<	32	33	<	<	18	18	<	<	16	<	31	33	22	16	25	29	24	23	25	22
	170	612	43	45	29	21	<	24	17	20	24	17	47	45	33	29	27	29	26	24	28	22	47	45	36	34	33	33	31	32	32	28
	280	1008	50	48	33	27	16	30	25	30	29	26	56	52	39	34	31	34	33	33	34	29	54	52	42	39	37	37	38	38	37	33
	470	1692	50	48	38	33	31	34	29	31	32	27	59	55	45	41	37	38	39	37	39	33	62	58	51	47	42	41	45	44	44	39
	665	2394	50	45	47	40	32	32	26	29	34	27	59	56	50	44	41	41	43	40	42	37	65	60	54	51	45	44	49	48	47	43
31	105	378	28	31	15	16	15	15	<	15	<	39	34	19	18	24	25	20	20	22	18	37	34	27	28	28	35	29	30	30	28	
	265	954	47	40	29	25	25	28	23	26	26	22	50	44	37	32	31	34	33	31	32	28	46	44	40	39	36	39	37	37	32	
	420	1512	54	44	34	30	29	33	28	31	31	27	55	48	43	38	35	38	38	37	37	32	53	49	46	43	40	42	41	41	41	36
	720	2592	60	50	42	36	35	38	34	37	36	32	60	53	48	42	40	42	44	42	42	39	61	55	53	48	44	47	46	46	46	41
	1055	3798	64	54	48	43	38	40	37	39	40	34	62	55	52	46	43	44	45	44	44	39	66	59	56	52	47	50	52	50	50	46
40	180	648	32	30	20	20	22	22	19	18	20	15	44	35	30	26	28	32	29	28	29	25	42	36	34	36	36	38	38	37	36	32
	445	1602	45	37	32	28	28	32	30	28	29	25	51	43	42	36	34	38	40	39	37	34	49	45	45	42	40	42	43	43	41	38
	710	2556	50	42	36	33	33	38	36	34	35	31	56	49	46	39	37	40	43	40	40	37	56	52	51	46	42	45	47	45	45	41
	1250	4500	63	50	47	40	38	41	41	42	40	37	64	52	49	44	43	45	49	47	46	43	64	56	56	50	46	49	52	50	49	46
	1775	6390	71	58	50	47	44	42	43	46	45	41	72	58	53	48	46	47	51	50	49	45	70	61	58	53	48	51	54	53	52	48

< indicates values below 15

TVAD Case Radiated Noise

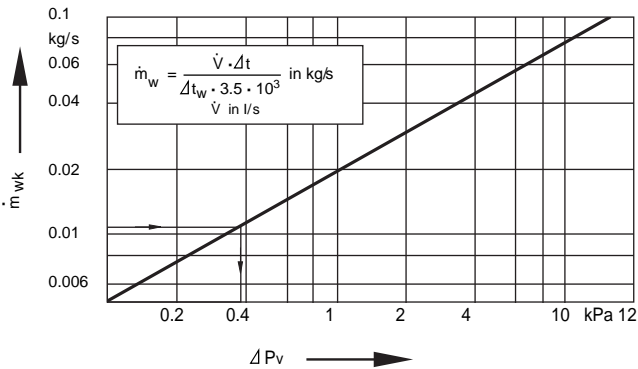
Table 17

Size	V̇		ΔP _{st} = 200 Pa														ΔP _{st} = 500 Pa														ΔP _{st} = 1000 Pa													
			L _w in dB/oct.														L _w in dB/oct.														L _w in dB/oct.													
			f _m in Hz														f _m in Hz														f _m in Hz													
			63	125	250	500	1000	2000	4000	8000	L _{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L _{pA} in dB(A)	NC	63	125	250	500	1000	2000	4000	8000	L _{pA} in dB(A)	NC												
12	15	54	<	20	<	<	<	<	<	15	<	<	24	18	18	16	19	18	17	20	17	16	33	26	26	19	25	24	25	26	24	22												
	35	126	21	30	23	15	17	17	17	21	17	17	35	32	26	22	23	24	23	25	23	21	40	34	29	25	28	29	27	29	27	25												
	60	216	31	35	29	23	22	23	22	25	23	21	39	39	31	25	25	28	25	27	26	23	44	39	32	29	31	33	30	32	31	28												
	95	342	37	39	34	28	25	27	26	27	26	23	42	44	36	28	28	31	28	29	29	25	47	45	37	32	33	36	33	35	34	30												
	145	522	42	42	37	33	28	29	26	28	29	24	45	47	40	34	31	33	33	32	33	28	49	49	40	35	35	38	37	37	36	32												
14	20	72	15	<	<	<	<	<	<	<	<	<	23	20	18	<	15	17	15	19	15	15	35	27	24	20	23	24	23	25	23	21												
	50	180	25	32	23	17	18	18	15	19	17	15	35	34	26	21	23	24	21	24	22	20	39	33	27	24	26	29	26	28	26	24												
	80	288	37	37	27	21	21	23	20	22	22	18	37	38	29	24	25	27	24	26	25	22	44	39	32	29	30	33	30	32	30	28												
	140	504	42	42	35	31	25	29	26	27	28	23	42	47	38	31	29	32	31	31	31	27	46	48	41	36	35	37	35	35	35	30												
	195	702	43	42	36	34	29	29	26	28	29	24	49	48	42	41	33	34	34	34	35	29	49	51	45	42	37	39	39	38	39	33												
16	25	90	21	23	15	<	<	<	<	<	<	<	22	22	17	<	16	17	15	19	15	16	32	26	22	18	22	22	22	25	21	21												
	65	234	34	33	24	18	17	17	15	19	17	15	34	33	27	21	22	23	21	23	22	19	40	34	30	25	26	28	27	29	27	25												
	100	360	40	37	29	22	20	22	20	22	21	18	40	39	32	25	25	27	25	26	26	22	45	39	35	29	29	32	30	32	30	28												
	170	612	45	41	33	27	24	26	24	27	26	23	47	45	37	31	29	31	29	31	30	27	50	46	40	34	31	35	34	35	34	30												
	250	900	46	44	37	32	28	28	27	29	29	25	53	50	42	36	32	34	34	35	34	30	53	51	44	38	36	38	37	38	37	33												
20	45	162	30	29	20	<	<	<	<	15	<	<	20	26	21	17	16	16	<	18	16	<	35	28	24	21	22	23	23	26	22	22												
	110	393	40	36	26	19	18	17	16	18	18	<	40	38	30	24	22	21	21	23	22	19	43	38	31	28	27	28	27	31	28	27												
	180	648	45	41	30	23	22	23	21	21	23	17	49	43	35	28	26	27	27	29	28	25	49	44	37	33	31	30	31	34	31	29												
	280	1008	46	43	35	27	25	27	26	28	27	24	53	47	41	32	30	31	33	33	32	29	54	52	43	36	34	34	37	37	36	32												
	445	1602	46	41	38	34	28	28	26	27	29	23	59	48	44	39	34	34	39	38	37	33	60	55	50	42	38	38	42	42	41	37												
25	70	252	23	27	<	<	<	<	<	<	<	<	30	28	<	<	<	<	<	<	<	<	29	28	18	<	21	24	19	18	20	17												
	170	612	41	40	25	16	<	19	<	15	19	<	45	40	29	24	23	24	21	19	23	17	45	40	32	29	29	28	26	27	27	23												
	280	1008	48	43	29	22	<	25	20	25	24	21	54	47	35	29	27	29	28	28	29	24	52	47	38	34	33	32	33	33	33	29												
	470	1692	48	43	34	28	27	29	24	26	27	22	57	50	41	36	33	33	34	32	34	29	60	53	47	42	38	36	40	39	39	34												
	665	2394	48	40	43	35	28	27	21	24	30	22	57	51	46	39	37	36	38	35	37	32	63	55	50	46	41	39	44	43	43	38												
31	105	378	27	27	<	<	<	<	<	<	<	<	38	30	15	<	20	19	<	15	17	<	36	30	23	23	24	29	23	25	25	22												
	265	954	46	36	25	20	21	22	17	21	21	17	49	40	33	27	27	28	28	27	27	22	45	40	36	34	32	33	31	32	32	28												
	420	1512	53	40	30	25	25	27	22	26	26	22	54	44	39	33	31	32	32	32	32	28	52	45	42	38	36	36	35	36	36	31												
	720	2592	59	46	38	31	31	32	28	32	32	28	59	49	44	37	36	36	38	37	37	32	60	51	49	43	40	41	40	41	41	37												
	1055	3798	63	50	44	38	34	34	31	34	36	29	61	51	48	41	39	38	39	39	39	34	65	55	52	47	43	44	46	45	45	40												
40	180	648	31	26	16	15	18	15	<	<	15	<	43	31	26	21	24	25	23	23	23	19	41	32	30	31	32	31	32	31	28													
	445	1602	44	33	28	23	24	25	24	23	24	19	50	39	38	31	30	31	34	34	32	29	48	41	41	37	36	35	37	38	36	33												
	710	2556	49	38	32	28	29	31	30	29	29	25	55	45	42	34	33	33	37	35	35	31	55	48	47	41	38	38	41	40	39	35												
	1250	4500	62	46	43	35	34	34	35	37	36	32	63	48	45	39	39	38	43	42	40	37	63	52	52	45	42	42	46	45	44	40												
	1775	6390	70	54	46	42	40	35	37	41	41	37	71	54	49	43	42	40	45	45	44	40	69	57	54	48	44	44	48	48	47	43												

< indicates values below 15

Reheat Coil Selection

1 Mean water pressure drop for sizes 12 to 40



Water pressure drop calculation

One or two row reheat coil

$$\dot{m}_{wk} = \frac{\dot{m}_w}{K} \text{ in kg/s}$$

Three-row reheat coil (2 RR and 1 RR connected in parallel)¹⁾

$$\dot{m}_{wk} \approx \frac{\dot{m}_w \cdot 0.75}{K^2} \text{ in kg/s}$$

Four-row reheat coil (2 RR and 2 RR connected in parallel)¹⁾

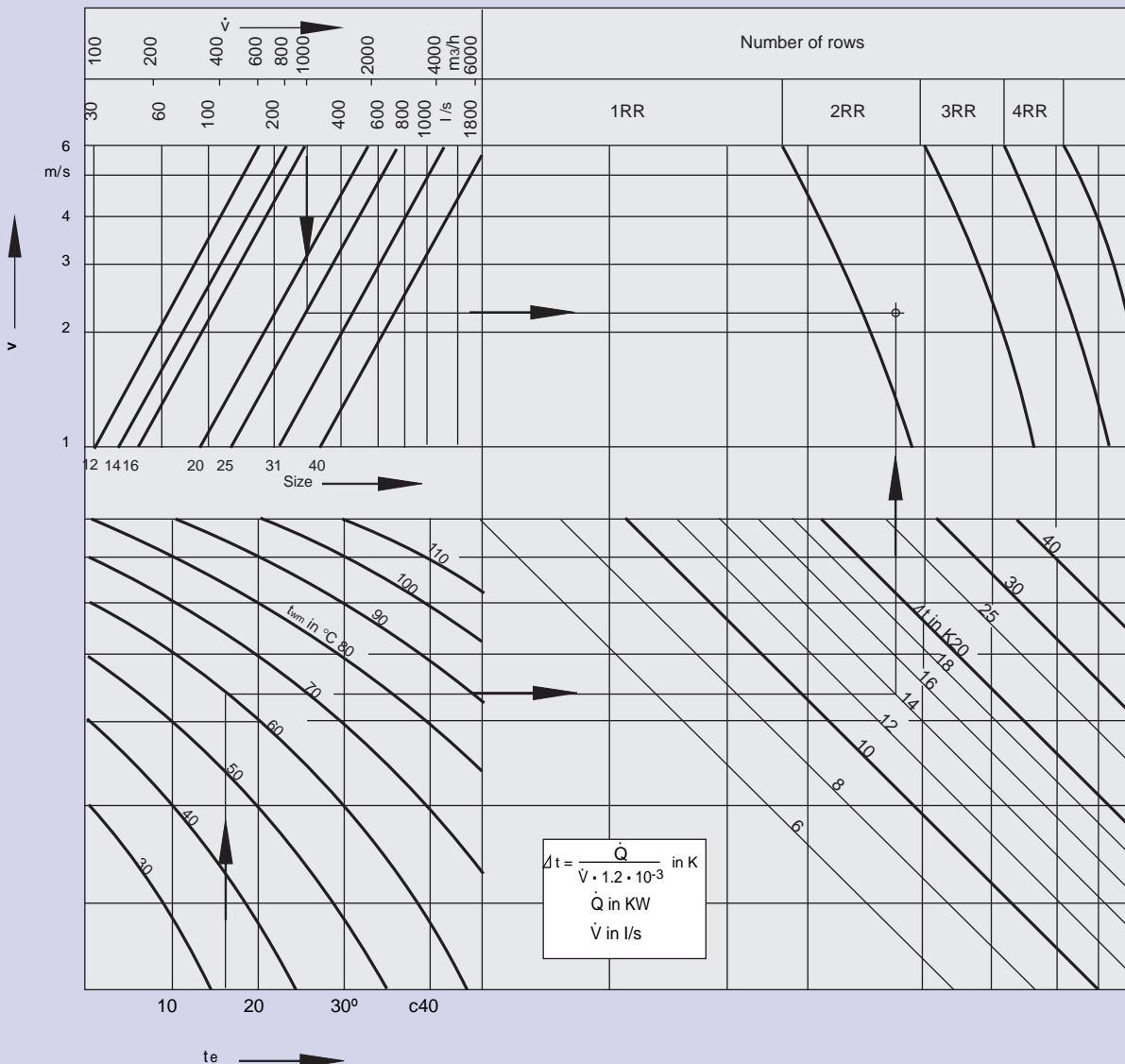
$$\dot{m}_{wk} \approx \frac{\dot{m}_w \cdot 0.5}{K^2} \text{ in kg/s}$$

- 1) Flow and return connections joined by others.
- 2) For two row reheat coil.

Number of circuits

Size	12	14	16	20	25	31	40
K	1 RR	1	1	1	2	2	4
	2 RR	1	1	2	4	4	7

2 Selection diagram



TVZ Order Details

Specification Text

VAV terminal box for variable volume supply air systems, flow rate range 15 to 1780 l/s or 54 to 6408 m³/hr, suitable for connecting to pneumatic or electronic control circuits. Damper leakage complies with DIN 1946, Part 4, when fully closed wiring by others. Each VAV box is tested and the desired volume flow rates set in the factory.

Sensing of the volume flow rate is by an averaging differential pressure grid. The minimum and maximum volume flow rates set at the factory are capable of being site monitored and adjusted. Actuated baffle plates are located behind the control damper to optimise acoustic and aerodynamic performance. Casing is lined with acoustic and thermal insulation, erosion-resistant up to 20 m/s. Circular high pressure duct spigot connection, low pressure duct connection angle flange or slide-on flange. Casing air leakage rate complies to class II, VDI 3803 or DIN 24194. The equipment conforms with clean room class 3, VDI 2083, and class 100 US-standard 209 b.

Static differential pressure range 20 to 1500 Pa, volume flow turndown to 10: 1, depending on the type of controller.

Materials:

Casing from galvanised sheet steel, mineral wool lining in the attenuator and damper section to have density of 30 to 40 kg/m³, with glass fibre scrim facing suitable for air speeds of up to 20 m/s, non-combustible to DIN4102, material category A2. Control damper from sheet steel with thermoplastic elastomer seal, plastic sensor hub, aluminium sensor tubes, polyurethane plain bearings.

Available with:

Additional Acoustic Cladding.

For reduction of the radiated noise from the casing, consisting of 40 mm mineral wool and an outer casing in 1 mm galvanised sheet steel.

Reheat coil

For supply volume reheat, casing from galvanised sheet steel, copper tubes and aluminium fins, connected to the box on the discharge side, flanged both ends.

TS Secondary Silencer

For reducing the discharge noise from the box, mineral wool lining and casing in 1 mm galvanised sheet steel, with angle flange or slide on flanges connections both ends.

Order Cod

see Price List

TVZ - R -1- LB / 16 / LP / LL1 / M-25 -240 l/s

Type

Supply box TVZ
With additional acoustic cladding TVZD

Handing

Right-hand R
Left-Hand L

Reheat Coil

With 1 row 1
With 2 rows 2
With 3 rows 3
With 4 rows 4
(Leave blank if no reheat coil)

Perforated plate lining

(no perforated plate lining on standard design, leave blank)

Matching flange

None (standard design) 0
Angle flange WR
Slide on flange LP

12
14
16
20
25
31
40
Size

Volume flow values

Quote units when ordering

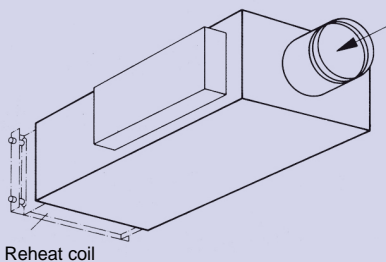
Type of operation

M master
S slave
E individual
F constant volume
(leave blank if Honeywell)

Control components

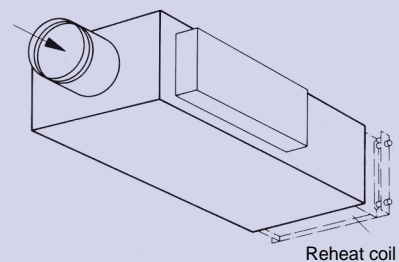
Actuator
Controller/ transducer
Manufacturer
T TROX-DDC
B Belimo
H Honeywell
J Johnson Controls
L Landis & Gyr
P Sauter pneumatic
S Staefa

Left-hand



Reheat coil

Right-hand



Reheat coil

Order example

Manufacturer: TROX

Type: TVZ -R -1- LB/ 16/ LP/ LL1 / M-25 -240 l/s

TVA Order Details

Specification Text

VAV terminal box for variable volume extract air systems, flow rate range 15 to 1780 l/s or 54 to 6408 m³/hr, suitable for connection to pneumatic or electronic control circuits. Damper leakage complies with DIN 1946, Part 4, when fully closed – wiring by others. Each VAV box is tested and the desired volume flow rates set in the factory.

Sensing of the volume flow rate is by an averaging differential pressure grid. The minimum and maximum volume flow rates set at the factory are capable of being site monitored and adjusted. Actuated baffle plates are located behind the control damper to optimise acoustic and aerodynamic performance. Casing is lined with acoustic and thermal insulation, erosion-resistant up to 20 m/s circular high pressure duct spigot connection low pressure duct connection by angle frame or slide on flange casing, air leakage rate complies to class II, VDI 3803, or DIN 24194. The box conforms with clean room class 3, VDI 2083, and class 100 US-standard 209 b.

Static differential pressure range 20 to 1500 Pa, volume flow turndown to 10: 1, depending on the type of controller.

Materials:

Casing from galvanised sheet steel, mineral wool lining in the attenuator and damper section to have a density of 30 to 40 kg/m³, with glass fibre scrim facing suitable for air velocities of up to 20 m/s, non-combustible to DIN 4102, material category A2. Control damper from sheet steel thermoplastic elastomer seal, plastic sensor hub, aluminium sensor tubes, polyurethane plain bearings.

Available with:

Additional Acoustic Cladding.

For reduction of radiated noise from the casing, consisting of 40 mm mineral wool and an outer casing in 1 mm galvanised sheet steel.

TS Secondary Silencer

For reducing the room side noise from the box, mineral wool lining and casing in 1 mm galvanised sheet steel, with angle flange or slide on flanges connections both ends.

Order Code

see Price List

TVA -R -LB / 16 / LP / LB1 / S -25 -240 l/s

Type

Extract box TVA

With additional acoustic cladding TVAD

12

14

16

20

25

31

40

Size

Volume flow values

Quote units when ordering

Handing

Right-handR

Left-handL

0

WR

LP

Type of operation

M master

S slave

E individual

F constant volume (leave blank if Honeywell)

Perforated plate lining

(no perforated plate lining on standard design, leave blank)

LB

Control components

Actuator

Controller/ transducer

Manufacturer

T TROX-DDC

B Belimo

H Honeywell

J Johnson Controls

L Landis & Gyr

P Sauter pneumatic

S Staefa

Matching flange

None (standard design)

Angle flange

Slide on flange

0

WR

LP

Control components

Actuator

Controller/ transducer

Manufacturer

T TROX-DDC

B Belimo

H Honeywell

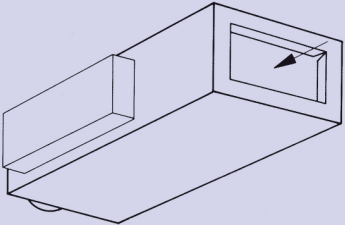
J Johnson Controls

L Landis & Gyr

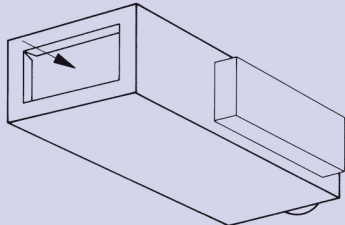
P Sauter pneumatic

S Staefa

Left-hand



Right-hand

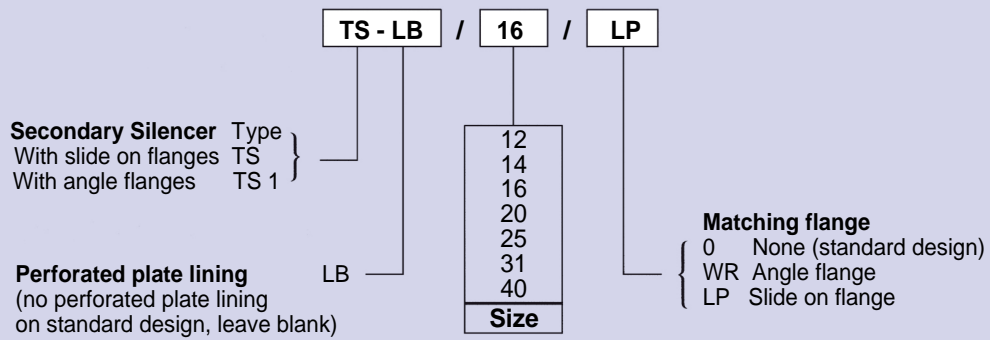


Order example

Manufacturer: TROX

Type: TVA -R -LB/ 16/ LP/ LB1 / S-25 -240 l/s

Order code



Order example

Manufacturer: TROX
 Type: TS - LB/ 16/ LP