Ref. no.: 600 - 613

Volume Flow Controller

VRSE

Variable volume flow controller
Circular, model VRSE

With lip sealing

Spigot ends according to DIN 12237

Laser-welded housing

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Update status 07.2016

Ref. no.: 600 - 613

Electronically or pneumatically variable volume flow controller

The volume flow controller VRSE is a low-cost alternative to the volume flow controller model VRME. The controller is used for the pressure-independent control of variable air flows in supply and exhaust air systems. The controller consists of a control plate which can simultaneously be used as shut-off damper, two measuring sticks integrated in the housing and the electronic control components.

- Air velocity 1.4 to 12.0 m/s
- Leakage air flow in case of closed control plate according to EN 1751 Cl. 4
- Housing leakage according to EN 1751, Class C

Dimensions:

- ø 80 mm, ø 100 mm, ø 125 mm, ø 140 mm, ø 150 mm, ø 160 mm, ø 180 mm, ø 200 mm, ø 224 mm, ø 250 mm, ø 280 mm, ø 315 mm, ø 355 mm, ø 400 mm

Design:

- Galvanized steel
- PUR coating inside and outside
- Stainless steel (1.4571) (INOX 316)

Options:

- Insulating shell 25 mm or 50 mm to reduce the radiating noise
- Silencer TSD to reduce the flow noise
- Connection on both sides with flat flange or board

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Electronically or pneumatically variable volume flow controller

(male coupling with double lip sealing as standard)

Add-on components:

- VAV universal controller (dynamic or static)
- VAV regulatory system for sensitive working areas with high-speed damper actuator
- Compact controller standard with static differential pressure measurement
- Compact controller Pharma with static differential pressure measurement and high-speed damper actuator
- Compact controller with dynamic differential pressure measurement
- Pneumatic volume flow controller
- Explosion-protected electronic or pneumatic volume flow controller with ATEX-certification for use in hazardous areas of zone 1

Product information:

- The differential pressure is measured using measuring sticks on which 2 – 8 measuring points are mounted according to the median line method
- Factory setting and programming on the airflows required by the customer
- The set minimum and maximum airflows can subsequently be adjusted by the customer
- Spigot ends according to DIN 12237 with double lip sealing
- Housing and control plate in galvanized steel
- Sealing of the control plate in silicone
- Sensor tubes in aluminium
- Ventilation check of each device on the test station

Technical data:

Nominal size:	80 - 400 mm
Volume flow range	25 - 5400 m³/h
Volume flow regulation area	about 12 - 100 % of the nominal flow
Differential pressure range	20 - 1000 Pa
Ambient temperature	0 - 50 °C

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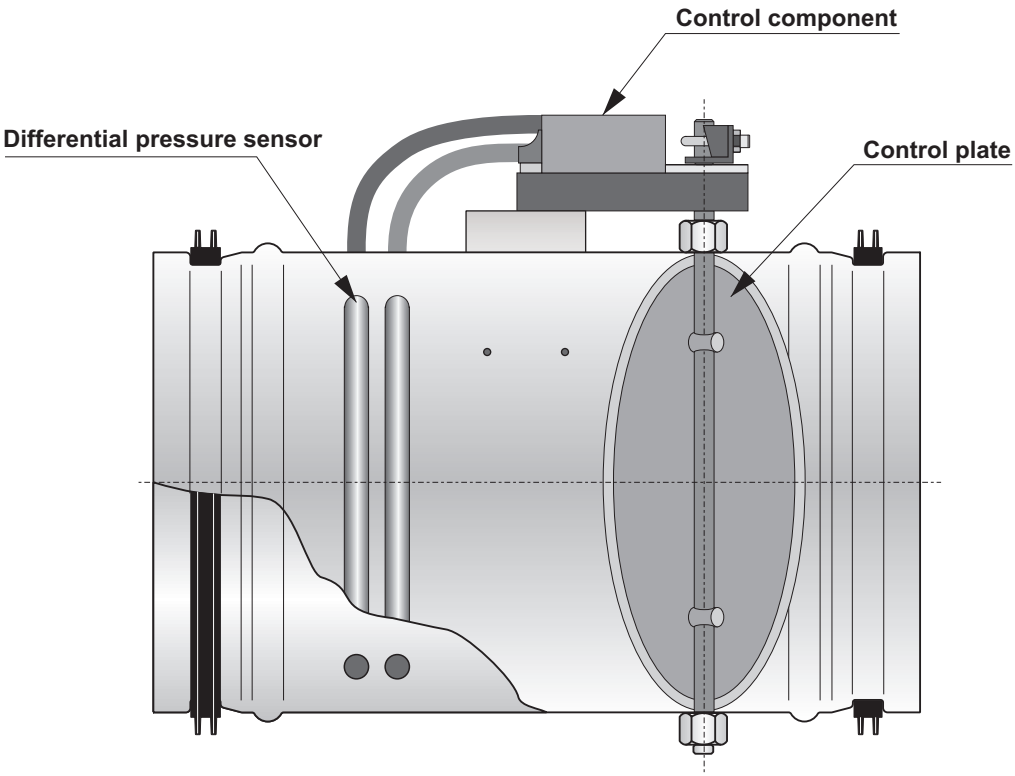
Function: The flow rate is recorded via the measuring sticks and a differential pressure sensor. The differential pressure sensor transfers the determined flow rate as an electrical signal to the control unit. The control unit compares this signal to the nominal value and adjusts the actuator correspondingly.

Schematic view of the VRSE



Control accuracy: The controller operates from the minimum pressure difference (see Diagram 1) up to the maximum pressure difference of 1000 Pa. Over this entire pressure range, the flow rate deviation is ± 10% (less than 100 m³/h ± 10m³/h).

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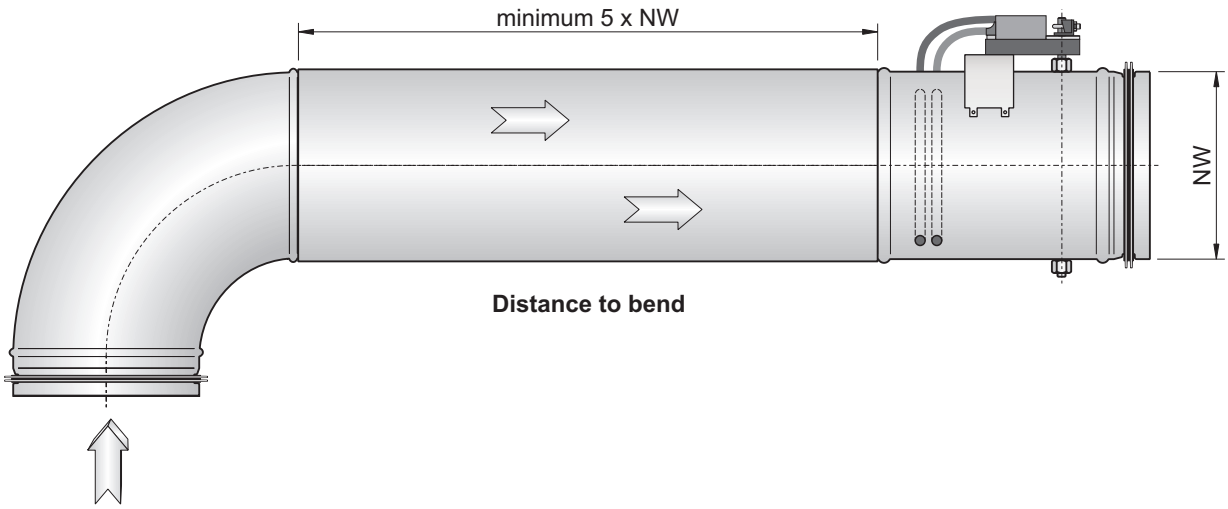
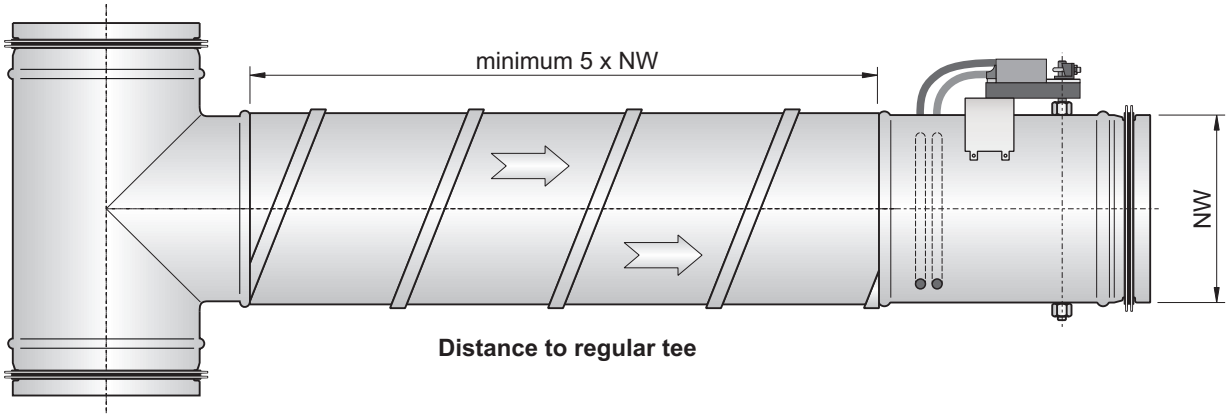
Electronically or pneumatically variable volume flow controller

Installation note: When installing behind deflections or junctions, the inflow zone must be 5 x NW.



Distance to bend



Distance to regular tee

Maintenance: All components are maintenance-free, non-ageing and corrosion-proof under normal conditions. According to DIN EN 12 097, the duct system and the volume flow controller must be accessible for possible adjustment and maintenance. In addition, the respective manufacturer's instructions apply to the servomotors and controllers.

Specifications:

Manufacturer: **AEROTECHNIK E. Siegwart**
Type: **VRSE, Ref. no. 600**

Electronic volume flow controller, manufactured by Aerotechnik Siegwart, circular construction, laser-welded housing with measuring sticks and top bracket to receive the actuator and controller, housing airtight according to DIN 12237, shut-off damper airtight according to EN 1751 Cl. 4, corrosion-protected, with non-ageing rubber, maintenance-free, including factory adjustment or programming of the volume flows and the conductance of the controller.

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Electronically or pneumatically variable volume flow controller

Dimensions:

Size ø d_1 [mm]	Selectable velocity V [m/s]	Nominal volume flow V_{nom} [m³/h]	Max. stat. pressure difference [Pa]	Dimensions l_1 [mm]	l_2 [mm]	l_3 [mm]	B Ref. no. 610 [mm]	C [mm]	Weight Ref. no. 610 [kg]
80	1,4 - 12,2	25 - 220	1000	298	40	378	90	25	1,4
100	1,4 - 12,0	40 - 340	1000	298	40	378	90	25	1,6
125	1,4 - 12,0	60 - 530	1000	298	40	378	90	25	1,8
140	1,4 - 12,0	80 - 660	1000	298	40	378	90	25	1,9
150	1,4 - 12,0	90 - 760	1000	298	40	378	90	25	2,1
160	1,4 - 12,0	100 - 870	1000	308	40	388	90	25	2,2
180	1,4 - 12,0	130 - 1100	1000	318	40	398	90	25	2,5
200	1,4 - 12,0	160 - 1360	1000	328	40	408	90	25	2,8
224	1,4 - 12,0	200 - 1700	1000	353	40	433	90	25	3,3
250	1,4 - 12,0	250 -2120	1000	363	40	443	90	25	3,7
280	1,4 - 12,0	310 - 2660	1000	393	60	513	90	25	4,5
300	1,4 - 12,0	360 - 3050	1000	423	60	543	90	25	5,5
315	1,4 - 12,0	400 - 3360	1000	423	60	543	90	25	6,1
355	1,4 - 12,0	500 - 4280	1000	533	60	653	90	25	7,5
400	1,4 - 11,9	650 - 5400	1000	505	80	665	90	25	8,9

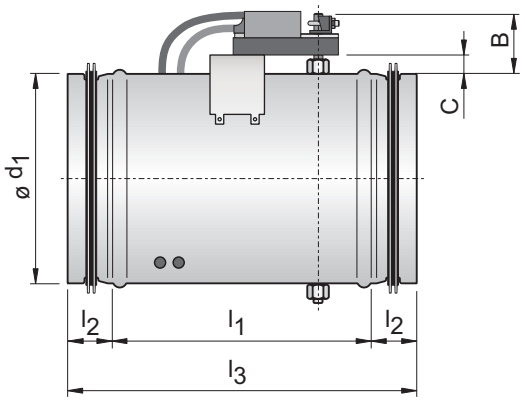
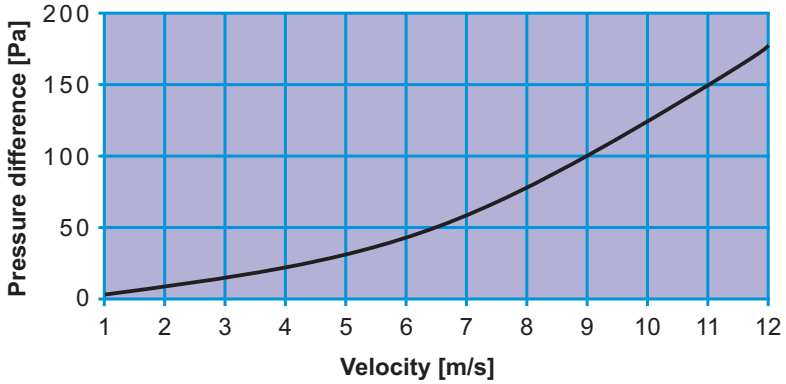


Diagram 1: Minimum pressure difference



Example:

nominal width NW 160

minimum pressure at 500 m³/h

$$\dot{V} = c * A \; ; \; c = \frac{\dot{V}}{A} = \frac{\dot{V}}{\frac{d^2 \pi}{4}}$$

$$c = \frac{500}{\frac{0{,}16^2 \pi}{4} \; 3600} = 6{,}9 \; \frac{m}{s}$$

(velocity 6,9 m/s)

Δp = 60 Pa

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Ref. no.: 600 - 613

Electronically or pneumatically variable volume flow controller

Overview:

Ref. no.	Type	Controller make and Type	Type of pressure sensor	Adjustable volume flow V_{min}	Adjustable volume flow V_{max}	Command signal
600	VRSE	**Belimo** Controller and sensor type VRD 3-AS Actuator LM24A-V (5 Nm)	dynamic	0% - 100%* of V_{nom}	30% - 100% of V_{nom}	2V-10V
601	VRSE	**Belimo** Controller type VRP and sensor type VFP300 Actuator LM24A-V (5 Nm)	static	0% - 80%* of V_{max}	30% - 100% of V_{nom}	2V-10V
602	VRSE	**Belimo** Controller type VRP-M and sensor type VFP300 Actuator type NM24A-V-ST (10 Nm)	static	0% - 100%* of V_{nom}	30% - 100% of V_{nom}	2V-10V
603	VRSE	**Sauter** Controller, sensor and actuator ASV115CF132E (10 Nm) Compact controller	static	20% - 80%* of V_{nom}	30% - 100% of V_{nom}	0V-10V
607	VRSE	**Siemens** Controller, sensor and actuator GDB 181.1E/3 (5 Nm) Compact controller	dynamic	0% - 100%* of V_{nom}	20% - 100% of V_{nom}	0V-10V
610	VRSE	**Belimo** Controller, sensor and actuator LMV-D3-MP (5 Nm) Compact controller	dynamic	0% - 100%* of V_{nom}	20% - 100% of V_{nom}	2V-10V
612	VRSE	**Schischek** Controller and sensor ExReg-V300-A Actuator type ExMax-5.10-CY (5/10 Nm)	static	0% - 100%* of V_{nom}	30% - 100% of V_{nom}	0V-10V
613	VRSP	**Sauter** Controller type RLP 10 up to NW 250 actuator type AK 31 P (1,8 Nm) to NW 280 actuator type AK 41 P (3 Nm)	static	20% - 80%* of V_{nom}	30% - 90% of V_{nom}	0,2 bar - 1 bar

*Make sure that the velocity in the tube must be at least 1,4 m/s.

Order code

VRSE – no. 600 –NW 80 – 25/50 mm insulating shell – galvanized steel – lip sealing – V=25/220 m³/h

Type:	VRSE
Ref. no.:	600 – 613 (see above)
Nominal width:	80 – 400 mm
Insulating shell:	No indication – without, 25 mm or 50 mm
Material:	Galvanized steel (as standard), stainless steel 1.4571, PUR
Connection:	Lip sealing (as standard), flat flange or flange
Volume flow:	Vmin / Vmax

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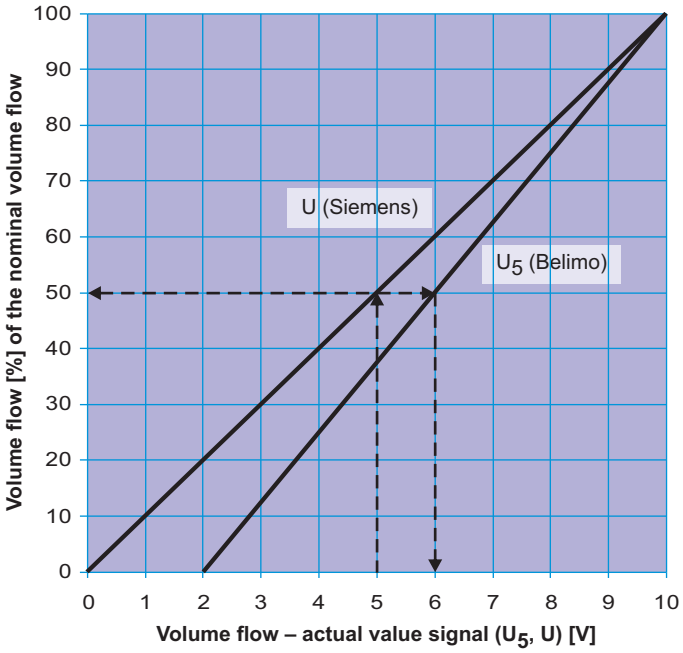
Electronically or pneumatically variable volume flow controller

Diagram 2: Actual value tension



Example: (2...10 V)

VRSE, no. 610 (Belimo LMV-D3-MP)
Nominal width NW 400
Nominal volume flow = 5400 m³/h
Actual volume flow = 2700 m³/h corresponding to 50%

Diagram 2 shows:
Actual value tension U_5 = 6 V

By calculation

$$U_5 = \frac{8V_{actual}}{V_{nom}} + 2 = \frac{8 * 2700}{5400} + 2 = 6\ V$$

Example: (0...10 V)

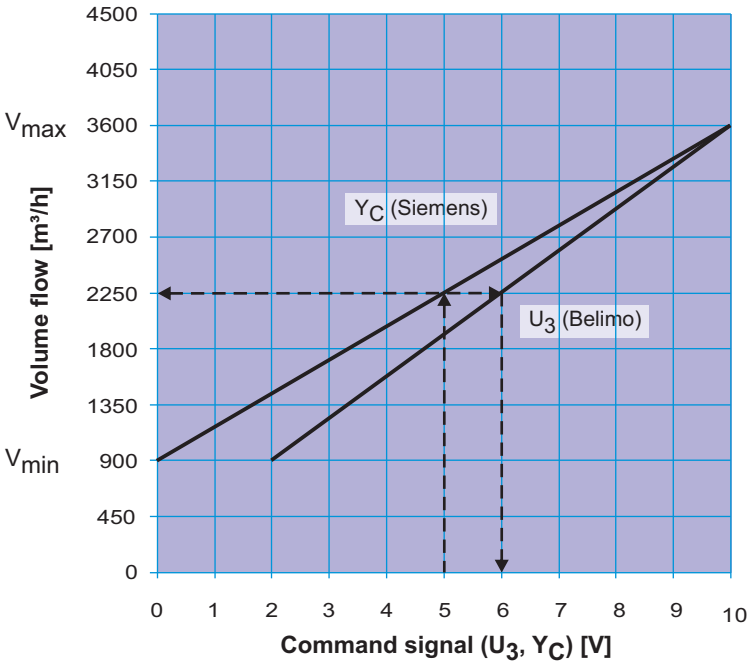
VRSE, no. 607 (Siemens GDB181.1E/3)
Nominal width NW 400
Nominal volume flow = 5400 m³/h
Actual value tension measured U = 5 V

Diagram 2 shows:
Actual volume flow = 50% of the nominal volume flow
= 2700 m³/h

By calculation

$$V = \frac{U}{10} * V_{nom} = \frac{5}{10} * 5400 = 2700\ m^3/h$$

Diagram 3: Set value tension



Example: (2...10 V)

VRSE, no. 610 (Belimo LMV-D3-MP)
Nominal width NW 400
Maximum volume flow = 3600 m³/h
Minimum volume flow = 900 m³/h
Required flow rate = 2250 m³/h

Diagram 3 shows:
Set value tension U_3 = 6 V

By calculation

$$U_3 = \frac{8}{V_{max}-V_{min}} * (V + \frac{1}{4} V_{max} - \frac{5}{4} V_{min})$$

$$= \frac{8}{3600 - 900} * (2250 + \frac{1}{4} * 3600 - \frac{5}{4} * 900) = 6\ V$$

Example: (0...10 V)

VRSE, no. 607 (Siemens GDB181.1E/3)
Nominal width NW 400
Maximum volume flow = 3600 m³/h
Minimum volume flow = 900 m³/h
Set value tension Y_c = 5 V

Diagram 3 shows:
Required flow rate = 2250 m³/h

By calculation

$$V = \frac{V_{max}-V_{min}}{10} * Y_c + V_{min}$$

$$= \frac{3600 - 900}{10} * 5 + 900 = 2250\ m^3/h$$

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Ref. no.: 600 - 613

Electronically or pneumatically variable volume flow controller

Table 1: Air flow noise

Size ø d_1 [mm]	Velocity [m/s]	Volume flow [m^3/h]	Static pressure difference at the controller [Pa]																											
			100 Pa									250 Pa									500 Pa									
			Octave power level* Lw dB/octave								Absorption area A [m²]	Octave power level* Lw dB/octave								Absorption area A [m²]	Octave power level* Lw dB/octave								Absorption area A [m²]
			63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
80	1,4	25	43	49	42	33	27	22	17	11	38	48	54	47	38	33	27	22	16	43	52	58	51	42	36	31	26	19	47
	5,5	100	56	62	55	46	40	35	30	23	51	61	67	60	51	45	40	35	28	56	65	70	64	55	49	44	39	32	60
	8,8	160	61	66	59	50	45	39	34	28	55	66	71	64	55	50	44	39	33	60	70	75	68	59	54	48	43	37	64
	12,2	220										69	74	67	58	53	47	42	36	63	72	78	71	62	57	51	46	40	67
100	1,4	40	45	50	43	34	29	24	18	12	39	50	55	49	39	34	29	23	17	44	54	59	52	43	38	33	27	21	48
	5,5	155	58	63	56	47	42	36	31	25	52	63	68	61	52	47	41	36	30	57	66	72	65	56	51	45	40	34	61
	8,8	250	62	67	61	51	46	41	35	29	56	67	72	66	57	51	46	41	34	61	71	76	69	60	55	50	44	38	65
	12	340										70	75	68	59	54	49	43	37	64	74	79	72	63	58	53	47	41	68
125	1,4	60	46	51	44	35	30	25	19	13	40	51	56	50	40	35	30	24	18	45	55	60	53	44	39	34	28	22	49
	5,7	250	59	64	58	49	43	38	33	26	54	64	70	63	54	48	43	38	31	59	68	73	67	58	52	47	42	35	63
	8,6	380	63	68	62	53	47	42	37	30	58	68	73	67	58	52	47	42	35	63	72	77	71	61	56	51	45	39	66
	12	530										71	77	70	61	55	50	45	38	66	75	80	74	65	59	54	49	42	70
140	1,4	80	47	52	46	37	31	26	21	14	42	52	57	51	42	36	31	26	19	47	56	61	55	46	40	35	30	23	50
	5,4	300	59	65	58	49	44	38	33	27	54	65	70	63	54	49	43	38	32	59	68	74	67	58	52	47	42	35	63
	8,3	460	63	69	62	53	48	42	37	31	58	68	74	67	58	53	47	42	36	63	72	78	71	62	56	51	46	39	67
	11,9	660										72	77	70	61	56	51	45	39	66	76	81	74	65	60	54	49	43	70
150	1,4	90	47	53	46	37	32	26	21	15	42	52	58	51	42	37	31	26	20	47	56	62	55	46	40	35	30	23	51
	5,5	350	60	65	59	50	44	39	33	27	54	65	70	64	55	49	44	39	32	60	69	74	68	58	53	48	42	36	63
	8,3	530	64	69	62	53	48	43	37	31	58	69	74	68	58	53	48	42	36	63	73	78	71	62	57	52	46	40	67
	11,9	760										72	78	71	62	56	51	46	39	67	76	81	75	66	60	55	50	43	71
160	1,4	100	48	53	46	37	32	26	21	15	42	53	58	51	42	37	31	26	20	47	56	62	55	46	41	35	30	24	51
	5,5	400	60	66	59	50	45	39	34	28	55	66	71	64	55	50	44	39	33	60	69	75	68	59	53	48	43	36	64
	8,3	600	64	70	63	54	48	43	38	31	59	69	75	68	59	53	48	43	36	64	73	78	72	63	57	52	47	40	68
	12	870										73	78	71	62	57	52	46	40	67	77	82	75	66	61	55	50	44	71
180	1,4	130	48	54	47	38	33	27	22	16	43	54	59	52	43	38	32	27	21	48	57	63	56	47	42	36	31	25	52
	5,5	500	61	66	60	51	45	40	35	28	56	66	71	65	56	50	45	40	33	61	70	75	69	59	54	49	43	37	64
	8,3	760	65	70	64	54	49	44	38	32	59	70	75	69	60	54	49	43	37	64	74	79	72	63	58	53	47	41	68
	12	1100										73	79	72	63	58	52	47	41	68	77	83	76	67	61	56	51	44	72
200	1,4	160	49	54	48	39	33	28	23	16	44	54	59	53	44	38	33	28	21	49	58	63	57	48	42	37	31	25	52
	5,3	600	61	67	60	51	46	40	35	29	56	66	72	65	56	51	45	40	34	61	70	76	69	60	54	49	44	37	65
	8,8	1000	66	71	65	56	50	45	40	33	61	71	77	70	61	55	50	45	38	66	75	80	74	65	59	54	49	42	70
	12	1360										74	79	73	64	58	53	48	41	69	78	83	77	67	62	57	51	45	72
224	1,4	200	50	55	48	39	34	29	23	17	44	55	60	53	44	39	34	28	22	49	59	64	57	48	43	37	32	26	53
	5,5	780	62	68	61	52	47	41	36	30	57	68	73	66	57	52	46	41	35	62	71	77	70	61	55	50	45	38	66
	8,3	1180	66	72	65	56	50	45	40	33	61	71	77	70	61	56	50	45	38	66	75	81	74	65	59	54	49	42	70
	12	1700										75	80	73	64	59	54	48	42	69	79	84	77	68	63	57	52	46	73
250	1,4	250	50	56	49	40	35	29	24	18	45	56	61	54	45	40	34	29	23	50	59	65	58	49	44	38	33	26	54
	5,4	950	63	68	61	52	47	42	36	30	57	68	73	67	57	52	47	41	35	62	72	77	70	61	56	51	45	39	66
	8,5	1500	67	72	66	57	51	46	41	34	62	72	78	71	62	56	51	46	39	67	76	81	75	66	60	55	50	43	71
	12	2120										75	81	74	65	60	54	49	43	70	79	85	78	69	63	58	53	46	74
280	1,4	310	51	56	50	41	35	30	25	18	46	56	61	55	46	40	35	30	23	51	60	65	59	49	44	39	33	27	54
	5,5	1220	64	69	62	53	48	43	37	31	58	69	74	67	58	53	48	42	36	63	73	78	71	62	57	52	46	40	67
	8,3	1840	68	73	66	57	52	46	41	35	62	73	78	71	62	57	51	46	40	67	77	82	75	66	61	55	50	44	71
	12	2660										76	81	75	66	60	55	50	43	71	80	85	79	69	64	59	53	47	74
300	1,4	360	52	57	50	41	36	30	25	19	46	57	62	55	46	41	35	30	24	51	60	66	59	50	45	39	34	28	55
	5,5	1400	64	70	63	54	48	43	38	31	59	69	75	68	59	53	48	43	36	64	73	78	72	63	57	52	47	40	68
	8,3	2100	68	73	67	58	52	47	41	35	62	73	78	72	63	57	52	47	40	68	77	82	76	66	61	56	50	44	71
	12	3050										77	82	75	66	61	55	50	44	71	80	86	79	70	65	59	54	47	75
315	1,4	400	52	57	51	41	36	31	25	19	46	57	62	56	47	41	36	31	24	51	61	66	59	50	45	40	34	28	55
	5,3	1500	64	70	63	54	48	43	38	31	59	69	75	68	59	53	48	43	36	64	73	78	72	63	57	52	47	40	68
	8,6	2400	69	74	67	58	53	47	42	36	63	74	79	72	63	58	52	47	41	68	78	83	76	67	62	56	51	45	72
	12	3360										77	82	75	66	61	56	50	44	71	81	86	79	70	65	59	54	48	75
355	1,4	500	53	58	51	42	37	31	26	20	47	58	63	56	47	42	36	31	25	52	61	67	60	51	46	40	35	29	56
	5,5	1960	65	71	64	55	49	44	39	32	60	70	76	69	60	54	49	44	37	65	74	79	73	64	58	53	48	41	69
	8,3	2960	69	74	68	59	53	48	43	36	64	74	79	73	64	58	53	48	41	69	78	83	77	67	62	57	51	45	72
	12	4280										78	83	76	67	62	56	51	45	72	81	87	80	71	66	60	55	49	76
400	1,4	650	53	59	52	43	38	32	27	21	48	59	64	57	48	43	37	32	26	53	62	68	61	52	47	41	36	29	57
	5,5	2500	66	71	65	56	50	45	40	33	60	71	76	70	61	55	50	45	38	66	75	80	74	64	59	54	48	42	69
	8,8	4000	70	76	69	60	55	49	44	38	65	75	81	74	65	60	54	49	43	70	79	85	78	69	63	58	53	46	74
	11,9	5400										78	84	77	68	62	57	52	45	73	82	87	81	72	66	61	56	49	77

*Sound level [dB/octave] in relation to 10^{-12}W

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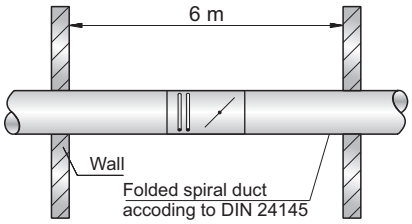
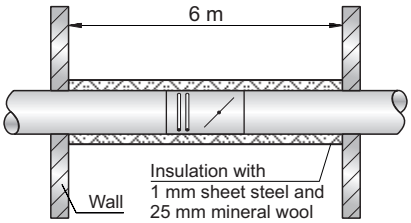
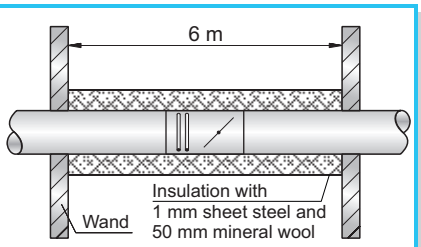
Electronically or pneumatically variable volume flow controller

Tabelle 2: Level correction values to calculate the radiated noise of a 6 m long pipe







Size ø d_1 [mm]	Correction value [db/octave] 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Additional dB(A)	Correction value [db/octave] 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Additional dB(A)	Correction value [db/octave] 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Additional dB(A)
80	16	17	18	17	16	17	16	13		17	18	21	23	25	26	26	22		18	20	30	39	28	40	35	34	
100	15	17	17	17	16	15	14	11		15	18	21	25	24	26	24	20		15	20	23	30	39	38	41	36	
125	16	17	18	18	17	16	15	11		16	18	19	18	24	24	25	22		17	20	24	30	37	36	37	34	
140	16	17	19	19	18	17	16	16		17	18	21	21	27	25	26	24		17	20	25	32	38	40	38	31	
150	16	17	18	18	18	17	16	13		17	18	20	23	26	26	27	21		19	20	24	35	38	37	36	33	
160	15	16	18	18	18	16	15	13		16	17	20	23	26	28	23	20		17	19	24	35	38	41	35	33	
180	14	15	17	17	18	16	15	12		14	15	20	19	26	25	25	21		14	18	24	29	38	36	35	32	
200	12	13	14	14	16	14	13	12		13	15	15	16	24	22	21	20		13	16	20	26	36	35	33	32	
224	16	17	18	17	16	17	16	13		17	18	21	23	25	26	26	22		18	20	30	39	28	40	35	34	
250	15	17	17	17	16	15	14	11		15	18	21	25	24	26	24	20		15	20	23	30	39	38	41	36	
280	16	17	18	18	17	16	15	11		16	18	19	18	24	24	25	22		17	20	24	30	37	36	37	34	
300	16	17	19	19	18	17	16	16		17	18	21	21	27	25	26	24		17	20	25	32	38	40	38	31	
250	16	17	18	18	18	17	16	13		17	18	20	23	26	26	27	21		19	20	24	35	38	37	36	33	
315	15	16	18	18	18	16	15	13		16	17	20	23	26	28	23	20		17	19	24	35	38	41	35	33	
355	14	15	17	17	18	16	15	12		14	15	20	19	26	25	25	21		14	18	24	29	38	36	35	32	
400	12	13	14	14	16	14	13	12		13	15	15	16	24	22	21	20		13	16	20	26	36	35	33	32	

Frequency →	Sound level [db/octave] 63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Summation A-evaluated dB(A)
Air flow noise according to table 1	60	66	59	50	45	39	34	28	55
Correction value to be deducted according to table 2	-17	-18	-21	-21	-27	-25	-26	-24	
Attenuation to be deducted according to VDI 2081	-4	-4	-4	-4	-4	-4	-4	-4	
Required radiating noise	39	44	34	25	14	10	4	0	30

Example:

Volume flow controller type VRSE 600
Nominal width 160 mm
Volume flow 400 m³/h
(= velocity 5,5 m/s)
pressure difference Δp 100 Pa

The radiated noise of a 6m long pipe section with mounted volume flow controller and insulation (25 mm) can be calculated according to the adjacent table.

If air is blown into a room, additional attenuation occurs as a result of the pipe outlet attenuation and room attenuation and thus a reduction of the sound level. The room and outlet attenuation can be calculated according to VDI 2081. As a rough estimate, approximately 8 dB can be deducted. The flow noise is heavily dependent on the local conditions, the radiating pipe length behind the sound absorber and the acoustic insulation and therefore the given data, calculated in the laboratory, can provide only a reference value.

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