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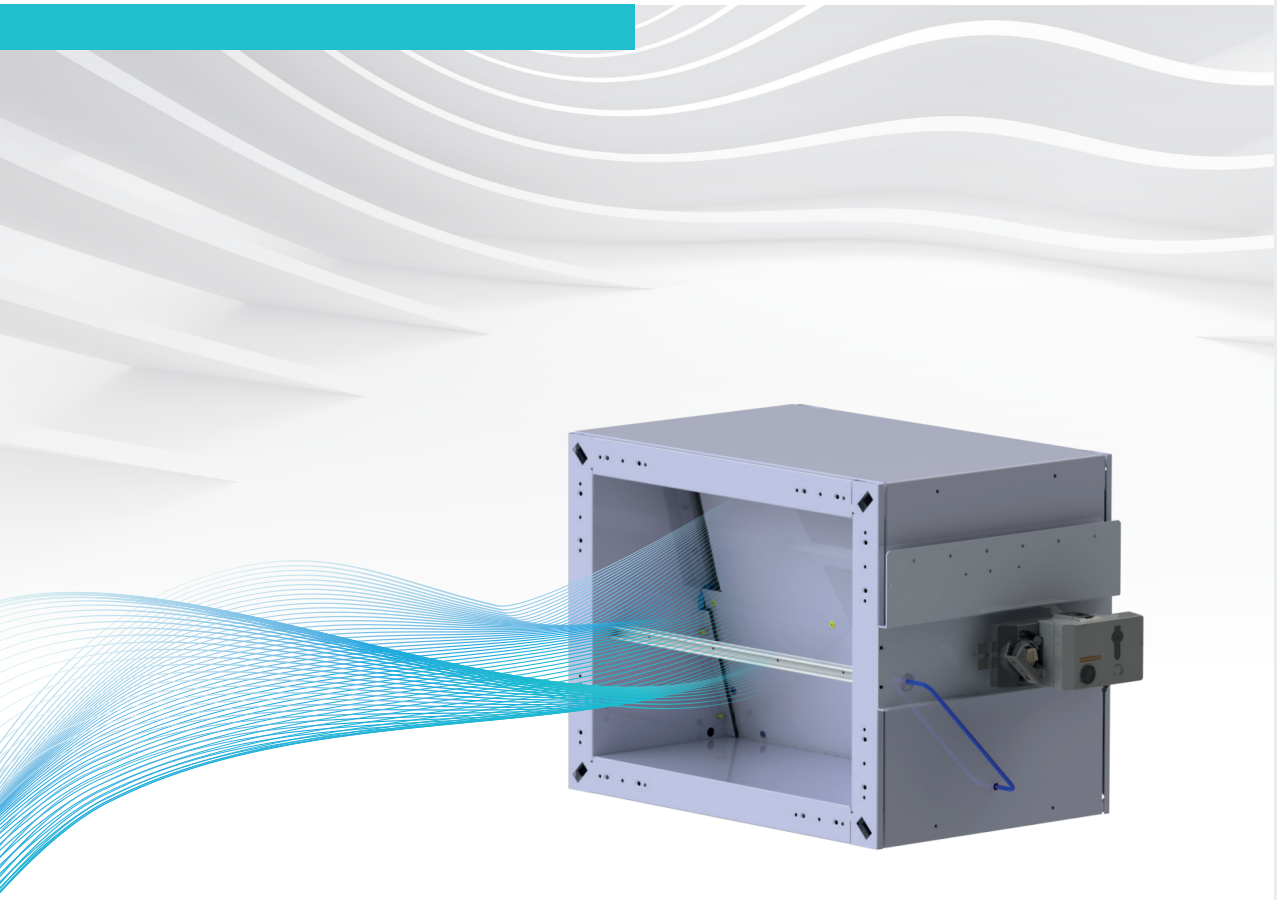
the potential of air
for a sustainable world

active control

AIR TECH SYSTEMS



Technical brochure

Pressure controller

DRF

The DRF pressure controller offers an efficient, precise and cost-effective solution for line pressure control in ventilation and air-conditioning systems.

It is ideal wherever a constant pressure is required in air pipes without the need for measurement of the air flow rate.

Differential pressure control up to 1000 Pa

Leakage air rate according to DIN EN 1751, Class 4 (DN 100/125: Class 3)

Housing tightness Class C according to DIN EN 1751

No flow path required

Low pressure losses: energy savings, quiet operation

Precise line pressure control for stable operating conditions

Measuring range: 0...500 Pa depending on version

Conversion or programming to DRFactive or VRFactive is possible

Compact design, retrofittable insulation shell

Content

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Application

The DRF pressure controller is used for line pressure control in air ducts within ventilation and air-conditioning systems.
It ensures that a constant and comparable inlet pressure is maintained at downstream components such as flow rate controllers, induction units or air diffusers.
This automatically balances the air circuits and achieves optimised pressure distribution throughout the entire system.

The measured pressure value can be used, taking the damper position into account, to control the fan speed (dead-point control), which leads to significant energy savings.
If required, the air circuit can be completely shut off.

Design

The DRF pressure controller consists of:

- A housing with a damper blade
- A control unit with a differential pressure sensor and actuator
- Optionally, an insulation shell for acoustic and thermal insulation

All components are pre-assembled and wired at the factory, enabling quick and easy installation.

The housing is fitted with flanges and slotted holes, suitable for:

- Air ducts with flat flanges according to DIN 24192
- Meinig and MEZ/SBM duct connections with a profile height of 30/40 mm

Features

- Wide control range for differential pressures up to 1000 Pa
- Very low air leakage rate with the damper blade closed in accordance with DIN EN 1751 Class 4 (size 200×100: Class 3 – meets the requirements of DIN 1946-4)
- Very low housing leakage in accordance with DIN EN 1751 Class C
- Low pressure loss, resulting in: energy savings and quiet operation
- Short installation length – suitable for confined installation spaces
- High control accuracy and low sensitivity to flow conditions
- Pre-assembled and tested at the factory
- Optionally available with an insulation shell for sound and thermal insulation

Materials and finishes

- Housing, damper blade, shaft: galvanised steel
- Damper bearings: POM plastic
- Seals: EPDM

Optional versions

- Powder-coated finish
- Damper blade and shaft made of stainless steel (V4A)
- All metal parts in the air stream made of stainless steel
- Aluminium gauge pressure transducer (for special versions)

Accessories and special versions

- Pressure tapping kit (item no. 673154) comprising:
  2 spigots with mounting accessories
  1 hose Ø 5 mm x 7 mm (2 m long)
- Insulation shell for sound and thermal insulation
- Feedback potentiometer for detecting the damper position
- SDF-SM splitter silencer made from galvanised sheet steel
- Further special versions available on request

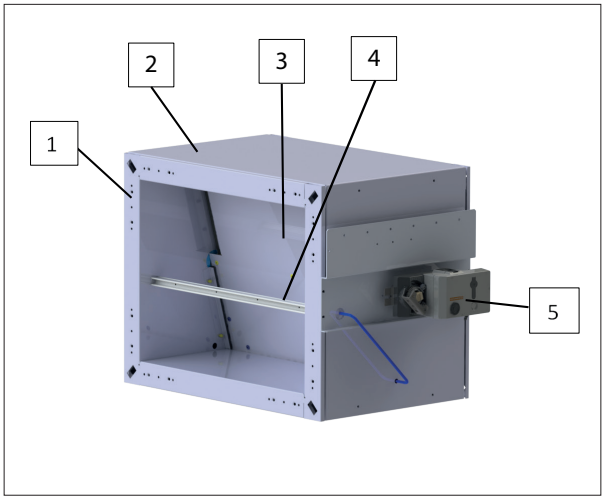
Function

How does the DRF work?

The static pressure in the air duct is detected via a pressure tap at the desired measuring point and measured by the differential pressure sensor.

The controller compares the actual pressure with the setpoint and controls the damper blade so that the setpoint is maintained as accurately as possible.

This control principle ensures stable pressure distribution throughout the duct network and contributes to efficient fan control.



1. Flat flange
2. Housing / Insulation shell
3. Control damper
4. Measuring strip
5. Compact pressure controller

Installation and positioning

Required straight flow path

The DRF pressure controller itself does not impose any special requirements on the flow path. However, when taking a pressure reading in the air duct, care must be taken to avoid flow separation or disturbances caused by obstacles; therefore, the pressure tap must therefore be fitted on site to a straight section of air duct at a sufficient distance from the nearest point of disturbance.

In duct or line pressure control, the pressure is measured relative to the ambient pressure, with one connection on the sensor left open ('+' for extract air, '-' for supply air) and the other connection linked to the measuring point. The pressure is controlled at the measuring point in the direction of air flow, downstream of the pressure controller in the supply air or upstream of the pressure controller in the extract air.

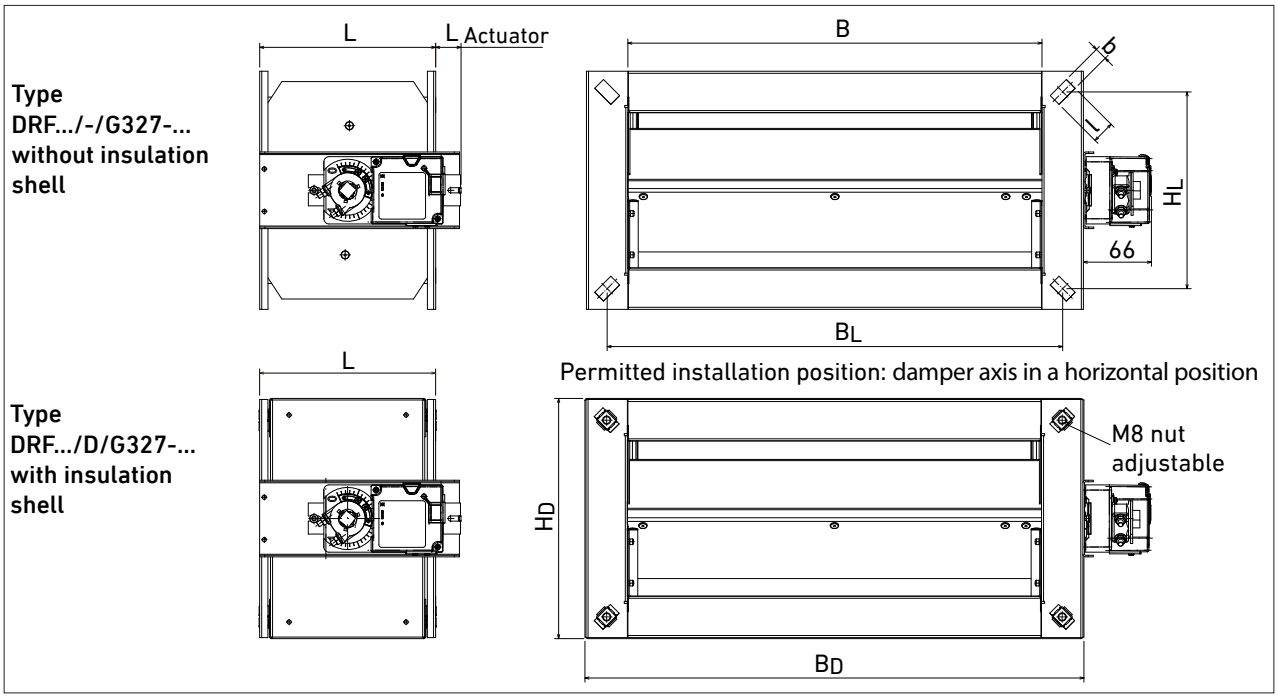
The pressure tapping point must be connected on site to the differential pressure sensor of the pressure controller using a pressure measurement hose.

For the differential pressure sensor, appropriate corrections for height and hose length must be made.

If the differential pressure sensor uses a static measuring principle, its permissible installation position must be observed. If necessary, a zero-point calibration must be carried out.

The DRF may only be installed with the damper axis in a horizontal position.

Dimensions and weights



Dimensions and weights

Nominal width B [mm]	Nominal height H [mm]	Width B_F [mm]	Height H_F [mm]	Length L [mm]	Hole spacing B_L [mm]	Hole spacing H_L [mm]	Width B_D [mm]	Height H_D [mm]	Max. torque [Nm]	Weight [kg] Type DRF/.../G327 without insulation shell	Weight [kg] Type DRF/.../G327 with insulation shell
200	100	280	180	135	240	140	282	182	5	3.3	4.6
300		380			340		382			4	5.8
400		480			440		482			4.7	6.8
500		580			540		582			5.4	7.8
600		680			640		682			6.1	8.6
300	150	380	230	170	340	190	382	232	5	4.7	6.8
400		480			440		482			5.5	7.9
500		580			540		582			6.3	9.1
600		680			640		682			7.1	10.5
200	200	280	280	220	240	240	282	282	5	4.6	7
300		380			340		382			5.6	8.6
400		480			440		482			6.6	9.8
500		580			540		582			7.6	11.5
600		680			640		682			8.6	12.7
800		880			840		882			10.5	15.5
300	250	380	330	270	340	290	382	332	5	6.6	11.6
400		480			440		482			7.7	12.6
500		580			540		582			8.8	15.7
600		680			640		682			9.9	17.8
800		880			840		882			11.9	22.1
300	300	380	380	325	340	340	382	382	10	8.1	13.3
400		480			440		482			9.5	15.8
500		580			540		582			10.5	17.8
600		680			640		682			13.1	20.3
800		880			840		882			16	23.8
1000		1080			1040		1082			19	27.8
400	400	480	480	430	440	440	482	482	10	13	20.3
500		580			540		582			14.8	22.8
600		680			640		682			16.6	26.3
800		880			840		882			20.2	30.8
1000		1080			1040		1082			23.8	35.3
1200		1280			1240		1282			27.4	40.3

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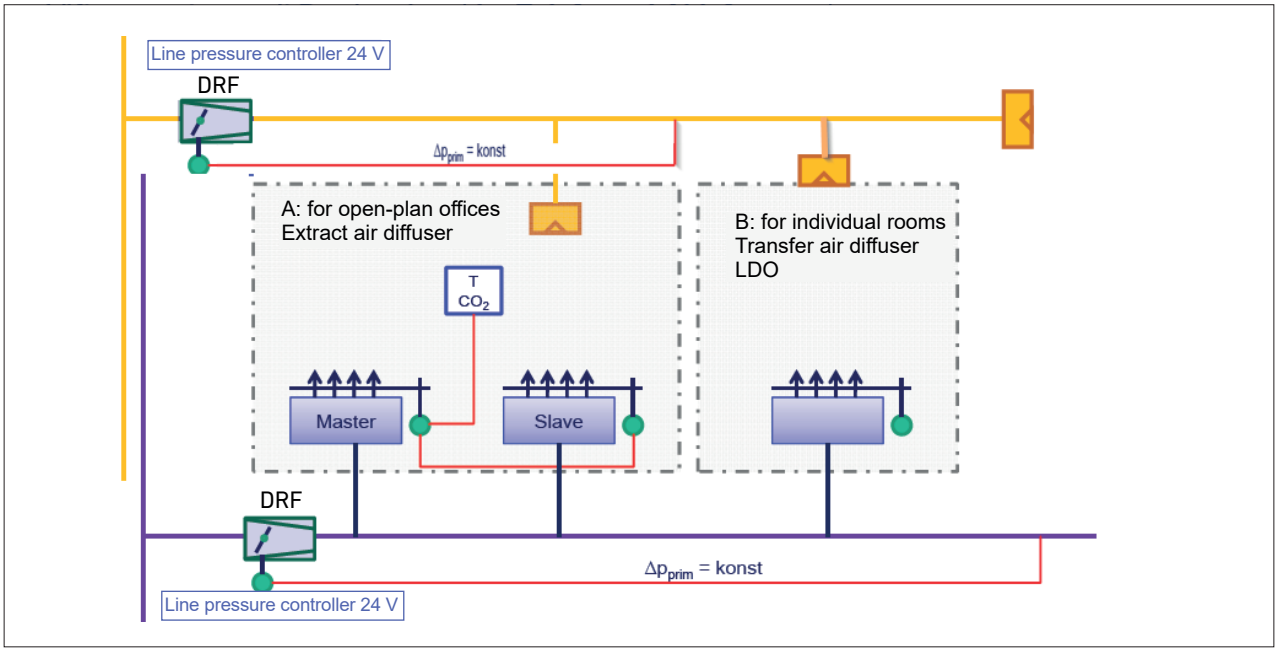
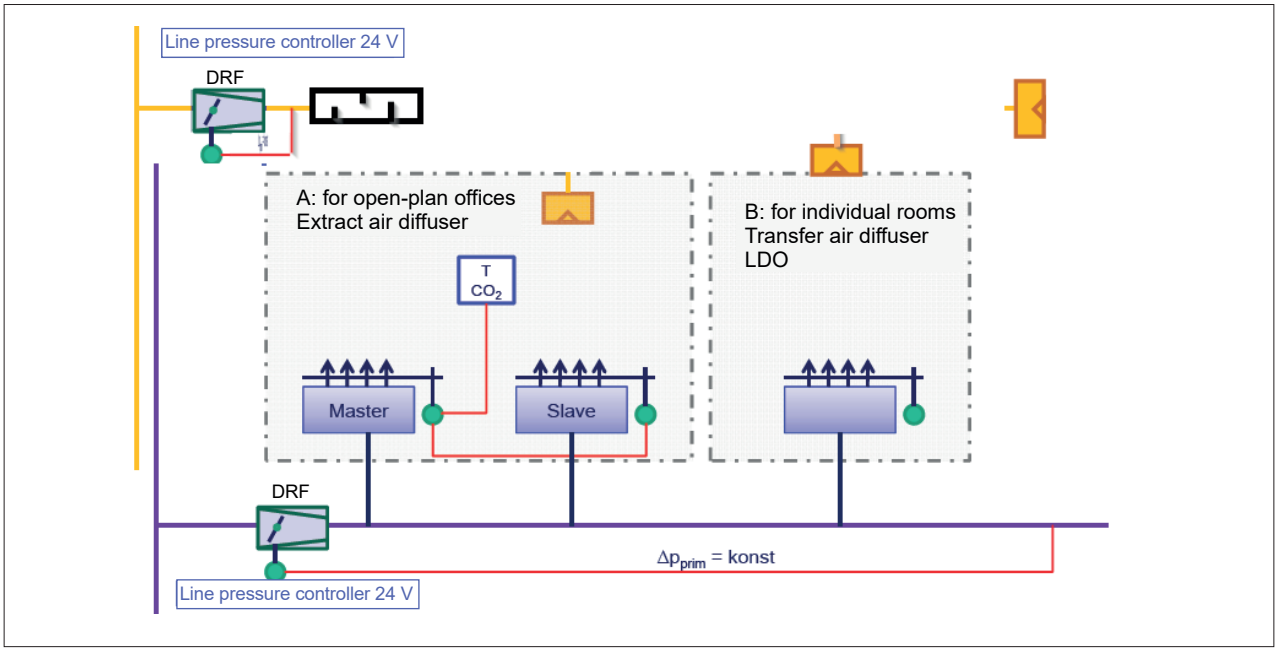
Ventilation systems with pressure controllers (examples)

The pressure setpoint must be designed in accordance with the downstream loads. A calculation of the ductwork network is essential.

Ventilation systems with pressure controllers in the supply air and extract air circuits



Variant 1



Variant 2

Nomenclature, order code

DRF /...x.../ S / D / G7XX

(1) (2) (3) (4) (5) (6)

(1) **Series**	DRF	=	Rectangular pressure controller
(2) **Measuring principle**		=	dynamic (standard version)
	S	=	static
(3) **Dimensions**	...x...	=	Nominal width B x nominal height H [mm] (see page 6)
(4) **Design**	S	=	Galvanised steel
	K	=	coated
		=	V4A stainless steel
(5) **Insulation shell**	D	=	with insulation shell
	–	=	without insulation shell
(6) **Make/type of control component**	G710	=	327VMZ-024-05-MB (up to nominal height 250 mm), Modbus-compatible
	G711	=	327VMZ-024-10-MB (from nominal height 300 mm), Modbus-compatible
	G720	=	327VMZ-024-05-MB (up to nominal height 250 mm), BACnet-compatible
		=	327VMZ-024-10-MB (from nominal height 300 mm), BACnet-compatible

Additional ordering information

	Please specify when ordering:	**If this information is not provided, the unit will be supplied with the following factory setting:**
DRF	- P_{min} [Pa] - P_{max} [Pa] - Control: analogue or Modbus - Mode; 0-10 V or 2-10 V	- P_{min} = 0 Pa - P_{max} = 500 Pa - Mode 0...10 V - Analogue control

Order example

DRF 600x200/S/D/G710, P_{min} = 150 Pa, P_{max} = 300 Pa, 2...10 V mode, analogue control

Technical data

	Pressure controller series			DRF
	Controller component type			Gruner 327-VMZ
Electrical Specifications	Power supply/rated voltage		24 V AC	X
			24 V DC	X
	Power consumption		[W]	3
	Connection	Type		Cable
		Cores	Number	6
			Cross-section [mm^2]	0.75
	Analogue	Inputs	Pressure setpoint	(0) 2...10 V DC / Ri > (100 kΩ) 50 kΩ (0) 4...20 mA / $R_{ext.}$ = 500 Ω
		Outputs	Actual pressure value	(0) 2...10 V DC, max. 0.5 mA
	Digital	Inputs	Pressure setpoint	X
		Outputs	Actual pressure value	X (Modbus RTU) + BACnet
			Damper position	X (Modbus RTU) + BACnet
Parameterisation	Pressure controller	on the unit	Function rotary switch	X
		via tool	Software	X
			Adjustment unit	X
		Parameter	Setpoints	X
			Control loop (P/I component)	X

Controller components

	Pressure controller series			DRF
	Controller component type			Gruner 327-VMZ
Function/Operation	Pressure control	Setpoints	Stages	2
			variable	-
	Shut off the damper		Contact input	X
			Setpoint 0 Pa	X
	Actual value	display	Pressure	X
		report	Pressure	Analogue & Modbus RTU + BACnet
			Damper position	Modbus RTU + BACnet
Pressure sensor/ controller	Measuring range		[Pa]	0...500
	Measuring principle			dynamic
	Altitude and hose length correction required			yes
	Internal hose diameter		[mm]	4...5
Actuator	Torque		up to H = 250 mm [Nm]	5
			from H = 300 mm [Nm]	10
	Running time		up to H = 250 mm [s/90°]	100
			from H = 300 mm [s/90°]	150
	Manual adjustment: Gear disengagement via push-button			X
Safety	Protection class		IP	54
	Ambient temperature			0...+50 °C
	Storage temperature			-20...+80 °C
	Ambient humidity			5...95 % r. F. non-condensing
	Environmental pollution degree		(EN 60730-1)	3

Airborne sound transmission without silencer

Nominal width B [mm]	Nominal height H [mm]	Air velocity [m/s]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa										Δp_{tot} = 500 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total		f_m [Hz]								Total	
			63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]
			L_W [dB/Okt]										L_W [dB/Okt]										L_W [dB/Okt]									
300	100	1	31	31	40	43	40	33	31	29	**44**	**37**	36	34	42	47	46	42	38	37	**50**	**42**	39	46	45	49	51	50	48	47	**56**	**48**
		2	37	38	45	41	42	39	34	31	**46**	**38**	39	39	49	50	48	46	43	40	**53**	**45**	43	43	49	55	55	54	52	52	**61**	**53**
		4	41	45	46	42	43	40	38	33	**47**	**40**	42	45	51	49	49	49	46	42	**55**	**47**	44	45	53	57	60	56	56	54	**64**	**56**
		7	56	58	55	50	48	45	43	38	**54**	**45**	52	55	59	54	53	51	52	52	**59**	**51**	51	53	60	60	61	59	60	59	**67**	**58**
		10	59	60	59	55	55	53	47	41	**60**	**49**	61	63	62	61	60	57	53	51	**65**	**54**	56	59	66	62	63	60	61	60	**68**	**58**
400	150	1	42	43	46	48	45	43	36	38	**50**	**42**	47	46	50	52	51	50	44	42	**56**	**48**	48	49	55	59	58	58	60	56	**65**	**58**
		2	46	50	50	47	45	47	39	39	**52**	**44**	49	51	57	56	52	53	58	49	**62**	**54**	54	55	59	62	61	61	67	60	**70**	**62**
		4	54	56	54	51	49	48	43	40	**55**	**45**	57	61	63	58	54	54	59	52	**63**	**54**	62	63	67	70	63	61	63	68	**72**	**63**
		7	60	60	58	54	52	49	45	42	**57**	**46**	64	66	66	61	58	56	58	53	**65**	**53**	69	70	74	72	66	64	64	70	**75**	**63**
		10	65	64	62	58	57	52	48	45	**61**	**48**	72	70	69	64	61	58	56	54	**67**	**53**	74	76	78	75	68	66	66	72	**77**	**64**
600	200	1	48	47	47	49	53	53	40	39	**57**	**49**	51	48	57	55	54	65	49	62	**67**	**59**	56	52	61	63	61	69	55	55	**71**	**63**
		2	55	47	51	54	53	57	46	41	**60**	**50**	61	50	57	56	56	60	52	63	**64**	**54**	60	51	59	65	63	67	68	59	**72**	**63**
		4	60	51	54	53	54	55	47	40	**59**	**46**	66	58	59	61	59	60	53	65	**65**	**53**	70	61	64	66	66	67	68	63	**73**	**61**
		7	61	60	58	56	54	55	48	44	**60**	**45**	70	62	61	63	60	61	54	67	**67**	**53**	78	71	71	71	71	69	69	66	**76**	**62**
		10	63	59	57	58	54	51	48	45	**60**	**43**	77	66	64	64	61	62	58	55	**68**	**51**	80	75	74	73	71	69	68	69	**77**	**60**
600	250	1	49	48	51	50	55	53	40	39	**58**	**50**	52	50	57	56	56	65	49	45	**67**	**59**	57	53	62	64	62	69	58	56	**72**	**64**
		2	55	49	52	55	55	56	45	41	**60**	**49**	56	52	57	58	58	61	55	47	**65**	**54**	61	54	62	67	65	69	67	59	**74**	**63**
		4	59	52	54	55	55	55	47	44	**60**	**46**	64	59	61	63	61	60	57	52	**66**	**53**	70	63	65	67	68	69	68	62	**75**	**61**
		7	63	61	58	57	55	55	49	45	**61**	**45**	71	64	63	64	62	62	60	59	**68**	**53**	79	72	72	72	72	70	69	67	**77**	**61**
		10	65	62	59	59	56	53	51	49	**61**	**44**	77	68	66	65	63	62	58	57	**69**	**51**	82	77	75	73	73	70	69	69	**78**	**60**
600	300	1	51	48	52	52	57	53	40	39	**49**	**51**	53	51	58	57	59	65	50	45	**67**	**58**	58	55	63	66	64	70	60	57	**73**	**64**
		2	55	50	54	57	56	55	44	41	**46**	**49**	57	53	57	60	61	61	54	48	**66**	**54**	62	57	64	68	67	71	66	59	**75**	**63**
		4	58	53	57	57	56	55	47	47	**45**	**46**	65	60	62	64	62	61	56	51	**67**	**52**	70	64	65	68	71	71	68	62	**76**	**61**
		7	64	62	60	59	57	56	50	46	**44**	**46**	71	65	64	65	63	62	60	59	**69**	**52**	79	73	72	73	74	71	69	67	**78**	**61**
		10	68	65	61	60	57	54	53	52	**63**	**44**	77	70	67	67	64	63	59	58	**70**	**51**	83	78	75	74	74	71	70	69	**79**	**60**
800	400	1	55	50	53	56	61	53	42	40	**62**	**52**	54	55	60	59	65	65	52	47	**69**	**58**	60	59	66	70	68	72	66	61	**76**	**67**
		2	57	53	59	60	59	55	43	42	**63**	**49**	60	57	59	65	67	64	53	49	**70**	**56**	65	63	69	72	72	77	64	60	**80**	**68**
		4	57	57	62	61	58	56	48	55	**64**	**47**	67	63	65	69	67	62	55	52	**71**	**54**	72	68	67	71	76	76	69	62	**81**	**65**
		7	67	65	64	63	61	59	54	49	**66**	**46**	73	69	67	68	67	65	61	60	**72**	**52**	82	76	74	76	78	74	70	69	**81**	**65**
		10	73	72	66	63	61	58	58	60	**67**	**47**	78	74	70	70	69	65	61	61	**73**	**53**	86	81	77	75	77	74	72	70	**81**	**62**

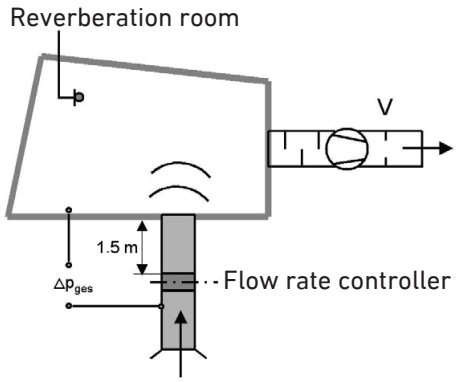
Δp_{tot} - Total pressure difference
f_m - Octave midband frequency
L_W - Sound power level
L_{WA} - Sound power level, A-weighted
L_{pA} - Sound pressure level, A-weighted

Conversion to other sizes is carried out at the same throttling point using flow velocity and pressure loss, with the ΔL values from the following table. The values refer to the respective nominal height H.

$L_{W\,Okt} = L_{W\,table} + \Delta L$ $L_{WA} = L_{WA\,table} + \Delta L$

Airborne sound transmission without silencer

Nominal width B [mm]	Nominal height H [mm]					
	100	150	200	250	300	400
200	-2		-5			
300	0	-1	-3	-3	-3	
400	1	0	-2	-2	-2	-3
500	2	1	-1	-1	-1	-2
600	3	2	0	0	0	-1
800			1	1	1	0
1000				2	2	1
1200					3	2



Airborne sound transmission with silencer

Nominal width B [mm]	Nominal height H [mm]	Air velocity [m/s]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa										Δp_{tot} = 500 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total		f_m [Hz]								Total	
			63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]
			L_W [dB/Okt]										L_W [dB/Okt]										L_W [dB/Okt]									
300	100	1	29	27	32	26	7	1	13	15	**27**	**19**	34	30	34	30	13	10	20	23	**31**	**23**	37	42	37	32	18	18	30	33	**37**	**29**
		2	35	34	37	24	9	7	16	17	**30**	**22**	37	35	41	33	15	14	25	26	**36**	**28**	41	39	41	38	22	22	34	38	**41**	**33**
		4	39	41	38	25	10	8	20	19	**32**	**24**	40	41	43	32	16	17	28	28	**37**	**29**	42	41	45	40	27	24	38	40	**44**	**36**
		7	54	54	47	33	15	13	25	24	**42**	**32**	50	51	51	37	20	19	34	38	**45**	**36**	49	49	52	43	28	27	42	45	**49**	**40**
		10	57	56	51	38	22	21	29	27	**45**	**34**	59	59	54	44	27	25	35	37	**49**	**38**	54	55	58	45	30	28	43	46	**52**	**41**
400	150	1	40	39	38	31	12	11	18	24	**33**	**25**	45	42	42	35	18	18	26	28	**37**	**29**	46	45	47	42	25	26	42	42	**47**	**39**
		2	44	46	42	30	12	15	21	25	**36**	**28**	47	47	49	39	19	21	40	35	**45**	**37**	52	51	51	45	28	29	49	46	**52**	**44**
		4	52	52	46	34	16	16	25	26	**41**	**30**	55	57	55	41	21	22	41	38	**49**	**39**	60	59	59	53	30	29	45	54	**57**	**47**
		7	58	56	50	37	19	17	27	28	**45**	**32**	62	62	58	44	25	24	40	39	**52**	**40**	67	66	66	55	33	32	46	56	**61**	**49**
		10	63	60	54	41	24	20	30	31	**49**	**34**	70	66	61	47	28	26	38	40	**55**	**41**	72	72	70	58	35	34	48	58	**64**	**50**
600	200	1	46	43	43	32	20	21	22	25	**37**	**29**	50	44	49	38	21	33	30	30	**43**	**35**	54	48	53	46	28	37	37	41	**49**	**41**
		2	53	43	42	37	20	25	28	27	**39**	**29**	53	46	49	39	23	28	38	33	**44**	**34**	58	47	51	48	30	35	50	45	**53**	**43**
		4	58	47	44	36	21	23	29	26	**40**	**26**	62	54	51	44	26	28	39	38	**47**	**34**	68	57	56	49	33	35	50	49	**55**	**42**
		7	59	56	49	39	21	23	30	30	**45**	**29**	68	58	53	46	27	29	42	44	**51**	**35**	76	67	63	54	38	37	51	52	**60**	**44**
		10	61	55	49	41	21	19	30	31	**45**	**27**	75	62	56	47	28	30	40	41	**53**	**35**	78	71	66	56	38	37	50	55	**62**	**44**
600	250	1	47	44	43	33	22	21	22	25	**37**	**29**	50	46	49	39	23	33	31	31	**43**	**35**	55	49	54	47	29	37	40	42	**50**	**42**
		2	53	45	44	38	22	24	27	27	**40**	**29**	54	48	49	41	25	29	37	33	**45**	**34**	59	50	54	50	32	37	49	45	**53**	**43**
		4	57	48	46	38	22	23	29	30	**41**	**27**	62	55	53	46	28	28	39	38	**49**	**35**	68	59	57	50	35	37	50	48	**55**	**41**
		7	61	57	50	40	22	23	31	31	**46**	**29**	69	60	55	47	29	30	42	45	**52**	**35**	77	68	64	55	39	38	51	53	**60**	**44**
		10	63	58	51	42	23	21	33	35	**47**	**28**	75	64	58	48	30	30	40	43	**55**	**35**	80	73	67	56	40	38	51	55	**63**	**44**
600	300	1	49	44	44	35	24	21	22	25	**38**	**29**	51	47	50	40	26	33	32	31	**44**	**35**	56	51	55	49	31	38	42	43	**51**	**42**
		2	53	46	46	40	23	23	26	27	**41**	**29**	55	49	49	43	28	29	36	34	**45**	**33**	60	53	56	51	34	39	48	45	**54**	**42**
		4	56	49	49	40	23	23	29	33	**43**	**28**	63	56	54	47	29	29	38	37	**49**	**34**	68	60	57	51	38	39	50	48	**56**	**41**
		7	62	58	52	42	24	24	32	32	**47**	**30**	69	61	56	48	30	30	42	45	**53**	**35**	77	69	64	56	41	39	51	53	**61**	**43**
		10	66	61	53	43	24	22	35	38	**49**	**29**	75	66	59	50	31	31	41	44	**56**	**36**	81	74	67	57	41	39	52	55	**64**	**44**
800	400	1	53	46	45	39	28	21	24	26	**40**	**30**	52	51	52	42	32	33	34	33	**46**	**35**	58	55	58	53	35	40	48	47	**55**	**44**
		2	55	49	51	43	26	23	25	28	**45**	**31**	58	53	51	48	34	32	35	35	**48**	**34**	63	59	61	55	39	45	46	46	**57**	**43**
		4	55	53	54	44	25	24	30	41	**48**	**31**	65	59	57	52	34	30	37	38	**53**	**36**	70	64	59	54	43	44	51	48	**58**	**41**
		7	65	61	56	46	28	27	36	35	**51**	**30**	71	65	59	51	34	33	43	46	**55**	**35**	80	72	66	59	45	42	52	55	**63**	**43**
		10	71	68	58	46	28	26	40	46	**55**	**33**	76	70	62	53	36	33	43	47	**59**	**37**	84	77	69	58	44	42	54	56	**66**	**44**

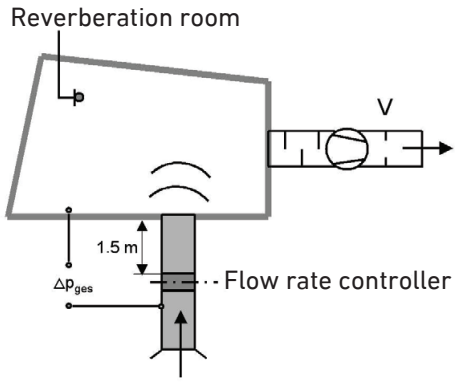
Δp_{tot} - Total pressure difference
f_m - Octave midband frequency
L_W - Sound power level
L_{WA} - Sound power level, A-weighted
L_{pA} - Sound pressure level, A-weighted

The values used to calculate attenuation apply to an active silencer length of 1000 mm. Conversion to other sizes is carried out at the same throttling point, based on flow velocity and pressure loss, using the ΔL values from the following table. The values refer to the respective nominal height H.

$L_{W\,Okt} = L_{W\,table} + \Delta L$ $L_{WA} = L_{WA\,table} + \Delta L$

Airborne sound transmission without silencer

Nominal width B [mm]	Nominal height H [mm]					
	100	150	200	250	300	400
200	-2		-5			
300	0	-1	-3	-3	-3	
400	1	0	-2	-2	-2	-3
500	2	1	-1	-1	-1	-2
600	3	2	0	0	0	-1
800			1	1	1	0
1000				2	2	1
1200					3	2



Structure-borne noise emission without insulation shell

Nomnal width B [mm]	Nominal height H [mm]	Air velocity [m/s]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa										Δp_{tot} = 500 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total		f_m [Hz]								Total	
			63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]
			L_W [dB/Okt]										L_W [dB/Okt]										L_W [dB/Okt]									
300	100	2	46	45	44	32	33	28	24	24	**39**	**30**	48	46	48	41	39	36	33	33	**45**	**36**	52	51	48	46	46	44	42	45	**52**	**43**
		4	51	52	45	33	33	30	28	26	**42**	**32**	52	52	50	40	40	38	36	36	**47**	**38**	53	52	52	48	50	46	46	47	**55**	**46**
		7	65	65	54	41	39	35	33	31	**52**	**43**	61	62	57	45	44	41	42	45	**53**	**44**	60	60	59	51	52	49	50	52	**58**	**50**
		10	69	67	58	46	46	43	37	34	**55**	**46**	71	70	61	52	51	47	43	44	**59**	**50**	65	67	64	53	54	50	51	53	**61**	**52**
		1	47	46	42	38	35	32	26	31	**41**	**32**	52	49	46	42	41	40	34	35	**47**	**38**	53	53	50	49	48	47	50	49	**56**	**47**
400	150	2	51	54	46	37	35	37	29	32	**44**	**35**	54	55	53	46	42	43	48	42	**53**	**44**	59	59	55	52	52	51	57	53	**61**	**52**
		4	59	60	50	41	39	37	33	33	**48**	**39**	62	65	59	48	45	44	49	45	**56**	**47**	67	66	63	59	53	51	53	61	**64**	**55**
		7	65	64	54	44	43	38	34	35	**52**	**43**	69	69	62	51	48	46	48	46	**59**	**50**	74	74	70	62	56	54	54	63	**67**	**58**
		10	70	68	58	48	47	42	38	38	**56**	**47**	77	73	65	54	51	48	46	47	**62**	**53**	79	79	74	65	59	56	56	65	**71**	**62**
		1	51	49	46	38	44	43	30	32	**48**	**39**	56	51	52	45	44	55	38	37	**57**	**48**	60	54	56	52	51	59	45	48	**61**	**52**
600	200	2	59	50	46	43	44	47	36	34	**50**	**42**	59	52	52	45	46	50	46	40	**54**	**45**	64	54	55	55	53	56	57	52	**63**	**53**
		4	64	53	48	43	44	45	37	33	**50**	**41**	67	60	55	50	49	49	47	45	**56**	**47**	74	64	59	56	56	56	57	56	**64**	**55**
		7	65	63	52	45	44	44	38	37	**52**	**43**	74	65	57	52	51	50	50	51	**59**	**50**	82	73	67	61	61	59	58	59	**68**	**59**
		10	67	62	52	47	45	41	38	38	**52**	**43**	81	69	60	54	51	51	47	48	**61**	**52**	84	78	69	63	62	59	58	62	**69**	**60**
		1	52	49	46	40	46	43	30	32	**49**	**40**	55	51	52	45	47	55	39	38	**57**	**48**	60	55	57	54	53	59	48	50	**62**	**53**
600	250	2	58	50	47	45	45	46	35	34	**51**	**42**	59	53	52	47	49	51	45	41	**55**	**46**	64	56	57	56	55	59	57	52	**64**	**55**
		4	62	54	50	45	45	45	37	37	**51**	**42**	67	61	56	52	51	50	47	45	**57**	**48**	73	65	60	57	59	59	58	55	**65**	**56**
		7	66	63	53	47	46	45	39	38	**53**	**44**	74	66	58	53	52	51	50	52	**60**	**51**	82	73	67	62	63	60	59	60	**68**	**60**
		10	68	64	54	48	46	43	41	42	**54**	**45**	80	70	61	55	53	52	48	50	**61**	**52**	85	78	70	63	63	60	59	62	**70**	**61**
		1	53	49	46	41	47	42	30	32	**50**	**40**	55	52	53	46	49	54	40	38	**57**	**48**	60	56	58	55	54	60	50	51	**63**	**54**
600	300	2	58	51	49	46	46	45	34	34	**42**	**42**	60	54	52	49	51	51	44	41	**56**	**47**	65	58	59	57	57	61	56	52	**65**	**56**
		4	60	55	51	46	46	45	37	40	**44**	**43**	67	61	56	54	53	50	46	45	**58**	**49**	73	65	60	58	61	61	58	55	**66**	**58**
		7	66	63	55	48	47	46	40	39	**45**	**45**	73	67	59	54	54	52	50	52	**60**	**51**	82	74	67	62	64	61	59	60	**69**	**60**
		10	70	67	56	49	48	44	43	45	**40**	**47**	79	71	62	56	55	53	49	51	**62**	**53**	85	79	70	63	64	61	60	62	**71**	**62**
		1	55	50	47	45	51	43	32	33	**53**	**44**	54	54	54	48	56	55	42	40	**59**	**51**	60	58	60	69	58	61	56	54	**68**	**59**
800	400	2	57	53	53	49	50	44	33	35	**53**	**44**	60	57	53	54	57	53	43	42	**60**	**51**	66	62	64	61	63	67	54	53	**70**	**61**
		4	57	57	56	50	49	46	38	48	**55**	**46**	67	63	59	58	57	52	45	45	**61**	**52**	72	67	62	60	66	66	59	55	**71**	**62**
		7	68	65	58	52	51	49	44	42	**57**	**48**	73	69	61	57	57	55	51	53	**63**	**54**	82	76	68	65	68	63	60	62	**72**	**63**
		10	73	72	61	52	51	48	48	53	**60**	**52**	78	74	65	59	59	55	51	54	**65**	**56**	86	81	71	64	67	64	62	63	**73**	**64**
		1	73	72	61	52	51	48	48	53	**60**	**52**	78	74	65	59	59	55	51	54	**65**	**56**	86	81	71	64	67	64	62	63	**73**	**64**

Δp_{tot} - Total pressure difference
f_m - Octave midband frequency
L_W - Sound power level
L_{WA} - Sound power level, A-weighted
L_{pA} - Sound pressure level, A-weighted

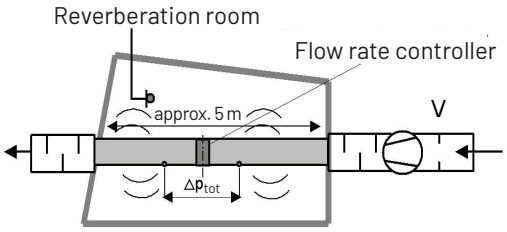
Conversion to other sizes is carried out at the same throttling point using flow velocity and pressure loss, with the ΔL values from the following table. The values refer to the respective nominal height H.

$L_{W\,Okt} = L_{W\,table} + \Delta L$ $L_{WA} = L_{WA\,table} + \Delta L$

Airborne sound transmission without silencer

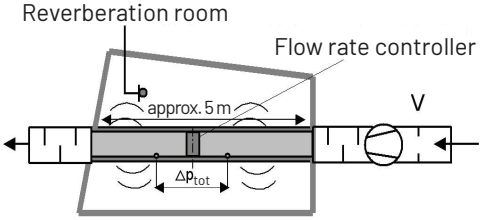
Nominal width B [mm]	Nominal height H [mm]					
	100	150	200	250	300	400
200	-2		-5			
300	0	-1	-3	-3	-3	
400	1	0	-2	-2	-2	-3
500	2	1	-1	-1	-1	-2
600	3	2	0	0	0	-1
800			1	1	1	0
1000				2	2	1
1200					3	2

Controller and air duct without insulation shell



Nominal width B [mm]	Nominal height H [mm]					
	100	150	200	250	300	400
200	-2		-5			
300	0	-1	-3	-3	-3	
400	1	0	-2	-2	-2	-3
500	2	1	-1	-1	-1	-2
600	3	2	0	0	0	-1
800			1	1	1	0
1000				2	2	1
1200					3	2

Controller and air duct with insulation shell



Structure-borne noise emission with insulation shell

Nominal width B [mm]	Nominal height H [mm]	Air velocity [m/s]	Δp_{tot} = 100 Pa										Δp_{tot} = 200 Pa										Δp_{tot} = 500 Pa									
			f_m [Hz]								Total		f_m [Hz]								Total		f_m [Hz]								Total	
			63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]	63	125	250	500	1 K	2 K	4 K	8 K	L_{WA} [dB(A)]	L_{pA} [dB(A)]
			L_W [dB/Okt]										L_W [dB/Okt]										L_W [dB/Okt]									
300	100	1	33	31	32	25	19	9	5	4	**27**	**18**	38	34	34	29	24	18	13	11	**31**	**22**	41	46	37	31	30	26	23	21	**36**	**27**
		2	39	38	37	23	21	15	9	5	**30**	**22**	41	39	41	31	27	22	18	14	**35**	**26**	45	43	41	37	34	30	27	26	**40**	**31**
		4	43	45	38	24	21	17	13	7	**33**	**24**	44	45	43	31	28	25	21	17	**37**	**28**	46	45	45	39	38	33	31	29	**43**	**34**
		7	58	58	47	32	27	21	18	12	**44**	**35**	54	55	50	36	32	27	26	26	**45**	**35**	53	53	52	42	39	35	35	33	**47**	**38**
		10	62	60	51	37	34	29	22	15	**47**	**38**	63	63	54	43	39	33	28	26	**50**	**41**	58	60	57	44	41	37	36	35	**51**	**42**
400	150	1	40	39	35	29	23	19	11	12	**31**	**22**	45	42	39	33	29	26	19	16	**36**	**27**	45	46	43	40	36	34	35	30	**43**	**34**
		2	43	47	39	28	23	23	14	13	**35**	**26**	47	48	46	37	30	29	33	23	**41**	**33**	52	52	48	43	40	37	41	34	**48**	**39**
		4	51	52	43	32	27	24	18	14	**39**	**30**	55	58	52	38	32	30	34	26	**47**	**38**	60	59	56	50	41	38	38	42	**52**	**43**
		7	57	57	47	35	31	25	19	17	**44**	**35**	61	62	55	42	36	32	33	28	**50**	**41**	66	67	63	53	44	40	39	45	**57**	**49**
		10	63	60	51	38	35	28	23	19	**48**	**38**	69	66	58	44	39	34	31	28	**54**	**45**	72	72	67	56	47	42	41	46	**61**	**53**
600	200	1	44	42	39	29	32	29	15	13	**37**	**28**	48	44	45	36	32	41	23	18	**44**	**35**	53	47	49	43	39	45	30	30	**49**	**40**
		2	51	43	39	34	32	33	20	15	**39**	**30**	52	45	45	36	34	36	31	21	**42**	**33**	56	47	48	46	41	43	42	33	**49**	**41**
		4	57	46	41	34	32	31	22	14	**39**	**30**	60	53	48	41	37	36	32	26	**45**	**36**	66	57	52	47	44	43	42	37	**52**	**43**
		7	58	56	45	36	32	31	22	19	**43**	**34**	66	58	50	43	39	37	35	33	**48**	**39**	74	66	60	52	49	45	43	40	**57**	**48**
		10	59	55	45	38	32	27	23	19	**43**	**34**	73	62	53	44	39	38	32	30	**52**	**43**	77	71	62	53	50	46	43	43	**60**	**51**
600	250	1	45	42	39	31	33	29	15	14	**37**	**28**	48	44	45	36	35	41	24	19	**44**	**35**	53	48	50	45	41	45	33	31	**50**	**40**
		2	51	43	40	36	33	32	20	16	**39**	**30**	52	46	45	38	37	37	30	22	**43**	**34**	57	49	50	47	43	45	42	34	**51**	**42**
		4	55	47	43	35	33	31	22	18	**40**	**31**	60	54	49	43	39	36	32	26	**46**	**37**	66	57	53	48	47	45	43	37	**53**	**44**
		7	58	56	46	38	34	32	24	20	**44**	**35**	66	59	51	44	40	38	35	33	**49**	**40**	74	66	60	53	50	46	44	41	**58**	**49**
		10	61	57	47	39	34	29	25	23	**45**	**36**	73	63	54	46	41	39	33	31	**52**	**43**	77	71	63	54	51	47	44	44	**60**	**51**
600	300	1	46	42	39	32	35	29	15	14	**38**	**29**	47	45	46	37	37	41	25	19	**45**	**36**	53	49	51	46	42	46	35	32	**50**	**42**
		2	50	44	42	37	34	31	19	15	**40**	**31**	52	47	45	40	39	38	29	22	**44**	**35**	57	51	52	48	45	48	40	33	**53**	**44**
		4	53	47	44	37	34	31	22	22	**41**	**32**	60	54	49	45	41	37	31	26	**47**	**38**	65	58	53	49	49	47	43	36	**54**	**45**
		7	59	56	48	39	35	32	25	21	**45**	**36**	66	59	52	45	42	39	35	33	**50**	**41**	74	67	60	53	52	47	44	41	**58**	**49**
		10	62	59	49	40	35	30	28	26	**47**	**37**	72	64	55	47	42	39	34	33	**53**	**44**	78	72	63	54	52	47	44	43	**61**	**52**
800	400	1	48	43	40	36	39	29	16	14	**41**	**32**	47	47	47	39	43	41	27	21	**47**	**38**	53	51	53	50	46	48	41	35	**53**	**44**
		2	50	46	46	40	37	31	18	16	**43**	**34**	53	50	46	45	45	40	28	24	**48**	**39**	58	55	57	52	50	53	39	34	**57**	**48**
		4	50	50	49	41	37	32	23	30	**44**	**35**	59	56	52	49	45	39	30	26	**50**	**42**	65	60	55	51	54	52	44	36	**58**	**49**
		7	60	57	51	43	39	35	29	23	**47**	**38**	66	62	54	48	45	41	36	35	**52**	**43**	75	68	61	56	56	50	45	43	**61**	**52**
		10	66	65	54	43	39	34	32	34	**52**	**43**	71	67	58	50	47	41	36	36	**55**	**47**	79	74	64	55	55	50	46	44	**62**	**54**

Δp_{tot} - Total pressure difference
f_m - Octave midband frequency
L_W - Sound power level
L_{WA} - Sound power level, A-weighted
L_{pA} - Sound pressure level, A-weighted

Conversion to other sizes is carried out at the same throttling point using flow velocity and pressure drop, with the ΔL values from the following table. The values refer to the respective nominal height H.

$L_{W\,Okt} = L_{W\,table} + \Delta L$ $L_{WA} = L_{WA\,table} + \Delta L$

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