

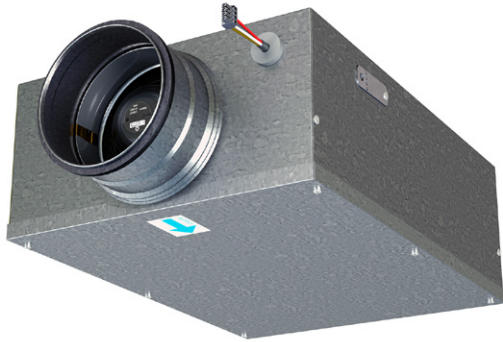
Lindab **DBV**

Flow regulator for supply air



Flow regulator for supply air

DBV



Description

DBV is a volume flow regulator used for VAV regulation of the supply air in a terminal duct for an active chilled beam. Also suitable together with eg. wall diffusers.

DBV is equipped with a unique linear cone damper technology, which makes it possible to regulate up to 200 Pa with low sound level.

The built-in VAV actuator is delivered pre-programmed with damper characteristic and in combination with a stable flow measurement over the damper, it makes the VAV regulation very accurate and reliable.

DBV can be installed directly in a terminal duct in front of the active chilled beam. DBV is not suited for exhaust air.

- Unique linear cone damper
- Low sound levels
- Stable flow measurements
- Reliable and accurate VAV regulation

Order code

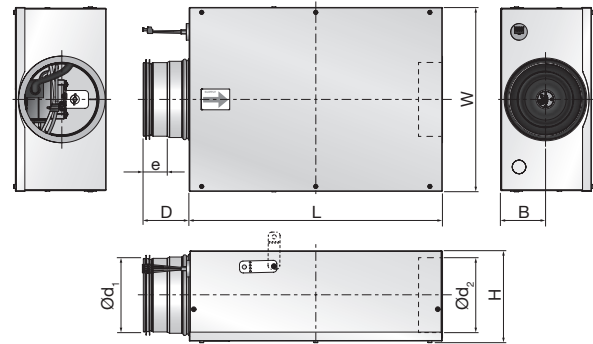
Product	DBV	aaa	bbb	MP
Type	DBV			
Duct connection Ød₁	Ø125 - 250			
Diffuser dimension Ød₂	Ø125 - 250			
Motor type	MP			

Example: DBV-125-125-MP

Factory settings

	Standard	On request
Min. air flow	0	Other min. flow
Max. air flow	V _{nom} (7m/s)	Other max. flow
Control signal	2-10 V	0-10 V
Feedback signal	Damper position	Air flow

Dimensions



Ød ₁ mm	Ød ₂ mm	B	D	e	H	L	W	m* kg
125	125	75	78	40	155	427	310	4.3
160	160	93	78	40	190	510	380	5.9
200	200	113	78	40	230	616	460	8.2
250	250	138	118	60	280	769	540	11.8

* Measured weights.

Motortype

Type	Documentation
MP	LHV-D3W-MP LIN
MOD/BAC	LHV-D3W-MOD LIN*
KNX	LHV-D3W-KNX LIN*

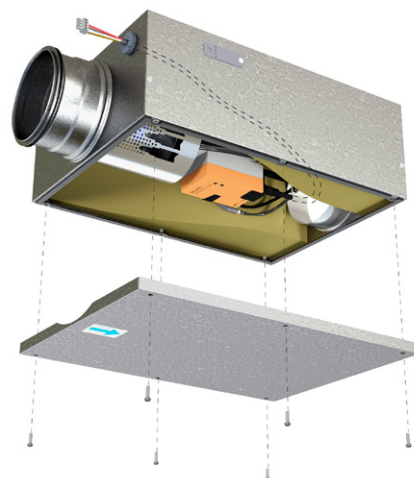
* For the [MOD/BAC](#) & [KNX](#) variants see documentation for rotation version (LMV) of Belimo VAV-Compact-D3, as the MOD/KNX related information/signals is the same for the linear version (LHV).

Rack stroke mechanically limited according to size

Size Ød ₁ , mm	125	160	200	250
Rack stroke mm	110	137	157	188

Maintenance

Easy access to inner parts. The motorized damper unit can be removed to enable cleaning of internal parts of the plenum box and gives access to the duct as well.



Materials and finish

Materials: Galvanised steel
Standard colour: Galvanised steel
The plenum box is available in other colours. Please contact Lindab's sales department for further information.

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Technical data

Settings

DBV is preset and calibrated from factory with the following air flow (V_{nominal}) setting corresponding to a velocity of 7 m/s.

Airflow limits

DBV		Lower regulation limit (0.56 m/s)*		Airflow Nominal (7.0 m/s)	
Inlet $\varnothing d_1$	Outlet $\varnothing d_2$	l/s	m ³ /h	l/s	m ³ /h
125	125	7	25	86	309
160	160	11	41	141	507
200	200	18	63	220	792
250	250	27	99	344	1237

*) Lower airflow is still measured, but regulation switches between closed and 8% of V_{nom} , which is a fixed Belimo setting.

Leakage through closed damper

Inlet $\varnothing d_1$	Closed damper leakage at 50 Pa**	
	l/s	m ³ /h
125	4.8	17.3
160	5.4	19.4
200	8.3	29.9
250	9.8	35.3

**) The damper is class 0 according to EN 1751, but the table shows the approximate leakage when the damper is fully closed.

If calculating for other pressures, use an exponent = 0.6.

Sound attenuation

Sound attenuation ΔL of the unit with fully open damper, see table below.

$\varnothing d_1$ mm	$\varnothing d_2$ mm	Centre frequency Hz							
		63	125	250	500	1K	2K	4K	8K
125	125	10	7	5	7	13	20	29	25
160	160	7	5	5	7	14	19	25	25
200	200	7	4	5	7	16	20	23	25
250	250	6	4	5	7	16	23	25	24

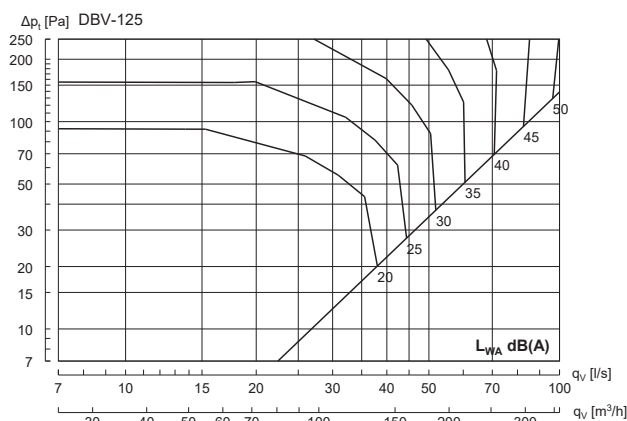
Capacity

Air flow q_v [l/s] and [m³/h], total pressure Δp_t [Pa] and sound power level L_{WA} [dB(A)] for the duct (flow noise) can be seen in the diagram.

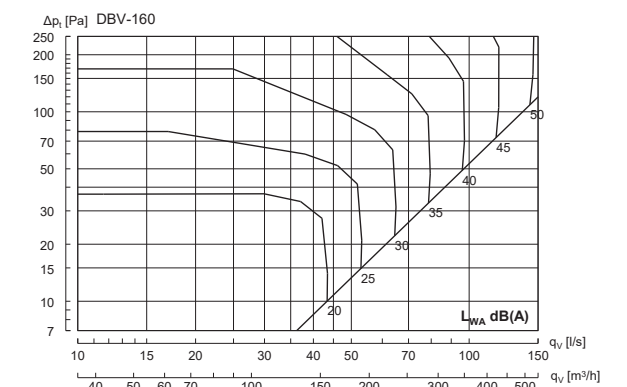
Frequency-related sound power level

The sound power level in a frequency band is defined as $L_{Wok} = L_{WA} + K_{ok}$. K_{ok} values are specified in the chart beneath the diagram.

DBV-125



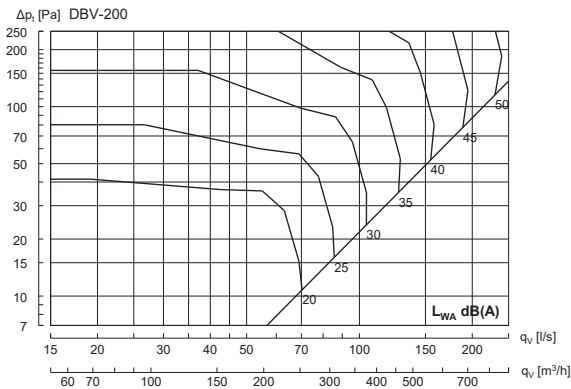
DBV-160



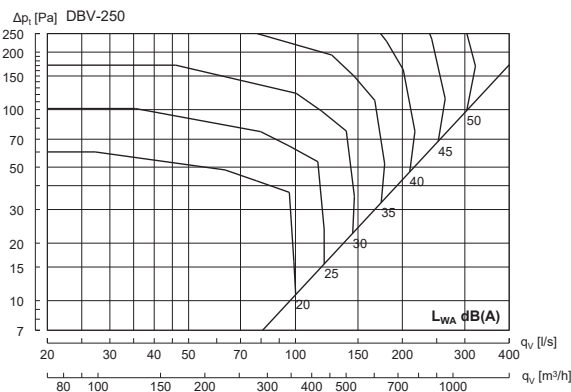
Flow regulator for supply air

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DBV-200

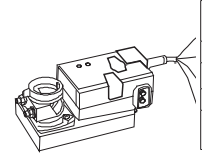


DBV-250



Type overview, MP versions

Type	Torque	Power consumption	Rating	Weight
LHV-D3-MP-LIN	150 Nm	2.5 W	4.5 VA	Approx 550 g



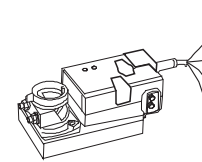
No.	Designation	Wire colour	Function
1	⊥ -	black	AC/DC 24 V supply
2	~ +	red	
3	◀ Y	white	Reference signal / override / sensor
5	▶ U	orange	- Actual value signal - MP bus connection

Note !

- Supply via safety isolating transformer !
- In conventionally controlled systems it is recommended that the connections 1 to 5 (PP) are led to accessible terminals (e.g. floor distributor) in order to allow remote access for diagnostics and service work.

Type overview MOD versions

Type	Torque	Power consumption	Rating	Weight
LHV-D3-MOD-LIN	150 Nm	2.5 W	4.5 VA	Approx 550 g



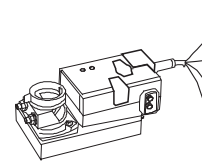
No.	Designation	Wire colour	Function
1	⊥ -	black	AC/DC 24 V supply
2	~ +	red	
3			
5	▶ MFT	orange	MP connection
6	D-	pink	BACnet / Modbus (RS485)
7	D+	grey	

Note !

- Supply via safety isolating transformer !
- Modbus signal assignment:
 $C_1 = D- = A$
 $C_2 = D+ = B$
- Supply and communication are not galvanically isolated.
- Connect earth signal for devices with one another.

Type overview KNX versions

Type	Torque	Power consumption	Rating	Weight
LHV-D3-KNX-LIN	150 Nm	2.5 W	4.5 VA	Approx 550 g



No.	Designation	Wire colour	Function
1	⊥ -	black	AC/DC 24 V supply
2	~ +	red	
3			
5	▶ MFT	orange	PP connection
6	D+	pink > red	KNX
7	D-	grey > black	

Note !

- Supply via safety isolating transformer !
- Signal assignment KNX:
 $D+ = KNX+ (pink > red)$
 $D- = KNX- (grey > black)$
- The connection to the KNX line should take place via WAGO connection terminals 222/221.

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Technical data

Sound data table in frequencies

Sound power level L_{WA} [dB] in each octave band frequency for duct noise is shown in the table below for different combinations of air flow q_v in [l/s] or [m³/h] and total pressure loss Δp_t [Pa].

Ød ₁ mm	Ød ₂ Pa	Duct velocity v = 2 m/s Octave band frequency Hz									Duct velocity v = 3 m/s Octave band frequency Hz									Duct velocity v = 4 m/s Octave band frequency Hz								
		63	125	250	500	1000	2000	4000	8000	A	63	125	250	500	1000	2000	4000	8000	A	63	125	250	500	1000	2000	4000	8000	A
125		$q_v = 25 \text{ l/s} / 88 \text{ m}^3/\text{h}$									$q_v = 37 \text{ l/s} / 133 \text{ m}^3/\text{h}$									$q_v = 49 \text{ l/s} / 177 \text{ m}^3/\text{h}$								
	20*	18	18	<15	<15	<15	<15	<15	<15	<15	23	25	20	18	<15	<15	<15	<15	19	30	33	28	26	23	<15	<15	<15	27
	50	26	23	16	15	<15	<15	<15	<15	16	28	29	21	20	15	<15	<15	<15	21	32	34	28	27	23	<15	<15	<15	28
	100	31	24	20	17	<15	<15	<15	<15	21	33	32	25	24	19	15	<15	<15	25	35	36	29	28	24	17	<15	15	29
	200	33	26	23	22	18	20	18	15	26	38	33	29	26	22	20	19	17	29	40	38	33	31	27	23	21	19	33
160	250	34	27	25	24	21	23	21	19	29	39	33	29	26	23	22	20	19	30	41	39	34	31	28	25	23	22	34
		$q_v = 40 \text{ l/s} / 145 \text{ m}^3/\text{h}$									$q_v = 60 \text{ l/s} / 217 \text{ m}^3/\text{h}$									$q_v = 80 \text{ l/s} / 290 \text{ m}^3/\text{h}$								
	20*	33	24	22	16	<15	<15	<15	<15	18	41	34	30	26	19	<15	<15	<15	28	48	40	37	33	27	20	<15	<15	35
	50	36	28	26	18	<15	<15	<15	<15	23	42	34	31	26	19	<15	<15	<15	28	49	40	38	33	27	20	<15	<15	35
	100	38	30	28	21	18	<15	15	20	26	45	37	34	27	22	19	15	19	31	49	41	38	33	27	21	15	18	35
200	200	39	32	30	23	21	18	18	24	29	49	39	36	30	25	22	22	28	34	54	44	40	35	30	25	22	27	38
	250	39	32	31	24	22	20	20	26	31	49	39	36	30	26	22	23	29	35	56	46	41	36	31	26	26	32	40
		$q_v = 63 \text{ l/s} / 226 \text{ m}^3/\text{h}$									$q_v = 94 \text{ l/s} / 339 \text{ m}^3/\text{h}$									$q_v = 126 \text{ l/s} / 452 \text{ m}^3/\text{h}$								
	20*	33	24	21	17	<15	<15	<15	<15	19	38	33	29	25	19	<15	<15	<15	27	44	40	36	32	27	18	<15	<15	34
	50	34	27	25	21	<15	<15	<15	<15	23	42	34	30	26	20	<15	<15	<15	29	46	41	36	32	28	19	<15	<15	35
250	100	34	33	29	24	22	20	19	18	29	43	36	33	29	23	15	<15	<15	32	49	42	38	33	29	20	<15	<15	36
	200	37	35	31	27	24	22	21	23	31	46	40	37	33	29	27	27	27	36	50	44	40	36	32	25	21	23	39
	250	38	36	32	28	26	23	23	25	33	46	41	37	33	29	27	27	27	37	52	45	41	37	33	28	25	27	40
		$q_v = 98 \text{ l/s} / 353 \text{ m}^3/\text{h}$									$q_v = 147 \text{ l/s} / 530 \text{ m}^3/\text{h}$									$q_v = 196 \text{ l/s} / 707 \text{ m}^3/\text{h}$								
	20**	33	25	22	19	<15	<15	<15	<15	20	43	35	31	28	26	<15	<15	<15	30	50	43	38	34	33	22	<15	<15	37
250	50	36	27	25	22	<15	<15	<15	<15	23	44	36	32	29	24	<15	<15	<15	30	51	43	39	35	33	22	<15	15	38
	100	44	34	29	26	20	<15	<15	17	28	45	37	34	30	25	<15	<15	17	32	52	44	39	35	33	23	18	18	38
	200	47	37	32	28	23	19	18	21	31	53	43	38	34	29	23	21	25	37	55	46	41	38	34	25	24	28	40
	250	47	38	33	29	25	20	19	23	33	54	44	39	35	31	25	24	28	38	57	47	42	39	36	27	25	29	42

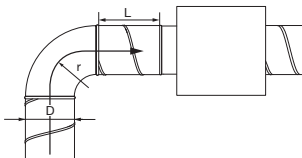
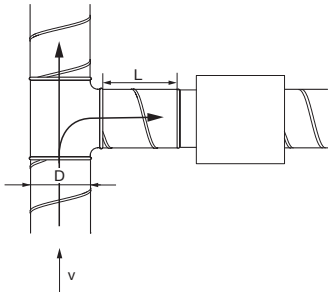
*) At 4 m/s the pressure loss is 33, 34 and 35 Pa with the damper fully open for DBV-125, 160 and 200 respectively.

**) At 3 m/s the pressure loss is 23 Pa and at 4 m/s 41 Pa with the damper fully open.

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Air flow measurement

Recommended lengths L of straight duct between a disturbance and DBV.

<div> Bend with radius $r \geq D$  </div>	<div> 1D </div>
<div> Box installed at the side branch of the distribution duct; for velocities in the distribution duct $v \geq 4$ m/s  </div>	<div> 3D </div>
<div> A general disturbance (none of the cases above) </div>	<div> 1D - 4D </div>

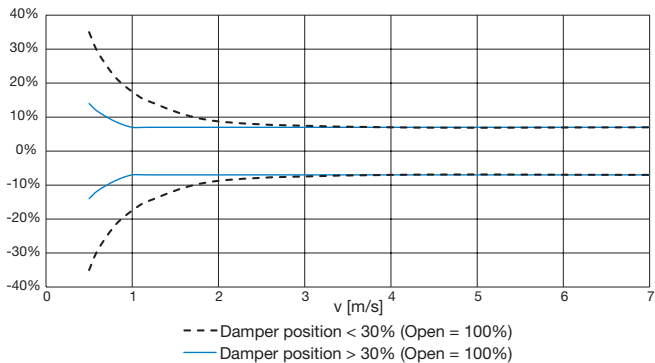
Accuracy

Damper position > 30% (Open = 100%)

The highest value of
 $\pm 7\%$ of reading or $\pm 1\%$ of V_{nom} (flow at 7 m/s).

Damper position < 30% (Open = 100%)

The highest value of
 $\pm 7\%$ of reading or $\pm 2.5\%$ of V_{nom} (flow at 7 m/s).



$\pm 7\%$ or table value (highest).

DBV	>30%	<30%
$\varnothing d_1$	$\pm 1\% V_{nom}$	$\pm 2.5\% V_{nom}$
mm	l/s	l/s
125	± 1.0	± 2.2
160	± 1.4	± 3.5
200	± 2.2	± 5.5
250	± 3.4	± 8.6

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Sound dimensioning (simplified)

Example 1:

What is the sound power level L_{WA} in system where a Premax I-60-15-125-A1-2.4 is combined with a DBV-125-125 (in series)?

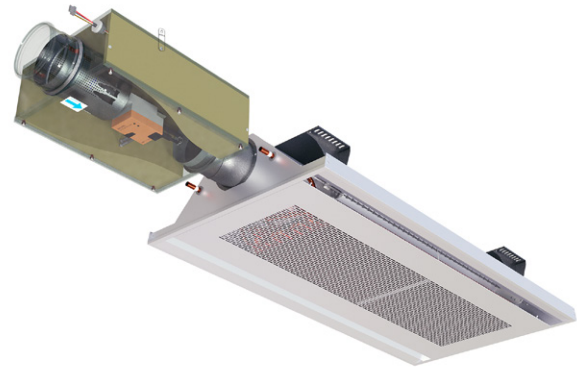
The primary airflow is $q_a = 40$ l/s and the pressure of Premax is 80 Pa.

Assuming the DBV is regulating to maximum air, in a well balanced system, the damper will be in nearly open position with a pressure loss of 40 Pa. i.e., total pressure loss is 120 Pa.

Answer:

Read of the sound power levels for DBV-125-125 in the diagram 2 and for Premax 2.4 m in the diagram 6 in Premax catalogue page 12, for $q_a = 40$ l/s.

The value for DBV-125-125 from diagram 2 is $L_{WA1} = 23$ dB(A).



Picture 6. DBV box and Premax chilled beam.

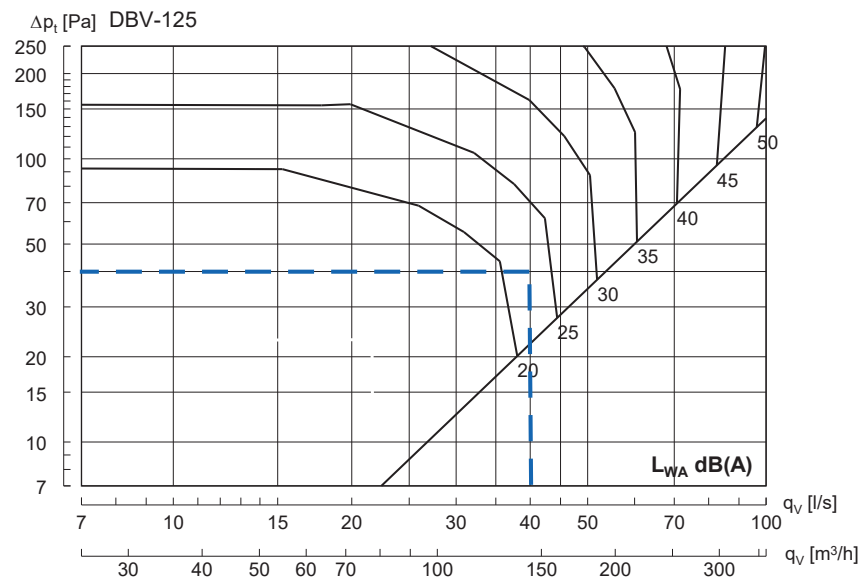


Diagram 2. Sound power level DBV-125 L_{WA}

The value for Premax I-60-15-125-A1-2.4 at 80 Pa $L_{WA2} = 26$ dB(A).

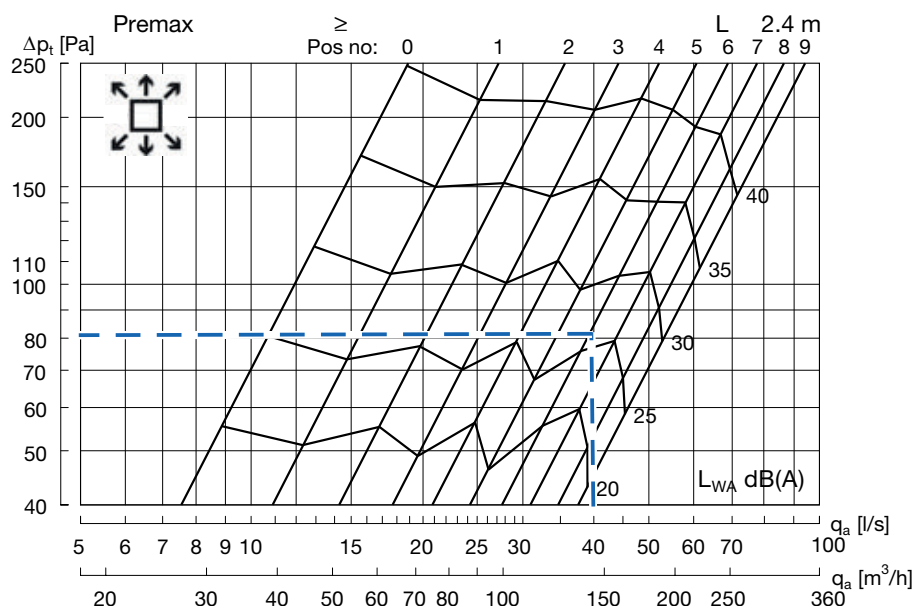


Diagram 3. Sound power level L_{WA} and JetCone setting for Premax $L > 2,0$ m (taken out from Premax catalogue page 12, diagram 6).

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Instead of using the diagram, you can find the sound power level L_{WA} for you specific chilled beam design and all available types easily in our waterborne calculator on www.lindQST.com.

Supply air beam

Project name: Acoustic design

Selected parameters

Requirements:

Primary airflow rate	QA	40	l/s
Primary airflow rate	QA	144	m³/h
Static nozzle pressure loss	Δpstat	80	Pa

Cooling

Room air temperature	tR	25.0	°C
Temperature gradient in room	tg	0.0	K
Primary air temperature	tai	18.0	°C
Water inlet temperature	twi	14.0	°C
Temperature difference water circuit	Δtw	3.0	K

Results

Pipe pressure drop loss	Δpw	43.3	kPa
Sound power	Lwa	26	dB(A)

Total Capacity

Pipe pressure drop loss	Δpw	43.3	kPa
Sound power	Lwa	26	dB(A)
Sound pressure level	lp	22	dB(A)
Penetration length, horizontal	Xp	1.5	m
JetCone setpoint's	Δpa	1	Pa
Added pressure loss in connection	Δpc	81	Pa
Total air pressure loss in duct		19.0	l/s
Air volume / active meter		68.6	m³/h
Air volume / active meter Water		408	l/min

Picture 7. Extract from the waterborne calculator on lindQST.com.

Calculate the difference between the two sound power levels:

$$\Delta L_{WA} = L_{WA2} - L_{WA1} = 26 \text{ dB(A)} - 23 \text{ dB(A)} = 3 \text{ dB(A)}$$

Read off the increase from "Diagram 4. Logarithmic addition of two levels" and add it to the higher sound power level, here $L_{WA2} = 26 \text{ dB(A)}$.

Diagram 4 shows a value of approx. 1.75 dB(A), which must be added to the higher level $L_{WA2} = 26 \text{ dB(A)}$.

The result is a total sound power level of $L_{WA} = 26 \text{ dB(A)} + 1.75 \text{ dB(A)} = 27.75 \text{ dB(A)}$.

Increase to be added to the higher level. [dB]

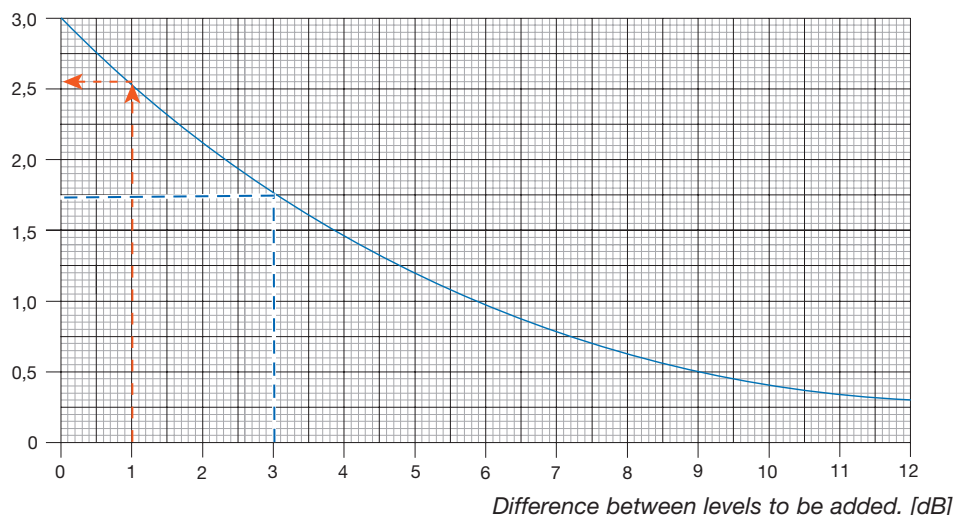


Diagram 4. Logarithmic addition of two sound levels.

NB! For any other combination with other Lindab active chilled beams please find the specific sound diagram in the corresponding product catalogue or in our waterborne calculator on www.lindQST.com.

We recommend a detailed sound calculation of the complete system! Please find detailed sound data in the product catalogues of DBV and the specific chilled beam type combined with.



Most of us spend the majority of our time indoors. Indoor climate is crucial to how we feel, how productive we are and if we stay healthy.

We at Lindab have therefore made it our most important objective to contribute to an indoor climate that improves people's lives. We do this by developing energy-efficient ventilation solutions and durable building products. We also aim to contribute to a better climate for our planet by working in a way that is sustainable for both people and the environment.

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