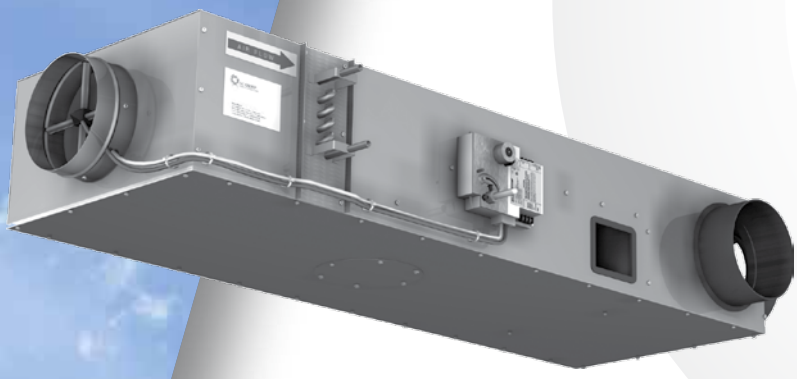


INDUCTION VAV AIR VOLUME CONTROL TERMINALS

NV SERIES

SUSTAINABLE / INNOVATION

HC GROEP

HC BARCOL-AIR | AIR DISTRIBUTION

Induction VAV
air volume control terminals

Table of contents

Description **Page**

Induction VAV
air volume control terminals

Type designation
(NV . . . . .)

Composition type designation:

N - V - O - N - F - O - B

N Position 1: **Product group**

N = air volume control terminals

V Position 2: **Function**

O = not applicable
V = VAV Induction terminal
W = VAV Induction terminal with controlled induction
1 = non standard, specify separately

O Position 3: **Controls (manufacturer)**

O = without controls
For controls, contact our sales staff

N Position 4: **Outlet**

O = not applicable
A = rectangular outlet
C = 4 circular outlets 'Octopus'
G = rectangular outlet and provision for integral hot water reheat coil
J = 4 circular outlets and provision for integral hot water reheat coil
N = rectangular outlet and provision for integral electric reheat coil
Q = 4 cirular outlets and provision for integral electric reheat coil
1 = non standard, specify separately

F Position 5: **Reheat coil**

O = without reheat coil
A = 1-row hot water reheat coil
B = 2-row hot water reheat coil
D = 4-row hot water reheat coil
E = 1-stage 230VAC/1-phase electric reheat coil
F = 2-stage 230VAC/1-phase electric reheat coil
G = 3-stage 230VAC/1-phase electric reheat coil
H = 1-stage 400VAC/3-phase electric reheat coil
J = 2-stage 400VAC/3-phase electric reheat coil
1 = non standard, specify separately

O Position 6: **Controls (type & function)**

O = without controls
For controls, contact our sales staff

B Position 7: **Sensor**

O = not applicable
B = Flo-Cross®, 2 x 12 point averaging and signal amplifying air flow sensor (standard)
1 = non standard, specify separately

Ordering example:

N	V	O	N	F	O	B	1	6	0	R	0	5	0	0
See above							Model		Handing controls & Heater		Heater capacity			

Ordering codes "Specials"

N..1... - 3010 = 4 balancing dampers in 'Octopus' outlet
N..1... - 3006 = 'Octopus' with 6 outlets instead of 4
N..1... - 3016 = 'Octopus' with 6 outlets incl. balancing dampers
N..1... - FL = Flange connection 30 mm for rectangular outlet

Ordering information:

Standard terminals:

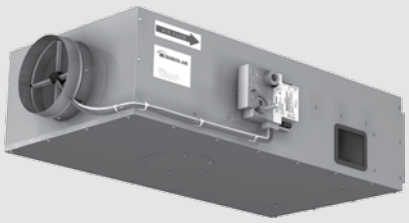
- quantity of terminals
- complete 7 digit code
- terminal size or model
- air volume setting (V_{max}, V_{min} etc)
- control handing (standard right side)
- if applicable, electric reheat coil capacity

Non standard terminals:

- for non standard terminals a full description and/or drawing are requested

Induction VAV
air volume control terminals

Technical data
Type NV . . . . .



Application

Type NV rectangular pressure-independent VAV air volume control terminals are designed particularly for systems with high variations in heat load. The terminals induce room air and mix it with conditioned primary air, maintaining a nearly constant air volume to the room thus providing sufficient air movement necessary to maintain occupant comfort even in extreme load variations. This specific characteristic means that cold air 'dumping' will not occur and that extremely low primary air temperatures can be used, without producing excessive differences between the supply and the room air temperature. The primary air is controlled by the patented airflow sensor type Flo-Cross®.
The Induction VAV terminals can be used for supply air applications in new or refurbishment projects.
The terminals can optionally be supplied with a distribution plenum and a built-in hot water or electric reheat coil.

Alternatively VAV terminals are ideal to be used for CO_2 control. Dependent of the indoor air quality, always the correct amount of fresh air will be supplied to the room. Off course the primary air handling system need to be suitable for this.

Features:
- Pressure independent control functions.
- Compact design; one-piece construction.
- Volume control range 100% down to 10% without the requirement of special VAV diffusers or assisting fans.
- Suitable for low temperature primary air systems.
- Factory fitted in-built distribution plenum with built-in hot water or electric reheat coil.
- Low leakage damper less than 2% of Vnom at 750 Pa.
- Low noise production.
- Suitable for all control functions (VAV, CAV, shut off, etc.) to maximise system energy savings.
- Flo-Cross® 2 x 12 points averaging and signal amplifying airflow sensor, better than 2,5% accuracy even with irregular duct approach.
- Maintenance free.

Technical information

Casing:
Air-tight construction made of galvanized sheet steel; casing leakage rate to Class II VDI 3803 / DIN 24 194. Duct-sleeve connections at the in- and outlet are suitable for DIN 24 145 or DIN 24 146 connections. The terminal has a circular inlet, two induction openings, rectangular outlet and an inspection opening at the bottom.
In case of multiple outlets, a perforated equalising grid in the multiple outlet section is fitted and balancing dampers can be provided on request.

Insulation:
The terminal is supplied with 25 mm thermal and acoustical insulation (30 kg/m^3) complying to: NFPA90A and 90B surface burning characteristics, BS476 part 6 and 7 fire propagation, UL 181 class 0 surface spread of flame and UL 94 HF1 flamability.

Damper:
Specially constructed 'jet-tronic' damper for induction effect made of galvanized sheet steel and low leakage. Damper shaft: aluminium, ø12 mm with self lubricating Nylon bearings.
Optional: additional damper in induction port for induction ratio control (type NW.....).

Flo-Cross®:
Extruded aluminium construction with nylon core + feet.

Distribution plenum:
Made of galvanized sheet steel with 13 mm internal isolation.
'Octopus' plenum has standard multiple outlet (4 x circular) outlet construction.
Optional single, double, triple or six circular outlets possible.
Outlet spigots are made of flame retardant polymer and optionally can be provided with volume control dampers made of galvanized sheet steel.

Reheat coil:
Choice of 1-, 2- or 4-row hot water reheat coil or electric reheat coil (230VAC/1-phase or 400VAC/3-phase).
More detailed technical information can be found in the separate NO documentation.

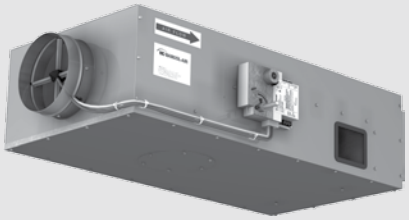
Controls:
Suitable for use with pneumatic, analogue electronic or DDC controllers. Controls can be factory fitted, wired and calibrated. Controls enclosure (galvanized sheet steel) can be provided optionally.

Delivery format

Delivery format:
- The VAV terminal will be supplied as a single mounting assembly. Optional ordered distribution plenum, reheat coil and/or controls are factory fitted, wired and calibrated. The on site delivered terminal is ready to be installed and commissioned.
- Controls location and hot water or electric connections are as a standard fitted on the right hand side of the terminal when looking in the direction of the airflow.
- On request, the terminal can be delivered with connections on the left hand side.
- When terminals are ordered with controls, these will be factory fitted, wired and calibrated upon request.
- When terminals are ordered with 'free-issue' controls by others, wiring diagrams and mounting instructions must be provided.

Induction VAV
air volume control terminals

Technical data
Type NV . . . .



Specify as:

Example:
Supply and install, induction variable air volume terminals with distribution plenum with 4 circular outlets, constructed from galvanized sheet steel. The terminal shall have duct-sleeve connections and shall be suitable for DIN 24 145 or DIN 24 146 respectively. The VAV terminals shall have a special 'jet-tronic' low leakage damper blade and an aluminium damper shaft with self lubricating Nylon bearings.
A centre averaging airflow sensor with at least 2 x 12 test points and amplified signal air flow sensor, type Flo-Cross® shall control the airflow with an accuracy not less than 2.5 %.
The terminals shall be supplied with 1-row hot water reheat coil.

The controller shall be I/A Series, DDC controller :
LonMark® compatible, type MNL-V2RVx
or
BACnet® compatible type MNB-V2.

Controls must be factory fitted, wired and calibrated according to the following requirements.

Maximum air volume 250 l/s
Minimum air volume 60 l/s
Minimum air volume 120 l/s (in case of reheat)
Terminal size 200 mm
Max. discharge sound index < NC25 (@250Pa Δp)
Max. radiated sound index < NC25 (@250Pa Δp)

Ordering example: type – model – handing = NVOJAOB – 200R

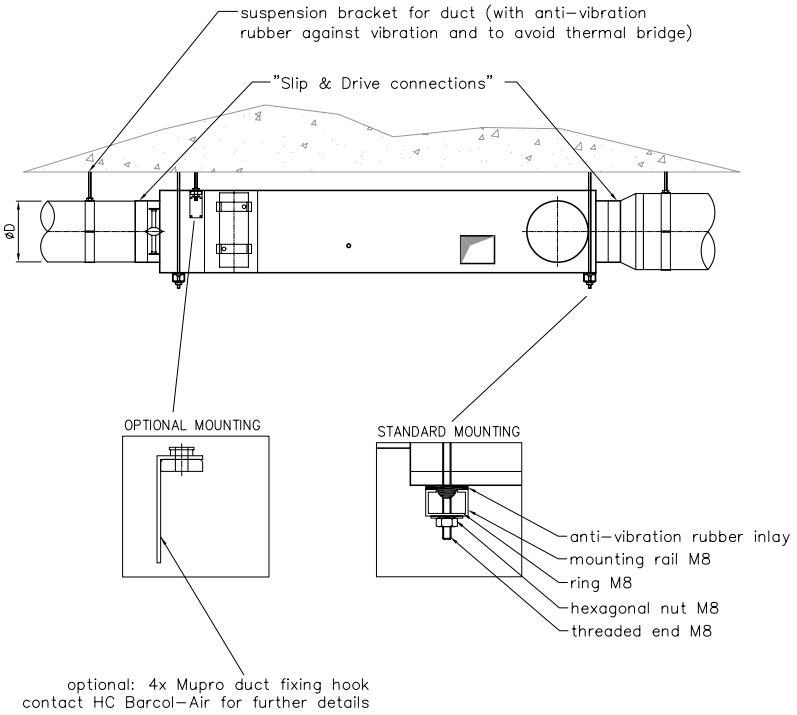
Manufacturer: HC Barcol-Air

Installation Instructions:

The HC Barcol-Air Induction VAV terminals shall be installed using at least two support brackets (DIN-rail or L-profile), with anti-vibration rubber under the terminal. Each of these brackets shall be fixed with two threaded rods to the ceiling slab above.

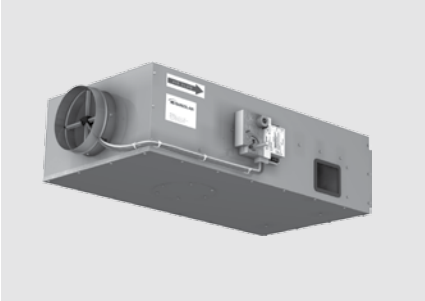
This installation method:
1 Shall prevent the body of the Induction VAV terminal from high mechanical tension, which could damage the construction and performance of the terminal.
2 Shall prevent torsion on the Induction VAV terminals, which could cause malfunction of the damper blades.
3 Provides some flexibility to the final location of the Induction VAV terminals.
4 Use at least 1x diagonal straight duct length before the Induction VAV inlet.
5 Additional manual volume control dampers (VCD's) before the inlet are not required / recommended!!
6. All connections shall be thermally isolated.
7. Pressure sensing tubes of Flo-Cross® airflow sensor shall not be "kinked"or otherwise obstructed by the external duct insulation.

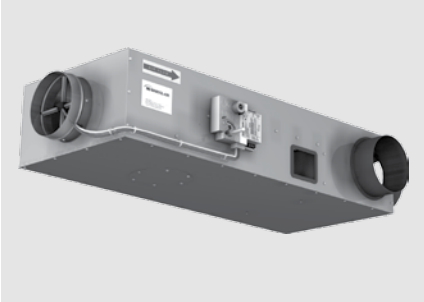
Optional 4 x Mupro fixing hooks can be used (see drawing).

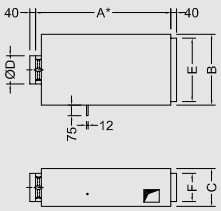


Induction VAV
air volume control terminals

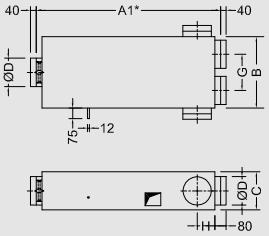
Model overview
(NV…..)







Type NVOA.OB



Type NVOC.OB

Dimensions NV

Model	100	125	160	200	250	315	355	400
A*	990	990	990	990	990	1540	1540	1540
A1*	1300	1300	1300	1300	1400	-	-	-
A2*	1240	1240	1240	1240	1240	1790	1790	1790
A3*	1550	1550	1550	1550	1750	-	-	-
B	330	330	400	500	600	740	820	910
C	228	228	248	268	318	408	408	458
ØD	98	123	158	198	248	313	353	398
E	275	275	350	450	550	690	770	850
F	170	170	175	200	250	330	330	380
G	180	180	215	255	305	-	-	-
H	125	125	125	125	175	-	-	-

All dimensions in mm.
** = Installed length.*
*** = Size varies with a 1-/2-row or 4-row hot water reheat coil.*

Other dimensions are available upon request.
Size 250 is maximum size for terminals with multiple outlet section.

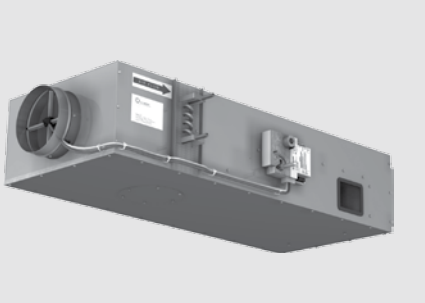
Kv values

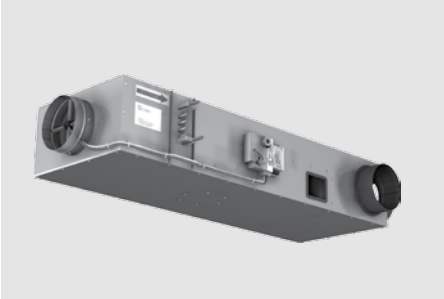
Model	100	125	160	200	250	315	355	400
Kv (l/s / Pa)	5,5	8,5	15,0	24,9	35,4	58,9	74,3	92,6

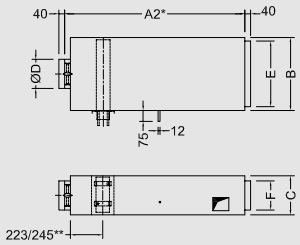
Flow = Kv x √ΔPfc
ΔPfc = Flo-Cross® signal
If ΔPfc = 30 Pa and VAV size = 160
Flow = 15,0 x √30 = 82 l/s

Induction VAV
air volume control terminals

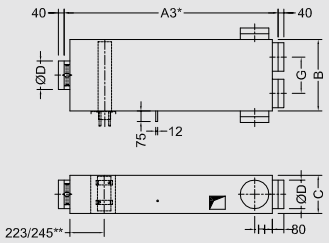
Model overview
(NV…..)



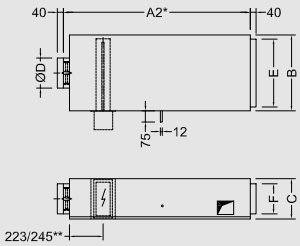




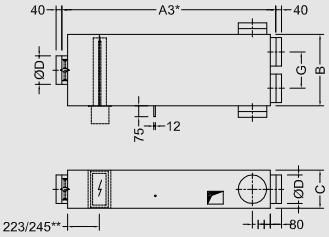
Type NVOG.OB



Type NVOJ.OB



Type NVON.OB



Type NVOQ.OB

For dimensions see page 4.

Induction VAV
air volume control terminals

Type NVOAOOB

Sound data Δ p = 150 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 150 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	-	25	21	-	-	-	--	--	--	25	26	-	-	-	-	--	--	--
	4	29	62	106	1	25	33	29	24	23	-	--	--	--	30	31	22	20	-	-	--	--	--
	6	44	94	160	2	31	37	34	29	27	18	--	--	--	34	35	26	24	20	-	--	--	--
	8	59	125	213	4	35	41	37	32	30	21	--	--	--	37	38	30	28	24	-	--	--	--
	10	74	156	266	6	38	43	40	35	32	23	--	--	--	39	40	33	31	27	19	--	--	--
	12	89	188	320,4	9	41	45	42	37	34	25	--	--	--	42	43	36	34	29	22	21	--	--
125	2	23	49	84	1	21	29	24	20	19	-	--	--	--	27	28	18	-	-	-	--	--	--
	4	47	99	168	2	31	37	32	28	26	17	--	--	--	33	34	25	22	18	-	--	--	--
	6	70	149	253	5	37	41	37	33	30	21	--	--	--	37	38	29	26	22	-	--	--	--
	8	94	198	337	8	41	45	40	36	33	24	--	--	--	40	41	33	30	26	18	--	--	--
	10	117	248	421	13	44	47	43	39	35	26	--	--	--	42	43	36	33	29	21	21	--	--
	12	140	296	504	19	46	49	45	41	37	28	22	--	--	44	45	38	36	31	24	24	--	--
160	2	39	82	139	0	29	33	28	24	22	-	--	--	--	31	27	21	-	-	-	--	--	--
	4	78	164	279	2	38	41	36	32	29	21	--	--	--	36	32	28	24	20	-	--	--	--
	6	116	246	418	3	43	46	41	37	33	25	--	--	--	40	36	32	29	24	17	--	--	--
	8	155	328	558	6	47	49	44	40	36	28	22	--	--	43	39	36	32	28	20	--	--	--
	10	194	410	697	10	50	52	47	43	39	30	25	--	21	45	41	39	35	31	23	22	--	--
	12	232	491	835,2	14	52	54	49	45	40	32	27	21	23	48	44	42	38	33	26	25	--	--
200	2	61	129	219	0	33	36	29	25	23	-	--	--	--	40	35	27	19	-	-	--	--	--
	4	122	258	439	2	42	44	37	33	31	21	--	--	--	45	40	34	26	22	-	20	--	--
	6	183	387	658	4	46	49	41	38	35	25	21	--	--	49	44	38	31	26	19	24	--	--
	8	244	516	878	8	50	52	45	41	38	28	25	--	22	52	47	42	34	30	22	27	--	21
	10	305	645	1097	12	53	55	47	44	40	30	27	22	24	54	49	45	37	33	25	30	21	24
	12	366	775	1317,6	18	55	57	49	46	42	32	30	24	27	56	51	48	40	35	28	32	24	26
250	2	96	203	345	1	38	39	31	27	25	-	--	--	--	42	37	30	21	18	-	--	--	--
	4	192	406	690	5	45	47	39	35	32	21	--	--	--	48	43	37	28	24	-	23	--	--
	6	288	609	1035	10	50	52	44	40	36	25	24	--	21	52	47	41	32	28	21	27	--	21
	8	383	812	1380	18	53	55	47	43	39	28	28	22	25	55	50	45	36	32	24	30	22	24
	10	479	1015	1725	28	55	58	50	46	41	31	30	25	28	57	52	48	39	35	27	33	25	27
	12	575	1218	2070	41	57	60	52	48	43	33	32	28	30	59	54	50	42	37	30	35	28	29
315	2	153	324	550	1	43	43	34	29	26	-	--	--	--	45	40	33	23	20	-	20	--	--
	4	306	648	1101	4	49	51	42	37	33	22	23	--	--	51	46	40	30	26	19	26	--	20
	6	459	971	1651	8	53	55	46	42	37	26	28	22	25	55	50	44	35	30	23	30	22	24
	8	612	1295	2202	15	56	59	50	45	40	29	31	26	29	58	53	48	38	34	26	33	25	27
	10	764	1619	2752	23	58	61	52	48	42	31	33	29	31	60	55	51	41	37	29	35	29	30
	12	917	1942	3301,2	34	60	63	54	50	44	33	35	32	34	62	57	53	44	39	32	38	31	33
355	2	195	412	701	1	46	44	35	30	27	-	--	--	--	47	42	35	24	21	-	22	--	--
	4	389	824	1401	5	51	52	43	38	34	22	25	--	22	53	48	41	31	27	20	28	--	22
	6	584	1236	2102	12	55	57	48	43	38	26	30	25	27	56	51	46	36	31	24	31	24	26
	8	779	1649	2803	22	57	60	51	46	41	29	33	28	31	59	54	49	39	35	27	34	27	29
	10	973	2061	3503	34	59	63	54	49	43	31	35	31	33	62	57	52	42	38	30	37	31	32
	12	1168	2473	4204,8	49	61	65	56	51	45	33	37	34	36	64	59	55	45	40	33	39	33	34
400	2	248	524	891	1	49	46	37	31	28	-	21	--	--	48	43	36	25	22	-	23	--	--
	4	495	1049	1783	4	54	54	45	39	35	22	27	21	24	54	49	43	32	28	21	29	21	24
	6	743	1573	2674	8	57	59	49	44	39	27	32	27	29	58	53	47	37	32	25	33	26	28
	8	990	2097	3565	15	59	62	53	47	42	29	35	31	33	61	56	51	40	36	28	36	29	31
	10	1238	2621	4456	23	60	65	55	49	44	32	37	34	36	63	58	54	43	39	31	38	32	33
	12	1485	3145	5346	33	62	67	57	52	46	34	39	36	38	65	60	56	46	42	34	41	35	36

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the assumptions as refered to in table 1 for ceiling plenum and suspended ceiling absorption.*
5. *Lp values are including a room absorption of 10 dB/Oct. `*
6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	7	11	16	22	23	22	dB
125	5	10	14	21	22	20	dB
160	4	7	11	15	16	15	dB
200	4	6	9	13	14	13	dB
250	3	6	8	12	13	12	dB
315	3	5	8	11	12	12	dB
355	3	4	7	10	11	12	dB
400	3	4	6	10	11	12	dB

Induction VAV
air volume control terminals

Type NVOAOOB

Sound data Δ p = 250 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 250 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	18	28	25	20	20	-	--	--	--	28	29	20	18	-	-	--	--	--
	4	29	62	106	1	28	36	33	28	27	20	--	--	--	34	35	26	24	20	-	--	--	--
	6	44	94	160	2	33	41	38	33	32	24	--	--	--	37	38	31	29	24	-	--	--	--
	8	59	125	213	4	38	44	41	36	35	27	--	--	--	40	41	34	32	27	20	--	--	--
	10	74	156	266	6	41	46	44	39	37	29	--	--	--	42	43	36	35	30	23	22	--	--
	12	89	188	320,4	9	43	49	46	41	39	31	21	--	--	44	45	39	37	32	25	24	--	--
125	2	23	49	84	1	24	32	29	24	24	-	--	--	--	31	32	23	20	-	-	--	--	--
	4	47	99	168	2	34	40	37	32	31	23	--	--	--	37	38	29	26	22	-	--	--	--
	6	70	149	253	5	39	44	41	37	35	27	--	--	--	40	41	33	31	26	19	--	--	--
	8	94	198	337	8	43	48	45	40	38	30	20	--	--	43	44	37	34	29	22	22	--	--
	10	117	248	421	13	46	50	47	43	40	32	23	--	--	45	46	39	37	32	25	24	--	21
	12	140	296	504	19	49	52	49	45	42	34	25	--	22	47	48	42	39	34	27	27	--	23
160	2	39	82	139	0	32	36	32	28	27	20	--	--	--	34	30	26	22	18	-	--	--	--
	4	78	164	279	2	41	44	40	36	34	27	--	--	--	40	36	33	29	25	17	--	--	--
	6	116	246	418	3	46	49	45	41	38	31	22	--	--	43	39	37	33	29	21	20	--	--
	8	155	328	558	6	50	52	48	44	41	34	25	--	22	46	42	40	36	32	24	23	--	--
	10	194	410	697	10	52	55	51	47	43	36	28	22	25	48	44	43	39	34	27	25	--	--
	12	232	491	835,2	14	55	57	53	49	45	38	30	24	27	50	46	45	42	37	29	27	--	21
200	2	61	129	219	0	36	39	33	30	28	20	--	--	--	43	38	32	24	20	-	--	--	--
	4	122	258	439	2	44	47	41	38	35	27	--	--	--	49	44	38	31	26	19	24	--	--
	6	183	387	658	4	49	52	46	42	39	31	25	--	22	52	47	43	35	30	23	28	--	22
	8	244	516	878	8	53	55	49	46	42	34	28	23	25	55	50	46	38	34	26	30	22	25
	10	305	645	1097	12	55	58	51	48	44	36	31	26	28	57	52	48	41	36	29	33	25	27
	12	366	775	1317,6	18	57	60	54	50	46	38	33	28	30	59	54	51	44	39	31	35	28	29
250	2	96	203	345	1	41	42	35	31	29	20	--	--	--	46	41	35	26	22	-	21	--	--
	4	192	406	690	5	48	50	43	39	36	27	23	--	--	52	47	41	33	28	21	27	--	21
	6	288	609	1035	10	52	55	48	44	41	31	28	22	25	55	50	45	37	32	25	31	23	25
	8	383	812	1380	18	56	58	51	47	43	34	31	26	28	58	53	49	40	36	28	33	26	28
	10	479	1015	1725	28	58	61	54	50	46	37	33	29	31	60	55	51	43	38	31	36	29	30
	12	575	1218	2070	41	60	63	56	52	48	38	35	31	33	62	57	54	46	41	33	38	31	32
315	2	153	324	550	1	46	46	38	33	31	21	--	--	--	49	44	38	28	24	-	24	--	--
	4	306	648	1101	4	52	54	46	41	38	28	27	21	23	55	50	44	35	30	23	30	22	24
	6	459	971	1651	8	56	58	51	46	42	32	31	26	28	58	53	48	39	34	27	33	26	28
	8	612	1295	2202	15	58	62	54	49	45	35	34	30	32	61	56	52	42	38	30	36	30	31
	10	764	1619	2752	23	61	64	56	52	47	37	37	33	35	63	58	54	45	40	33	39	32	33
	12	917	1942	3301,2	34	62	66	59	54	49	39	39	35	37	65	60	57	48	43	35	41	35	36
355	2	195	412	701	1	48	48	39	34	31	21	21	--	--	51	46	39	29	25	18	26	--	20
	4	389	824	1401	5	54	56	47	42	38	28	28	23	25	56	51	46	36	32	24	31	24	26
	6	584	1236	2102	12	58	60	52	47	43	32	33	28	31	60	55	50	40	36	28	35	28	30
	8	779	1649	2803	22	60	64	55	50	45	35	36	32	34	62	57	53	43	39	31	38	31	33
	10	973	2061	3503	34	62	66	58	53	48	37	38	35	37	65	60	56	46	41	34	40	34	35
	12	1168	2473	4204,8	49	63	68	60	55	50	39	40	38	39	67	62	58	49	44	36	42	37	37
400	2	248	524	891	1	51	50	41	35	32	21	24	--	--	52	47	41	30	26	19	27	--	22
	4	495	1049	1783	4	56	58	49	43	39	28	30	25	28	58	53	47	37	33	25	33	26	28
	6	743	1573	2674	8	59	62	54	48	43	32	35	31	33	61	56	51	41	37	29	37	30	31
	8	990	2097	3565	15	61	66	57	51	46	35	38	35	36	64	59	55	44	40	32	39	33	34
	10	1238	2621	4456	23	63	68	60	54	48	38	40	38	39	66	61	57	47	42	35	42	36	37
	12	1485	3145	5346	33	64	70	62	56	50	39	42	40	41	68	63	60	50	45	37	44	39	39

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the assumptions as refered to in table 1 for ceiling plenum and suspended ceiling absorption.*
5. *Lp values are including a room absorption of 10 dB/Oct.*
6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	7	11	16	22	23	22	dB
125	5	10	14	21	22	20	dB
160	4	7	11	15	16	15	dB
200	4	6	9	13	14	13	dB
250	3	6	8	12	13	12	dB
315	3	5	8	11	12	12	dB
355	3	4	7	10	11	12	dB
400	3	4	6	10	11	12	dB

Induction VAV
air volume control terminals

Type NVOCOOB

Sound data Δ p = 150 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 150 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	-	18	-	-	-	-	--	--	--	25	26	-	-	-	-	--	--	--
	4	29	62	106	1	19	26	21	-	-	-	--	--	--	30	31	22	20	-	-	--	--	--
	6	44	94	160	2	25	30	26	19	-	-	--	--	--	34	35	26	24	20	-	--	--	--
	8	59	125	213	4	29	34	29	22	18	-	--	--	--	37	38	30	28	24	-	--	--	--
	10	74	156	266	6	32	36	32	25	20	-	--	--	--	39	40	33	31	27	19	--	--	--
	12	89	188	320,4	9	35	38	34	27	22	-	--	--	--	42	43	36	34	29	22	21	--	--
125	2	23	49	84	1	-	22	-	-	-	-	--	--	--	27	28	18	-	-	-	--	--	--
	4	47	99	168	2	25	30	24	18	-	-	--	--	--	33	34	25	22	18	-	--	--	--
	6	70	149	253	5	31	34	29	23	18	-	--	--	--	37	38	29	26	22	-	--	--	--
	8	94	198	337	8	35	38	32	26	21	-	--	--	--	40	41	33	30	26	18	--	--	--
	10	117	248	421	13	38	40	35	29	23	-	--	--	--	42	43	36	33	29	21	21	--	--
	12	140	296	504	19	40	42	37	31	25	-	--	--	--	44	45	38	36	31	24	24	--	--
160	2	39	82	139	0	23	26	20	-	-	-	--	--	--	31	27	21	-	-	-	--	--	--
	4	78	164	279	2	32	34	28	22	17	-	--	--	--	36	32	28	24	20	-	--	--	--
	6	116	246	418	3	37	39	33	27	21	-	--	--	--	40	36	32	29	24	17	--	--	--
	8	155	328	558	6	41	42	36	30	24	-	--	--	--	43	39	36	32	28	20	--	--	--
	10	194	410	697	10	44	45	39	33	27	18	--	--	--	45	41	39	35	31	23	22	--	--
	12	232	491	835,2	14	46	47	41	35	28	20	--	--	--	48	44	42	38	33	26	25	--	--
200	2	61	129	219	0	27	29	21	-	-	-	--	--	--	40	35	27	19	-	-	--	--	--
	4	122	258	439	2	36	37	29	23	19	-	--	--	--	45	40	34	26	22	-	20	--	--
	6	183	387	658	4	40	42	33	28	23	-	--	--	--	49	44	38	31	26	19	24	--	--
	8	244	516	878	8	44	45	37	31	26	-	--	--	--	52	47	42	34	30	22	27	--	21
	10	305	645	1097	12	47	48	39	34	28	18	21	--	--	54	49	45	37	33	25	30	21	24
	12	366	775	1317,6	18	49	50	41	36	30	20	23	--	--	56	51	48	40	35	28	32	24	26
250	2	96	203	345	1	32	32	23	17	-	-	--	--	--	42	37	30	21	18	-	--	--	--
	4	192	406	690	5	39	40	31	25	20	-	--	--	--	48	43	37	28	24	-	23	--	--
	6	288	609	1035	10	44	45	36	30	24	-	--	--	--	52	47	41	32	28	21	27	--	21
	8	383	812	1380	18	47	48	39	33	27	-	21	--	--	55	50	45	36	32	24	30	22	24
	10	479	1015	1725	28	49	51	42	36	29	19	23	--	20	57	52	48	39	35	27	33	25	27
	12	575	1218	2070	41	51	53	44	38	31	21	26	--	22	59	54	50	42	37	30	35	28	29
315	2	153	324	550	1	37	36	26	19	-	-	--	--	--	45	40	33	23	20	-	20	--	--
	4	306	648	1101	4	43	44	34	27	21	-	--	--	--	51	46	40	30	26	19	26	--	20
	6	459	971	1651	8	47	48	38	32	25	-	21	--	--	55	50	44	35	30	23	30	22	24
	8	612	1295	2202	15	50	52	42	35	28	-	24	--	21	58	53	48	38	34	26	33	25	27
	10	764	1619	2752	23	52	54	44	38	30	19	27	21	24	60	55	51	41	37	29	35	29	30
	12	917	1942	3301,2	34	54	56	46	40	32	21	29	23	26	62	57	53	44	39	32	38	31	33
355	2	195	412	701	1	40	37	27	20	-	-	--	--	--	47	42	35	24	21	-	22	--	--
	4	389	824	1401	5	45	45	35	28	22	-	--	--	--	53	48	41	31	27	20	28	--	22
	6	584	1236	2102	12	49	50	40	33	26	-	23	--	--	56	51	46	36	31	24	31	24	26
	8	779	1649	2803	22	51	53	43	36	29	17	26	20	23	59	54	49	39	35	27	34	27	29
	10	973	2061	3503	34	53	56	46	39	31	19	28	23	26	62	57	52	42	38	30	37	31	32
	12	1168	2473	4204,8	49	55	58	48	41	33	21	30	26	28	64	59	55	45	40	33	39	33	34
400	2	248	524	891	1	43	39	29	21	-	-	--	--	--	48	43	36	25	22	-	23	--	--
	4	495	1049	1783	4	48	47	37	29	23	-	21	--	--	54	49	43	32	28	21	29	21	24
	6	743	1573	2674	8	51	52	41	34	27	-	25	--	22	58	53	47	37	32	25	33	26	28
	8	990	2097	3565	15	53	55	45	37	30	17	28	23	25	61	56	51	40	36	28	36	29	31
	10	1238	2621	4456	23	54	58	47	39	32	20	30	26	28	63	58	54	43	39	31	38	32	33
	12	1485	3145	5346	33	56	60	49	42	34	22	32	28	30	65	60	56	46	42	34	41	35	36

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the assumptions as refered to in table 1 for ceiling plenum and suspended ceiling absorption.*
5. *Lp values are including a room absorption of 10 dB/Oct.*
6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	13	18	24	32	35	34	dB
125	11	17	22	31	34	32	dB
160	10	14	19	25	28	27	dB
200	10	13	17	23	26	25	dB
250	9	13	16	22	25	24	dB
315	9	12	16	21	24	24	dB
355	9	12	16	21	24	24	dB
400	8	11	13	19	22	23	dB

Induction VAV
air volume control terminals

Type NVOCOOB

Sound data Δ p = 250 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 250 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	-	21	17	-	-	-	--	--	--	28	29	20	18	-	-	--	--	--
	4	29	62	106	1	22	29	25	18	-	-	--	--	--	34	35	26	24	20	-	--	--	--
	6	44	94	160	2	27	34	30	23	20	-	--	--	--	37	38	31	29	24	-	--	--	--
	8	59	125	213	4	32	37	33	26	23	-	--	--	--	40	41	34	32	27	20	--	--	--
	10	74	156	266	6	35	39	36	29	25	-	--	--	--	42	43	36	35	30	23	22	--	--
	12	89	188	320,4	9	37	42	38	31	27	19	--	--	--	44	45	39	37	32	25	24	--	--
125	2	23	49	84	1	18	25	21	-	-	-	--	--	--	31	32	23	20	-	-	--	--	--
	4	47	99	168	2	28	33	29	22	19	-	--	--	--	37	38	29	26	22	-	--	--	--
	6	70	149	253	5	33	37	33	27	23	-	--	--	--	40	41	33	31	26	19	--	--	--
	8	94	198	337	8	37	41	37	30	26	18	--	--	--	43	44	37	34	29	22	22	--	--
	10	117	248	421	13	40	43	39	33	28	20	--	--	--	45	46	39	37	32	25	24	--	21
	12	140	296	504	19	43	45	41	35	30	22	--	--	--	47	48	42	39	34	27	27	--	23
160	2	39	82	139	0	26	29	24	18	-	-	--	--	--	34	30	26	22	18	-	--	--	--
	4	78	164	279	2	35	37	32	26	22	-	--	--	--	40	36	33	29	25	17	--	--	--
	6	116	246	418	3	40	42	37	31	26	19	--	--	--	43	39	37	33	29	21	20	--	--
	8	155	328	558	6	44	45	40	34	29	22	--	--	--	46	42	40	36	32	24	23	--	--
	10	194	410	697	10	46	48	43	37	31	24	21	--	--	48	44	43	39	34	27	25	--	--
	12	232	491	835,2	14	49	50	45	39	33	26	23	--	--	50	46	45	42	37	29	27	--	21
200	2	61	129	219	0	30	32	25	20	-	-	--	--	--	43	38	32	24	20	-	--	--	--
	4	122	258	439	2	38	40	33	28	23	-	--	--	--	49	44	38	31	26	19	24	--	--
	6	183	387	658	4	43	45	38	32	27	19	--	--	--	52	47	43	35	30	23	28	--	22
	8	244	516	878	8	47	48	41	36	30	22	21	--	--	55	50	46	38	34	26	30	22	25
	10	305	645	1097	12	49	51	43	38	32	24	24	--	20	57	52	48	41	36	29	33	25	27
	12	366	775	1317,6	18	51	53	46	40	34	26	26	--	23	59	54	51	44	39	31	35	28	29
250	2	96	203	345	1	35	35	27	21	17	-	--	--	--	46	41	35	26	22	-	21	--	--
	4	192	406	690	5	42	43	35	29	24	-	--	--	--	52	47	41	33	28	21	27	--	21
	6	288	609	1035	10	46	48	40	34	29	19	21	--	--	55	50	45	37	32	25	31	23	25
	8	383	812	1380	18	50	51	43	37	31	22	24	--	21	58	53	49	40	36	28	33	26	28
	10	479	1015	1725	28	52	54	46	40	34	25	27	21	24	60	55	51	43	38	31	36	29	30
	12	575	1218	2070	41	54	56	48	42	36	26	29	23	26	62	57	54	46	41	33	38	31	32
315	2	153	324	550	1	40	39	30	23	19	-	--	--	--	49	44	38	28	24	-	24	--	--
	4	306	648	1101	4	46	47	38	31	26	-	--	--	--	55	50	44	35	30	23	30	22	24
	6	459	971	1651	8	50	51	43	36	30	20	24	--	21	58	53	48	39	34	27	33	26	28
	8	612	1295	2202	15	52	55	46	39	33	23	27	22	24	61	56	52	42	38	30	36	30	31
	10	764	1619	2752	23	55	57	48	42	35	25	30	25	27	63	58	54	45	40	33	39	32	33
	12	917	1942	3301,2	34	56	59	51	44	37	27	32	27	30	65	60	57	48	43	35	41	35	36
355	2	195	412	701	1	42	41	31	24	19	-	--	--	--	51	46	39	29	25	18	26	--	20
	4	389	824	1401	5	48	49	39	32	26	-	22	--	--	56	51	46	36	32	24	31	24	26
	6	584	1236	2102	12	52	53	44	37	31	20	26	20	23	60	55	50	40	36	28	35	28	30
	8	779	1649	2803	22	54	57	47	40	33	23	29	24	27	62	57	53	43	39	31	38	31	33
	10	973	2061	3503	34	56	59	50	43	36	25	31	27	29	65	60	56	46	41	34	40	34	35
	12	1168	2473	4204,8	49	57	61	52	45	38	27	33	29	32	67	62	58	49	44	36	42	37	37
400	2	248	524	891	1	45	43	33	25	20	-	--	--	--	52	47	41	30	26	19	27	--	22
	4	495	1049	1783	4	50	51	41	33	27	-	24	--	20	58	53	47	37	33	25	33	26	28
	6	743	1573	2674	8	53	55	46	38	31	20	28	22	25	61	56	51	41	37	29	37	30	31
	8	990	2097	3565	15	55	59	49	41	34	23	31	26	29	64	59	55	44	40	32	39	33	34
	10	1238	2621	4456	23	57	61	52	44	36	26	33	29	31	66	61	57	47	42	35	42	36	37
	12	1485	3145	5346	33	58	63	54	46	38	27	35	32	34	68	63	60	50	45	37	44	39	39

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the assumptions as refered to in table 1 for ceiling plenum and suspended ceiling absorption.*
5. *Lp values are including a room absorption of 10 dB/Oct.*
6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	13	18	24	32	35	34	dB
125	11	17	22	31	34	32	dB
160	10	14	19	25	28	27	dB
200	10	13	17	23	26	25	dB
250	9	13	16	22	25	24	dB
315	9	12	16	21	24	24	dB
355	9	12	16	21	24	24	dB
400	8	11	13	19	22	23	dB

Induction VAV
air volume control terminals

Type NVOG . OB
NVON . OB

Sound data Δ p = 150 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 150 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	-	25	21	-	-	-	--	--	--	25	26	-	-	-	-	--	--	--
	4	29	62	106	2	25	33	29	24	23	-	--	--	--	30	31	22	20	-	-	--	--	--
	6	44	94	160	4	31	37	34	29	27	18	--	--	--	34	35	26	24	20	-	--	--	--
	8	59	125	213	7	35	41	37	32	30	21	--	--	--	37	38	30	28	24	-	--	--	--
	10	74	156	266	10	38	43	40	35	32	23	--	--	--	39	40	33	31	27	19	--	--	--
	12	89	188	320,4	15	41	45	42	37	34	25	--	--	--	42	43	36	34	29	22	21	--	--
125	2	23	49	84	1	21	29	24	20	19	-	--	--	--	27	28	18	-	-	-	--	--	--
	4	47	99	168	5	31	37	32	28	26	17	--	--	--	33	34	25	22	18	-	--	--	--
	6	70	149	253	11	37	41	37	33	30	21	--	--	--	37	38	29	26	22	-	--	--	--
	8	94	198	337	19	41	45	40	36	33	24	--	--	--	40	41	33	30	26	18	--	--	--
	10	117	248	421	29	44	47	43	39	35	26	--	--	--	42	43	36	33	29	21	21	--	--
	12	140	296	504	42	46	49	45	41	37	28	22	--	--	44	45	38	36	31	24	24	--	--
160	2	39	82	139	1	29	33	28	24	22	-	--	--	--	31	27	21	-	-	-	--	--	--
	4	78	164	279	5	38	41	36	32	29	21	--	--	--	36	32	28	24	20	-	--	--	--
	6	116	246	418	12	43	46	41	37	33	25	--	--	--	40	36	32	29	24	17	--	--	--
	8	155	328	558	22	47	49	44	40	36	28	22	--	--	43	39	36	32	28	20	--	--	--
	10	194	410	697	34	50	52	47	43	39	30	25	--	21	45	41	39	35	31	23	22	--	--
	12	232	491	835,2	49	52	54	49	45	40	32	27	21	23	48	44	42	38	33	26	25	--	--
200	2	61	129	219	2	33	36	29	25	23	-	--	--	--	40	35	27	19	-	-	--	--	--
	4	122	258	439	6	42	44	37	33	31	21	--	--	--	45	40	34	26	22	-	20	--	--
	6	183	387	658	14	46	49	41	38	35	25	21	--	--	49	44	38	31	26	19	24	--	--
	8	244	516	878	25	50	52	45	41	38	28	25	--	22	52	47	42	34	30	22	27	--	21
	10	305	645	1097	38	53	55	47	44	40	30	27	22	24	54	49	45	37	33	25	30	21	24
	12	366	775	1317,6	55	55	57	49	46	42	32	30	24	27	56	51	48	40	35	28	32	24	26
250	2	96	203	345	2	38	39	31	27	25	-	--	--	--	42	37	30	21	18	-	--	--	--
	4	192	406	690	9	45	47	39	35	32	21	--	--	--	48	43	37	28	24	-	23	--	--
	6	288	609	1035	21	50	52	44	40	36	25	24	--	21	52	47	41	32	28	21	27	--	21
	8	383	812	1380	37	53	55	47	43	39	28	28	22	25	55	50	45	36	32	24	30	22	24
	10	479	1015	1725	58	55	58	50	46	41	31	30	25	28	57	52	48	39	35	27	33	25	27
	12	575	1218	2070	83	57	60	52	48	43	33	32	28	30	59	54	50	42	37	30	35	28	29
315	2	153	324	550	2	43	43	34	29	26	-	--	--	--	45	40	33	23	20	-	20	--	--
	4	306	648	1101	8	49	51	42	37	33	22	23	--	--	51	46	40	30	26	19	26	--	20
	6	459	971	1651	18	53	55	46	42	37	26	28	22	25	55	50	44	35	30	23	30	22	24
	8	612	1295	2202	32	56	59	50	45	40	29	31	26	29	58	53	48	38	34	26	33	25	27
	10	764	1619	2752	50	58	61	52	48	42	31	33	29	31	60	55	51	41	37	29	35	29	30
	12	917	1942	3301,2	71	60	63	54	50	44	33	35	32	34	62	57	53	44	39	32	38	31	33
355	2	195	412	701	3	46	44	35	30	27	-	--	--	--	47	42	35	24	21	-	22	--	--
	4	389	824	1401	12	51	52	43	38	34	22	25	--	22	53	48	41	31	27	20	28	--	22
	6	584	1236	2102	28	55	57	48	43	38	26	30	25	27	56	51	46	36	31	24	31	24	26
	8	779	1649	2803	50	57	60	51	46	41	29	33	28	31	59	54	49	39	35	27	34	27	29
	10	973	2061	3503	78	59	63	54	49	43	31	35	31	33	62	57	52	42	38	30	37	31	32
	12	1168	2473	4204,8	112	61	65	56	51	45	33	37	34	36	64	59	55	45	40	33	39	33	34
400	2	248	524	891	2	49	46	37	31	28	-	21	--	--	48	43	36	25	22	-	23	--	--
	4	495	1049	1783	9	54	54	45	39	35	22	27	21	24	54	49	43	32	28	21	29	21	24
	6	743	1573	2674	20	57	59	49	44	39	27	32	27	29	58	53	47	37	32	25	33	26	28
	8	990	2097	3565	36	59	62	53	47	42	29	35	31	33	61	56	51	40	36	28	36	29	31
	10	1238	2621	4456	57	60	65	55	49	44	32	37	34	36	63	58	54	43	39	31	38	32	33
	12	1485	3145	5346	82	62	67	57	52	46	34	39	36	38	65	60	56	46	42	34	41	35	36

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the assumptions as refered to in table 1 for ceiling plenum and suspended ceiling absorption.*
5. *Lp values are including a room absorption of 10 dB/Oct.*
6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	7	11	16	22	23	22	dB
125	5	10	14	21	22	20	dB
160	4	7	11	15	16	15	dB
200	4	6	9	13	14	13	dB
250	3	6	8	12	13	12	dB
315	3	5	8	11	12	12	dB
355	3	4	7	10	11	12	dB
400	3	4	6	10	11	12	dB

Induction VAV
air volume control terminals

Type NVOG . OB
NVON . OB

Sound data Δ p = 250 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 250 Pa																
						discharge sound									radiated sound							
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	18	28	25	20	20	-	--	--	--	28	29	20	18	-	-	--	--	--
	4	29	62	106	2	28	36	33	28	27	20	--	--	--	34	35	26	24	20	-	--	--	--
	6	44	94	160	4	33	41	38	33	32	24	--	--	--	37	38	31	29	24	-	--	--	--
	8	59	125	213	7	38	44	41	36	35	27	--	--	--	40	41	34	32	27	20	--	--	--
	10	74	156	266	10	41	46	44	39	37	29	--	--	--	42	43	36	35	30	23	22	--	--
	12	89	188	320,4	15	43	49	46	41	39	31	21	--	--	44	45	39	37	32	25	24	--	--
125	2	23	49	84	1	24	32	29	24	24	-	--	--	--	31	32	23	20	-	-	--	--	--
	4	47	99	168	5	34	40	37	32	31	23	--	--	--	37	38	29	26	22	-	--	--	--
	6	70	149	253	11	39	44	41	37	35	27	--	--	--	40	41	33	31	26	19	--	--	--
	8	94	198	337	19	43	48	45	40	38	30	20	--	--	43	44	37	34	29	22	22	--	--
	10	117	248	421	29	46	50	47	43	40	32	23	--	--	45	46	39	37	32	25	24	--	21
	12	140	296	504	42	49	52	49	45	42	34	25	--	22	47	48	42	39	34	27	27	--	23
160	2	39	82	139	1	32	36	32	28	27	20	--	--	--	34	30	26	22	18	-	--	--	--
	4	78	164	279	5	41	44	40	36	34	27	--	--	--	40	36	33	29	25	17	--	--	--
	6	116	246	418	12	46	49	45	41	38	31	22	--	--	43	39	37	33	29	21	20	--	--
	8	155	328	558	22	50	52	48	44	41	34	25	--	22	46	42	40	36	32	24	23	--	--
	10	194	410	697	34	52	55	51	47	43	36	28	22	25	48	44	43	39	34	27	25	--	--
	12	232	491	835,2	49	55	57	53	49	45	38	30	24	27	50	46	45	42	37	29	27	--	21
200	2	61	129	219	2	36	39	33	30	28	20	--	--	--	43	38	32	24	20	-	--	--	--
	4	122	258	439	6	44	47	41	38	35	27	--	--	--	49	44	38	31	26	19	24	--	--
	6	183	387	658	14	49	52	46	42	39	31	25	--	22	52	47	43	35	30	23	28	--	22
	8	244	516	878	25	53	55	49	46	42	34	28	23	25	55	50	46	38	34	26	30	22	25
	10	305	645	1097	38	55	58	51	48	44	36	31	26	28	57	52	48	41	36	29	33	25	27
	12	366	775	1317,6	55	57	60	54	50	46	38	33	28	30	59	54	51	44	39	31	35	28	29
250	2	96	203	345	2	41	42	35	31	29	20	--	--	--	46	41	35	26	22	-	21	--	--
	4	192	406	690	9	48	50	43	39	36	27	23	--	--	52	47	41	33	28	21	27	--	21
	6	288	609	1035	21	52	55	48	44	41	31	28	22	25	55	50	45	37	32	25	31	23	25
	8	383	812	1380	37	56	58	51	47	43	34	31	26	28	58	53	49	40	36	28	33	26	28
	10	479	1015	1725	58	58	61	54	50	46	37	33	29	31	60	55	51	43	38	31	36	29	30
	12	575	1218	2070	83	60	63	56	52	48	38	35	31	33	62	57	54	46	41	33	38	31	32
315	2	153	324	550	2	46	46	38	33	31	21	--	--	--	49	44	38	28	24	-	24	--	--
	4	306	648	1101	8	52	54	46	41	38	28	27	21	23	55	50	44	35	30	23	30	22	24
	6	459	971	1651	18	56	58	51	46	42	32	31	26	28	58	53	48	39	34	27	33	26	28
	8	612	1295	2202	32	58	62	54	49	45	35	34	30	32	61	56	52	42	38	30	36	30	31
	10	764	1619	2752	50	61	64	56	52	47	37	37	33	35	63	58	54	45	40	33	39	32	33
	12	917	1942	3301,2	71	62	66	59	54	49	39	39	35	37	65	60	57	48	43	35	41	35	36
355	2	195	412	701	3	48	48	39	34	31	21	21	--	--	51	46	39	29	25	18	26	--	20
	4	389	824	1401	12	54	56	47	42	38	28	28	23	25	56	51	46	36	32	24	31	24	26
	6	584	1236	2102	28	58	60	52	47	43	32	33	28	31	60	55	50	40	36	28	35	28	30
	8	779	1649	2803	50	60	64	55	50	45	35	36	32	34	62	57	53	43	39	31	38	31	33
	10	973	2061	3503	78	62	66	58	53	48	37	38	35	37	65	60	56	46	41	34	40	34	35
	12	1168	2473	4204,8	112	63	68	60	55	50	39	40	38	39	67	62	58	49	44	36	42	37	37
400	2	248	524	891	2	51	50	41	35	32	21	24	--	--	52	47	41	30	26	19	27	--	22
	4	495	1049	1783	9	56	58	49	43	39	28	30	25	28	58	53	47	37	33	25	33	26	28
	6	743	1573	2674	20	59	62	54	48	43	32	35	31	33	61	56	51	41	37	29	37	30	31
	8	990	2097	3565	36	61	66	57	51	46	35	38	35	36	64	59	55	44	40	32	39	33	34
	10	1238	2621	4456	57	63	68	60	54	48	38	40	38	39	66	61	57	47	42	35	42	36	37
	12	1485	3145	5346	82	64	70	62	56	50	39	42	40	41	68	63	60	50	45	37	44	39	39

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the assumptions as refered to in table 1 for ceiling plenum and suspended ceiling absorption.*
5. *Lp values are including a room absorption of 10 dB/Oct.*
6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	7	11	16	22	23	22	dB
125	5	10	14	21	22	20	dB
160	4	7	11	15	16	15	dB
200	4	6	9	13	14	13	dB
250	3	6	8	12	13	12	dB
315	3	5	8	11	12	12	dB
355	3	4	7	10	11	12	dB
400	3	4	6	10	11	12	dB

Induction VAV
air volume control terminals

Type NVOJ . OB
NVOQ . OB

Sound data Δ p = 150 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 150 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	-	18	-	-	-	-	--	--	--	25	26	-	-	-	-	--	--	--
	4	29	62	106	2	19	26	21	-	-	-	--	--	--	30	31	22	20	-	-	--	--	--
	6	44	94	160	4	25	30	26	19	-	-	--	--	--	34	35	26	24	20	-	--	--	--
	8	59	125	213	7	29	34	29	22	18	-	--	--	--	37	38	30	28	24	-	--	--	--
	10	74	156	266	10	32	36	32	25	20	-	--	--	--	39	40	33	31	27	19	--	--	--
	12	89	188	320,4	15	35	38	34	27	22	-	--	--	--	42	43	36	34	29	22	21	--	--
125	2	23	49	84	1	-	22	-	-	-	-	--	--	--	27	28	18	-	-	-	--	--	--
	4	47	99	168	5	25	30	24	18	-	-	--	--	--	33	34	25	22	18	-	--	--	--
	6	70	149	253	11	31	34	29	23	18	-	--	--	--	37	38	29	26	22	-	--	--	--
	8	94	198	337	19	35	38	32	26	21	-	--	--	--	40	41	33	30	26	18	--	--	--
	10	117	248	421	29	38	40	35	29	23	-	--	--	--	42	43	36	33	29	21	21	--	--
	12	140	296	504	42	40	42	37	31	25	-	--	--	--	44	45	38	36	31	24	24	--	--
160	2	39	82	139	1	23	26	20	-	-	-	--	--	--	31	27	21	-	-	-	--	--	--
	4	78	164	279	5	32	34	28	22	17	-	--	--	--	36	32	28	24	20	-	--	--	--
	6	116	246	418	12	37	39	33	27	21	-	--	--	--	40	36	32	29	24	17	--	--	--
	8	155	328	558	22	41	42	36	30	24	-	--	--	--	43	39	36	32	28	20	--	--	--
	10	194	410	697	34	44	45	39	33	27	18	--	--	--	45	41	39	35	31	23	22	--	--
	12	232	491	835,2	49	46	47	41	35	28	20	--	--	--	48	44	42	38	33	26	25	--	--
200	2	61	129	219	2	27	29	21	-	-	-	--	--	--	40	35	27	19	-	-	--	--	--
	4	122	258	439	6	36	37	29	23	19	-	--	--	--	45	40	34	26	22	-	20	--	--
	6	183	387	658	14	40	42	33	28	23	-	--	--	--	49	44	38	31	26	19	24	--	--
	8	244	516	878	25	44	45	37	31	26	-	--	--	--	52	47	42	34	30	22	27	--	21
	10	305	645	1097	38	47	48	39	34	28	18	21	--	--	54	49	45	37	33	25	30	21	24
	12	366	775	1317,6	55	49	50	41	36	30	20	23	--	--	56	51	48	40	35	28	32	24	26
250	2	96	203	345	2	32	32	23	17	-	-	--	--	--	42	37	30	21	18	-	--	--	--
	4	192	406	690	9	39	40	31	25	20	-	--	--	--	48	43	37	28	24	-	23	--	--
	6	288	609	1035	21	44	45	36	30	24	-	--	--	--	52	47	41	32	28	21	27	--	21
	8	383	812	1380	37	47	48	39	33	27	-	21	--	--	55	50	45	36	32	24	30	22	24
	10	479	1015	1725	58	49	51	42	36	29	19	23	--	20	57	52	48	39	35	27	33	25	27
	12	575	1218	2070	83	51	53	44	38	31	21	26	--	22	59	54	50	42	37	30	35	28	29
315	2	153	324	550	2	37	36	26	19	-	-	--	--	--	45	40	33	23	20	-	20	--	--
	4	306	648	1101	8	43	44	34	27	21	-	--	--	--	51	46	40	30	26	19	26	--	20
	6	459	971	1651	18	47	48	38	32	25	-	21	--	--	55	50	44	35	30	23	30	22	24
	8	612	1295	2202	32	50	52	42	35	28	-	24	--	21	58	53	48	38	34	26	33	25	27
	10	764	1619	2752	50	52	54	44	38	30	19	27	21	24	60	55	51	41	37	29	35	29	30
	12	917	1942	3301,2	71	54	56	46	40	32	21	29	23	26	62	57	53	44	39	32	38	31	33
355	2	195	412	701	3	40	37	27	20	-	-	--	--	--	47	42	35	24	21	-	22	--	--
	4	389	824	1401	12	45	45	35	28	22	-	--	--	--	53	48	41	31	27	20	28	--	22
	6	584	1236	2102	28	49	50	40	33	26	-	23	--	--	56	51	46	36	31	24	31	24	26
	8	779	1649	2803	50	51	53	43	36	29	17	26	20	23	59	54	49	39	35	27	34	27	29
	10	973	2061	3503	78	53	56	46	39	31	19	28	23	26	62	57	52	42	38	30	37	31	32
	12	1168	2473	4204,8	112	55	58	48	41	33	21	30	26	28	64	59	55	45	40	33	39	33	34
400	2	248	524	891	2	43	39	29	21	-	-	--	--	--	48	43	36	25	22	-	23	--	--
	4	495	1049	1783	9	48	47	37	29	23	-	21	--	--	54	49	43	32	28	21	29	21	24
	6	743	1573	2674	20	51	52	41	34	27	-	25	--	22	58	53	47	37	32	25	33	26	28
	8	990	2097	3565	36	53	55	45	37	30	17	28	23	25	61	56	51	40	36	28	36	29	31
	10	1238	2621	4456	57	54	58	47	39	32	20	30	26	28	63	58	54	43	39	31	38	32	33
	12	1485	3145	5346	82	56	60	49	42	34	22	32	28	30	65	60	56	46	42	34	41	35	36

1. *Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.*
2. *Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".*
3. *The discharge sound pressure levels are determined with the assumptions as refered to in table 1 for downstream ductwork including a diffuser with insulated plenum box.*
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6. *dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".*
7. *Δps is static pressure drop across VAV air volume control terminal with damper fully open.*
8. *For non standard applications and/or selections, please contatct our technical staff.*

Table 1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	14	20	26	35	38	37	dB
125	12	18	24	34	37	35	dB
160	11	16	21	28	31	30	dB
200	11	15	19	26	29	28	dB
250	10	14	18	25	28	27	dB
315	10	13	18	25	27	27	dB
355	10	13	18	25	27	27	dB
400	9	12	16	23	25	26	dB

Induction VAV
air volume control terminals

Type NVOJ . OB
NVOQ . OB

Sound data Δ p = 250 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 250 Pa																	
						discharge sound									radiated sound								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	0	-	21	17	-	-	-	--	--	--	28	29	20	18	-	-	--	--	--
	4	29	62	106	2	22	29	25	18	-	-	--	--	--	34	35	26	24	20	-	--	--	--
	6	44	94	160	4	27	34	30	23	20	-	--	--	--	37	38	31	29	24	-	--	--	--
	8	59	125	213	7	32	37	33	26	23	-	--	--	--	40	41	34	32	27	20	--	--	--
	10	74	156	266	10	35	39	36	29	25	-	--	--	--	42	43	36	35	30	23	22	--	--
	12	89	188	320	15	37	42	38	31	27	19	--	--	--	44	45	39	37	32	25	24	--	--
125	2	23	49	84	1	18	25	21	-	-	-	--	--	--	31	32	23	20	-	-	--	--	--
	4	47	99	168	5	28	33	29	22	19	-	--	--	--	37	38	29	26	22	-	--	--	--
	6	70	149	253	11	33	37	33	27	23	-	--	--	--	40	41	33	31	26	19	--	--	--
	8	94	198	337	19	37	41	37	30	26	18	--	--	--	43	44	37	34	29	22	22	--	--
	10	117	248	421	29	40	43	39	33	28	20	--	--	--	45	46	39	37	32	25	24	--	21
	12	140	296	504	42	43	45	41	35	30	22	--	--	--	47	48	42	39	34	27	27	--	23
160	2	39	82	139	1	26	29	24	18	-	-	--	--	--	34	30	26	22	18	-	--	--	--
	4	78	164	279	5	35	37	32	26	22	-	--	--	--	40	36	33	29	25	17	--	--	--
	6	116	246	418	12	40	42	37	31	26	19	--	--	--	43	39	37	33	29	21	20	--	--
	8	155	328	558	22	44	45	40	34	29	22	--	--	--	46	42	40	36	32	24	23	--	--
	10	194	410	697	34	46	48	43	37	31	24	21	--	--	48	44	43	39	34	27	25	--	--
	12	232	491	835	49	49	50	45	39	33	26	23	--	--	50	46	45	42	37	29	27	--	21
200	2	61	129	219	2	30	32	25	20	-	-	--	--	--	43	38	32	24	20	-	--	--	--
	4	122	258	439	6	38	40	33	28	23	-	--	--	--	49	44	38	31	26	19	24	--	--
	6	183	387	658	14	43	45	38	32	27	19	--	--	--	52	47	43	35	30	23	28	--	22
	8	244	516	878	25	47	48	41	36	30	22	21	--	--	55	50	46	38	34	26	30	22	25
	10	305	645	1097	38	49	51	43	38	32	24	24	--	20	57	52	48	41	36	29	33	25	27
	12	366	775	1318	55	51	53	46	40	34	26	26	--	23	59	54	51	44	39	31	35	28	29
250	2	96	203	345	2	35	35	27	21	17	-	--	--	--	46	41	35	26	22	-	21	--	--
	4	192	406	690	9	42	43	35	29	24	-	--	--	--	52	47	41	33	28	21	27	--	21
	6	288	609	1035	21	46	48	40	34	29	19	21	--	--	55	50	45	37	32	25	31	23	25
	8	383	812	1380	37	50	51	43	37	31	22	24	--	21	58	53	49	40	36	28	33	26	28
	10	479	1015	1725	58	52	54	46	40	34	25	27	21	24	60	55	51	43	38	31	36	29	30
	12	575	1218	2070	83	54	56	48	42	36	26	29	23	26	62	57	54	46	41	33	38	31	32
315	2	153	324	550	2	40	39	30	23	19	-	--	--	--	49	44	38	28	24	-	24	--	--
	4	306	648	1101	8	46	47	38	31	26	-	--	--	--	55	50	44	35	30	23	30	22	24
	6	459	971	1651	18	50	51	43	36	30	20	24	--	21	58	53	48	39	34	27	33	26	28
	8	612	1295	2202	32	52	55	46	39	33	23	27	22	24	61	56	52	42	38	30	36	30	31
	10	764	1619	2752	50	55	57	48	42	35	25	30	25	27	63	58	54	45	40	33	39	32	33
	12	917	1942	3301	71	56	59	51	44	37	27	32	27	30	65	60	57	48	43	35	41	35	36
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	10	973	2061	3503	78	56	59	50	43	36	25	31	27	29	65	60	56	46	41	34	40	34	35
	12	1168	2473	4205	112	57	61	52	45	38	27	33	29	32	67	62	58	49	44	36	42	37	37
400	2	248	524	891	2	45	43	33	25	20	-	--	--	--	52	47	41	30	26	19	27	--	22
	4	495	1049	1783	9	50	51	41	33	27	-	24	--	20	58	53	47	37	33	25	33	26	28
	6	743	1573	2674	20	53	55	46	38	31	20	28	22	25	61	56	51	41	37	29	37	30	31
	8	990	2097	3565	36	55	59	49	41	34	23	31	26	29	64	59	55	44	40	32	39	33	34
	10	1238	2621	4456	57	57	61	52	44	36	26	33	29	31	66	61	57	47	42	35	42	36	37
	12	1485	3145	5346	82	58	63	54	46	38	27	35	32	34	68	63	60	50	45	37	44	39	39

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355	10	13	18	25	27	27	dB
400	9	12	16	23	25	26	dB

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