ONLINE SELECTION TOOL
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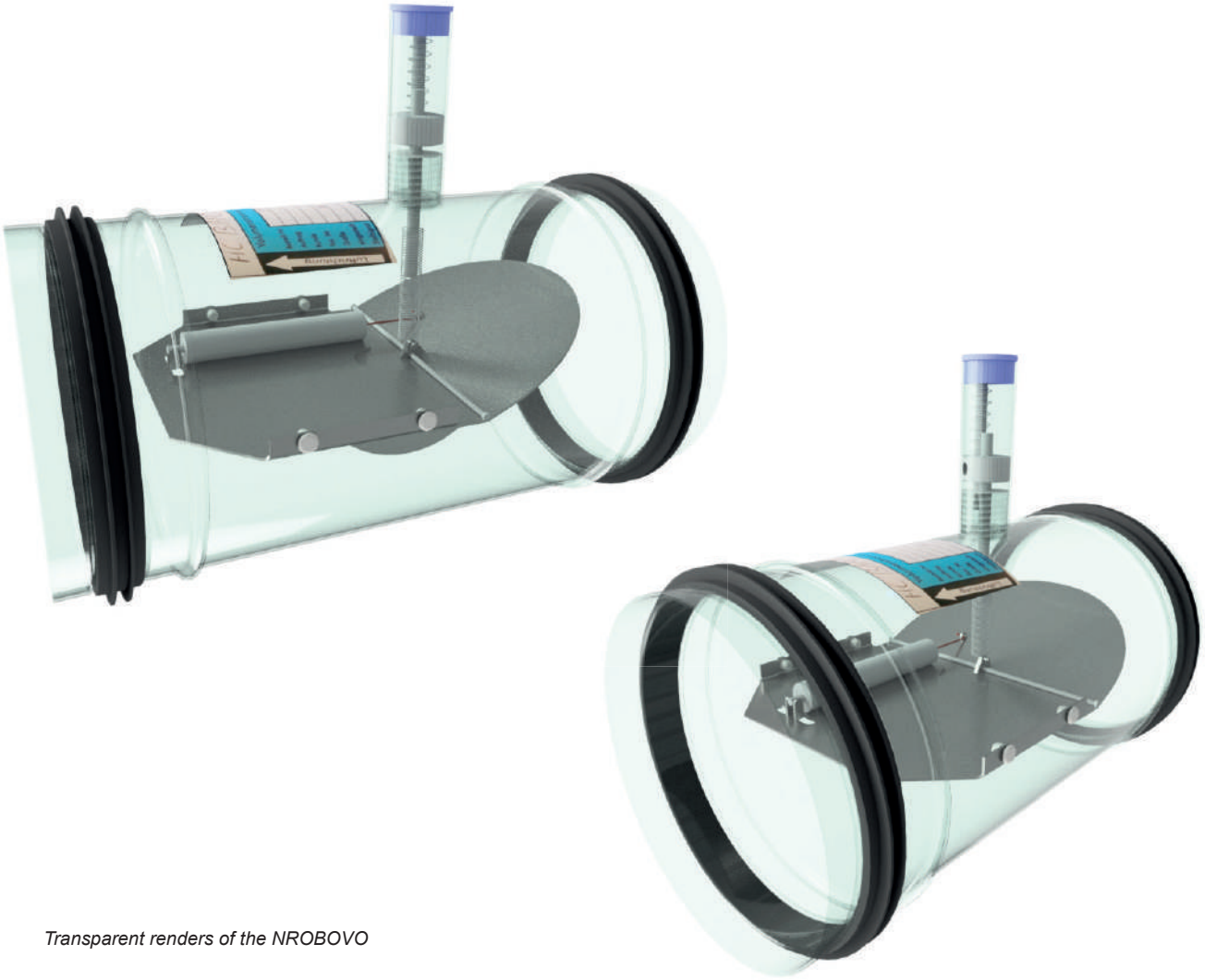
CIRCULAR CAV AIR VOLUME CONTROL TERMINALS

SYSTEM POWERED MECHANICAL REGULATOR

NR | NT TYPE

BARCOL-AIR
AIR DISTRIBUTION

type NROBOVO



Transparent renders of the NROBOVO

Composition type designation:

N - R - O - B - O - V - O

N Position 1: **Product group**

N = constant air volume terminal

R Position 2: **Function**

O = not applicable
R = single wall, circular CAV terminals with system powered mechanical regulator
T = double wall, circular CAV terminals with system powered mechanical regulator
1 = non standard, specify separately

O Position 3: **Control**

O = system powered, mechanical regulator (standard)
1 = non standard, specify separately

B Position 4: **Outlet**

O = not applicable
B = circular outlet
C = 4 circular outlets ('Octopus')
G = rectangular outlet and provision for integral hot water reheat coil
H = Circular 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
P = circular outlet and provision for integral electric reheat coil
Q = 4 circular outlets and provision for integral electric reheat coil
1 = non standard, specify separately

O 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
T = 230VAC-1Ph Modulating control (Thyristor)
V = 400VAC-3Ph Modulating control (Thyristor)
1 = non standard, specify separately

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

O = not applicable
V = factory pre-set with provision for site adjustment across the full volume range
1 = non standard, specify separately

O Position 7: **Finish**

O = standard finish (galvanized steel)
E = epoxy coating
1 = non standard, specify separately

Ordering example:

N	R	O	B	O	V	O		0	2	0	0		Q	6	5	0
See above								Model					Air volume (m^3/h)			

Ordering information:

Standard terminals:

- quantity of terminals
- complete 7 digit code
- terminal size or model
- air volume setting (Q) in m^3/h
- 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

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

Circular CAV air volume control terminals

Technical data

Type N(R/T).....

Application

N(R/T) series circular, constant volume terminals with system powered mechanical regulator are designed to keep a constant air flow, independent of the inlet static pressure without the use of a DDC CAV/VAV controller/actuator. These terminals save commissioning time on site and are suitable either for supply or return air in new or refurbishment projects.

Features:
- Single wall or double wall.
- Pressure independent from 50 – 1000 Pa.
- Compact design.
- Low pressure loss over the terminal.
- Control accuracy ±10% (in the recommended flow range).
- Control accuracy for air volumes below 100 m^3/h will be ±10m^3/h.
- Temperature insensitive (-30°C to +100°C).
- Can be mounted in any position.
- Factory pre-set, saves commissioning time on site.
- Provision for on-site adjustment across the full volume range.
- Maintenance free.
- Factory fitted discharge plenum with built-in hot water or electric reheat coil.
- Low noise production.
- Casing air leakage complying to NEN-EN 1751 class C.

Technical information

Casing:
- Terminal casing made of galvanized sheet steel (non spiral) with sleeve connection with rubber gasket.
- Optional: finish with epoxy/RAL coating is available upon request.
- Casing air leakage complying to NEN-EN 1751 class C, Class II VDI 3803 or DIN 24 194.
- Duct-sleeve connections at the in- and outlet are suitable for DIN 24 145 or DIN 24 146 connections.
- In case of double wall construction 25 mm insulation material is used completely enclosed by the double wall construction.
- Type NROB is optionally available in SS 304 or SS 316 (add. cost)

Damper:
- The damper blade is mounted in a smooth and maintenance-free PTFE bushing. A pneumatic piston damper prevents overshoots and oscillation of the control plate and ensures an accurate response and control behaviour.
- Damper blade: aluminium.
- Damper shaft: stainless steel with self lubricating Nylon bearings.

Discharge plenum:
- Made of galvanized sheet steel with 13 mm internal insulation (30 kg/m^3).
- Plenum with standard rectangular or 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 balancing 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...- type documentation.

Controls:
- The factory setpoint is indicated on the pre-calibrated terminal.
- If the CAV terminal is equipped with a electric or hot water reheat coil, seperate temperature control is required.

Finish:
- Standard finish galvanized steel.
- Optional: finish with epoxy/RAL coating is available upon request.
- Type NROB is optionally available in SS 304 or SS 316 (add. cost)

Delivery format:
- The constant air volume (*Q in increments of 5 m3/h) and other necessary calibration data must be provided together with the purchase order.

Specify as

Example:
Supply and install, circular, pressure independent constant air volume terminals with system powered mechanical regulator; control accuracy ±10% of CAV. The construction shall be galvanized steel with a casing leakage rate classified according to class II, VDI 3803/ DIN 24 194.
The CAV terminals shall have an aluminium damper blade with stainless steel shaft rotating in self lubricating Nylon bearings.
The damper blade is mounted in a smooth and maintenance-free PTFE bushing. A pneumatic piston damper prevents overshoots and oscillation of the control plate and ensures an accurate response and control behaviour.

Air volume 161 l/s
Terminal size 200 mm
Max. pressure loss 60 Pa
Max. discharge sound index < NC35 (@250Pa Δ p)
Max. radiated sound index < NC28 @250Pa Δ p)

Barcol-Air control type “V”, factory set with provision for site adjustment across the full volume range.

Ordering example : type – model – airflow (m3/h) = NROBOVO - 0200 - Q580 (= 161 l/s)

Barcol-Air type NROBOVO.

Type N(R/T).....

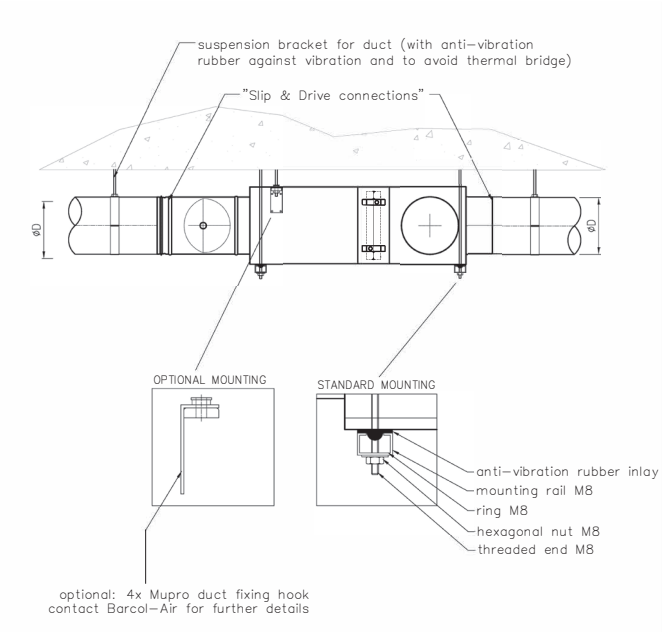
Installation instructions:

The Barcol-Air CAV 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.

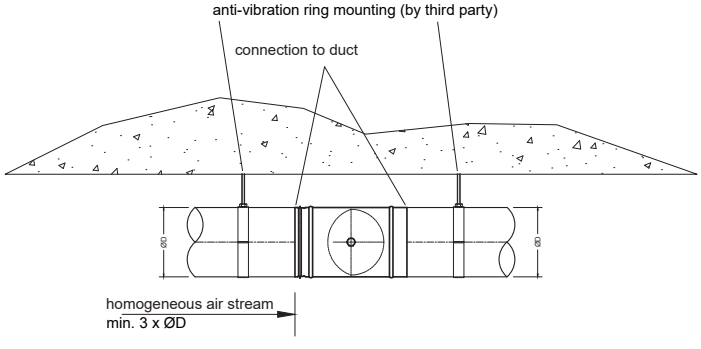
Optional 4 x Mupro fixing hooks can be used (see drawing).

This installation method:
1 Shall prevent the body of the CAV terminal from high mechanical tension, which could damage the construction and performance of the terminal.
2 Shall prevent torsion on the CAV terminals, which could cause malfunction of the damper blades.
3 Provides some flexibility to the final location of the CAV terminals.
4 Use at least 3x diagonal straight duct length before the CAV inlet.
5 Additional manual volume control dampers (VCD's) before the inlet are not required / recommended!!
6. All connections shall be thermally isolated.

Installation of circular CAV terminals can be done in a similar way, with the only assumption that two circular support brackets with anti-vibration rubber (installation clamps) instead of DIN-rail or L-profile shall be used. To prevent the VAV terminal from rotation, we recommend to use a complete clamp (support + top bracket), so that the terminal is 'clammed' in between.



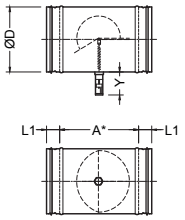
Mounting drawing type NROJ...



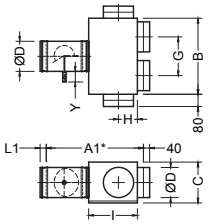
Mounting drawing type NROB...

Circular CAV air volume control terminals

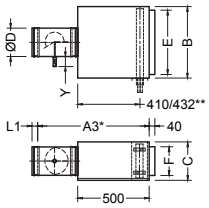
Dimensions NR units



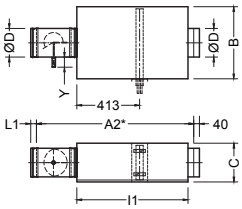
Type NROBOVO



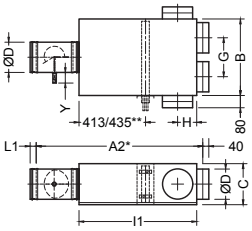
Type NROCOVO



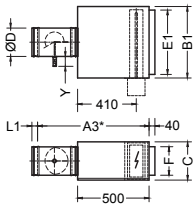
Type NROG.VO



Type NROH.VO



Type NROJ.VO



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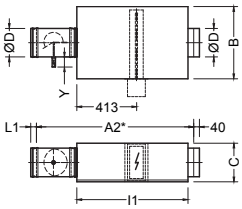
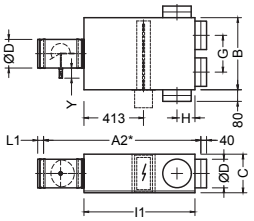
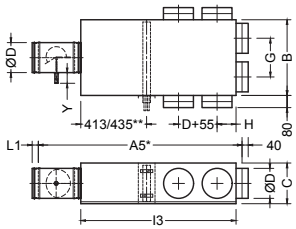


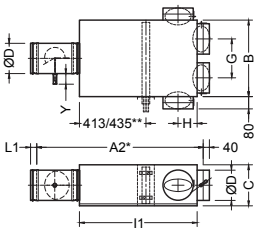
Type NROP.VO



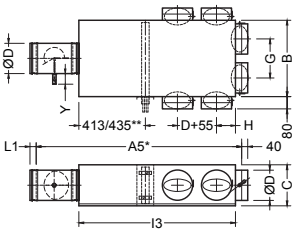
Type NROQ.VO



Type NROJ... - 3006



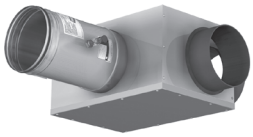
Type NROJ... - 3010



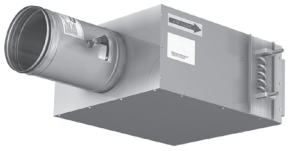
Type NROJ... - 3016

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

Type NROBOVO



Type NROCOVO



Type NROG/H.VO

Type NROJ.VO

Dimensions

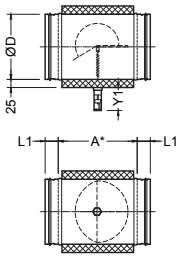
Model	80	100	125	140	160	200	250	315	400
A*	135	165	165	165	235	235	235	225	295
A1*	485	515	515	515	585	635	685	725	895
A2*	935	965	965	965	1035	1085	1135	1175	1345
A3*	675	705	705	705	775	775	775	765	835
A4*	640	670	695	730	800	890	990	1095	1350
A5*	1090	1120	1145	1180	1250	1340	1440	1545	1800
B	330	330	330	400	400	500	600	740	910
B1	330	330	330	400	400	400	600	600	600
C	228	228	228	248	248	268	318	408	458
ØD	78	98	123	138	158	198	248	313	398
E	275	275	275	350	350	450	550	690	850
E1	275	275	275	350	350	350	550	550	550
F	170	170	170	175	175	200	250	330	380
G	180	180	180	215	215	255	305	370	455
H	125	125	125	125	125	125	175	200	250
I	270	270	270	270	270	320	370	420	520
I1	720	720	720	720	720	770	820	870	970
I2	425	425	450	485	485	575	675	790	975
I3	875	875	900	935	935	1025	1125	1240	1425
L1	40	40	40	40	40	40	40	60	60
Y	70	70	70	70	70	70	70	110	110
Y1	85	85	85	85	85	85	85	125	125
J	155	155	155	155	155	155	155	155	230
K	105	105	105	105	105	105	105	105	160

Notes:
1. All dimensions in mm.
2. Other dimensions available on request
*3. * = Installed length.*

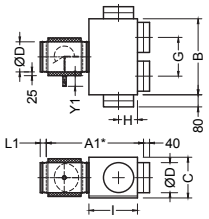
Model Ø	CAV air volume range								
	l/s			CFM			m^3/h		
	Min		Max	Min		Max	Min		Max
80	11	-	35	24	-	74	40	-	125
100	19	-	61	41	-	129	70	-	220
125	28	-	78	59	-	165	100	-	280
140	42	-	111	88	-	235	150	-	400
160	50	-	139	106	-	294	180	-	500
200	69	-	250	147	-	529	250	-	900
250	139	-	417	294	-	882	500	-	1500
315	222	-	778	471	-	1647	800	-	2800
400	278	-	1111	588	-	2353	1000	-	4000

Circular CAV air volume control terminals

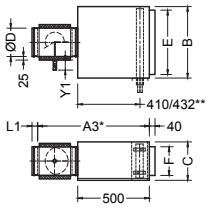
Dimensions NT units



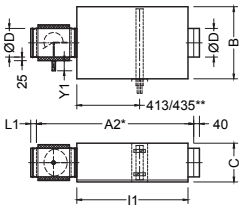
Type NTOBOVO



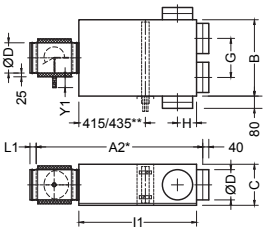
Type NTOCOVO



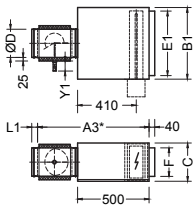
Type NTOG.VO



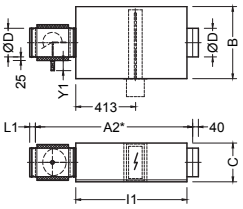
Type NTOH.VO



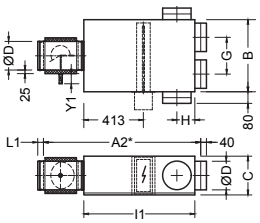
Type NTOJ.VO



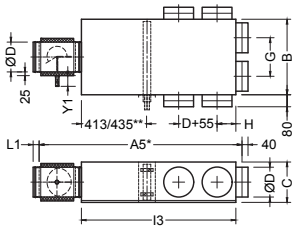
Type NTON.VO



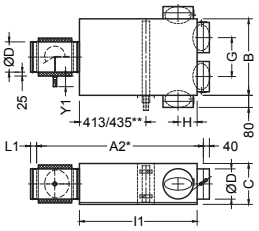
Type NTOP.VO



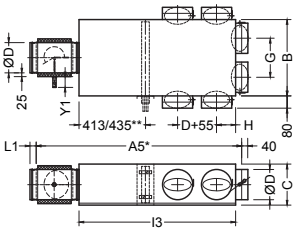
Type NTOQ.VO



Type NTOJ... - 3006



Type NTOJ... - 3010



Type NTOJ... - 3016

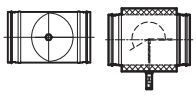
Notes:
1. All dimensions in mm.
*2. ** = Size varies with a 1-/2-row or 4-row hot water reheat coil.*

Dimensions

Model	80	100	125	140	160	200	250	315	400
A*	135	165	165	165	235	235	235	225	295
A1*	485	515	515	515	585	635	685	725	895
A2*	935	965	965	965	1035	1085	1135	1175	1345
A3*	675	705	705	705	775	775	775	765	835
A4*	640	670	695	730	800	890	990	1095	1350
A5*	1090	1120	1145	1180	1250	1340	1440	1545	1800
B	330	330	330	400	400	500	600	740	910
B1	330	330	330	400	400	400	600	600	600
C	228	228	228	248	248	268	318	408	458
ØD	78	98	123	138	158	198	248	313	398
E	275	275	275	350	350	450	550	690	850
E1	275	275	275	350	350	350	550	550	550
F	170	170	170	175	175	200	250	330	380
G	180	180	180	215	215	255	305	370	455
H	125	125	125	125	125	125	175	200	250
I	270	270	270	270	270	320	370	420	520
I1	720	720	720	720	720	770	820	870	970
I2	425	425	450	485	485	575	675	790	975
I3	875	875	900	935	935	1025	1125	1240	1425
L1	40	40	40	40	40	40	40	60	60
Y	70	70	70	70	70	70	70	110	110
Y1	85	85	85	85	85	85	85	125	125
J	155	155	155	155	155	155	155	155	230
K	105	105	105	105	105	105	105	105	160

Notes:
1. All dimensions in mm.
2. Other dimensions available on request
*3. * = Installed length.*

Type NROBOVO (single wall)
NTOBOVO (double wall)



Sound data ∆ p = 125 Pa

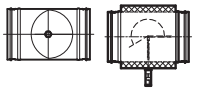
Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 125 Pa																								
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						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	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									dB								
80	2,4	11	24	40	41	40	37	36	35	36	30	--	--	--	20	-	-	-	18	-	--	--	--	18	-	-	-	-	-	--	--	--
	4,0	19	39	67	47	48	44	42	40	40	33	--	--	--	28	20	18	21	22	-	--	--	--	26	-	-	-	-	-	--	--	--
	6,0	28	59	100	69	52	48	46	44	44	38	24	--	--	32	24	22	26	26	21	--	--	--	30	17	-	-	-	-	--	--	--
	7,5	35	74	125	98	54	50	48	47	47	41	26	--	20	34	26	25	28	29	24	--	--	--	32	19	-	-	-	-	--	--	--
100	2,6	19	41	70	41	44	41	38	37	35	30	--	--	--	26	17	-	19	18	-	--	--	--	23	-	-	-	-	-	--	--	--
	4,0	29	62	106	47	49	45	43	42	40	35	20	--	--	30	22	20	24	23	18	--	--	--	27	-	-	-	-	-	--	--	--
	6,0	44	94	160	70	53	49	47	46	45	40	25	--	--	34	26	24	29	28	23	--	--	--	31	18	-	-	-	-	--	--	--
	8,3	61	129	220	100	55	52	49	49	48	43	27	--	21	36	28	26	31	30	26	--	--	--	33	20	-	-	-	-	--	--	--
125	2,4	28	59	100	41	44	42	39	38	38	32	--	--	--	24	21	20	22	23	19	--	--	--	20	-	-	-	-	-	--	--	--
	4,0	47	99	168	47	51	47	44	42	41	35	23	--	--	31	26	25	26	26	22	--	--	--	27	20	-	-	-	-	--	--	--
	6,0	70	149	253	70	55	52	48	46	46	40	27	--	21	35	31	29	30	31	27	--	--	--	31	25	17	19	17	-	--	--	--
	6,7	78	165	280	81	56	53	49	47	47	41	28	--	22	36	32	30	31	32	28	--	--	--	32	26	18	20	18	-	--	--	--
140	2,8	42	88	150	42	48	44	41	38	37	32	--	--	--	30	27	28	27	25	19	--	--	--	29	22	17	-	-	-	--	--	--
	4,0	58	124	210	47	51	48	45	42	42	36	23	--	--	33	30	32	31	29	23	--	--	--	32	25	21	17	-	-	--	--	--
	6,0	89	188	320	70	56	52	50	47	47	41	27	--	22	38	35	36	36	34	28	--	--	--	37	30	25	22	-	-	--	--	--
	7,5	111	235	400	100	58	55	52	49	49	44	30	22	24	40	37	39	38	37	31	21	--	--	39	32	28	24	18	-	--	--	--
160	2,6	50	106	180	41	46	44	40	37	37	30	--	--	--	29	29	28	27	26	19	--	--	--	26	21	17	-	-	-	--	--	--
	4,0	78	164	279	47	51	49	45	43	42	35	23	--	--	34	34	33	33	31	24	--	--	--	31	26	22	17	-	-	--	--	--
	6,0	116	246	418	70	55	53	49	47	47	40	28	--	23	38	38	38	37	36	29	20	--	--	35	30	27	21	-	-	--	--	--
	7,2	139	294	500	92	57	55	51	49	49	43	29	22	25	40	40	40	39	38	32	22	--	--	37	32	29	23	17	-	--	--	--
200	2,3	69	147	250	41	46	43	41	41	40	34	--	--	--	29	30	30	32	29	24	--	--	--	30	23	20	18	-	-	--	--	--
	4,0	122	258	439	47	52	49	46	44	43	37	24	--	--	35	36	35	35	32	27	--	--	--	36	29	25	21	-	-	--	--	--
	6,0	183	387	658	70	56	53	50	49	48	42	28	21	23	39	40	39	40	37	32	22	--	--	40	33	29	26	19	-	--	--	--
	8,2	250	529	900	117	60	56	54	53	52	46	32	24	26	43	43	43	44	41	36	25	--	--	44	36	33	30	23	-	--	--	--
250	2,9	139	294	500	42	50	47	44	41	40	33	22	--	--	31	34	33	27	30	23	--	--	--	29	27	21	-	-	-	--	--	--
	4,0	192	406	690	47	53	51	48	45	44	37	26	--	20	35	38	37	31	34	27	--	--	--	33	31	25	17	-	-	--	--	--
	6,0	288	609	1035	70	58	55	52	50	49	42	30	22	25	39	42	42	36	39	32	23	--	--	37	35	30	22	19	-	--	--	--
	8,7	417	882	1500	132	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
315	2,9	222	471	800	41	51	48	44	41	40	33	23	--	--	34	32	29	29	28	24	--	--	--	31	25	19	-	-	-	--	--	--
	4,0	306	648	1101	47	55	52	48	45	44	37	26	--	21	37	36	33	33	32	28	--	--	--	34	29	23	17	-	-	--	--	--
	6,0	459	971	1651	70	59	56	52	50	49	43	31	23	26	41	40	38	37	37	33	21	--	--	38	33	28	21	19	-	--	--	--
	10,2	778	1647	2800	184	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400	2,2	278	588	1000	43	50	47	45	44	43	36	22	--	--	35	32	31	32	33	27	--	--	--	32	25	19	17	-	-	--	--	--
	4,0	495	1049	1783	47	56	52	48	47	46	39	27	--	21	41	37	34	35	36	30	--	--	--	38	30	22	20	17	-	--	--	--
	6,0	743	1573	2674	70	60	56	53	52	51	44	32	25	27	45	42	39	40	41	35	24	--	--	42	35	27	25	22	-	--	--	--
	9,0	1111	2353	4000	141	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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 mentioned 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 mentioned 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. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. 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

Type NROBOVO (single wall)
NTOBOVO (double wall)



Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 250 Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
80	2,4	11	24	40	41	47	44	43	42	43	37	--	--	--	26	20	19	23	25	20	--	--	--	24	-	-	-	-	-	--	--	--
	4,0	19	39	67	47	55	51	48	46	46	40	26	--	21	34	27	25	28	28	23	--	--	--	32	20	-	-	-	-	--	--	--
	6,0	28	59	100	69	59	55	52	51	51	45	30	23	25	38	31	29	32	33	28	--	--	--	36	24	17	17	-	-	--	--	--
	7,5	35	74	125	98	61	57	55	53	53	47	33	26	28	41	33	31	35	35	30	--	--	--	39	26	19	20	-	-	--	--	--
100	2,6	19	41	70	41	48	47	45	45	45	40	21	--	--	30	23	22	28	27	23	--	--	--	27	15	-	-	-	-	--	--	--
	4,0	29	62	106	47	55	52	49	48	47	41	27	--	21	37	28	26	31	30	25	--	--	--	34	20	-	-	-	-	--	--	--
	6,0	44	94	160	70	59	56	54	53	52	46	31	24	26	41	33	31	35	34	30	--	--	--	38	25	19	20	-	-	--	--	--
	8,3	61	129	220	100	61	58	56	55	54	49	34	27	28	43	35	33	38	37	33	--	--	--	40	27	21	23	-	-	--	--	--
125	2,4	28	59	100	41	50	48	45	44	45	39	23	--	--	31	27	26	28	29	26	--	--	--	27	21	-	17	-	-	--	--	--
	4,0	47	99	168	47	57	54	50	48	48	41	29	22	24	38	33	31	32	32	28	--	--	--	34	27	19	21	18	-	--	--	--
	6,0	70	149	253	70	62	58	55	53	53	46	33	27	28	42	37	36	37	37	33	20	--	--	38	31	24	26	23	-	--	--	--
	6,7	78	165	280	81	63	59	56	54	54	47	34	28	29	43	38	37	38	38	34	21	--	--	39	32	25	27	24	-	--	--	--
140	2,8	42	88	150	42	53	50	49	47	47	42	25	--	--	35	33	35	36	35	29	--	--	--	34	28	24	22	-	-	--	--	--
	4,0	58	124	210	47	58	54	52	49	48	42	30	22	24	40	37	38	38	36	29	20	--	--	39	32	27	24	17	-	--	--	--
	6,0	89	188	320	70	62	59	56	53	53	48	34	28	29	44	41	43	42	41	35	25	--	--	43	36	32	28	22	-	--	--	--
	7,5	111	235	400	100	64	61	59	56	56	50	36	30	32	46	44	45	45	43	37	27	--	21	45	39	34	31	24	-	20	--	--
160	2,6	50	106	180	41	52	51	48	47	47	41	25	--	--	34	36	36	37	36	30	--	--	--	31	28	25	21	-	-	--	--	--
	4,0	78	164	279	47	58	55	51	49	49	42	30	22	25	40	41	40	39	38	31	22	--	--	37	33	29	23	17	-	--	--	--
	6,0	116	246	418	70	62	60	56	54	54	47	34	27	30	44	45	44	44	43	36	27	--	21	41	37	33	28	22	-	--	--	--
	7,2	139	294	500	92	64	61	58	56	56	49	36	30	32	46	47	46	46	45	38	29	20	23	43	39	35	30	24	-	--	--	--
200	2,3	69	147	250	41	52	50	48	47	46	41	25	--	--	35	37	37	38	36	30	--	--	--	36	30	27	24	18	-	--	--	--
	4,0	122	258	439	47	59	55	52	51	50	44	31	23	25	42	42	41	42	39	33	24	--	--	43	35	31	28	21	-	--	--	--
	6,0	183	387	658	70	63	60	57	56	54	49	35	29	30	46	47	46	47	44	38	28	--	22	47	40	36	33	26	18	22	--	--
	8,2	250	529	900	117	66	63	60	59	58	53	38	33	34	49	50	49	50	48	42	32	23	26	50	43	39	36	30	22	25	--	--
250	2,9	139	294	500	42	56	54	52	51	50	44	29	21	24	37	41	42	36	40	34	23	--	--	35	34	30	22	20	-	--	--	--
	4,0	192	406	690	47	60	57	54	52	50	43	32	25	27	41	44	44	37	40	33	25	--	--	39	37	32	23	20	-	--	--	--
	6,0	288	609	1035	70	64	62	59	57	55	48	37	30	32	46	49	48	42	45	38	30	22	24	44	42	36	28	25	19	21	--	--
	8,7	417	882	1500	132	68	66	63	61	60	53	40	35	36	50	53	53	47	50	43	34	26	28	48	46	41	33	30	24	25	--	20
315	2,9	222	471	800	41	57	56	53	51	51	44	30	23	26	40	40	38	39	38	35	22	--	--	37	33	28	23	20	-	--	--	--
	4,0	306	648	1101	47	61	58	54	52	51	44	33	26	28	44	42	40	39	39	34	23	--	--	41	35	30	23	21	-	--	--	--
	6,0	459	971	1651	70	65	63	59	57	56	49	38	32	33	48	47	44	44	44	40	28	--	22	45	40	34	28	26	20	20	--	--
	10,2	778	1647	2800	184	71	69	65	63	62	56	43	39	39	53	53	50	50	50	46	34	26	28	50	46	40	34	32	26	26	--	--
400	2,2	278	588	1000	43	57	54	51	50	50	43	29	21	23	42	39	37	38	39	34	21	--	--	39	32	25	23	20	-	--	--	--
	4,0	495	1049	1783	47	62	58	55	54	53	46	34	28	29	47	44	41	42	42	37	26	--	20	44	37	29	27	23	17	--	--	--
	6,0	743	1573	2674	70	67	63	60	58	58	51	38	33	34	52	48	46	46	47	42	30	23	25	49	41	34	31	28	22	23	--	--
	9,0	1111	2353	4000	141	71	67	64	63	63	56	43	39	39	56	53	50	51	52	47	35	28	30	53	46	38	36	33	27	27	--	22

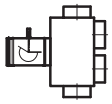
1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
3. The discharge sound pressure levels are determined with the assumptions as mentioned 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 mentioned 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. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. For non standard applications and/or selections, please contatct our technical staff.

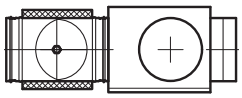
Table 1: Assumptions for additional attenuation

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

Circular CAV air volume control terminals

Sound data





Type NROCOVO (single wall)
NTOCOVO (double wall)

Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 125 Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
80	2,4	11	24	40	41	34	30	29	29	29	23	--	--	--	20	-	-	-	18	-	--	--	--	18	-	-	-	-	-	--	--	--
	4,0	19	39	67	47	42	37	34	30	30	24	--	--	--	28	20	18	21	22	-	--	--	--	26	-	-	-	-	-	--	--	--
	6,0	28	59	100	69	46	41	38	34	32	27	--	--	--	32	24	22	26	26	21	--	--	--	30	17	-	-	-	-	--	--	--
	7,5	35	74	125	98	48	43	40	37	35	29	--	--	--	34	26	25	28	29	24	--	--	--	32	19	-	-	-	-	--	--	--
100	2,6	19	41	70	41	38	34	30	31	28	23	--	--	--	26	17	-	19	18	-	--	--	--	23	-	-	-	-	-	--	--	--
	4,0	29	62	106	47	43	38	35	32	30	26	--	--	--	30	22	20	24	23	18	--	--	--	27	-	-	-	-	-	--	--	--
	6,0	44	94	160	70	47	42	39	36	33	29	--	--	--	34	26	24	29	28	23	--	--	--	31	18	-	-	-	-	--	--	--
	8,3	61	129	220	100	49	45	41	39	36	31	20	--	--	36	28	26	31	30	26	--	--	--	33	20	-	-	-	-	--	--	--
125	2,4	28	59	100	41	38	35	31	32	31	25	--	--	--	24	21	20	22	23	19	--	--	--	20	-	-	-	-	-	--	--	--
	4,0	47	99	168	47	45	40	36	32	31	26	--	--	--	31	26	25	26	26	22	--	--	--	27	20	-	-	-	-	--	--	--
	6,0	70	149	253	70	49	45	40	36	34	29	20	--	--	35	31	29	30	31	27	--	--	--	31	25	17	19	17	-	--	--	--
	6,7	78	165	280	81	50	46	41	37	35	29	21	--	--	36	32	30	31	32	28	--	--	--	32	26	18	20	18	-	--	--	--
140	2,8	42	88	150	42	42	37	33	32	30	25	--	--	--	30	27	28	27	25	19	--	--	--	29	22	17	-	-	-	--	--	--
	4,0	58	124	210	47	45	41	37	32	32	27	--	--	--	33	30	32	31	29	23	--	--	--	32	25	21	17	-	-	--	--	--
	6,0	89	188	320	70	50	45	42	37	35	30	21	--	--	38	35	36	36	34	28	--	--	--	37	30	25	22	-	-	--	--	--
	7,5	111	235	400	100	52	48	44	39	37	32	23	--	--	40	37	39	38	37	31	21	--	--	39	32	28	24	18	-	--	--	--
160	2,6	50	106	180	41	40	37	32	31	30	23	--	--	--	29	29	28	27	26	19	--	--	--	26	21	17	-	-	-	--	--	--
	4,0	78	164	279	47	45	42	37	33	30	26	--	--	--	34	34	33	33	31	24	--	--	--	31	26	22	17	-	-	--	--	--
	6,0	116	246	418	70	49	46	41	37	35	29	21	--	--	38	38	38	37	36	29	20	--	--	35	30	27	21	-	-	--	--	--
	7,2	139	294	500	92	51	48	43	39	37	31	23	--	--	40	40	40	39	38	32	22	--	--	37	32	29	23	17	-	--	--	--
200	2,3	69	147	250	41	40	36	33	31	33	27	--	--	--	29	30	30	32	29	24	--	--	--	30	23	20	18	-	-	--	--	--
	4,0	122	258	439	47	46	42	38	34	31	28	--	--	--	35	36	35	35	32	27	--	--	--	36	29	25	21	-	-	--	--	--
	6,0	183	387	658	70	50	46	42	39	36	31	22	--	--	39	40	39	40	37	32	22	--	--	40	33	29	26	19	-	--	--	--
	8,2	250	529	900	117	54	49	46	43	40	34	25	--	--	43	43	43	44	41	36	25	--	--	44	36	33	30	23	-	--	--	--
250	2,9	139	294	500	42	44	40	36	31	33	26	--	--	--	31	34	33	27	30	23	--	--	--	29	27	21	-	-	-	--	--	--
	4,0	192	406	690	47	47	44	40	35	32	28	--	--	--	35	38	37	31	34	27	--	--	--	33	31	25	17	-	-	--	--	--
	6,0	288	609	1035	70	52	48	44	40	37	31	23	--	--	39	42	42	36	39	32	23	--	--	37	35	30	22	19	-	--	--	--
	8,7	417	882	1500	132	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
315	2,9	222	471	800	42	45	41	36	31	33	26	--	--	--	34	32	29	29	28	24	--	--	--	31	25	19	-	-	-	--	--	--
	4,0	306	648	1101	47	49	45	40	35	32	28	--	--	--	37	36	33	33	32	28	--	--	--	34	29	23	17	-	-	--	--	--
	6,0	459	971	1651	70	53	49	44	40	37	32	24	--	--	41	40	38	37	37	33	21	--	--	38	33	28	21	19	-	--	--	--
	10,2	778	1647	2800	184	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400	2,2	278	588	1000	41	44	40	37	34	31	29	--	--	--	35	32	31	32	33	27	--	--	--	32	25	19	17	-	-	--	--	--
	4,0	495	1049	1783	47	50	45	40	37	34	30	21	--	--	41	37	34	35	36	30	--	--	--	38	30	22	20	17	-	--	--	--
	6,0	743	1573	2674	70	54	49	45	42	39	33	25	--	--	45	42	39	40	41	35	24	--	--	42	35	27	25	22	-	--	--	--
	9,0	1111	2353	4000	141	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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 mentioned 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 mentioned 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. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. For non standard applications and/or selections, please contatct our technical staff.

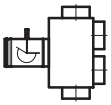
Table 1: Assumptions for additional attenuation

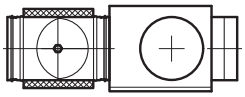
Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	9	10	11	13	15	15	dB
125	8	9	10	12	14	14	dB
160	8	9	10	12	14	14	dB
200	7	8	9	11	13	13	dB
250	7	8	9	11	13	13	dB
315	7	8	9	11	13	13	dB
355	7	8	9	11	13	13	dB
400	7	8	9	11	13	13	dB

Sound data





Type NROCOVO (single wall)
NTOCOVO (double wall)

Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 250 Pa																								
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
80	2,4	11	24	40	41	41	37	35	32	31	25	--	--	--	26	20	19	23	25	20	--	--	--	24	-	-	-	-	-	--	--	--
	4,0	19	39	67	47	49	44	40	36	34	28	--	--	--	34	27	25	28	28	23	--	--	--	32	20	-	-	-	-	--	--	--
	6,0	28	59	100	69	53	48	44	41	39	33	24	--	--	38	31	29	32	33	28	--	--	--	36	24	17	17	-	-	--	--	--
	7,5	35	74	125	98	55	50	47	43	41	35	26	--	21	41	33	31	35	35	30	--	--	--	39	26	19	20	-	-	--	--	--
100	2,6	19	41	70	41	42	40	37	35	33	28	--	--	--	30	23	22	28	27	23	--	--	--	27	15	-	-	-	-	--	--	--
	4,0	29	62	106	47	49	45	41	38	35	29	20	--	--	37	28	26	31	30	25	--	--	--	34	20	-	-	-	-	--	--	--
	6,0	44	94	160	70	53	49	46	43	40	34	25	--	--	41	33	31	35	34	30	--	--	--	38	25	19	20	-	-	--	--	--
	8,3	61	129	220	100	55	51	48	45	42	37	27	--	21	43	35	33	38	37	33	--	--	--	40	27	21	23	-	-	--	--	--
125	2,4	28	59	100	41	44	41	37	34	33	27	--	--	--	31	27	26	28	29	26	--	--	--	27	21	-	17	-	-	--	--	--
	4,0	47	99	168	47	51	47	42	38	36	29	23	--	--	38	33	31	32	32	28	--	--	--	34	27	19	21	18	-	--	--	--
	6,0	70	149	253	70	56	51	47	43	41	34	27	--	21	42	37	36	37	37	33	20	--	--	38	31	24	26	23	-	--	--	--
	6,7	78	165	280	81	57	52	48	44	42	35	28	21	22	43	38	37	38	38	34	21	--	--	39	32	25	27	24	-	--	--	--
140	2,8	42	88	150	42	47	43	41	37	35	30	--	--	--	35	33	35	36	35	29	--	--	--	34	28	24	22	-	-	--	--	--
	4,0	58	124	210	47	52	47	44	39	36	30	23	--	--	40	37	38	38	36	29	20	--	--	39	32	27	24	17	-	--	--	--
	6,0	89	188	320	70	56	52	48	43	41	36	28	20	22	44	41	43	42	41	35	25	--	--	43	36	32	28	22	-	--	--	--
	7,5	111	235	400	100	58	54	51	46	44	38	30	23	25	46	44	45	45	43	37	27	--	21	45	39	34	31	24	-	20	--	--
160	2,6	50	106	180	41	46	44	40	37	35	29	--	--	--	34	36	36	37	36	30	--	--	--	31	28	25	21	-	-	--	--	--
	4,0	78	164	279	47	52	48	43	39	37	30	23	--	--	40	41	40	39	38	31	22	--	--	37	33	29	23	17	-	--	--	--
	6,0	116	246	418	70	56	53	48	44	42	35	28	--	22	44	45	44	44	43	36	27	--	21	41	37	33	28	22	-	--	--	--
	7,2	139	294	500	92	58	54	50	46	44	37	29	22	24	46	47	46	46	45	38	29	20	23	43	39	35	30	24	-	--	--	--
200	2,3	69	147	250	41	46	43	40	37	34	29	--	--	--	35	37	37	38	36	30	--	--	--	36	30	27	24	18	-	--	--	--
	4,0	122	258	439	47	53	48	44	41	38	32	24	--	--	42	42	41	42	39	33	24	--	--	43	35	31	28	21	-	--	--	--
	6,0	183	387	658	70	57	53	49	46	42	37	28	21	23	46	47	46	47	44	38	28	--	22	47	40	36	33	26	18	22	--	--
	8,2	250	529	900	117	60	56	52	49	46	41	32	25	27	49	50	49	50	48	42	32	23	26	50	43	39	36	30	22	25	--	--
250	2,9	139	294	500	42	50	47	44	41	38	32	22	--	--	37	41	42	36	40	34	23	--	--	35	34	30	22	20	-	--	--	--
	4,0	192	406	690	47	54	50	46	42	38	31	26	--	--	41	44	44	37	40	33	25	--	--	39	37	32	23	20	-	--	--	--
	6,0	288	609	1035	70	58	55	51	47	43	36	30	23	24	46	49	48	42	45	38	30	22	24	44	42	36	28	25	19	21	--	--
	8,7	417	882	1500	132	62	59	55	51	48	41	34	27	29	50	53	53	47	50	43	34	26	28	48	46	41	33	30	24	25	--	20
315	2,9	222	471	800	42	51	49	45	41	39	32	24	--	--	40	40	38	39	38	35	22	--	--	37	33	28	23	20	-	--	--	--
	4,0	306	648	1101	47	55	51	46	42	39	32	27	--	21	44	42	40	39	39	34	23	--	--	41	35	30	23	21	-	--	--	--
	6,0	459	971	1651	70	59	56	51	47	44	37	31	24	26	48	47	44	44	44	40	28	--	22	45	40	34	28	26	20	20	--	--
	10,2	778	1647	2800	184	65	62	57	53	50	44	37	31	32	53	53	50	50	50	46	34	26	28	50	46	40	34	32	26	26	--	--
400	2,2	278	588	1000	41	51	47	43	40	38	31	22	--	--	42	39	37	38	39	34	21	--	--	39	32	25	23	20	-	--	--	--
	4,0	495	1049	1783	47	56	51	47	44	41	34	27	20	22	47	44	41	42	42	37	26	--	20	44	37	29	27	23	17	--	--	--
	6,0	743	1573	2674	70	61	56	52	48	46	39	32	26	27	52	48	46	46	47	42	30	23	25	49	41	34	31	28	22	23	--	--
	9,0	1111	2353	4000	141	65	60	56	53	51	44	36	31	32	56	53	50	51	52	47	35	28	30	53	46	38	36	33	27	27	--	22

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3. The discharge sound pressure levels are determined with the assumptions as mentioned in table 1 for downstream ductwork including a diffuser with insulated plenum box.
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7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. For non standard applications and/or selections, please contatct our technical staff.

Table 1: Assumptions for additional attenuation

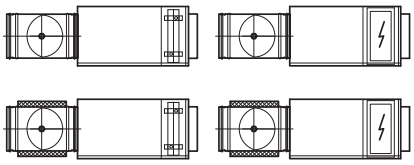
Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	9	10	11	13	15	15	dB
125	8	9	10	12	14	14	dB
160	8	9	10	12	14	14	dB
200	7	8	9	11	13	13	dB
250	7	8	9	11	13	13	dB
315	7	8	9	11	13	13	dB
355	7	8	9	11	13	13	dB
400	7	8	9	11	13	13	dB

Circular CAV air volume control terminals

Sound data



Type NROG.VO / NRON.VO (single wall)
NTOG.VO / NTON.VO (double wall)

Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 125 Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
80	2,4	11	24	40	42	35	30	24	23	24	-	--	--	--	20	-	-	-	18	-	--	--	--	18	-	-	-	-	-	--	--	--
	4,0	19	39	67	51	43	36	29	27	27	19	--	--	--	28	20	18	21	22	-	--	--	--	26	-	-	-	-	-	--	--	--
	6,0	28	59	100	77	46	40	33	31	31	23	--	--	--	32	24	22	26	26	21	--	--	--	30	17	-	-	-	-	--	--	--
	7,5	35	74	125	110	48	42	35	33	33	25	--	--	--	34	26	25	28	29	24	--	--	--	32	19	-	-	-	-	--	--	--
100	2,6	19	41	70	42	39	33	26	25	23	-	--	--	--	26	17	-	19	18	-	--	--	--	23	-	-	-	-	-	--	--	--
	4,0	29	62	106	50	43	38	30	29	28	20	--	--	--	30	22	20	24	23	18	--	--	--	27	-	-	-	-	-	--	--	--
	6,0	44	94	160	77	47	41	34	33	32	25	--	--	--	34	26	24	29	28	23	--	--	--	31	18	-	-	-	-	--	--	--
	8,3	61	129	220	110	48	43	36	35	34	27	--	--	--	36	28	26	31	30	26	--	--	--	33	20	-	-	-	-	--	--	--
125	2,4	28	59	100	42	38	34	27	25	26	18	--	--	--	24	21	20	22	23	19	--	--	--	20	-	-	-	-	-	--	--	--
	4,0	47	99	168	50	45	40	31	29	29	20	--	--	--	31	26	25	26	26	22	--	--	--	27	20	-	-	-	-	--	--	--
	6,0	70	149	253	77	49	44	35	33	33	25	--	--	--	35	31	29	30	31	27	--	--	--	31	25	17	19	17	-	--	--	--
	6,7	78	165	280	90	50	45	36	34	34	26	21	--	--	36	32	30	31	32	28	--	--	--	32	26	18	20	18	-	--	--	--
140	2,8	42	88	150	43	42	37	29	26	25	17	--	--	--	30	27	28	27	25	19	--	--	--	29	22	17	-	-	-	--	--	--
	4,0	58	124	210	50	46	40	32	29	29	21	--	--	--	33	30	32	31	29	23	--	--	--	32	25	21	17	-	-	--	--	--
	6,0	89	188	320	78	50	44	37	34	34	26	20	--	--	38	35	36	36	34	28	--	--	--	37	30	25	22	-	-	--	--	--
	7,5	111	235	400	113	51	46	39	36	36	28	22	--	--	40	37	39	38	37	31	21	--	--	39	32	28	24	18	-	--	--	--
160	2,6	50	106	180	43	41	36	27	25	24	-	--	--	--	29	29	28	27	26	19	--	--	--	26	21	17	-	-	-	--	--	--
	4,0	78	164	279	51	46	41	32	30	30	21	--	--	--	34	34	33	33	31	24	--	--	--	31	26	22	17	-	-	--	--	--
	6,0	116	246	418	78	49	45	36	34	34	25	20	--	--	38	38	38	37	36	29	20	--	--	35	30	27	21	-	-	--	--	--
	7,2	139	294	500	104	51	46	38	36	36	27	22	--	--	40	40	40	39	38	32	22	--	--	37	32	29	23	17	-	--	--	--
200	2,3	69	147	250	42	40	36	29	28	27	20	--	--	--	29	30	30	32	29	24	--	--	--	30	23	20	18	-	-	--	--	--
	4,0	122	258	439	51	47	41	33	32	30	22	--	--	--	35	36	35	35	32	27	--	--	--	36	29	25	21	-	-	--	--	--
	6,0	183	387	658	78	50	45	37	36	35	27	21	--	--	39	40	39	40	37	32	22	--	--	40	33	29	26	19	-	--	--	--
	8,2	250	529	900	133	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	44	36	33	30	23	-	--	--	--
250	2,9	139	294	500	44	45	40	32	29	27	18	--	--	--	31	34	33	27	30	23	--	--	--	29	27	21	-	-	-	--	--	--
	4,0	192	406	690	51	48	43	35	33	31	22	--	--	--	35	38	37	31	34	27	--	--	--	33	31	25	17	-	-	--	--	--
	6,0	288	609	1035	78	52	47	39	37	36	27	23	--	--	39	42	42	36	39	32	23	--	--	37	35	30	22	19	-	--	--	--
	8,7	417	882	1500	150	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
315	2,9	222	471	800	44	49	45	31	29	28	19	--	--	--	34	32	29	29	28	24	--	--	--	31	25	19	-	-	-	--	--	--
	4,0	306	648	1101	51	52	48	35	33	32	23	23	--	--	37	36	33	33	32	28	--	--	--	34	29	23	17	-	-	--	--	--
	6,0	459	971	1651	79	56	52	39	37	36	28	27	--	22	41	40	38	37	37	33	21	--	--	38	33	28	21	19	-	--	--	--
	10,2	778	1647	2800	210	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400	2,2	278	588	1000	42	48	44	32	31	31	22	21	--	--	35	32	31	32	33	27	--	--	--	32	25	19	17	-	-	--	--	--
	4,0	495	1049	1783	51	53	48	36	34	34	24	24	--	--	41	37	34	35	36	30	--	--	--	38	30	22	20	17	-	--	--	--
	6,0	743	1573	2674	79	57	52	40	39	38	29	28	21	23	45	42	39	40	41	35	24	--	--	42	35	27	25	22	-	--	--	--
	9,0	1111	2353	4000	161	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
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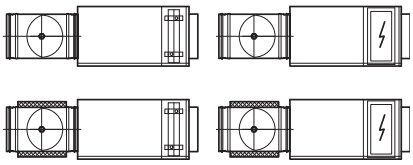
Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	13	17	23	26	28	30	dB
125	12	15	22	25	27	29	dB
160	12	15	22	25	27	29	dB
200	11	15	21	24	26	28	dB
250	11	15	21	24	26	28	dB
315	8	11	21	24	26	26	dB
355	8	11	21	24	26	26	dB
400	8	11	21	24	26	26	dB



Type NROG.VO / NRON.VO (single wall)
NTOG.VO / NTON.VO (double wall)

Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 250 Pa																								
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
80	2,4	11	24	40	42	42	37	31	30	31	23	--	--	--	26	20	19	23	25	20	--	--	--	24	-	-	-	-	-	--	--	--
	4,0	19	39	67	51	50	43	36	34	34	26	20	--	--	34	27	25	28	28	23	--	--	--	32	20	-	-	-	-	--	--	--
	6,0	28	59	100	77	53	47	40	38	38	30	24	--	--	38	31	29	32	33	28	--	--	--	36	24	17	17	-	-	--	--	--
	7,5	35	74	125	110	55	49	42	40	40	32	26	--	21	41	33	31	35	35	30	--	--	--	39	26	19	20	-	-	--	--	--
100	2,6	19	41	70	42	44	40	33	33	33	26	--	--	--	30	23	22	28	27	23	--	--	--	27	15	-	-	-	-	--	--	--
	4,0	29	62	106	50	50	45	37	36	35	27	21	--	--	37	28	26	31	30	25	--	--	--	34	20	-	-	-	-	--	--	--
	6,0	44	94	160	77	54	48	41	40	39	32	24	--	--	41	33	31	35	34	30	--	--	--	38	25	19	20	-	-	--	--	--
	8,3	61	129	220	110	55	50	43	42	41	34	26	--	21	43	35	33	38	37	33	--	--	--	40	27	21	23	-	-	--	--	--
125	2,4	28	59	100	42	45	41	34	33	33	25	--	--	--	31	27	26	28	29	26	--	--	--	27	21	-	17	-	-	--	--	--
	4,0	47	99	168	50	52	47	38	36	36	27	23	--	--	38	33	31	32	32	28	--	--	--	34	27	19	21	18	-	--	--	--
	6,0	70	149	253	77	56	51	42	40	40	32	27	--	22	42	37	36	37	37	33	20	--	--	38	31	24	26	23	-	--	--	--
	6,7	78	165	280	90	57	52	43	41	41	33	28	21	23	43	38	37	38	38	34	21	--	--	39	32	25	27	24	-	--	--	--
140	2,8	42	88	150	43	48	43	37	35	35	28	--	--	--	35	33	35	36	35	29	--	--	--	34	28	24	22	-	-	--	--	--
	4,0	58	124	210	50	53	47	39	36	36	28	23	--	--	40	37	38	38	36	29	20	--	--	39	32	27	24	17	-	--	--	--
	6,0	89	188	320	78	57	51	44	41	41	33	27	21	23	44	41	43	42	41	35	25	--	--	43	36	32	28	22	-	--	--	--
	7,5	111	235	400	113	58	53	46	43	43	35	29	23	25	46	44	45	45	43	37	27	--	21	45	39	34	31	24	-	20	--	--
160	2,6	50	106	180	43	47	44	36	35	35	27	--	--	--	34	36	36	37	36	30	--	--	--	31	28	25	21	-	-	--	--	--
	4,0	78	164	279	51	53	48	39	37	37	28	24	--	--	40	41	40	39	38	31	22	--	--	37	33	29	23	17	-	--	--	--
	6,0	116	246	418	78	56	52	43	41	41	32	27	20	22	44	45	44	44	43	36	27	--	21	41	37	33	28	22	-	--	--	--
	7,2	139	294	500	104	58	54	45	43	43	34	29	22	24	46	47	46	46	45	38	29	20	23	43	39	35	30	24	-	--	--	--
200	2,3	69	147	250	42	47	43	36	35	35	27	--	--	--	35	37	37	38	36	30	--	--	--	36	30	27	24	18	-	--	--	--
	4,0	122	258	439	51	54	48	40	39	37	30	24	--	--	42	42	41	42	39	33	24	--	--	43	35	31	28	21	-	--	--	--
	6,0	183	387	658	78	57	52	44	43	42	34	28	22	24	46	47	46	47	44	38	28	--	22	47	40	36	33	26	18	22	--	--
	8,2	250	529	900	133	60	55	47	46	45	38	31	25	27	49	50	49	50	48	42	32	23	26	50	43	39	36	30	22	25	--	--
250	2,9	139	294	500	44	51	47	40	39	38	30	22	--	--	37	41	42	36	40	34	23	--	--	35	34	30	22	20	-	--	--	--
	4,0	192	406	690	51	55	50	42	40	38	29	26	--	20	41	44	44	37	40	33	25	--	--	39	37	32	23	20	-	--	--	--
	6,0	288	609	1035	78	59	54	46	44	43	34	30	23	25	46	49	48	42	45	38	30	22	24	44	42	36	28	25	19	21	--	--
	8,7	417	882	1500	150	62	57	50	48	46	38	33	27	29	50	53	53	47	50	43	34	26	28	48	46	41	33	30	24	25	--	20
315	2,9	222	471	800	44	56	53	41	39	39	30	27	--	22	40	40	38	39	38	35	22	--	--	37	33	28	23	20	-	--	--	--
	4,0	306	648	1101	51	59	55	42	40	39	30	30	24	25	44	42	40	39	39	34	23	--	--	41	35	30	23	21	-	--	--	--
	6,0	459	971	1651	79	63	59	46	44	43	35	34	28	30	48	47	44	44	44	40	28	--	22	45	40	34	28	26	20	20	--	--
	10,2	778	1647	2800	210	67	64	51	49	49	40	39	34	35	53	53	50	50	50	46	34	26	28	50	46	40	34	32	26	26	--	--
400	2,2	278	588	1000	42	55	51	39	38	38	29	26	--	21	42	39	37	38	39	34	21	--	--	39	32	25	23	20	-	--	--	--
	4,0	495	1049	1783	51	60	55	43	41	41	31	31	25	27	47	44	41	42	42	37	26	--	20	44	37	29	27	23	17	--	--	--
	6,0	743	1573	2674	79	64	59	47	46	45	36	35	30	31	52	48	46	46	47	42	30	23	25	49	41	34	31	28	22	23	--	--
	9,0	1111	2353	4000	161	68	63	51	50	50	41	39	34	35	56	53	50	51	52	47	35	28	30	53	46	38	36	33	27	27	--	22

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 mentioned 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 mentioned 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. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. For non standard applications and/or selections, please contatct our technical staff.

Table 1: Assumptions for additional attenuation

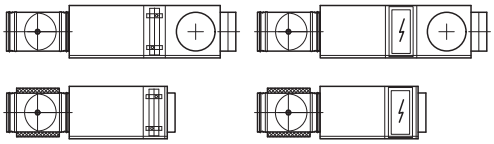
Hz	125	250	500	1K	2K	4K
Discharge (dB)	5	10	20	30	30	25
Radiated (dB)	2	5	10	15	15	20

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	13	17	23	26	28	30	dB
125	12	15	22	25	27	29	dB
160	12	15	22	25	27	29	dB
200	11	15	21	24	26	28	dB
250	11	15	21	24	26	28	dB
315	8	11	21	24	26	26	dB
355	8	11	21	24	26	26	dB
400	8	11	21	24	26	26	dB

Circular CAV air volume control terminals

Sound data



Type NRO(H/J/Q)VO (single wall)
NTO(H/J/Q)VO (double wall)

Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot				min. ∆ p_s	∆ p = 125 Pa																								
						discharge sound									radiated sound single wall									radiated sound double wall							
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB							
80	2,4	11	24	40	42	29	23	-	-	-	-	--	--	--	20	-	-	-	18	-	--	--	--	18	-	-	-	-	-	--	--	--
	4,0	19	39	67	51	37	29	21	17	-	-	--	--	--	28	20	18	21	22	-	--	--	--	26	-	-	-	-	-	--	--	--
	6,0	28	59	100	77	40	33	25	21	19	-	--	--	--	32	24	22	26	26	21	--	--	--	30	17	-	-	-	-	--	--	--
	7,5	35	74	125	110	42	35	27	23	21	-	--	--	--	34	26	25	28	29	24	--	--	--	32	19	-	-	-	-	--	--	--
100	2,6	19	41	70	42	33	26	18	-	-	-	--	--	--	26	17	-	19	18	-	--	--	--	23	-	-	-	-	-	--	--	--
	4,0	29	62	106	50	37	31	22	19	-	-	--	--	--	30	22	20	24	23	18	--	--	--	27	-	-	-	-	-	--	--	--
	6,0	44	94	160	77	41	34	26	23	20	-	--	--	--	34	26	24	29	28	23	--	--	--	31	18	-	-	-	-	--	--	--
	8,3	61	129	220	110	42	36	28	25	22	-	--	--	--	36	28	26	31	30	26	--	--	--	33	20	-	-	-	-	--	--	--
125	2,4	28	59	100	42	32	27	19	-	-	-	--	--	--	24	21	20	22	23	19	--	--	--	20	-	-	-	-	-	--	--	--
	4,0	47	99	168	50	39	33	23	19	-	-	--	--	--	31	26	25	26	26	22	--	--	--	27	20	-	-	-	-	--	--	--
	6,0	70	149	253	77	43	37	27	23	21	-	--	--	--	35	31	29	30	31	27	--	--	--	31	25	17	19	17	-	--	--	--
	6,7	78	165	280	90	44	38	28	24	22	-	--	--	--	36	32	30	31	32	28	--	--	--	32	26	18	20	18	-	--	--	--
140	2,8	42	88	150	43	36	30	21	-	-	-	--	--	--	30	27	28	27	25	19	--	--	--	29	22	17	-	-	-	--	--	--
	4,0	58	124	210	50	40	33	24	19	-	-	--	--	--	33	30	32	31	29	23	--	--	--	32	25	21	17	-	-	--	--	--
	6,0	89	188	320	78	44	37	29	24	22	-	--	--	--	38	35	36	36	34	28	--	--	--	37	30	25	22	-	-	--	--	--
	7,5	111	235	400	113	45	39	31	26	24	-	--	--	--	40	37	39	38	37	31	21	--	--	39	32	28	24	18	-	--	--	--
160	2,6	50	106	180	43	35	29	19	-	-	-	--	--	--	29	29	28	27	26	19	--	--	--	26	21	17	-	-	-	--	--	--
	4,0	78	164	279	51	40	34	24	20	18	-	--	--	--	34	34	33	33	31	24	--	--	--	31	26	22	17	-	-	--	--	--
	6,0	116	246	418	78	43	38	28	24	22	-	--	--	--	38	38	38	37	36	29	20	--	--	35	30	27	21	-	-	--	--	--
	7,2	139	294	500	104	45	39	30	26	24	-	--	--	--	40	40	40	39	38	32	22	--	--	37	32	29	23	17	-	--	--	--
200	2,3	69	147	250	42	34	29	21	18	-	-	--	--	--	29	30	30	32	29	24	--	--	--	30	23	20	18	-	-	--	--	--
	4,0	122	258	439	51	41	34	25	22	18	-	--	--	--	35	36	35	35	32	27	--	--	--	36	29	25	21	-	-	--	--	--
	6,0	183	387	658	78	44	38	29	26	23	-	--	--	--	39	40	39	40	37	32	22	--	--	40	33	29	26	19	-	--	--	--
	8,2	250	529	900	133	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	44	36	33	30	23	-	--	--	--
250	2,9	139	294	500	44	39	33	24	19	-	-	--	--	--	31	34	33	27	30	23	--	--	--	29	27	21	-	-	-	--	--	--
	4,0	192	406	690	51	42	36	27	23	19	-	--	--	--	35	38	37	31	34	27	--	--	--	33	31	25	17	-	-	--	--	--
	6,0	288	609	1035	78	46	40	31	27	24	-	--	--	--	39	42	42	36	39	32	23	--	--	37	35	30	22	19	-	--	--	--
	8,7	417	882	1500	150	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
315	2,9	222	471	800	44	43	38	23	19	-	-	--	--	--	34	32	29	29	28	24	--	--	--	31	25	19	-	-	-	--	--	--
	4,0	306	648	1101	51	46	41	27	23	20	-	--	--	--	37	36	33	33	32	28	--	--	--	34	29	23	17	-	-	--	--	--
	6,0	459	971	1651	79	50	45	31	27	24	-	--	--	--	41	40	38	37	37	33	21	--	--	38	33	28	21	19	-	--	--	--
	10,2	778	1647	2800	210	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400	2,2	278	588	1000	42	42	37	24	21	19	-	--	--	--	35	32	31	32	33	27	--	--	--	32	25	19	17	-	-	--	--	--
	4,0	495	1049	1783	51	47	41	28	24	22	-	--	--	--	41	37	34	35	36	30	--	--	--	38	30	22	20	17	-	--	--	--
	6,0	743	1573	2674	79	51	45	32	29	26	17	22	--	--	45	42	39	40	41	35	24	--	--	42	35	27	25	22	-	--	--	--
	9,0	1111	2353	4000	161	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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 "-".
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6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
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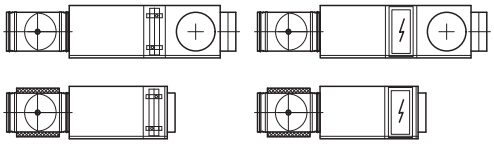
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. For non standard applications and/or selections, please contatct our technical staff.

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	17	23	26	28	30	dB
125	12	15	22	25	27	29	dB
160	12	15	22	25	27	29	dB
200	11	15	21	24	26	28	dB
250	11	15	21	24	26	28	dB
315	8	11	21	24	26	26	dB
355	8	11	21	24	26	26	dB
400	8	11	21	24	26	26	dB



Type NRO(H/J/Q)VO (single wall)
NTO(H/J/Q)VO (double wall)

Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot					∆ p = 250 Pa																							
						discharge sound									radiated sound single wall									radiated sound double wall							
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. ∆ p_s	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	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									dB							
80	2,4	11	24	40	42	36	30	23	20	19	-	--	--	--	26	20	19	23	25	20	--	--	--	24	-	-	-	-	-	--	--	--
	4,0	19	39	67	51	44	36	28	24	22	-	--	--	--	34	27	25	28	28	23	--	--	--	32	20	-	-	-	-	--	--	--
	6,0	28	59	100	77	47	40	32	28	26	18	--	--	--	38	31	29	32	33	28	--	--	--	36	24	17	17	-	-	--	--	--
	7,5	35	74	125	110	49	42	34	30	28	20	--	--	--	41	33	31	35	35	30	--	--	--	39	26	19	20	-	-	--	--	--
100	2,6	19	41	70	42	38	33	25	23	21	-	--	--	--	30	23	22	28	27	23	--	--	--	27	15	-	-	-	-	--	--	--
	4,0	29	62	106	50	44	38	29	26	23	-	--	--	--	37	28	26	31	30	25	--	--	--	34	20	-	-	-	-	--	--	--
	6,0	44	94	160	77	48	41	33	30	27	20	--	--	--	41	33	31	35	34	30	--	--	--	38	25	19	20	-	-	--	--	--
	8,3	61	129	220	110	49	43	35	32	29	22	--	--	--	43	35	33	38	37	33	--	--	--	40	27	21	23	-	-	--	--	--
125	2,4	28	59	100	42	39	34	26	23	21	-	--	--	--	31	27	26	28	29	26	--	--	--	27	21	-	17	-	-	--	--	--
	4,0	47	99	168	50	46	40	30	26	24	-	--	--	--	38	33	31	32	32	28	--	--	--	34	27	19	21	18	-	--	--	--
	6,0	70	149	253	77	50	44	34	30	28	20	20	--	--	42	37	36	37	37	33	20	--	--	38	31	24	26	23	-	--	--	--
	6,7	78	165	280	90	51	45	35	31	29	21	21	--	--	43	38	37	38	38	34	21	--	--	39	32	25	27	24	-	--	--	--
140	2,8	42	88	150	43	42	36	29	25	23	-	--	--	--	35	33	35	36	35	29	--	--	--	34	28	24	22	-	-	--	--	--
	4,0	58	124	210	50	47	40	31	26	24	-	--	--	--	40	37	38	38	36	29	20	--	--	39	32	27	24	17	-	--	--	--
	6,0	89	188	320	78	51	44	36	31	29	21	21	--	--	44	41	43	42	41	35	25	--	--	43	36	32	28	22	-	--	--	--
	7,5	111	235	400	113	52	46	38	33	31	23	23	--	--	46	44	45	45	43	37	27	--	21	45	39	34	31	24	-	20	--	--
160	2,6	50	106	180	43	41	37	28	25	23	-	--	--	--	34	36	36	37	36	30	--	--	--	31	28	25	21	-	-	--	--	--
	4,0	78	164	279	51	47	41	31	27	25	-	--	--	--	40	41	40	39	38	31	22	--	--	37	33	29	23	17	-	--	--	--
	6,0	116	246	418	78	50	45	35	31	29	20	21	--	--	44	45	44	44	43	36	27	--	21	41	37	33	28	22	-	--	--	--
	7,2	139	294	500	104	52	47	37	33	31	22	23	--	--	46	47	46	46	45	38	29	20	23	43	39	35	30	24	-	--	--	--
200	2,3	69	147	250	42	41	36	28	25	23	-	--	--	--	35	37	37	38	36	30	--	--	--	36	30	27	24	18	-	--	--	--
	4,0	122	258	439	51	48	41	32	29	25	18	--	--	--	42	42	41	42	39	33	24	--	--	43	35	31	28	21	-	--	--	--
	6,0	183	387	658	78	51	45	36	33	30	22	22	--	--	46	47	46	47	44	38	28	--	22	47	40	36	33	26	18	22	--	--
	8,2	250	529	900	133	54	48	39	36	33	26	25	--	--	49	50	49	50	48	42	32	23	26	50	43	39	36	30	22	25	--	--
250	2,9	139	294	500	44	45	40	32	29	26	18	--	--	--	37	41	42	36	40	34	23	--	--	35	34	30	22	20	-	--	--	--
	4,0	192	406	690	51	49	43	34	30	26	17	--	--	--	41	44	44	37	40	33	25	--	--	39	37	32	23	20	-	--	--	--
	6,0	288	609	1035	78	53	47	38	34	31	22	23	--	--	46	49	48	42	45	38	30	22	24	44	42	36	28	25	19	21	--	--
	8,7	417	882	1500	150	56	50	42	38	34	26	27	--	22	50	53	53	47	50	43	34	26	28	48	46	41	33	30	24	25	--	20
315	2,9	222	471	800	44	50	46	33	29	27	18	21	--	--	40	40	38	39	38	35	22	--	--	37	33	28	23	20	-	--	--	--
	4,0	306	648	1101	51	53	48	34	30	27	18	24	--	--	44	42	40	39	39	34	23	--	--	41	35	30	23	21	-	--	--	--
	6,0	459	971	1651	79	57	52	38	34	31	23	28	21	23	48	47	44	44	44	40	28	--	22	45	40	34	28	26	20	20	--	--
	10,2	778	1647	2800	210	61	57	43	39	37	28	32	27	28	53	53	50	50	50	46	34	26	28	50	46	40	34	32	26	26	--	--
400	2,2	278	588	1000	42	49	44	31	28	26	17	--	--	--	42	39	37	38	39	34	21	--	--	39	32	25	23	20	-	--	--	--
	4,0	495	1049	1783	51	54	48	35	31	29	19	25	--	--	47	44	41	42	42	37	26	--	20	44	37	29	27	23	17	--	--	--
	6,0	743	1573	2674	79	58	52	39	36	33	24	29	22	24	52	48	46	46	47	42	30	23	25	49	41	34	31	28	22	23	--	--
	9,0	1111	2353	4000	161	62	56	43	40	38	29	32	27	28	56	53	50	51	52	47	35	28	30	53	46	38	36	33	27	27	--	22

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 mentioned 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 mentioned 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. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. Sound data indicated by "X" are not provided as minimum required static pressure drop is more than the given pressure drop.
9. 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	17	23	26	28	30	dB
125	12	15	22	25	27	29	dB
160	12	15	22	25	27	29	dB
200	11	15	21	24	26	28	dB
250	11	15	21	24	26	28	dB
315	8	11	21	24	26	26	dB
355	8	11	21	24	26	26	dB
400	8	11	21	24	26	26	dB

Circular CAV air volume control terminals

Instructions on adjusting the constant air volume

Adjusting the air volume of a constant-volume-terminal

The Barcol-Air constant-air-volume-terminals, type NR / NT are factory pre-set on the desired air volume. The air volume can be changed within the ranges of the unit and read on a scale. Adjustment goes manually by Allen key.

Model Ø	CAV air volume range								
	l/s			CFM			m^3/h		
	Min		Max	Min		Max	Min		Max
80	11	-	35	24	-	74	40	-	125
100	19	-	61	41	-	129	70	-	220
125	28	-	78	59	-	165	100	-	280
140	42	-	111	88	-	235	150	-	400
160	50	-	139	106	-	294	180	-	500
200	69	-	250	147	-	529	250	-	900
250	139	-	417	294	-	882	500	-	1500
315	222	-	778	471	-	1647	800	-	2800
400	278	-	1111	588	-	2353	1000	-	4000

Adjusting the air volume

The image at the right shows a mechanincal CAV terminal with the scale marking. At the upperside of the scale marking the air volume can be adjusted with an Allen key (2mm).

Accuracy

The volume flow controller is a mechanical self-powered unit and works without external power supply. A damper blade with low-friction bearings is adjusted by aerodynamic forces such that the set volume flow rate is maintained within the differential pressure range.

Over the entire pressure range, the flow rate deviation is ± 10% (less than 100 m³ / h ± 10 m³/h).

For small air velocities below 4 m/s, the flow rate deviation can easily be larger than indicated above. Unfavourable flow conditions, pollution or minor bracing during installation can also cause larger deviations.

BARCOL-AIR
AIR DISTRIBUTION

OUR TECHNOLOGY | YOUR WELLBEING

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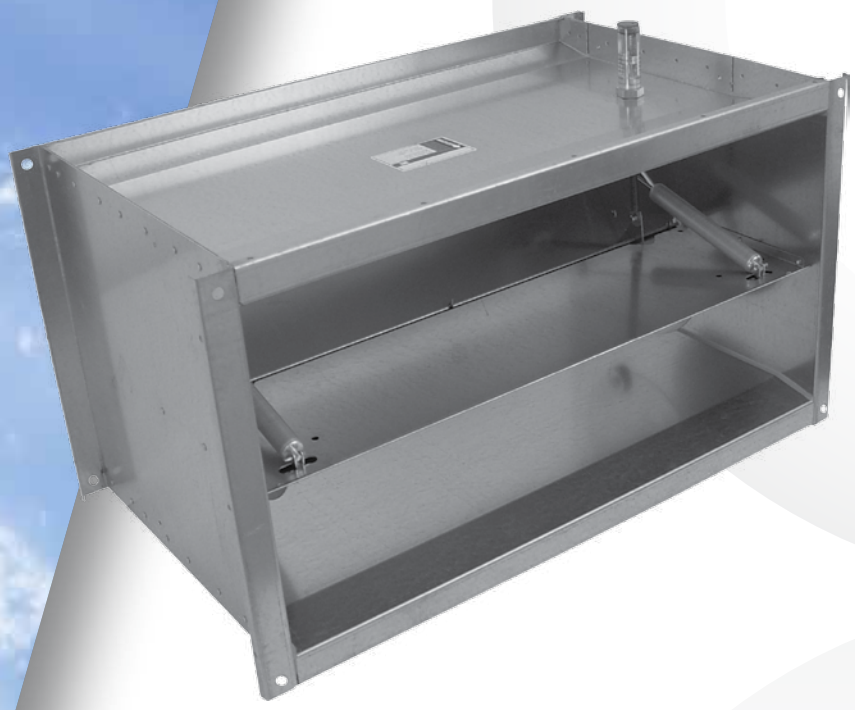


RECTANGULAR CAV AIR VOLUME CONTROL TERMINALS

WITH SYSTEM POWERED MECHANICAL REGULATOR

NM / NN SERIES

SUSTAINABLE / INNOVATION

HC GROEP

HC BARCOL-AIR | AIR DISTRIBUTION

Rectangular CAV air volume control terminals with system powered mechanical regulator

Table of contents

Description **Page**

Rectangular CAV air volume control terminals with system powered mechanical regulator

Type designation
Single wall (NM .....)
Single wall (NN .....)

Composition type designation:

N - M - O - A - O - V - O

N Position 1: **Product group**

O = not applicable

M Position 2: **Function**

O = not applicable
M = rectangular CAV terminal, single wall construction
N = rectangular CAV terminal, double wall construction
1 = non standard, specify separately

O Position 3: **Control**

O = system powered, regulator (standard)
1 = non standard, specify separately

B Position 4: **Outlet**

O = not applicable
A = rectangular outlet
1 = non standard, specify separately

O Position 5: **Reheat coil**

O = without reheat coil
1 = non standard, specify separately

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

O = not applicable
V = factory set with provision for on-site adjustment across the full volume scale
1 = non standard, specify separately

O Position 7: **Finish**

O = standard finish (galvanized steel)
E = epoxy coating
1 = non standard, specify separately

Ordering example:

N	M	O	A	O	V	O	6	0	3	0	Q	6	5	0
See above							Width (cm)		Height (cm)		Air volume (m^3/h)			

Ordering information:

Standard terminals:

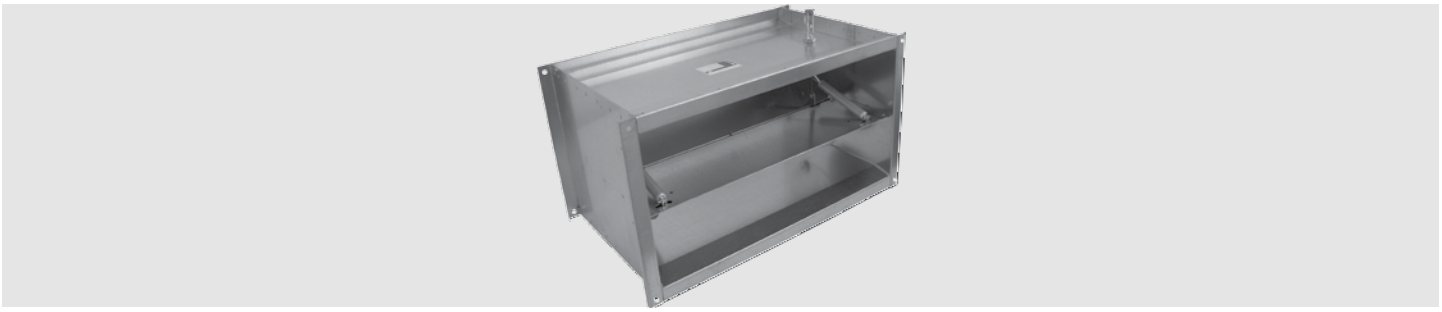
- quantity of terminals
- complete 7 digit code
- terminal size or model
- air volume setting (Q)
- control handing (standard right side)

Non standard terminals:

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

Rectangular CAV air volume control terminals with system powered mechanical regulator

Technical data
Single wall (type NM .....)
Double wall (type NN .....)



Application

NM / NN series rectangular, constant volume terminals with system powered mechanical regulator are designed to keep a constant air flow, independent of the inlet static pressure without the use of a DDC CAV/VAV controller/ actuator. These terminals save commissioning time on site and are suitable either for supply or return air in new or refurbishment projects.

Features:
- Single wall or double wall.
- Pressure independent from 80 – 1000 Pa.
- Compact design.
- Low pressure loss over the terminal.
- Control accuracy ±10% (in the recommended flow range).
- Temperature insensitive (-30°C to +100°C).
- Can be mounted in any position.
- Factory set, saves commissioning time on site.
- Provision for on-site adjustment across the full volume scale.
- Maintenance free.
- Low noise production.

Technical information

Casing:
Terminal casing made of galvanized sheet steel (non spiral) with sleeve connection with rubber gasket. Casing leakage rate to Class II VDI 3803 or DIN 24 194. Duct-sleeve connections at the in- and outlet are suitable for DIN 24 145 or DIN 24 146 connections. In case of double wall construction 30 mm insulation material is used completely enclosed by the double wall construction.

Damper:
Damper blade: aluminium.
Damper shaft: stainless steel with self lubricating Nylon bearings.

Controls:
- The factory setpoint is indicated on the terminal.

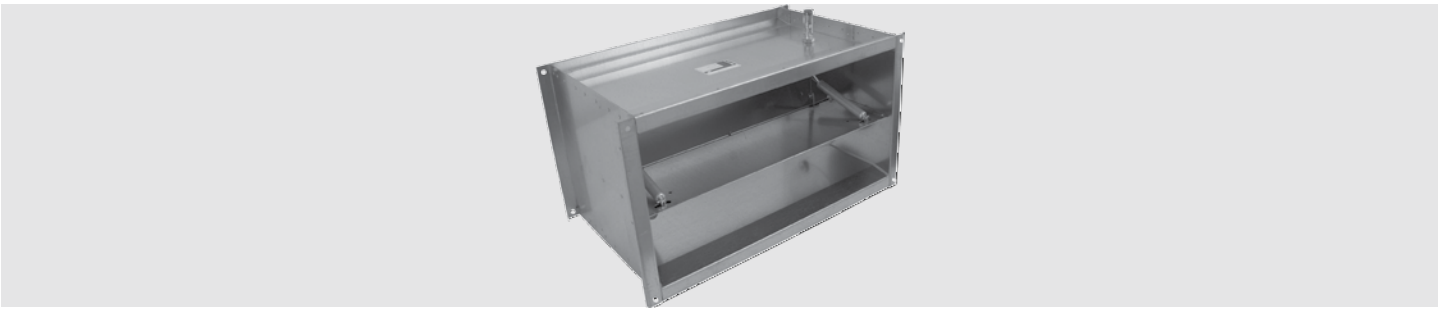
Finish:
- Standard finish galvanized steel.
- Optional finish with epoxy coating is available upon request.

Delivery format

Delivery format:
- When ordering, the required air volume must be indicated.

Rectangular CAV air volume control terminals with system powered mechanical regulator

Technical data
Single wall (type NM .....)
Double wall (type NN .....)



Specify as:

Example:
Supply and install, rectangular, pressure independent constant air volume terminals with system powered mechanical regulator; control accuracy ±10% of V_{CAV}. The construction shall be galvanized steel with a casing leakage rate classified according to class II, VDI 3803/ DIN 24 194. The CAV terminals shall have an aluminium damper blade with stainless steel shaft rotating in self lubricating Nylon bearings.

Air volume 360 l/s
Terminal size 300 x 200 mm
Max. pressure loss 60 Pa
Max. discharge sound index < NC35 (@250Pa Δ p)
Max. radiated sound index < NC35 @250Pa Δ p)

HC Barcol-Air control type “V”, factory set with provision for on-site adjustment across the full volume scale. (HC Barcol-Air type NMOAOVO).

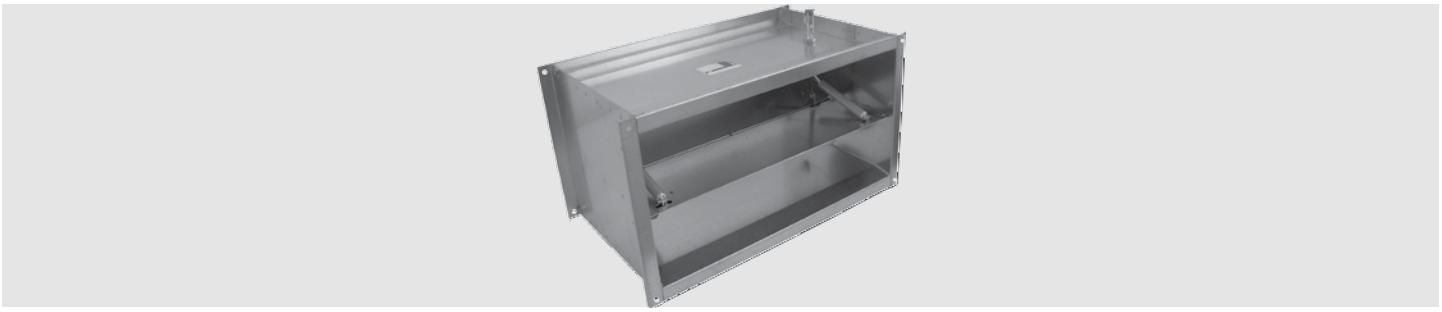
Ordering example : type – model – airflow (m^3/h) = NMOAOVO - 3020 - Q1296 (= 360 l/s)

Manufacturer: HC Barcol-Air

Model W x H	Recommended air volume								
	l/s			CFM			m^3/h		
	Min		Max	Min		Max	Min		Max
200 x 100	56	-	194	119	-	411	202	-	698
300 x 100	60	-	222	127	-	470	216	-	799
400 x 100	84	-	304	178	-	644	302	-	1094
150 x 150	68	-	203	143	-	429	243	-	729
300 x 150	135	-	405	286	-	858	486	-	1458
200 x 200	120	-	360	254	-	762	432	-	1296
300 x 200	180	-	540	381	-	1144	648	-	1944
400 x 200	240	-	720	508	-	1525	864	-	2592
300 x 300	270	-	810	572	-	1715	972	-	2916
450 x 300	405	-	1215	858	-	2573	1458	-	4374
600 x 300	540	-	1620	1144	-	3431	1944	-	5832
400 x 400	480	-	1440	1016	-	3049	1728	-	5184
500 x 400	600	-	1800	1271	-	3812	2160	-	6480
600 x 400	720	-	2160	1525	-	4574	2592	-	7776
500 x 500	750	-	2250	1588	-	4765	2700	-	8100
600 x 500	900	-	2700	1906	-	5718	3240	-	9720
600 x 600	1080	-	3240	2287	-	6861	3888	-	11664

Rectangular air volume control terminals
with system powered mechanical regulator

Installation Instructions
Single wall (type NM .....)
Double wall (type NN .....)



Installation Instructions:

The HC Barcol-Air CAV 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 CAV terminal from high mechanical tension, which could damage the construction and performance of the terminal.

2 Shall prevent torsion on the CAV terminals, which could cause malfunction of the damper blades.

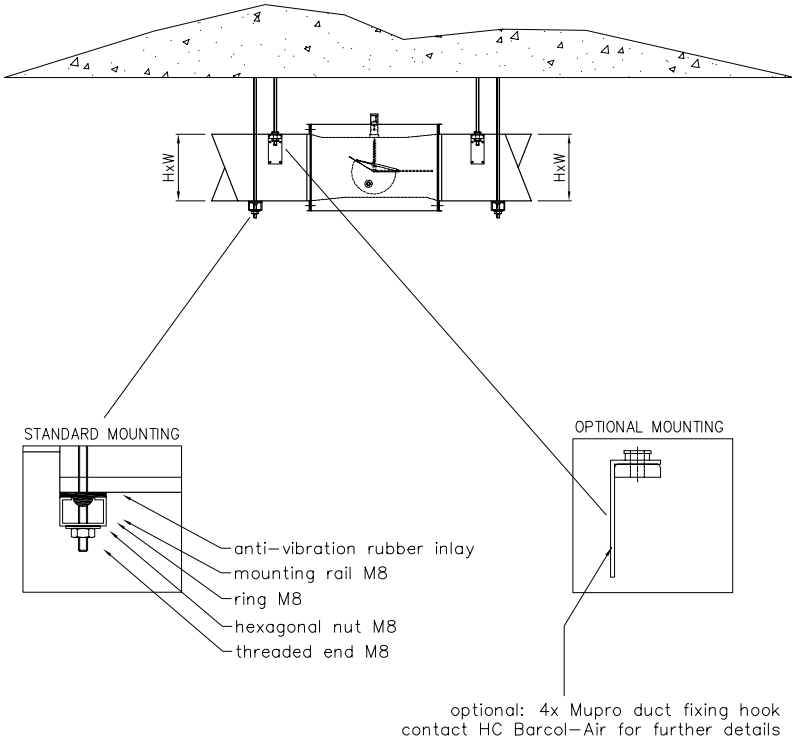
3 Provides some flexibility to the final location of the CAV terminals.

4 Use at least 1x diagonal straight duct length before the CAV inlet.

5 Additional manual volume control dampers (VCD's) before the inlet are not required / recommended!!

6. All connections shall be thermally isolated.

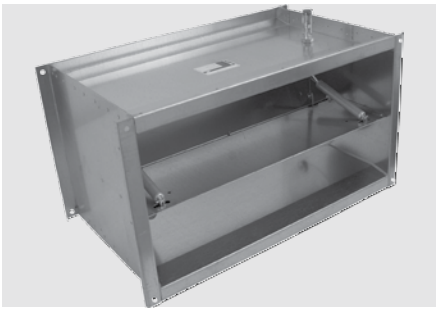
Optional 4 x Mupro fixing hooks can be used (see drawing).

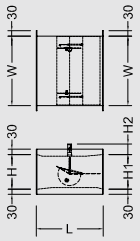


HC GROEP
HC BARCOL-AIR | AIR DISTRIBUTION

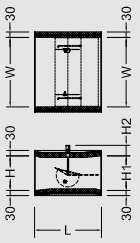
Rectangular air volume control terminals
with system powered mechanical regulator

Model overview
Single wall (type NM .....)
Double wall (type NN .....)





Type NMOAOVO



Type NNOAOVO

L = Installed length.

Dimensions								
Height	Width (W)							Length (L)
(H)	150	200	300	400	450	500	600	
100		•	•	•				220
150	•	•	•					385
200		•	•	•				385
300			•		•		•	385
400				•		•	•	385
500						•	•	425
600							•	470

Remark:
All dimensions in mm.

Rectangular CAV air volume control terminals
with system powered mechanical regulator

Type NMOAOVO
NNOAOVO

Sound data Δ p = 125 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 125 Pa																								
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
200 x 100	2,8	56	119	202	68	49	48	46	44	42	39	22	--	--	47	45	42	38	35	31	25	--	--	43	38	30	22	17	-	--	--	--
	6,0	121	256	435	100	55	54	52	51	49	47	28	21	24	53	51	48	45	42	39	31	23	26	49	44	36	29	24	21	24	--	--
	9,7	194	411	698	199	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
300 x 100	2,0	60	127	216	64	47	46	44	42	39	37	20	--	--	42	40	36	33	28	27	--	--	--	35	30	20	-	-	-	--	--	--
	4,7	141	299	508	82	54	53	51	49	47	45	27	--	23	49	47	43	40	36	35	27	--	22	42	37	27	21	14	-	--	--	--
	7,4	222	470	799	132	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400 x 100	2,1	84	178	302	66	48	47	45	43	40	37	21	--	--	43	41	37	34	29	27	21	--	--	36	31	21	-	-	-	--	--	--
	4,9	196	415	705	86	54	53	52	50	48	46	28	--	23	49	47	44	41	37	36	27	--	22	42	37	28	22	-	-	--	--	--
	7,6	304	644	1094	136	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
150 x 150	3,0	68	143	243	71	50	49	47	45	43	41	23	--	--	48	47	44	41	37	34	27	--	22	44	41	33	27	20	17	20	--	--
	6,0	135	286	486	100	55	54	53	51	49	47	29	21	24	53	52	50	47	43	40	32	24	27	49	46	39	33	26	23	25	--	20
	9,0	203	429	729	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
300 x 150	3,0	135	286	486	71	52	51	49	47	45	42	25	--	20	48	46	43	39	36	31	26	--	20	42	37	29	21	16	10	--	--	--
	6,0	270	572	972	100	58	56	55	53	51	49	31	23	26	54	51	49	45	42	38	32	23	26	48	42	35	27	22	17	23	--	--
	9,0	405	858	1458	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
200 x 200	3,0	120	254	432	71	52	51	49	47	45	42	25	--	20	50	49	46	43	39	35	29	21	24	46	43	35	29	22	18	22	--	--
	6,0	240	508	864	100	58	56	55	53	51	49	31	23	26	56	54	52	49	45	42	35	27	29	52	48	41	35	28	25	28	--	23
	9,0	360	762	1296	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
300 x 200	3,0	180	381	648	71	54	52	50	48	46	43	27	--	22	50	47	44	40	37	32	27	--	22	44	38	30	22	17	-	--	--	--
	6,0	360	762	1296	100	59	58	56	54	52	50	32	26	28	55	53	50	46	43	39	33	26	28	49	44	36	28	23	18	24	--	--
	9,0	540	1144	1944	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400 x 200	3,0	240	508	864	71	54	53	51	49	46	43	27	--	23	50	48	45	41	37	32	28	--	23	44	39	31	23	17	-	--	--	--
	6,0	480	1016	1728	100	60	58	57	55	53	50	33	26	28	56	53	51	47	44	39	34	26	28	50	44	37	29	24	18	25	--	--
	9,0	720	1525	2592	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
300 x 300	3,0	270	572	972	71	55	53	51	49	47	44	28	--	23	52	49	46	43	39	35	29	21	24	47	41	33	27	20	-	22	--	--
	6,0	540	1144	1944	100	60	59	57	56	53	51	33	27	29	57	55	52	50	45	42	35	28	30	52	47	39	34	26	23	27	--	22
	9,0	810	1715	2916	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
450 x 300	3,0	405	858	1458	71	56	54	52	50	47	45	29	21	24	52	50	46	43	38	35	30	22	25	46	42	32	26	18	15	21	--	--
	6,0	810	1715	2916	100	62	60	59	57	54	52	35	28	30	58	56	53	50	45	42	36	29	31	52	48	39	33	25	22	27	--	23
	9,0	1215	2573	4374	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
600 x 300	3,0	540	1144	1944	71	57	55	53	51	48	45	30	22	25	53	51	47	44	39	35	31	23	26	47	43	33	27	19	-	22	--	--
	6,0	1080	2287	3888	100	62	61	59	57	55	52	35	29	31	58	57	53	50	46	42	37	30	32	52	49	39	33	26	22	28	21	24
	9,0	1620	3431	5832	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
400 x 400	3,0	480	1016	1728	71	57	55	53	51	48	45	30	22	25	54	51	48	45	40	36	31	23	26	49	43	35	29	21	17	24	--	--
	6,0	960	2033	3456	100	62	61	59	57	55	52	35	29	31	59	57	54	51	47	43	37	30	32	54	49	41	35	28	24	29	21	24
	9,0	1440	3049	5184	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
500 x 400	3,0	600	1271	2160	71	58	56	63	51	48	45	33	27	29	54	52	57	44	39	35	36	31	33	48	44	43	27	19	-	25	--	--
	6,0	1200	2541	4320	100	63	62	60	58	55	53	36	30	32	59	58	54	51	46	43	37	31	33	53	50	40	34	26	23	29	22	25
	9,0	1800	3812	6480	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
600 x 400	3,0	720	1525	2592	71	58	56	54	52	49	46	31	23	26	54	52	48	45	40	36	32	24	27	48	44	34	28	20	-	23	--	--
	6,0	1440	3049	5184	100	64	62	60	58	56	53	37	30	32	60	58	54	51	47	43	38	31	33	54	50	40	34	27	23	29	22	25
	9,0	2160	4574	7776	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
500 x 500	3,0	750	1588	2700	71	58	56	54	52	49	46	31	23	26	54	52	48	45	40	36	32	24	27	48	44	34	28	20	-	23	--	--
	6,0	1500	3176	5400	100	64	62	60	58	56	53	37	30	32	60	58	54	51	47	43	38	31	33	54	50	40	34	27	23	29	22	25
	9,0	2250	4765	8100	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
600 x 500	3,0	900	1906	3240	71	59	57	55	52	49	46	32	24	27	55	53	49	45	40	36	33	26	28	49	45	35	28	20	-	24	--	--
	6,0	1800	3812	6480	100	64	63	61	58	56	53	37	31	33	60	59	55	51	47	43	38	33	34	54	51	41	34	27	23	30	23	26
	9,0	2700	5718	9720	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
600 x 600	3,0	1080	2287	3888	71	59	57	55	53	50	47	32	24	27	55	53	49	46	41	37	33	26	28	49	45	35	29	21	17	24	--	--
	6,0	2160	4574	7776	100	65	63	62	59	56	54	38	31	33	61	59	56	52	47	44	39	33	34	55	51	42	35	27	24	30	23	26
	9,0	3240	6861	11664	175	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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3. *The discharge sound pressure levels are determined with the following assumptions for downstream ductwork including a diffuser with insulated plenum box.*
4. *The radiated sound pressure levels are determined with the following assumptions 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. *The values for insertion loss do not include end reflection.*
8. *Δps is static pressure drop across VAV air volume control unit.*
9. *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

Rectangular CAV air volume control terminals
with system powered mechanical regulator

Type NMOAOVO
NNOAOVO

Sound data Δ p = 250 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 250 Pa																										
						discharge sound									radiated sound single wall										radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			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	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									dB								
200 x 100	2,8	56	119	202	68	55	54	52	50	48	45	28	21	24	53	51	48	44	41	37	31	23	26	49	44	36	28	23	19	24	--	--
	6,0	121	256	435	100	61	60	58	57	55	53	34	28	30	59	57	54	51	48	45	37	30	32	55	50	42	35	30	27	30	22	25
	9,7	194	411	698	199	64	63	62	61	59	57	38	31	33	62	60	58	55	52	49	41	34	36	58	53	46	39	34	31	33	26	28
300 x 100	2,0	60	127	216	64	53	52	50	48	45	43	26	--	22	48	46	42	39	34	33	26	--	20	41	36	26	20	-	-	--	--	--
	4,7	141	299	508	82	60	59	57	55	53	51	33	27	29	55	53	49	46	42	41	33	26	28	48	43	33	27	20	21	23	--	--
	7,4	222	470	799	132	63	62	61	59	57	55	37	30	32	58	56	53	50	46	45	36	29	31	51	46	37	31	24	25	26	--	20
400 x 100	2,1	84	178	302	66	54	53	51	49	46	43	27	--	23	49	47	43	40	35	33	27	--	22	42	37	27	21	-	-	--	--	--
	4,9	196	415	705	86	60	59	58	56	54	52	34	27	29	55	53	50	47	43	42	33	26	28	48	43	34	28	21	22	23	--	--
	7,6	304	644	1094	136	64	63	61	60	58	56	37	31	33	59	57	53	51	47	46	37	30	32	52	47	37	32	25	26	27	--	22
150 x 150	3,0	68	143	243	71	56	55	53	51	49	47	29	22	25	54	53	50	47	43	40	33	26	28	50	47	39	33	26	23	26	--	22
	6,0	135	286	486	100	61	60	59	57	55	53	35	28	30	59	58	56	53	49	46	38	31	33	55	52	45	39	32	29	31	24	27
	9,0	203	429	729	175	64	63	62	61	59	57	38	31	33	62	61	59	57	53	50	41	35	37	58	55	48	43	36	33	34	28	30
300 x 150	3,0	135	286	486	71	58	57	55	53	51	48	31	24	27	54	52	49	45	42	37	32	24	27	48	43	35	27	22	-	23	--	--
	6,0	270	572	972	100	64	62	61	59	57	55	37	30	32	60	57	55	51	48	44	38	30	32	54	48	41	33	28	23	29	21	23
	9,0	405	858	1458	175	66	66	64	63	61	59	40	35	37	62	61	58	55	52	48	41	35	37	56	52	44	37	32	27	31	24	27
200 x 200	3,0	120	254	432	71	58	57	55	53	51	48	31	24	27	56	55	52	49	45	41	35	28	30	52	49	41	35	28	24	28	21	24
	6,0	240	508	864	100	64	62	61	59	57	55	37	30	32	62	60	58	55	51	48	41	34	36	58	54	47	41	34	31	34	27	29
	9,0	360	762	1296	175	66	66	64	63	61	59	40	35	37	64	64	61	59	55	52	44	39	40	60	58	50	45	38	35	37	31	33
300 x 200	3,0	180	381	648	71	60	58	56	54	52	49	33	26	28	56	53	50	46	43	38	33	26	28	50	44	36	28	23	17	24	--	--
	6,0	360	762	1296	100	65	64	62	60	58	56	38	33	34	61	59	56	52	49	45	39	33	34	55	50	42	34	29	24	30	22	25
	9,0	540	1144	1944	175	68	67	65	64	62	59	41	36	38	64	62	59	56	53	48	42	36	38	58	53	45	38	33	27	33	26	28
400 x 200	3,0	240	508	864	71	60	59	57	55	52	49	33	27	29	56	54	51	47	43	38	34	27	29	50	45	37	29	23	17	25	--	--
	6,0	480	1016	1728	100	66	64	63	61	59	56	39	33	34	62	59	57	53	50	45	40	33	34	56	50	43	35	30	24	31	24	25
	9,0	720	1525	2592	175	69	68	66	64	62	60	42	37	39	65	63	60	56	53	49	43	37	39	59	54	46	38	33	28	34	27	29
300 x 300	3,0	270	572	972	71	61	59	57	55	53	50	34	27	29	58	55	52	49	45	41	35	28	30	53	47	39	33	26	22	28	--	22
	6,0	540	1144	1944	100	66	65	63	62	59	57	39	34	36	63	61	58	56	51	48	41	35	37	58	53	45	40	32	29	33	26	28
	9,0	810	1715	2916	175	69	68	67	65	63	61	43	37	39	66	64	62	59	55	52	45	39	40	61	56	49	43	36	33	36	30	31
450 x 300	3,0	405	858	1458	71	62	60	58	56	53	51	35	28	30	58	56	52	49	44	41	36	29	31	52	48	38	32	24	21	27	--	23
	6,0	810	1715	2916	100	68	66	65	63	60	58	41	35	37	64	62	59	56	51	48	42	36	38	58	54	45	39	31	28	33	27	29
	9,0	1215	2573	4374	175	71	70	68	66	64	62	44	40	41	67	66	62	59	55	52	46	41	42	61	58	48	42	35	32	37	31	33
600 x 300	3,0	540	1144	1944	71	63	61	59	57	54	51	36	29	31	59	57	53	50	45	41	37	30	32	53	49	39	33	25	21	28	21	24
	6,0	1080	2287	3888	100	68	67	65	63	61	58	41	36	38	64	63	59	56	52	48	43	37	39	58	55	45	39	32	28	34	28	30
	9,0	1620	3431	5832	175	72	70	69	67	65	62	45	40	41	68	66	63	60	56	52	46	41	42	62	58	49	43	36	32	37	31	33
400 x 400	3,0	480	1016	1728	71	63	61	59	57	54	51	36	29	31	60	57	54	51	46	42	37	30	32	55	49	41	35	27	23	30	22	24
	6,0	960	2033	3456	100	68	67	65	63	61	58	41	36	38	65	63	60	57	53	49	43	37	39	60	55	47	41	34	30	35	29	30
	9,0	1440	3049	5184	175	72	70	69	67	65	62	45	40	41	69	66	64	61	57	53	47	41	42	64	58	51	45	38	34	39	34	35
500 x 400	3,0	600	1271	2160	71	64	62	69	57	54	51	39	34	35	60	58	63	50	45	41	42	38	39	54	50	49	33	25	21	31	22	25
	6,0	1200	2541	4320	100	69	68	66	64	61	59	42	37	39	65	64	60	57	52	49	43	39	40	59	56	46	40	32	29	35	29	31
	9,0	1800	3812	6480	175	72	71	69	67	65	63	45	41	42	68	67	63	60	56	53	47	42	43	62	59	49	43	36	33	38	33	34
600 x 400	3,0	720	1525	2592	71	64	62	60	58	55	52	37	30	32	60	58	54	51	46	42	38	31	33	54	50	40	34	26	22	29	22	25
	6,0	1440	3049	5184	100	70	68	66	64	62	59	43	37	39	66	64	60	57	53	49	44	39	40	60	56	46	40	33	29	35	29	31
	9,0	2160	4574	7776	175	73	71	70	68	65	63	46	41	42	69	67	64	61	56	53	47	42	43	63	59	50	44	36	33	38	33	34
500 x 500	3,0	750	1588	2700	71	64	62	60	58	55	52	37	30	32	60	58	54	51	46	42	38	31	33	54	50	40	34	26	22	29	22	25
	6,0	1500	3176	5400	100	70	68	66	64	62	59	43	37	39	66	64	60	57	53	49	44	39	40	60	56	46	40	33	29	35	29	31
	9,0	2250	4765	8100	175	73	72	70	68	66	63	46	42	43	69	68	64	61	57	53	48	43	44	63	60	50	44	37	33	39	34	36
600 x 500	3,0	900	1906	3240	71	65	63	61	58	55	52	38	31	33	61	59	55	51	46	42	39	33	34	55	51	41	34	26	22	30	23	26
	6,0	1800	3812	6480	100	70	69	67	64	62	59	43	39	40	66	65	61	57	53	49	44	40	41	60	57	47	40	33	29	36	30	32
	9,0	2700	5718	9720	175	74	72	71	68	66	63	47	43	43	70	68	65	61	57	53	48	43	44	64	60	51	44	37	33	39	34	36
600 x 600	3,0	1080	2287	3888	71	65	63	61	59	56	53	38	31	33	61	59	55	52	47	43	39	33	34	55	51	41	35	27	23	30	23	26
	6,0	2160	4574	7776	100	71	69	68	65	62	60	44	39	40	67	65	62	58	53	50	45	40	41	61	57	48	41	33	30	36	30	32
	9,0	3240	6861	11664	175	74	73	71	69	67	64	47	43	44	70	69	65	62	58	54	49	44	45	64	61	51	45	38	34	40	35	37

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Radiated (dB)	2	5	10	15	15	20

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