INDUCTION VAV BOXES - IVA

DESCRIPTION & FEATURES

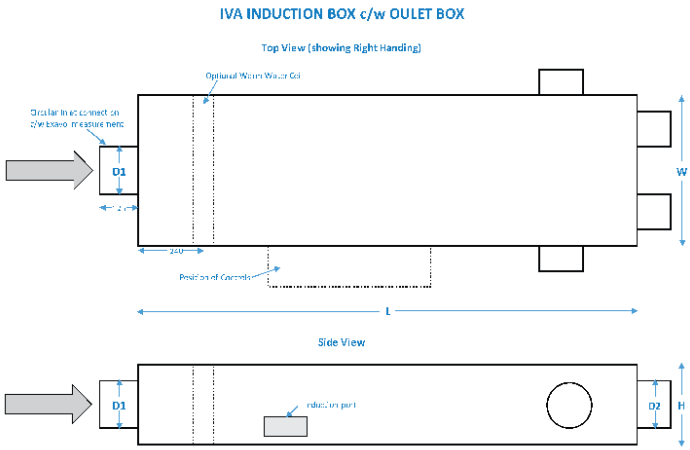
Induction VAV (Variable Air Volume) boxes are suitable for room temperature control in low, medium and high pressure installations. Units are suitable for Supply & Extract applications.

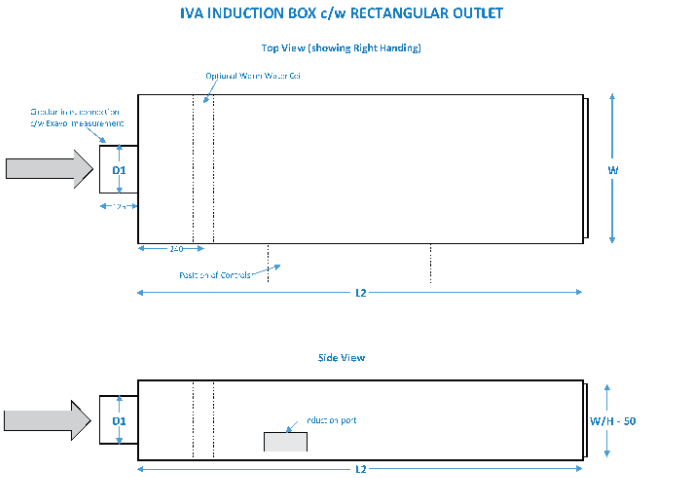
Housing of Galvnised Sheet Steel, internal acoustic and thermal lining. Inlet and outlet connections according to DIN 241456 and Eurovent diameters.

Units can be mounted in any position but must be in accordance with the controls specialist recommendations.

As standard, handing is Right Hand when viewed in direction of air flow.

IVA ORDERING CODE	
Series	**IVA**
Induct	**I** - Induction **0** - No induction
Conn	**R** - Rectangular **O** - Outlet Box (4x circular) **D** - Outlet Box (4x circular) with Dampers
Access	**C** - Warm Water Coil **0** - Not applicable **B1** - Belimo LMV-D3-MP (sizes 100, 125 & 160) **B2** - Belimo NMV-D3-MP (sizes 200 & 250)
Control	**B3** - Belimo VRD3 + NM24A-V (controller with separate actuator) **B4** - Belimo Compact LMV-D3-LON (sizes 100, 125 & 160) **B5** - Belimo Compact NMV-D3-LON (sizes 200 & 250)
Notes	Controls listed above are standard. We can use other manufactures controls if required, please contact Sales Office.
Example: **IVA/I/R/0/B1 Size 125**	





SIZE	D1	L	L2	H	W	D2
100	100	1205	1000	175	350	123
125	125	1205	1000	175	350	123
160	160	1450	1250	210	420	158
200	200	1630	1400	250	500	198
250	250	1930	1650	300	600	248

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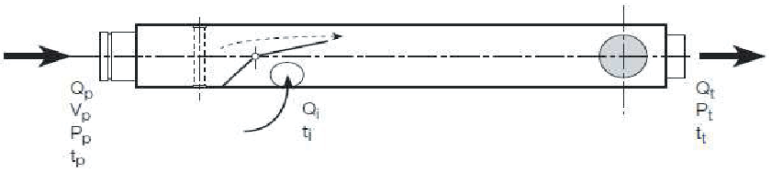
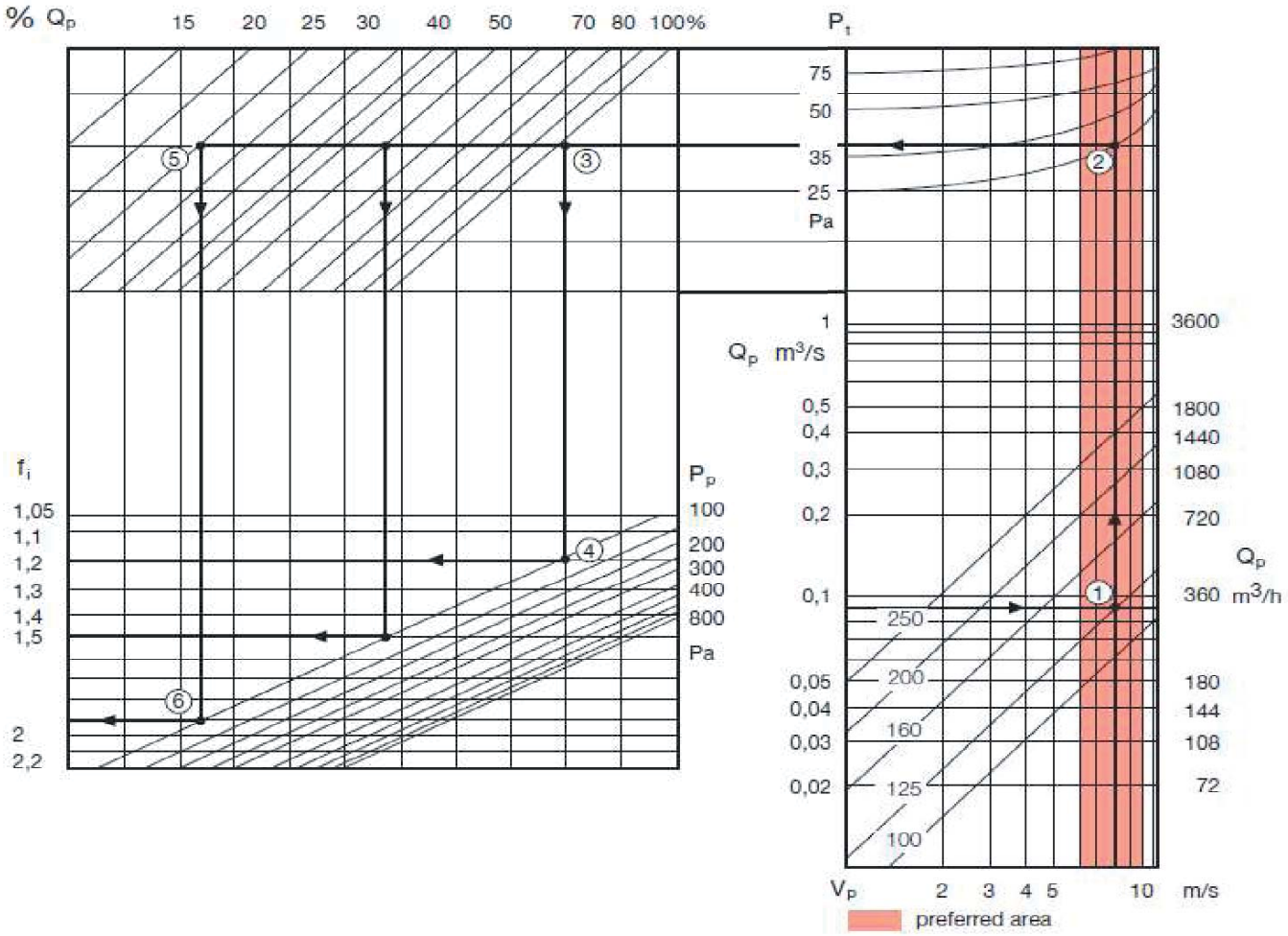
IVA SELECTION DIAGRAM



Qp = primary air volume in m3/s (m3/h)
Vp = velocity in primary connection in m/s
Pp = inlet pressure in Pa
tp = primary temperature in °C
fi = induction factor
Qt = total air volume (Qp x fj)
Pt = available pressure in distribution plenum
at 100 % primary without induction
tt = secondary air temperature in °C
Qi = induction air volume m3/s (m3/h)



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IVA SELECTION EXAMPLE

Given:

Q_p = 0,09 m³/s (maximum)
P_p = 100 Pa
P_t = 25 Pa
t_p = 16°C
t_i = 24°C (room temperature)
Summer minimum 25 %

Required:

model size
V_p = . . m/s
Q_t = . . m³/s
t_t = . . C bij maximum and minimum capacity

Solution:

Determine model size within preference area (1).
model size 125 bij V_p = 7.8 m/s.

Determine f_i at 100% capacity and 100 P_a inlet pressure (2 3 4)
f_i= 1.2

Determine Q_t at maximum capacity for diffuser selection
Q_t= 1.2 x 0.09 = 0.108 m³/s

Determine t_t at maximum capacity
$\Delta t_t = \Delta t_p : f_i$
= 8 : 1.2 = 6.6°C

$t_t = t_i - \Delta t_t$
= 24 – 6.6 = 17.4°C

Determine f_i at 25 % capacity and 100 Pa inlet pressure Summer situation 5 6
f_i = 1.9

Determine Q_t at minimum capacity Summer situation

$$Q_t = \frac{1.9 \times 0.09 \times 25}{100} = 0.043 \text{ m}^3/\text{s}$$

Determine t_t at minimum capacity Summer situation

$\Delta t_t = \Delta t_p : t_i$
= 8 : 1.9 = 4.2°C

$t_t = t_i - A\, t_t$
= 24 - 4,2 = 19.8°C

In order not to complicate things, the basis was taken that the inlet pressure will remain the same at minimum capacity. The actual values of Q_t and t_t will be more favourable at a higher inlet pressure.

General Sound Data

- the sound power is given in dB at a reference value of 10^{-12} watt.
- The sound pressure levels Lp, dB(A) stated have taken into account the following:
  For discharge sound, the attenuation of a silencer and a ceiling diffuser with plenum box.
  For radiated sound the attenuation of the ceiling plenum and associated false ceiling.
  For correction values please see correctiontable below.
- The adopted room attenuation is 10dB. If the actual value is lower, the dB(A) values have to be corrected.
- Note: the Lw values have been measured with one end nozzle of the duct in the free room. (i.e. including end reflection).
  For rooms with low sound levels (<25dB(A)), hard surface, light walls etc. consult an acoustic consultant.
- For type IVA/0 the radiated sound level may be reduced by 2dB.

Correction Table

	Octave Bands					
	125	250	500	1k	2k	4k
Radiated Sound	2	5	10	15	15	15

The above values have been used in the calculation of Lp, dB(A) values on the following pages.

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IVA DISCHARGE NOISE DATA

SIZE 100 - MINIMUM VOLUME @ 1.5m/s = 12l/s, 2m/s = 16l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
31	4	100	29	27	24	19	9	5	9	200	36	34	31	26	16	12	14
47	6		32	30	27	22	12	8	10		38	36	33	28	18	14	16
63	8		35	33	30	25	15	11	13		40	38	35	30	20	16	18
79	10		37	35	32	27	17	13	15		42	40	37	32	22	18	20
31	4	400	43	41	38	33	23	19	21	800	50	48	45	40	30	26	28
47	6		45	43	40	35	25	21	23		52	50	47	42	32	28	30
63	8		47	45	42	37	27	23	25		54	52	49	44	34	30	32
79	10		48	46	43	38	28	24	26		55	53	50	45	35	31	33

SIZE 125 - MINIMUM VOLUME @ 1.5m/s = 18l/s, 2m/s = 25l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
49	4	100	31	29	26	21	11	7	9	200	38	36	33	28	18	14	16
74	6		34	32	29	24	14	10	12		40	38	35	30	20	16	18
98	8		37	35	32	27	17	13	15		42	40	37	32	22	18	20
123	10		39	37	34	29	19	15	17		44	42	39	34	24	20	22
49	4	400	45	43	40	35	25	21	23	800	52	50	47	42	32	28	30
74	6		47	45	42	37	27	23	25		54	52	49	44	34	30	32
98	8		49	47	44	39	29	25	27		56	54	51	46	36	32	33
123	10		50	48	45	40	30	26	28		57	55	52	47	37	33	35

SIZE 160 - MINIMUM VOLUME @ 1.5m/s = 30l/s, 2m/s = 40l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
80	4	100	34	32	29	24	14	10	11	200	40	38	35	30	20	16	18
121	6		36	34	31	26	16	12	14		42	40	37	32	22	18	20
161	8		39	37	34	29	19	15	17		44	42	39	34	24	20	22
201	10		41	39	36	31	21	17	19		46	44	41	36	26	22	24
80	4	400	47	45	42	37	27	23	25	800	54	52	49	44	34	30	32
121	6		49	47	44	39	29	25	27		56	54	51	46	36	32	34
161	8		51	49	46	41	31	27	29		58	56	53	48	38	34	36
201	10		52	50	47	42	32	28	30		59	57	54	49	39	35	37

INDUCTION VAV BOXES - IVA

IVA DISCHARGE NOISE DATA (continued)

SIZE 200 - MINIMUM VOLUME @ 1.5m/s = 47l/s, 2m/s = 63l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
126	4	100	43	36	30	25	15	11	17	200	47	42	36	32	22	18	22
188	6		46	39	33	28	18	14	20		49	44	37	34	24	20	24
251	8		51	45	38	31	21	17	26		54	49	41	36	26	22	29
314	10		56	49	43	33	23	19	30		58	53	46	38	28	24	33
126	4	400	53	50	44	39	29	25	29	800	56	54	51	46	36	32	34
188	6		55	52	46	41	31	27	31		58	56	53	48	38	34	36
251	8		60	56	49	43	33	29	36		60	58	55	50	40	36	38
314	10		62	58	52	44	34	30	38		61	59	56	51	41	37	40

SIZE 250 - MINIMUM VOLUME @ 1.5m/s = 74l/s, 2m/s = 98l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
196	4	100	45	38	32	27	17	13	19	200	49	44	39	34	24	20	24
296	6		47	40	36	30	20	16	21		51	46	41	36	26	22	26
393	8		53	46	40	33	23	19	27		57	51	45	38	28	24	32
491	10		55	49	43	35	25	21	30		59	53	48	40	30	26	34
196	4	400	54	50	46	41	31	27	30	800	58	56	53	48	38	34	36
295	6		56	52	47	43	33	29	32		60	58	55	50	40	36	38
393	8		62	57	52	45	35	31	37		62	60	57	52	42	38	40
491	10		64	60	55	46	36	32	40		63	61	58	53	43	39	41

INDUCTION VAV BOXES - IVA

IVA RADIATED NOISE DATA

SIZE 100 - MINIMUM VOLUME @ 1.5m/s = 12l/s, 2m/s = 16l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
31	4	100	30	31	29	23	20	14	11	200	37	38	36	30	27	21	18
47	6		33	34	32	26	23	17	14		39	40	38	32	29	23	20
63	8		36	37	35	29	26	20	16		41	42	40	34	31	25	22
79	10		38	39	37	31	28	22	19		43	44	42	36	33	27	24
31	4	400	44	45	43	37	34	28	25	800	51	52	50	41	41	35	32
47	6		46	47	45	39	36	30	27		53	54	52	46	43	37	34
63	8		48	49	47	41	38	32	29		55	56	54	48	45	39	35
79	10		49	50	48	42	39	33	30		56	57	55	49	46	40	37

SIZE 125 - MINIMUM VOLUME @ 1.5m/s = 18l/s, 2m/s = 25l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
49	4	100	32	33	31	25	22	16	13	200	39	40	38	32	29	23	20
74	6		35	36	34	28	25	19	16		41	42	40	34	31	25	22
98	8		38	39	37	31	28	22	18		43	44	42	36	33	27	24
123	10		40	41	39	33	30	24	21		45	46	44	38	35	29	26
49	4	400	46	47	45	39	36	30	27	800	53	54	52	46	43	37	34
74	6		48	49	47	41	38	32	29		55	56	54	48	45	39	36
98	8		50	51	49	43	40	34	30		57	58	56	50	47	41	37
123	10		51	52	50	44	41	35	32		58	59	57	51	48	42	39

SIZE 160 - MINIMUM VOLUME @ 1.5m/s = 30l/s, 2m/s = 40l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
80	4	100	35	36	34	28	25	19	15	200	41	42	40	34	31	25	22
121	6		37	38	36	30	27	21	18		43	44	42	36	33	27	24
161	8		40	41	39	33	30	24	21		45	46	44	38	35	29	26
201	10		42	43	41	35	32	26	23		47	48	46	40	37	31	28
80	4	400	48	49	47	41	38	32	29	800	55	56	54	48	45	39	36
121	6		50	51	49	43	40	34	31		57	58	56	50	47	41	38
161	8		52	53	51	45	42	36	33		59	60	58	52	49	43	40
201	10		53	54	52	46	43	37	34		60	61	59	53	50	44	41

INDUCTION VAV BOXES - IVA

IVA RADIATED NOISE DATA (continued)

SIZE 200 - MINIMUM VOLUME @ 1.5m/s = 47l/s, 2m/s = 63l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
126	4	100	49	41	38	31	28	23	23	200	46	45	45	38	35	30	26
188	6		51	43	41	34	31	26	26		48	47	47	40	37	32	28
251	8		54	50	44	37	34	29	30		56	52	49	42	39	34	32
314	10		58	54	46	39	36	31	34		59	57	51	44	41	36	36
126	4	400	50	52	52	45	42	37	33	800	57	59	59	52	49	44	40
188	6		52	54	54	47	44	39	35		59	61	61	54	51	46	42
251	8		56	55	52	49	46	41	35		61	63	63	56	53	48	43
314	10		60	60	55	50	47	42	39		63	64	64	57	54	49	44

SIZE 250 - MINIMUM VOLUME @ 1.5m/s = 74l/s, 2m/s = 98l/s																	
AIR VOL	VEL	INLET	Lw in dB/octave						Lp	INLET	Lw in dB/octave						Lp
(l/s)	(m/s)	(Pa)	123	250	500	1000	2000	4000	(dBA)	(Pa)	123	250	500	1000	2000	4000	(dBA)
196	4	100	50	42	40	33	30	25	25	200	46	46	43	40	37	32	26
296	6		52	44	43	36	33	28	27		48	28	44	42	39	34	28
393	8		54	50	46	39	36	31	30		55	53	48	44	41	36	32
491	10		55	54	48	41	38	33	33		58	58	51	46	43	38	36
196	4	400	50	53	51	47	44	39	33	800	59	61	61	54	51	46	42
295	6		51	54	52	49	46	41	34		61	63	63	56	53	48	44
393	8		57	57	53	51	48	43	37		63	65	65	58	55	50	45
491	10		61	60	55	52	49	44	39		64	66	66	59	56	51	46

Notes