

VIROO Ceiling with ALS

Square ceiling air diffuser with nozzles for supply air, with commissioning box



QUICK FACTS

- Flush design
- Suitable for VAV-applications
- Fast and easy installation
- Sealing ring, standard for spigot
- Energy efficient with tightness class C, EN 1751:2014
- Commissioning box, 360° rotatable
- Commissioning box with insulation, damper and measurement function
- Standard swirl spread, alternative spread 3-way and vertical
- Standard black or white rectangular nozzle

AIR FLOW - SOUND PRESSURE ROOM (Lp10A) *)							
VIROO Ceiling Size		25 dB(A)		30 dB(A)		35 dB(A)	
		l/s	m ³ /h	l/s	m ³ /h	l/s	m ³ /h
125-600		35	126	42	151	48	173
160-600		43	155	52	187	60	216
200-600		78	281	89	320	103	371
250-600		92	331	106	382	122	439
315-600		118	425	136	490	158	569
400-600		170	612	195	702	225	810
VIROO Ceiling Size	ALS Size	25 dB(A)		30 dB(A)		35 dB(A)	
		l/s	m ³ /h	l/s	m ³ /h	l/s	m ³ /h
125-600	100-125	22	79	28	101	35	126
160-600	100-160	26	94	34	122	45	162
160-600	125-160	33	119	40	144	49	176
200-600	125-200	34	122	48	173	70	252
200-600	160-200	52	187	63	227	78	281
250-600	160-250	59	212	78	281	99	356
250-600	200-250	70	252	87	313	105	378
315-600	200-315	75	270	105	378	130	468
315-600	250-315	103	371	125	450	146	526
400-600	250-400	103	371	135	486	165	594
400-600	315-400	135	486	155	558	190	684

Total pressure drop 50 Pa.

*) L_{p10A} = Sound pressure incl. A-filter with 4 dB room attenuation and 10 m² room absorption area.

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Technical description

Design

- The air diffuser consists of a backing box and a diffuser face.
- The diffuser face has plastic rectangular nozzles and is designed for discharging high airflows. Nozzles can easily be changed from standard swirl spread to 3-way or vertical spread. Information in separate Instructions/Manuals
- Quick Access system makes it easier and faster to open and close the diffuser face for installation, commissioning and cleaning, see figure 1.
- Commissioning box is 360° rotatable, which makes duct installation easier and flexible ducts are not necessary.
- Telescopic vertically fine adjustment is possible between the commissioning box and the air diffuser to reach alignment with the ceiling.
- Tightness class C, according to EN 1751:2014, for the commissioning box gives an energy efficient system and all the supply air will be utilized in the room.

Materials and finish

- The backing box and diffuser face are made of sheet steel, the spigot is made of galvanized sheet steel.
- The sheet steel is painted.
- Standard colour:
 - White semi-gloss, lustre 40, RAL 9003/NCS S 0500-N
- Alternative standard colours:
 - Silver gloss, lustre 80, RAL 9006
 - Grey aluminium gloss, lustre 80, RAL 9007
 - White semi-gloss, lustre 40, RAL 9010
 - Black semi-gloss, lustre 35, RAL 9005
 - Grey semi-gloss, lustre 30, RAL 7037
- Non-painted finish and other colours available on request.
- The rectangular nozzle is made of environmentally friendly plastic (PP-polypropylene) and is available in black and white.

Accessories

Commissioning box:

- ALS. The commissioning box is made of galvanized sheet steel and has internal sound absorbent insulation^{*)} with reinforced surface layer.

^{*)}Fire-resistance graded to B-s1,d0 in accordance with EN ISO 11925-2.

Frame:

- SAR K. For aesthetic installation of a lowered diffuser.

Adapter for suspended ceilings:

- ADAPTER. For adaptation to various variants and makes of suspended ceiling systems. See separate product sheet for ADAPTER.

Project design

- The air diffuser (backing box and diffuser face) is delivered with commissioning box.
- The air diffuser has the dimensions 595 x 595mm. It can be placed directly in suspended ceilings with visible grid 600x600 mm.



- Air diffusers with commissioning box should be fixed to the ceiling and duct system.

Installation

- To dismantle the diffuser face, insert a thin object, for example a Quick Access card.
- Insert the card in between the diffuser face and the diffuser backing box in order to release the springs.
- Move the card from the centre out towards the corner, see figure 1.
- The inlet spigot of the diffuser backing box can be secured to the connecting duct by means of self-tapping screws or a blind rivets.
- For flush-mounting in suspended ceiling systems, secure the air diffuser by means of screws into place in the framework through either the sides or top of the diffuser backing box.
- The air diffuser is designed for installation in modular suspended ceiling systems. The air diffuser can be placed directly in suspended ceiling systems, with visible T-bar framework, then fix to the commissioning box.
- The commissioning box ALS must be secured to the building structure by means of hangers or mounting brackets. The ALS has mounting brackets on the sides and M8 connection on top of the box.
- Extension with 500 mm circular duct between the commissioning box and the air diffuser can be made, without having to lengthen the measuring tubes and damper adjustment cords, see figure 2.

Commissioning with ALS

- For details on commissioning details, see the installation and maintenance instructions.
- Measurement accuracy and requirement on straight duct before the commissioning box, see Figure 2. The requirements of straight duct depends on the type of disturbance before the commissioning box. Figure 2 shows a bend, a dimensional change and a T-piece. Other types of disturbances requires at least 2xD straight (D = connection dimension) for measurement accuracy of $\pm 10\%$ of the flow.

Maintenance

- The air diffuser and the commissioning box can be cleaned, if necessary, using lukewarm water with dishwashing detergent added or by vacuum cleaning using a brush nozzle.

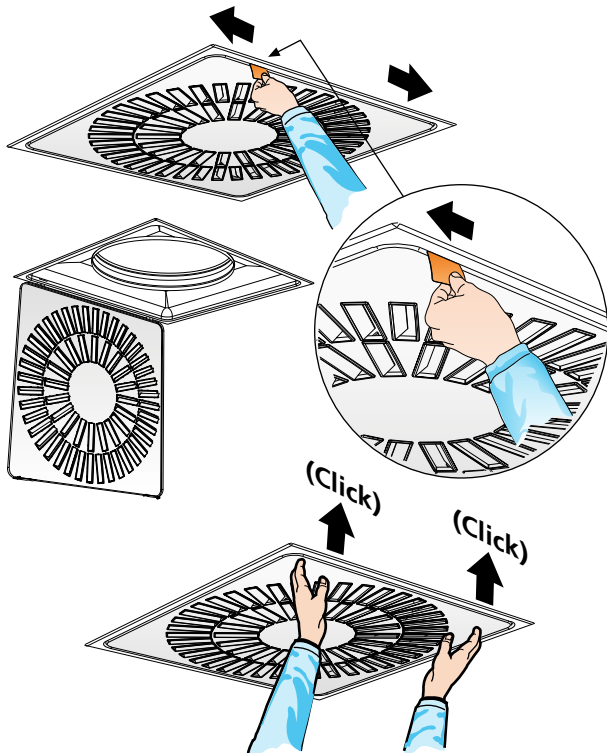


Figure 1. Quick Access.

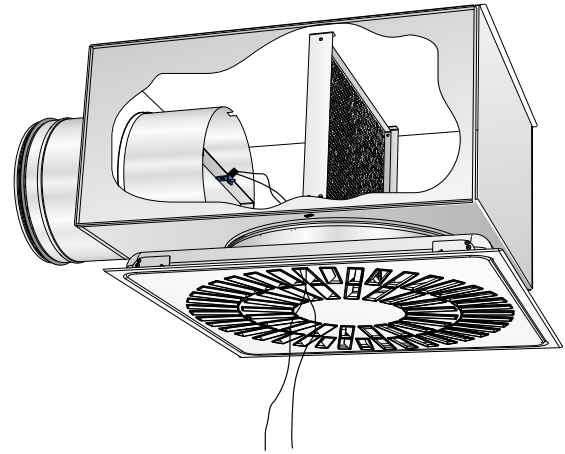


Figure 3. VIREO C with ALS, removable damper.

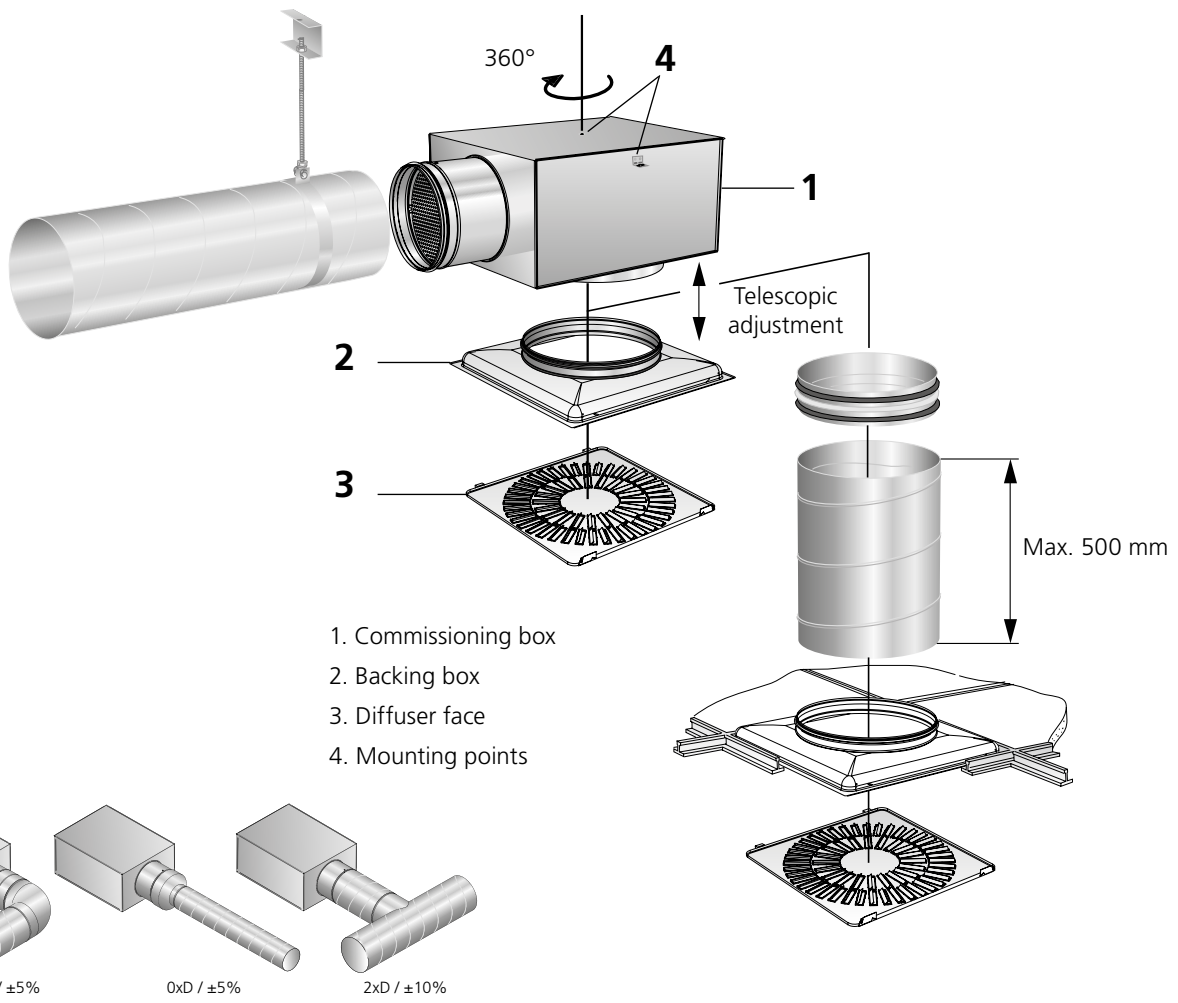


Figure 2. Installation alternatives.

Sizing

Sound data - explanation

The sound level is given in dB(A) for products in rooms and applies to rooms with 10 m² equivalent sound absorption area. Any exceptions are given in the product description.

Measurement of air diffusers according to ISO 5135 and ISO 3471, which is intended for broad-band sound of a stable nature is performed according to the so-called "Comparison method", which means that the measured effective sound power level is compared with the sound pressure level for a calibrated sound source with a known sound power (method II and ASHRAE 36-72).

L_w = Sound power level in the octave band in dB over 1 pW. (10⁻¹² W)

L_{p10A} = Sound pressure level in dB(A) according to normalised frequency weighting A. All sound levels are related to an equivalent absorption area of 10 m² (acoustic absorption of 4 dB)

ΔL = Sound attenuation in the octave band (dB)

K_{OK} = Correction for producing the L_w value in the octave band

Sound pressure level L_{p10A} dB(A) or $L_{w_{tot}}$ dB can be divided into octave bands using the correction factor K_{OK} . This is given in table form for each product.

Formula: $L_w = L_{p10A} + K_{OK}$

The sound data divided into octave bands is also given in table form. For products with a sound level reported in dB(A) the opening attenuation is included in the sound attenuation data.

Calculation software

Refer to Swegon's calculation software ProSelect for data regarding sound in the octave band and sound attenuation in the octave band.

Airflow

The airflow is given in l/s and m³/h, and is listed in the engineering diagram for each product.

Throw length

Testing method according to EN 12238.

The throw ($l_{0,2}$) is the longest distance from the centre of a supply air diffuser to the isovel 0,2 m/s at isothermal air supply. A throw of $l_{0,2}$ is provided for all Swegon's air diffusers.

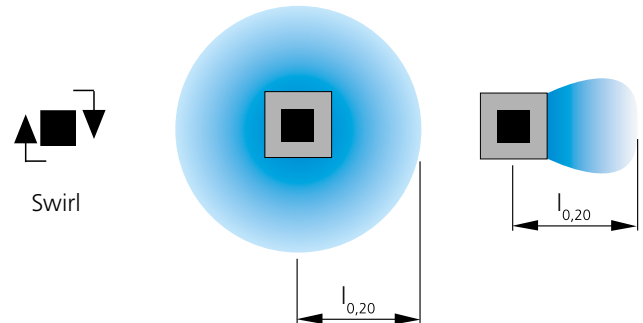
The values given in the engineering graph apply to isothermal supply air.

For air diffusers, the throw is given for mounting facing the ceiling. Some supply air diffusers can be mounted free hanging or suspended from the ceiling, in which case the throw is reduced by approximately 20%. "Free-hanging" means that the diffuser outlet is at least 400 mm from the ceiling.

For calculating the width of the air stream, air velocities

in the occupied zone or sound levels in rooms with other dimensions, please refer to our ProAir web calculation software available for download at www.swegon.com.

Illustration of the spread direction:



Engineering graphs - explanation

General

Unless stated otherwise, the engineering graph for each product provides the following information:

- Data for isothermal conditions
- Throw with an end velocity of 0,2 m/s
- Sound level L_{p10A} dB(A) 10 m² equivalent sound absorption
- Pressure drop p_t , Pa
- Air flow q l/s and m³/h

Pressure drop

In the engineering graph for air terminals the pressure drop is given as the total pressure drop (p_t). The total pressure drop (p_t) is the sum of the static pressure drop (p_s) and the dynamic pressure (p_d) over the air terminal.

Supply air: $p_t = p_s + p_d$

For a supply air terminal the total pressure drop is the sum of two positive pressures and therefore has a larger numerical value than the static pressure drop. For extract air terminals the static pressure drop is negative and the total pressure drop is therefore a numerically smaller value than the static pressure drop.

Extract air: $p_t = (-p_s) + p_d$

The dynamic pressure is calculated as follows:

$$P_d = \frac{v^2}{2} \rho \quad \text{Pa}$$

where v is the inlet velocity in m/s
 ρ is the air density in kg/m³

Sizing example

Room area: 20x10 m with projected air flow = 5000 m³/h.

Sound requirement for supply air diffuser: L_{WA} = 40 dB(A) and 8 dB room attenuation.

Air velocities in the occupied zone should be lower than 0,2 m/s.

Supply air temperature = 18°C.

Room temperature = 24°C.

Gives dT= - 6 K.

Calculate numbers of air diffusers

Distance to wall has to be at least 2 m, which gives 2 rows with air diffusers = 10 air diffusers with 500 m³/h per air diffuser, with 4 m between the air diffusers.

From graph:

Open damper 0°, with q= 500 m³/h gives:

- L_{pA} = 26 dB(A) and acoustic absorption of 4 dB.
- 15 Pa total pressure drop.
- l_{0,2} = 3,8 m throw with standard swirl spread (isothermal conditions, end velocity of 0,2 m/s).

Control of requirements

Sound L_{WA}

Conversion to sound effect

L_{WA} = L_{pA} + 4 dB = 26+4 = 30 dB(A) for each air diffuser.

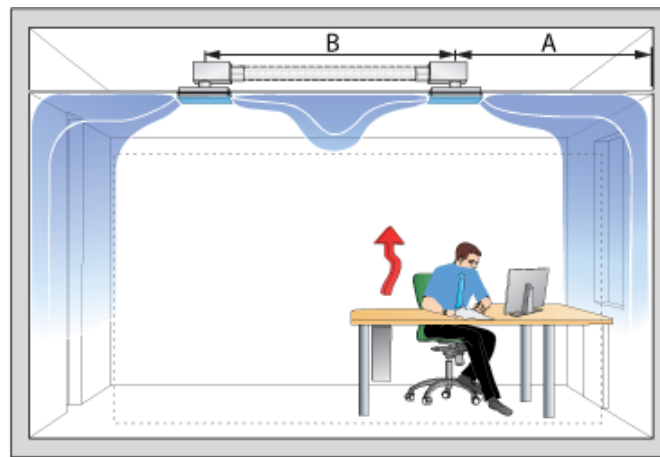
10 air diffusers á 30 dB(A) gives with logarithmic addition L_{WA} = 30 +10 = 40 dB(A).

We get total sound pressure for the room L_{pA} = 40-8 = 32 dB(A), (acoustic absorption of 8 dB).

Velocities in the occupied zone

Smallest recommended distance between air diffuser and wall is calculated in ProSelect (www.swegon.com).

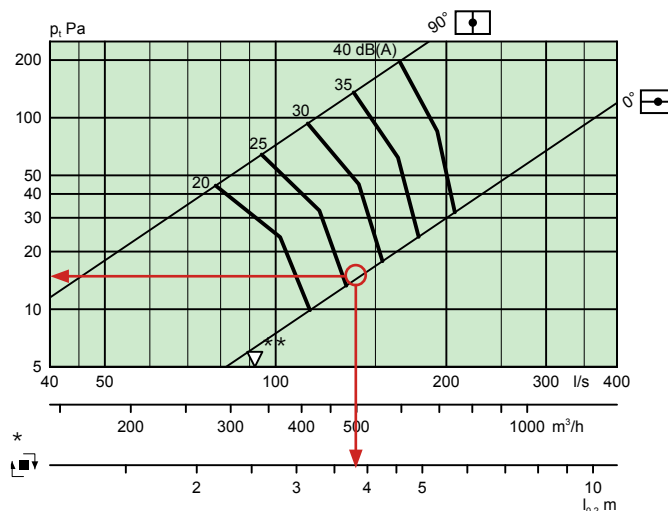
ProSelect gives: when dT = - 6 K, B = 3,6 m, shortest distance to wall = 0,25 m when the air diffuser is placed on 4 m ceiling height.



A = Distance wall to wall in the occupied zone (0,20 m/s).

B = Distance between air diffusers in the occupied zone (0,20 m/s).

Sizing example with damper



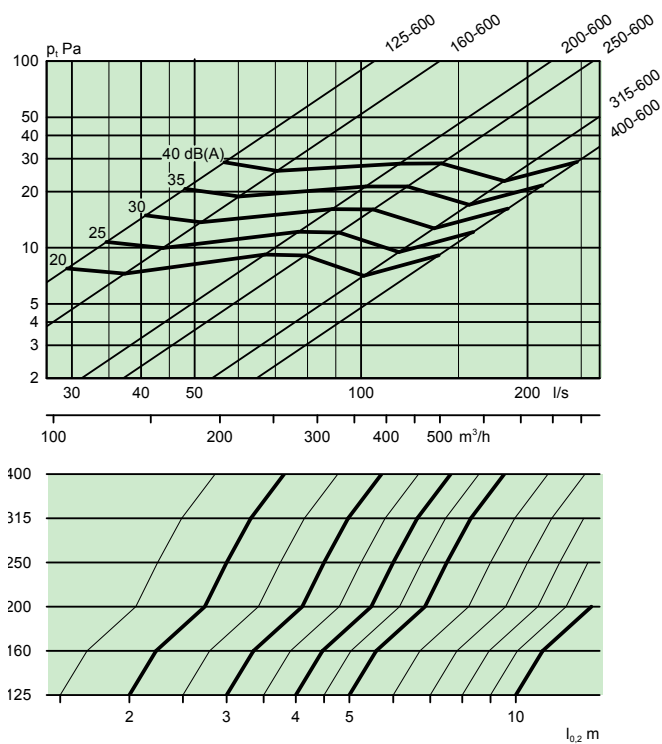
- *Swirl spread
- **Minimum flow for commissioning
- Isothermal throw = 3,8 m
- L_{pA} = 26dB(A)

VIREO C and VIREO C with ALS

- The dB(A) values are applicable to rooms with normal acoustic absorption of 4 dB.
- Throw $l_{0,2}$ is measured under isothermal conditions.
- Graph for supply air shows standard swirl spread
- Recommended max. permissible temperatures below/over room temperature is $\pm 10K$.
- Recommended Ceiling height is 2.5-4 m

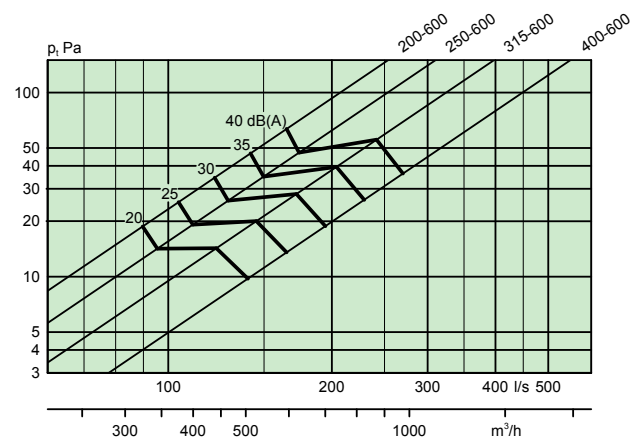
VIREO C - Supply air, Air diffuser

Air flow – Pressure drop – Sound level – Throw



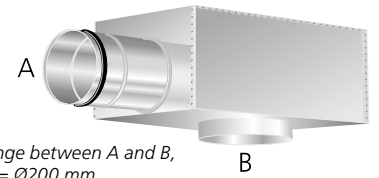
VIREO C - Extract air, Air diffuser

Air flow – Pressure drop – Sound level



VIREO C + ALS - Supply air, Air diffuser with commissioning box

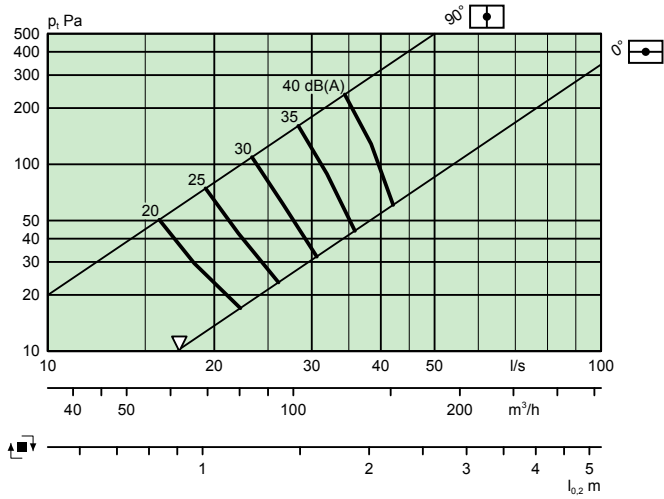
Air flow – Pressure drop – Sound level – Throw



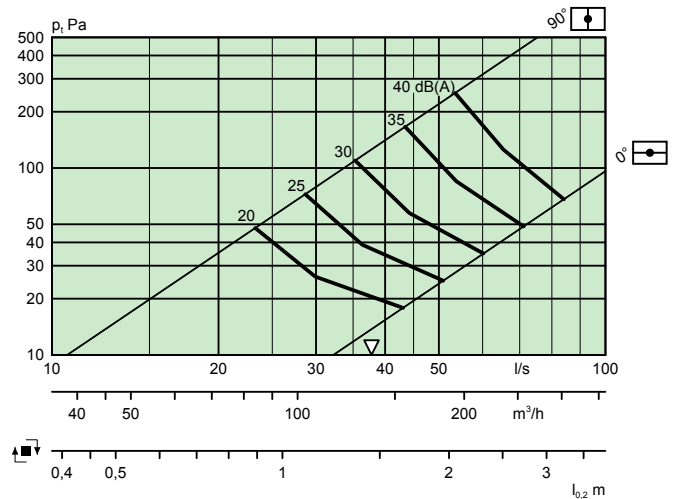
Explanation of the step model:

- One step = One dimensional change between A and B, for example, A = Ø160 mm and B = Ø200 mm.
- Two steps = Two dimensional changes between A and B, for example, A = Ø160 mm and B = Ø250 mm.

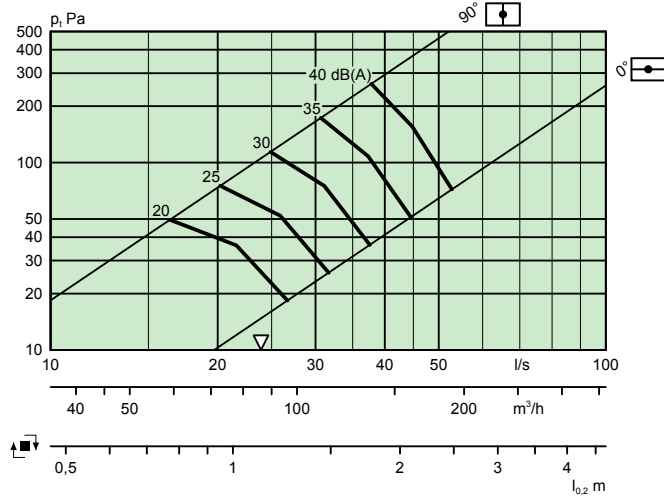
VIREO C 125-600 + ALS 100-125 - One step



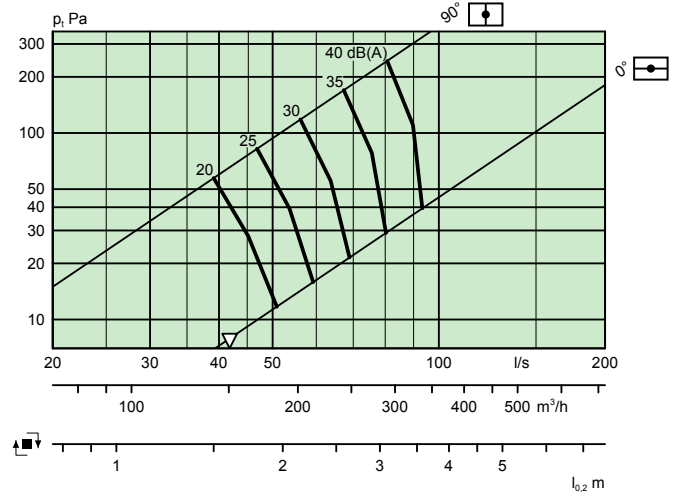
VIREO C 200 -600 + ALS 125-200 - Two steps



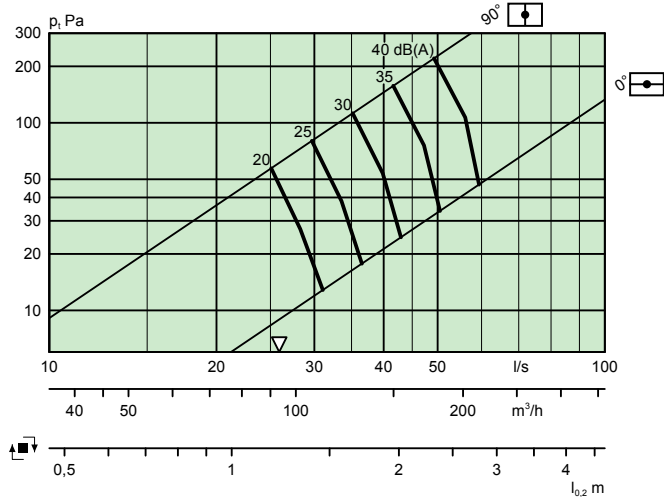
VIREO C 160 -600 + ALS 100-160 - Two steps



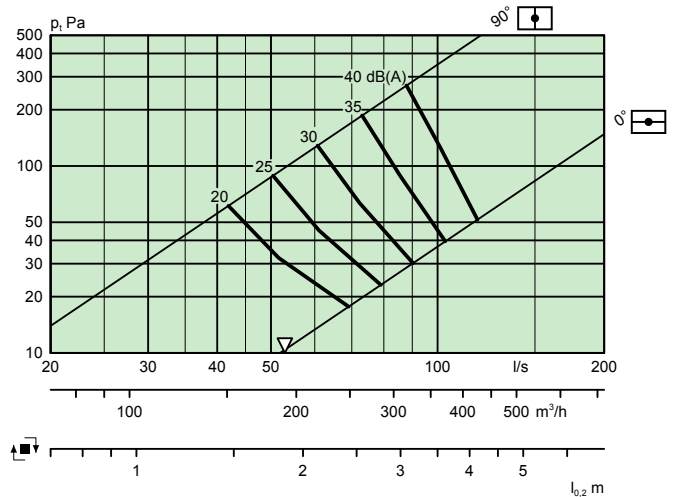
VIREO C 200 -600 + ALS 160-200 - One step



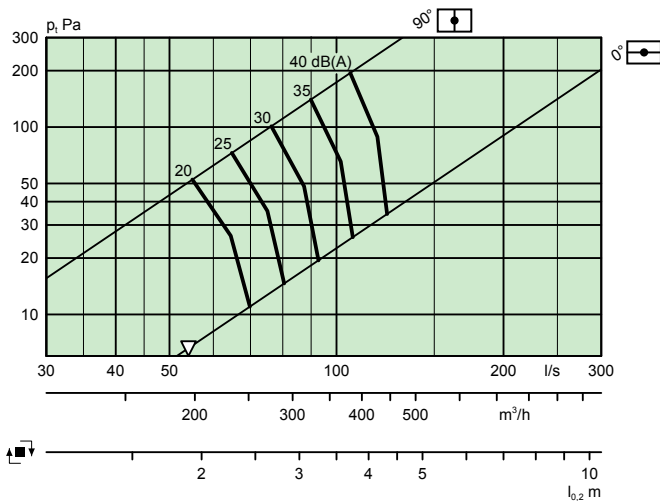
VIREO C 160 -600 + ALS 125-160 - One step



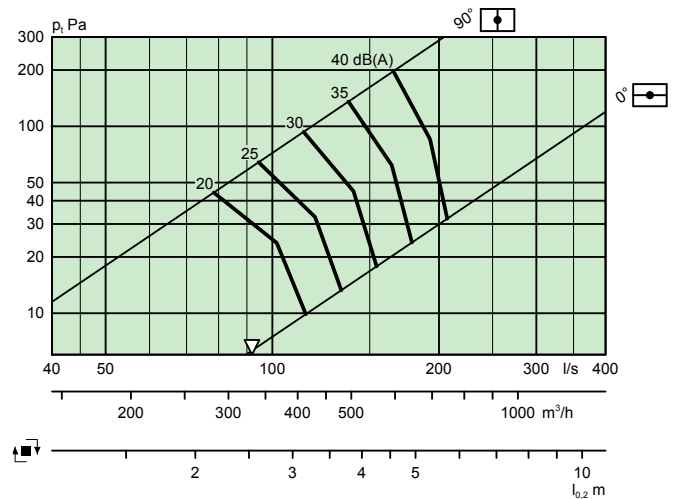
VIREO C 250 -600 + ALS 160-250 - Two steps



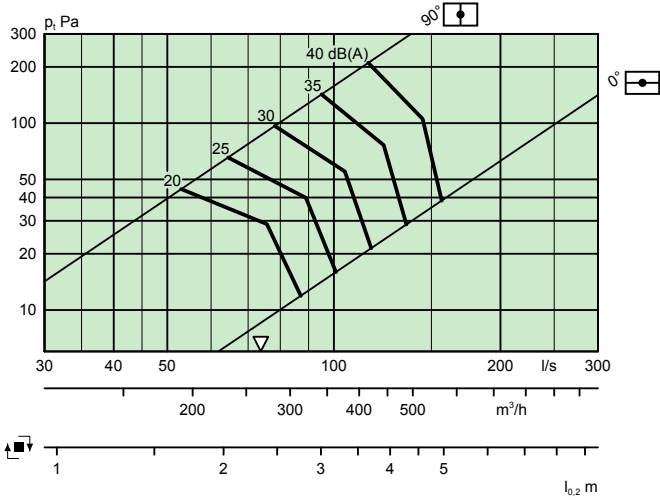
VIREO C 250 -600 + ALS 200-250 - One step



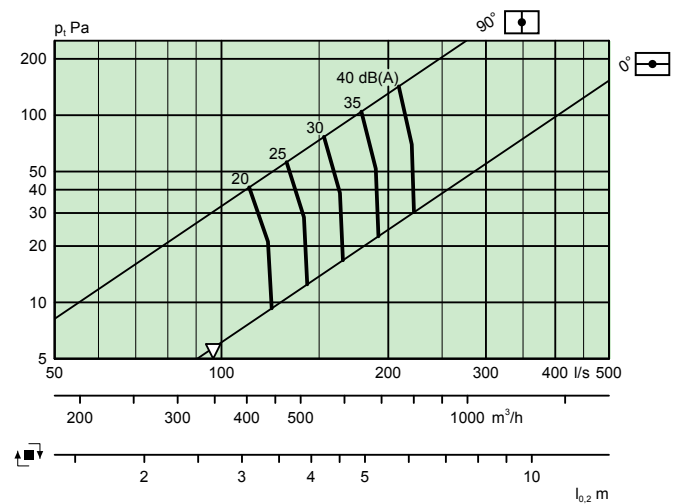
VIREO C 400 -600 + ALS 250-400 - Two steps



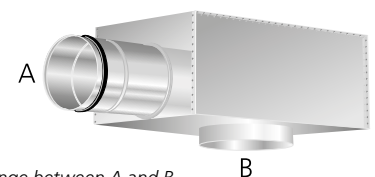
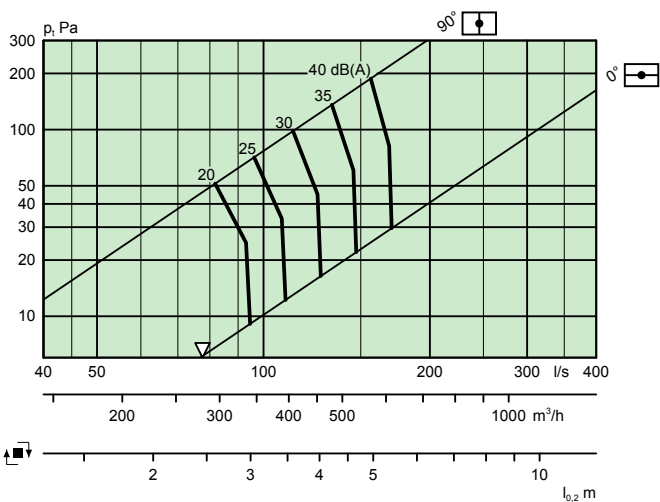
VIREO C 315 -600 + ALS 200-315 - Two steps



VIREO C 400 -600 + ALS 315-400 - One step



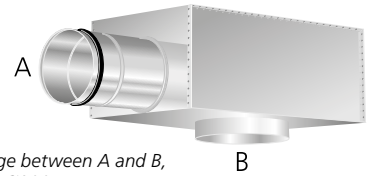
VIREO C 315 -600 + ALS 250-315 - One step



Explanation of the step model:

- One step = One dimensional change between A and B, for example, A = Ø160 mm and B = Ø200 mm.
- Two steps = Two dimensional changes between A and B, for example, A = Ø160 mm and B = Ø250 mm.

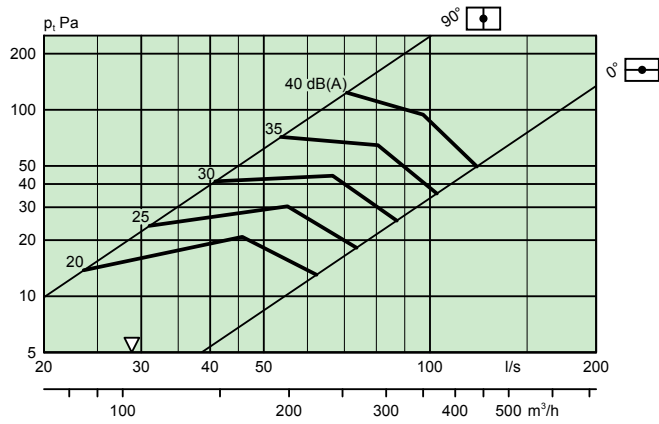
VIREO C + ALS - Extract air, Air diffuser with commissioning box
 Air flow – Pressure drop – Sound level



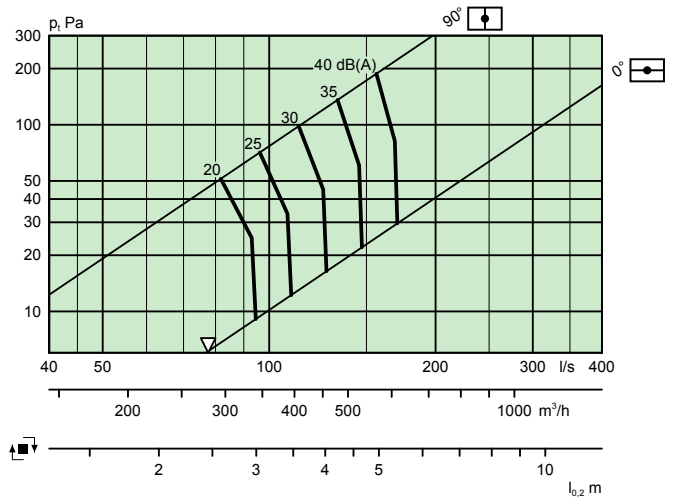
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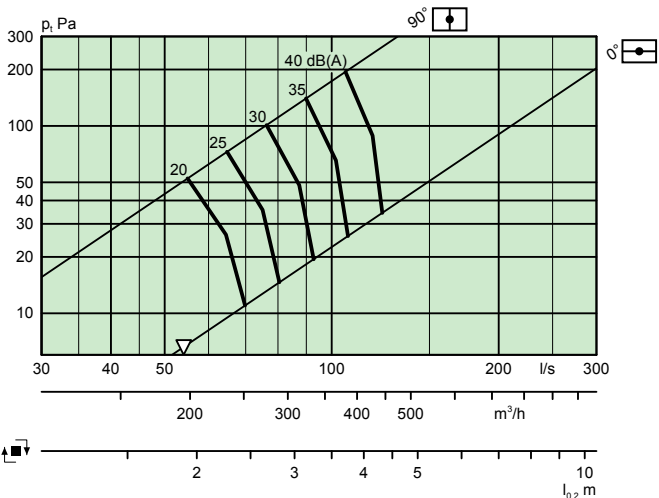
VIREO C 250 -600 + ALS 160-250 - Two steps



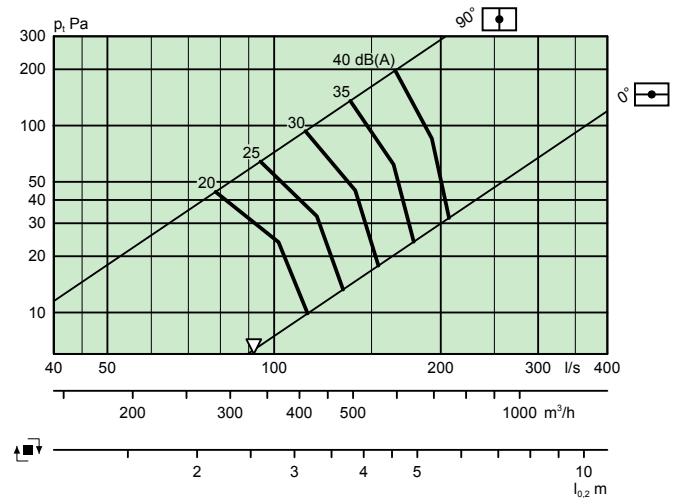
VIREO C 315 -600 + ALS 250-315 - One step



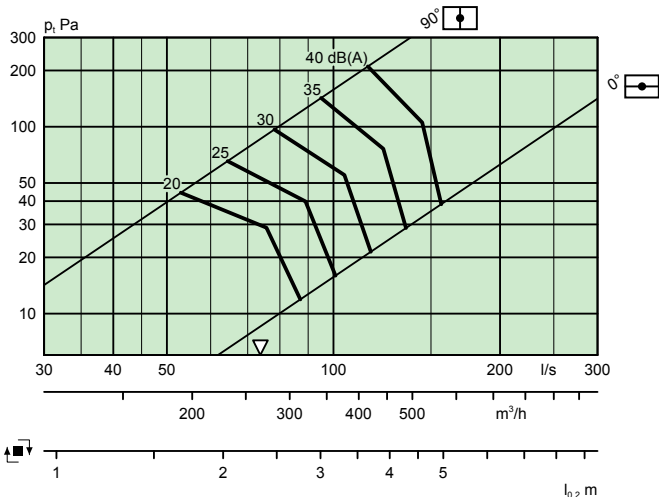
VIREO C 250 -600 + ALS 200-250 - One step



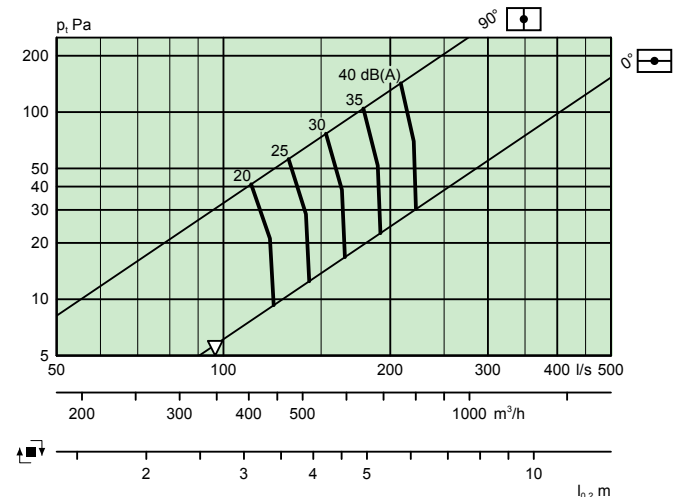
VIREO C 400 -600 + ALS 250-400 - Two steps



VIREO C 315 -600 + ALS 200-315 - Two steps



VIREO C 400 -600 + ALS 315-400 - One step



Dimensions and weights

VIREO C

Size	A	ØD1	l	M	Weight, kg
125-600	595	124	575	70	3,6
160-600	595	159	575	70	3,6
200-600	595	199	575	70	3,5
250-600	595	249	575	70	3,5
315-600	595	314	575	50	3,4
400-600	595	399	575	50	3,2

Dimensions of opening in ceiling = l x l

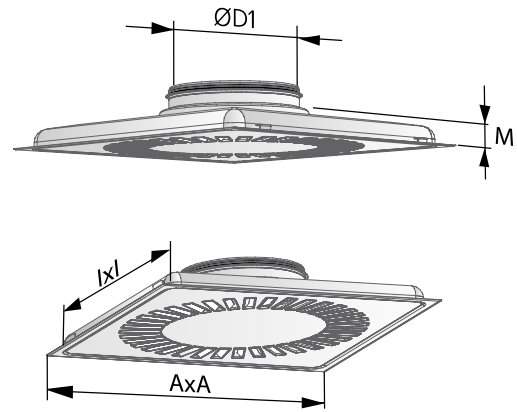


Figure 4. VIREO C.

VIREO C with ALS 1-step

Size	A	B	C	ØD	Ød	E1	F1	G1	H	K	Weight, kg
125-600	595	282	217	99	125	255	113	175	270	80	5,4
160-600	595	342	252	124	160	279	113	188	315	80	6,0
200-600	595	404	288	159	200	314	113	205	375	100	7,0
250-600	595	504	332	199	250	354	113	225	465	115	8,3
315-600	595	622	388	249	315	395	93	230	575	140	10,6
400-600	595	767	488	314	400	455	93	262	712	175	15,0

VIREO C with ALS 2-step

Size	A	B	C	ØD	Ød	E1	F1	G1	H	K	Weight, kg
160-600	595	342	252	99	160	255	113	175	315	80	5,7
200-600	595	404	288	124	200	279	113	188	355	80	6,4
250-600	595	504	332	159	250	314	113	205	450	100	7,5
315-600	595	622	388	199	315	334	93	205	550	115	9,6
400-600	595	622	488	249	400	400	100	230	535	140	11,4

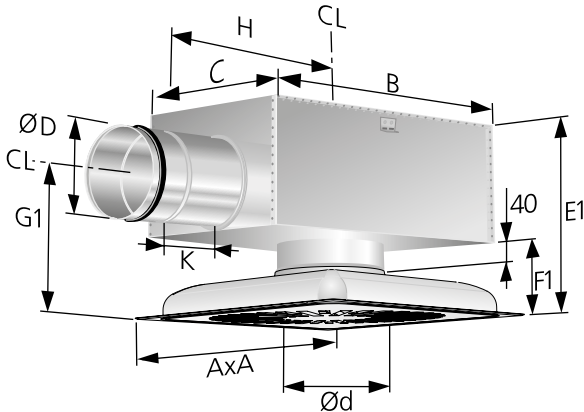


Figure 5. VIREO C with ALS.

Frame – SAR K

Size	Dimensions (mm)		Weight (kg)
	L	N	
600*)	595	75	1,0

*) Position the ALS box so that its branch extends 20 mm below the ceiling surface.

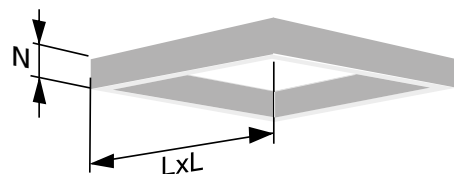
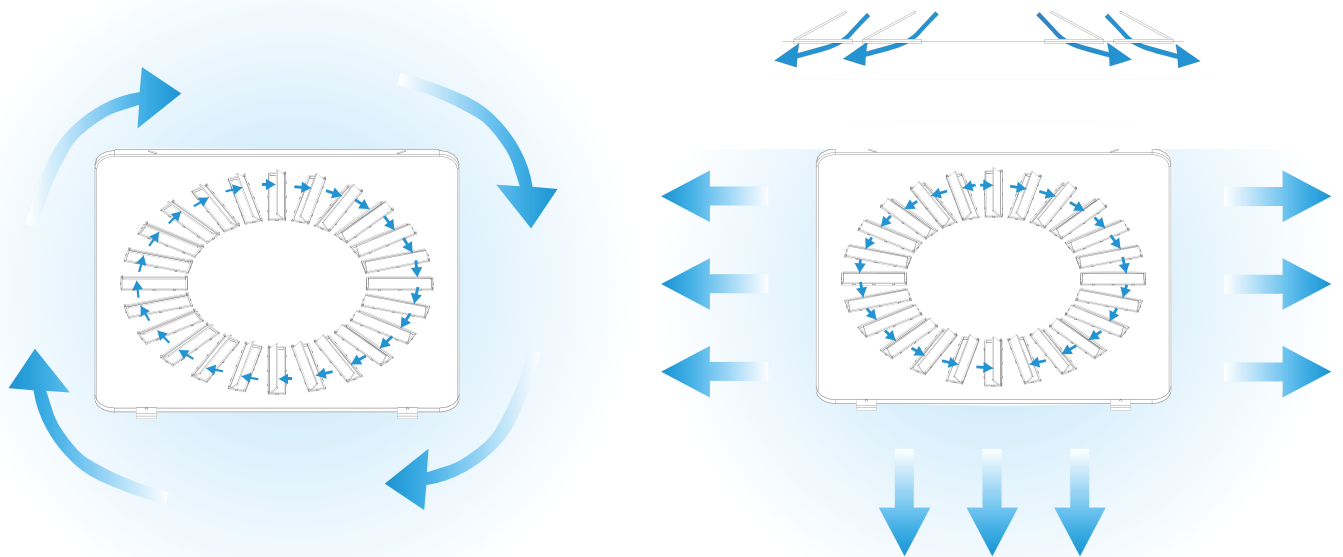


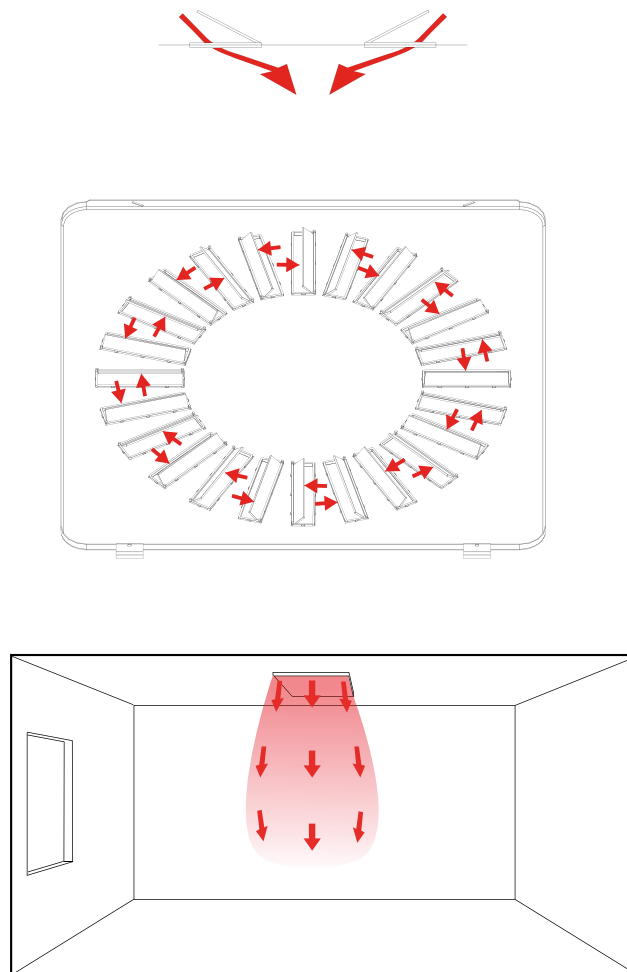
Figure 6. Frame, SAR K.

Nozzle settings, examples - View from above the air diffuser

Size 125-600, 160-600 - 24 nozzles

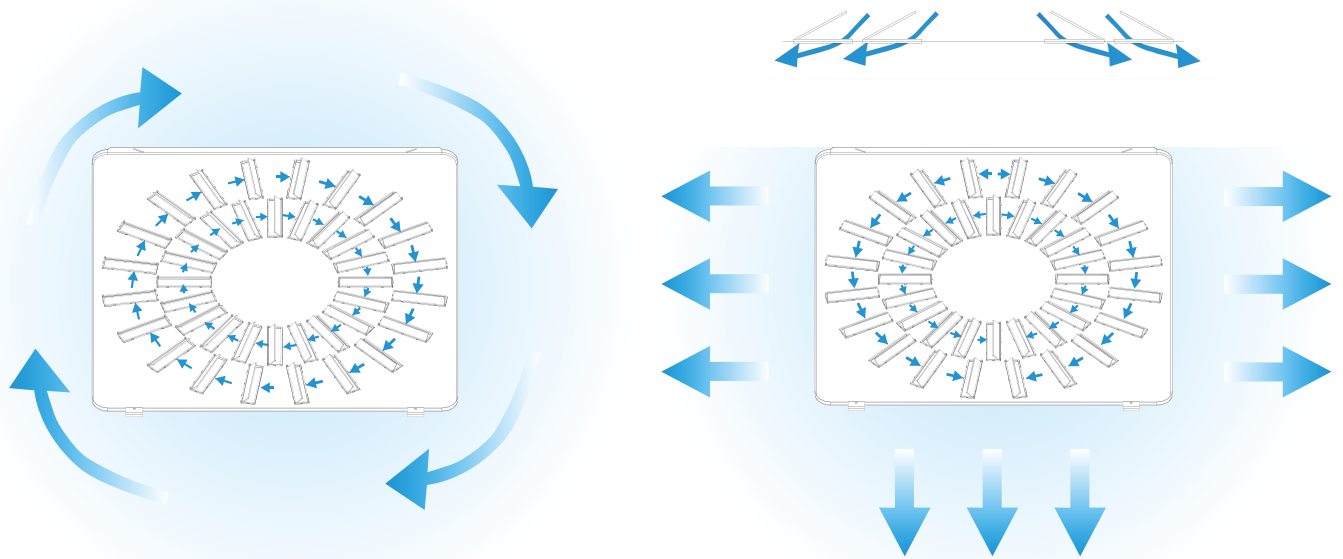


1. Standard rotation pattern, the air comes out counterclockwise when looking at the air diffuser.
2. 3-ways, half of the air comes out counterclockwise, the other half clockwise.

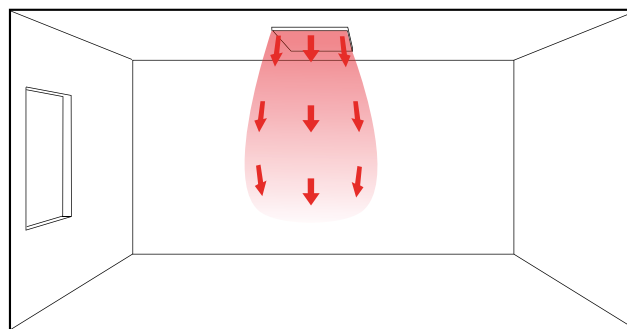
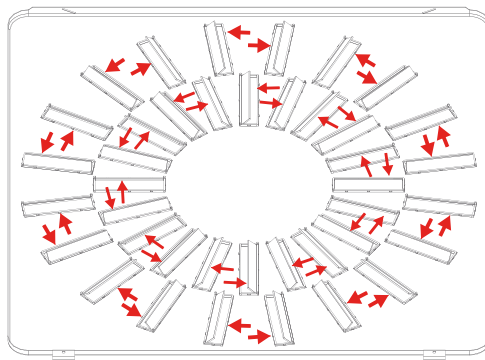
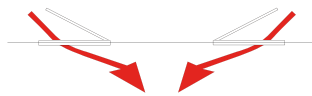


3. Vertical, the nozzles are positioned against each other (two and two). The air streams meet and are directed downwards.

Size 200-600, 250-600 - 40 nozzles

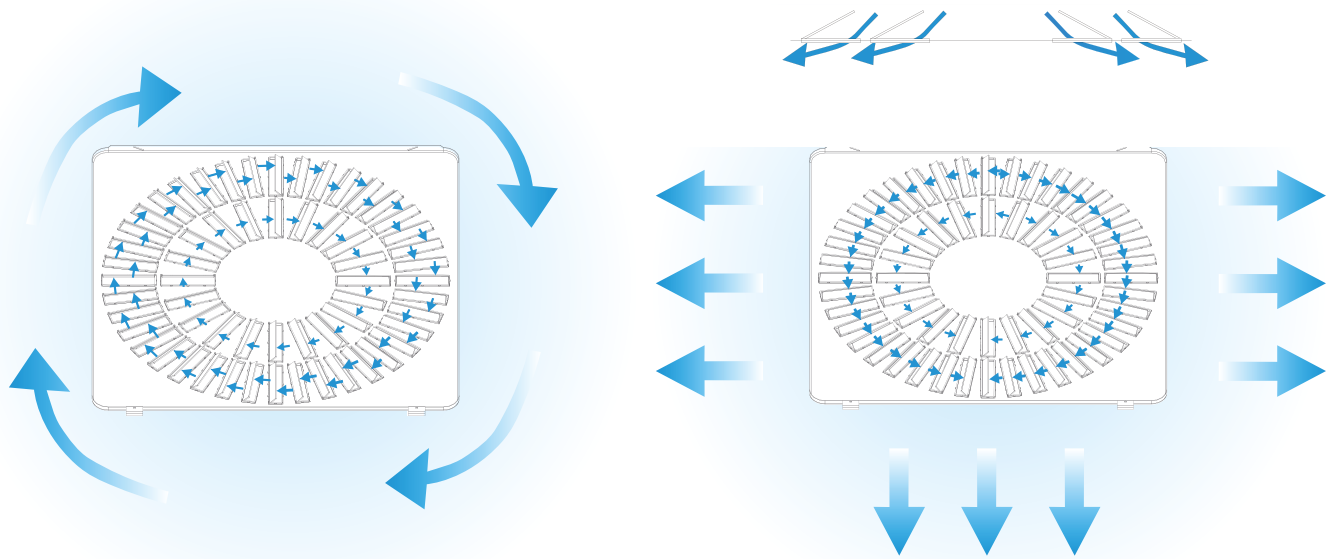


1. Standard rotation pattern, the air comes out counterclockwise when looking at the air diffuser.
2. 3-ways, half of the air comes out counterclockwise, the other half clockwise.

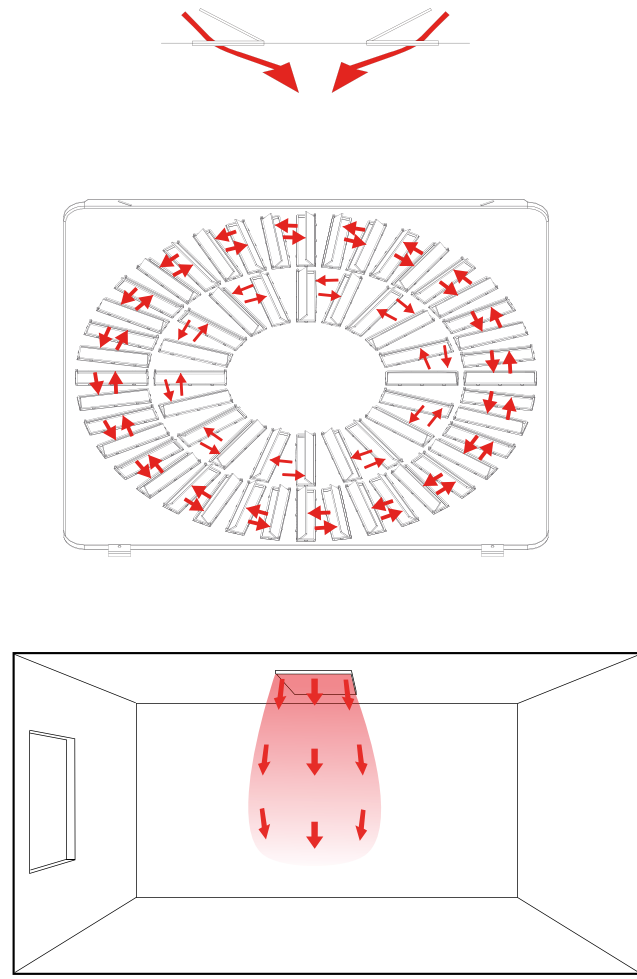


3. Vertical, the nozzles are positioned against each other (two and two). The air streams meet and are directed downwards.

Size 315-600, 400-600 - 60 nozzles



- 1. Standard rotation pattern, the air comes out counterclockwise when looking at the air diffuser.
- 2. 3-ways, half of the air comes out counterclockwise, the other half clockwise.



- 3. Vertical, the nozzles are positioned against each other (two and two). The air streams meet and are directed downwards.

Order key

Product

Square ceiling air diffuser for supply air VIREO C a -aaa -bbb -ccc

Version

Nominal connection size, mm:

125, 160, 200, 250, 315, 400

Nominal square dimension, mm: 600

White nozzles: WhiteNozz

Black nozzles: BlackNozz

Accessories

Commissioning box ALS d -aaa -bbb

Version:

For VIREO C:	ALS:
125-600	100-125
160-600	100-160
160-600	125-160
200-600	125-200
200-600	160-200
250-600	160-250
250-600	200-250
315-600	200-315
315-600	250-315
400-600	250-400
400-600	315-400

Frame SAR b K -aaa

Version:

Square:

Size:

125-600:	600
160-600:	600
200-600:	600
250-600:	600
315-600:	600
400-600:	600

Specification text

Swegon's complete square perforated type VIREO C ceiling air diffuser, with ALS commissioning box and the following functions:

- Designed for modular suspended ceilings (600 x 600 mm).
- Quick Access for quick access to the commissioning box and the duct system.
- White powder paint sprayed and baked finish, RAL 9003/NCS S 0500-N.
- Cleanable ALS commissioning box, made of galvanized sheet steel.

Size: VIREO Ca -aaa-bbb-ccc med xx items
ALSa aaa-bbb

Accessory:

Frame: SARb K -aaa xx items