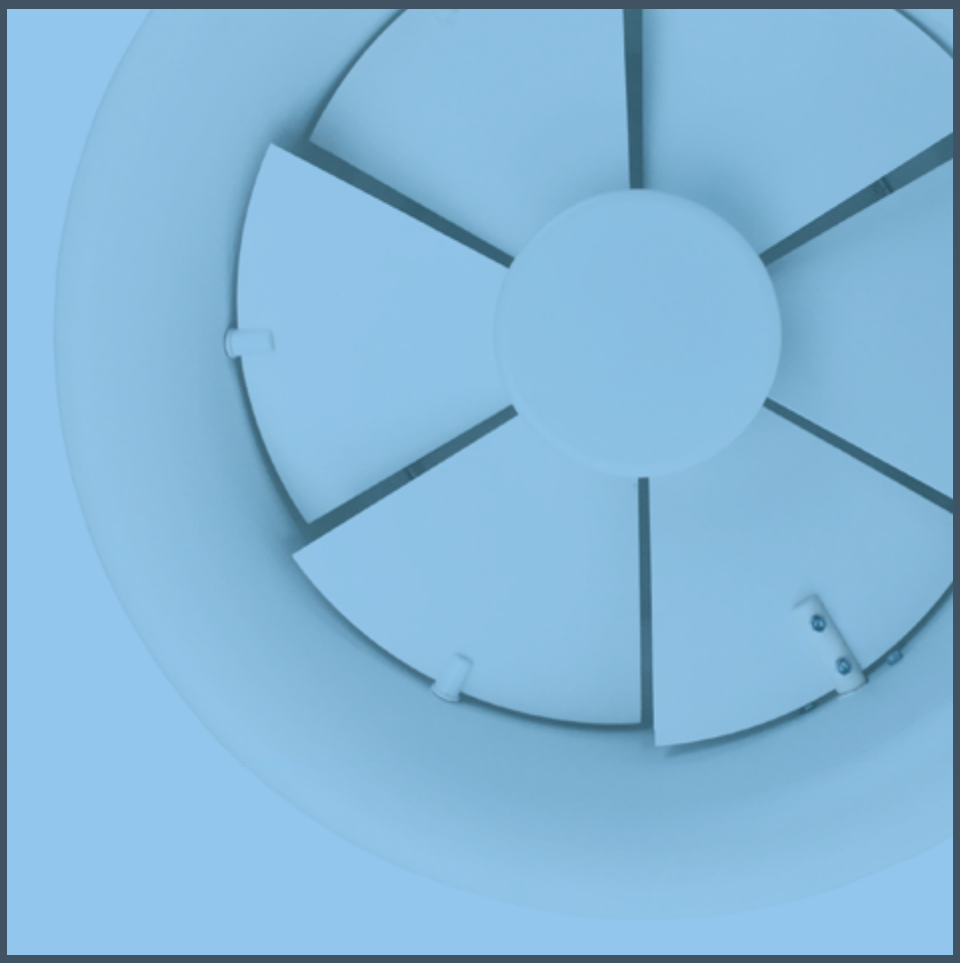
klimaoprema
HVAC SOLUTIONS



PRODUCT CATALOG

2019

AIR DIFFUSION | AIR VOLUME CONTROL | KITCHEN HOODS | SOUND ATTENUATORS | FIRE DAMPERS | AIR TREATMENT

Welcome to Klimaoprema!

Klimaoprema Inc. manufactures HVAC and cleanroom equipment, supplies top quality products and satisfies the highest standards in HVAC projects. With more than 40 years of experience, through continuous improvement and investment in new technologies, we are one of the most respected European manufacturers of HVAC and Cleanroom industry.
Today Klimaoprema is modern and organized production company with experienced engineers, robotized and automated production, top quality CNC machinery, testing laboratory and ERP business planning systems.

Quality

Klimaoprema owns ISO 9001:2008 Quality Certificate, NS-EN ISO 13485:2012 certification for design, production, installation, maintenance and validation of cleanrooms and operating rooms. For the French market fire damper is certified according to NF-264. For the German and Russian markets we have proprietary statements. We have a CE mark for products that is necessary. Certificates are regularly renewed and products are tested.

Automated production

The factory is equipped with the most modern production lines for rectangular housings, cylindrical housings and cleanroom panels. World production lines are developed in collaboration between Klimaoprema's experts and renowned European manufacturers.

Testing laboratory

Testing laboratory is made in cooperation with Faculty of mechanical engineering and naval architecture in Zagreb. It is in accordance with standards EN 13182, ISO 7736, ISO 5219 and ASHRAE standard 113. It enables testing of aerodynamic characteristics, making the products competitive in quality and price.

Software for product selection

Product selection software enables simple and easy product selection. It also offers complete solutions and time savings when planning large HVAC projects.

Products on stock

On our finished products warehouse large number of products are in available momentarily upon the customer request.

klimaoprema

1 / VENTILATION GRILLES

S1 / OAH, OAV, OAB, OAK, OAN, OAS, OAM, OCM, PCR, OCP, ORP, PTR, CCH, CCV, NRA, NRB, NRE, NRK

2 / AIR DIFFUSION

S1 / ANA, ANE, AND
S2 / ANK, ANO
S3 / DVF
S4 / DOS, DRS
S5 / DEV, DEK, DEU
S6 / DVS
S7 / DK
S8 / ANP
S9 / ODP, KDP
S10 / SR
S11 / DVS
S12 / DHV
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S14 / UPK, SPB

3 / SPECIAL DIFFUSERS

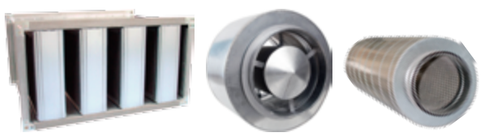
S1 / SAP-F, SAP-Z
S2 / ZOV, ZOT
S3 / IR, SDV, DSK
S4 / PDI
S5 / SD

4 / AIR VOLUME CONTROL

S1 / LOUVRES
S2 / RZ-C, RZ-P, ZTZ-C, ZPC
S3 / RVP-C, RVP-P, RVK
S4 / CAVU
S5 / RKP-C, RKP-P
S6 / SmartVAV

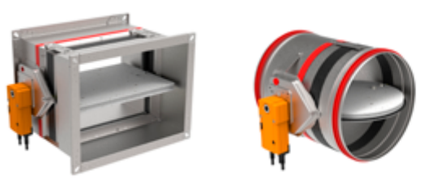
5 / KITCHEN HOODS

S1 / NZK, NZR, NZP, NSK, NSR, NSP, NES, NEZ



6 / ATTENUATORS

S1 / PZ, PZC, PZM, PK



7 / FIRE DAMPERS

S1 / FDC25/40, FD25/40

8 / AIR TREATMENT

S1 / PKN, PKF, PKH, PKH-4C
S2 / RKF, RKW
S3 / SONATA
S4 / GRAND
S5 / XS

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1/S1

v 3.3 (en)

VENTILATION GRILLES

OAH, OAV, OAB, OAK, OAN, OAS, OAM,
OCM, PCR, ORP, PTR, CCH, CCV, NRA,
NRB, NRE, NRK

klimaoprema

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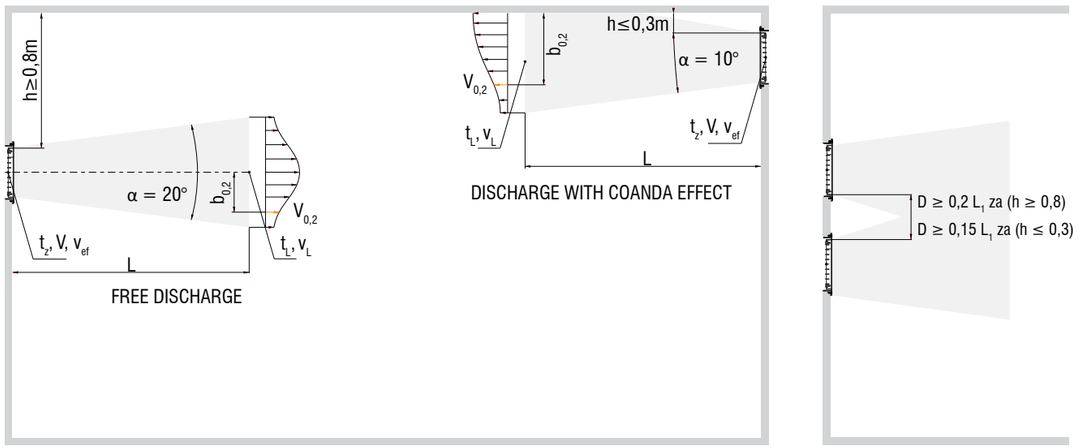
Definition of symbols

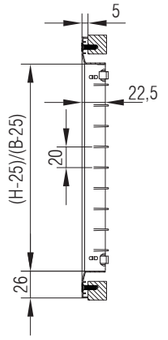
V (m^3/h)	-	Air flow
v_{ef} (m/s)	-	Effective air velocity
v_L (m/s)	-	Maximum air velocity on a distance L
B x H (mm)	-	Standard grille dimensions
A_{ef} (m^2)	-	Effective discharge area
h (m)	-	Vertical distance from grille to ceiling
D (m)	-	Horizontal distance between two grilles
L (m)	-	Air throw
i	-	Air induction
t_z (°C)	-	Supply air temperature
t_p (°C)	-	Room air temperature
t_L (°C)	-	Core temperature on a distance L
Δt_z (°C)	-	(t_z - t_p)
Δt_L (°C)	-	(t_L - t_p)
$b_{0,2}$ (m)	-	Jet width - distance between jet core and point where velocity equals 0,2 m/s
yt (m)	-	Air jet deflection
α (°)	-	Jet dissipation angle
ß (°)	-	Blade angle
L_{WA} (dB(A))	-	Sound power level
Δp (Pa)	-	Pressure drop

Discharge scheme



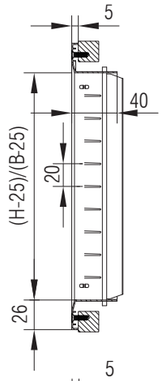
Design changes reserved

ALUMINIUM GRILLES



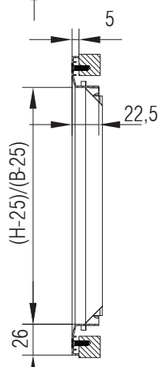
OAH 1

- frame and blades made out of anodized aluminium profiles
- one row of horizontal individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



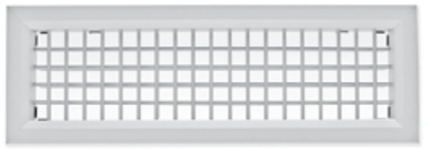
OAH 2

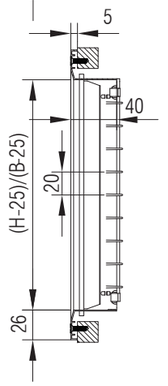
- frame and blades made out of anodized aluminium profiles
- front row of horizontal individually adjustable blades
- back row of vertical individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



OAV 1

- frame and blades made out of anodized aluminium profiles
- one row of vertical individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall





OAV 2

- frame and blades made out of anodized aluminium profiles
- front row of vertical individually adjustable blades
- back row of horizontal individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall

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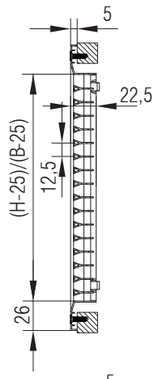
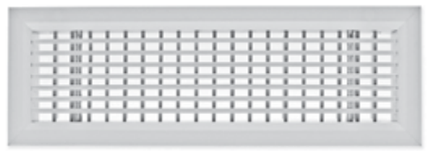
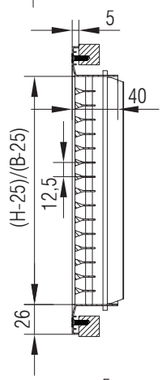
Design changes reserved



OAB 1-0

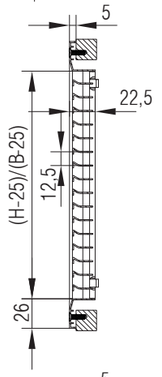
- frame and blades made out of anodized aluminium profiles
- one row of horizontal fixed blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall





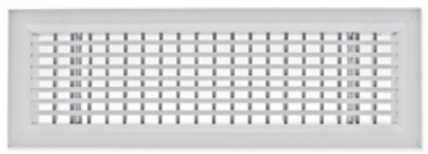
OAB 2-0

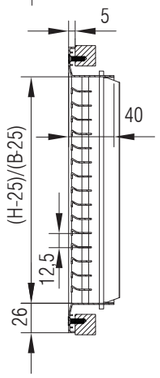
- frame and blades made out of anodized aluminium profiles
- front row of horizontal adjustable blades
- back row of vertical adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



OAB 1-15

- frame and blades made out of anodized aluminium profiles
- one row of horizontal fixed blades with deflection angle 15°
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall





OAB 2-15

- frame and blades made out of anodized aluminium profiles
- front row of horizontal fixed blades
- back row of vertical adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall

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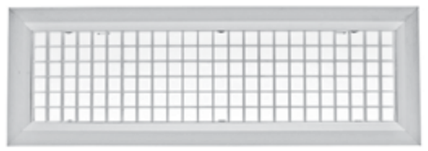
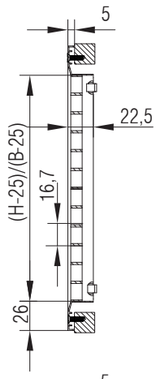
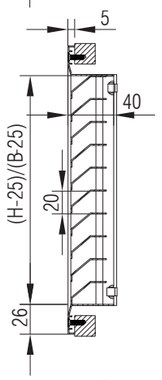
Design changes reserved





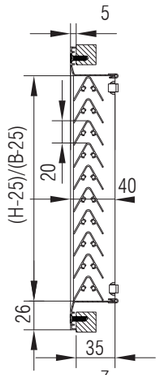
OAK

- frame made out of anodized aluminium profiles
- fixed plastic rectangular mesh
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



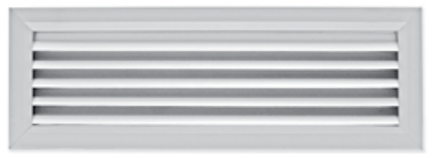
OAN

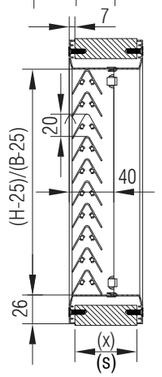
- frame and blades made out of anodized aluminium profiles
- one row of horizontal fixed blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



OAS

- frame and blades made out of anodized aluminium profiles
- one row of horizontal fixed blades
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall





OAS - R

- frame, counterframe and blades made out of anodized aluminium profiles
- one row of horizontal fixed blades
- counterframe for back side of the door
- fixing with visible screws (wall and ceiling)
- OAS-R(x) unknown door width (x=37-50mm)
- OAS-R(s) known door width (s=22-67mm)

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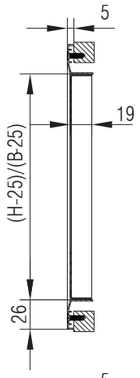
***Standard dimensions pg. 13

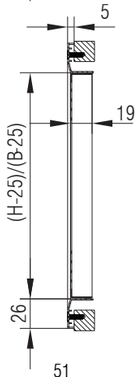
Design changes reserved

SPECIAL GRILLE



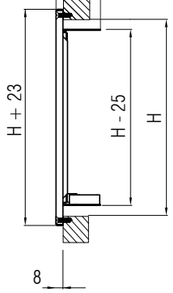
OAM

- frame made out of anodized aluminium profiles
- fixed mesh made out of aluminium sheet
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



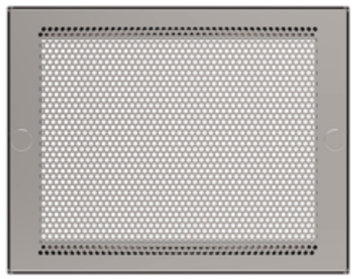
OCM

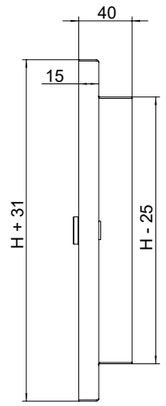
- frame made out of anodized aluminium profiles
- fixed mesh of perforated steel sheet
- perforation 6x6mm, step 8,5mm
- powder coated in white RAL 9010
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall



PCR

- frame made out of steel sheet profiles
- fixed mesh of perforated steel sheet
- round perforation 4mm, 40%
- powder coated in white RAL 9010
- fixing with visible screws
- perforated cover opens around axis on B side
- closing mechanism on back side of the cover





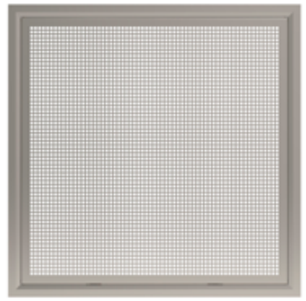
OCP

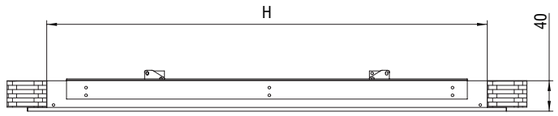
- frame made out of stainless steel
- fixed mesh of perforated steel sheet
- round perforation
- fixing with screws (only in wall)

*Options pg. 20
**Installation pg. 21

Design changes reserved

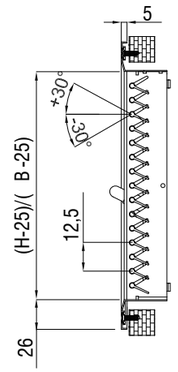
FAN-COIL GRILLE





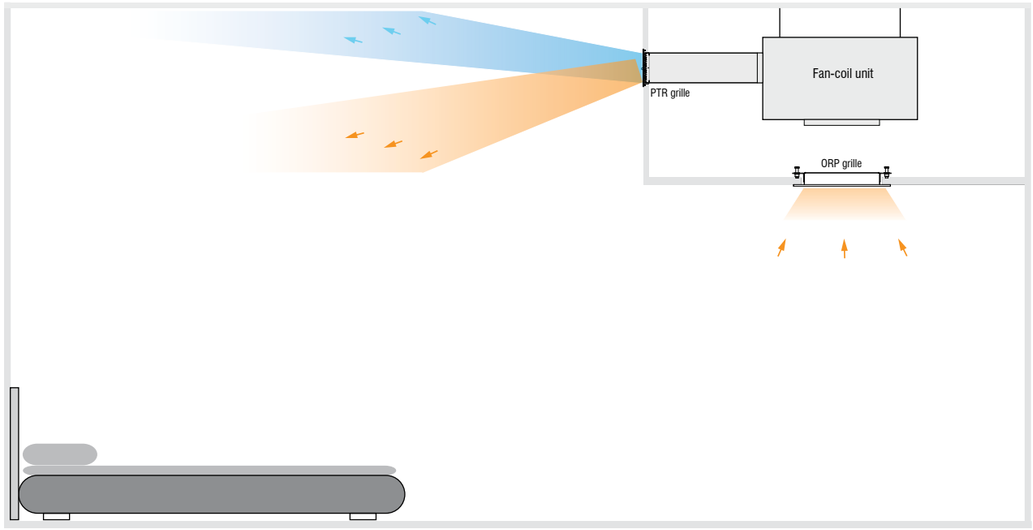
ORP

- frame and screen made out of anodized aluminium profiles
- installation in suspended ceiling
- free hanging perforated screen with click lock
- fixed with angle and M6 screws
- standard dimensions: 500 x 500
  600 x 600
  700 x 700



Adjustable supply grille PTR

- frame and blades made out of anodized aluminium profiles
- front row of horizontal adjustable, interconnected blades (deflection angle ± 30°)
- fixing with visible screws (wall and ceiling)
- fixing with mounting frame (UR) only in wall
- standard dimensions pg. 12



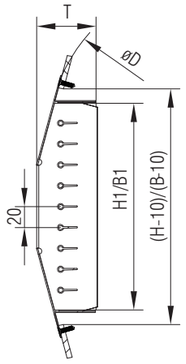
Standard dimensions for aluminium grilles	
B	225 - 1225 mm, in increments 100mm
H	125 - 525 mm, in increments 100mm

* B > H

*Options pg. 20
**Installation pg. 21

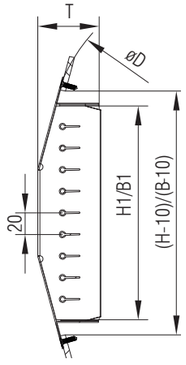
Design changes reserved

STEEL GRILLES FOR ROUND DUCT



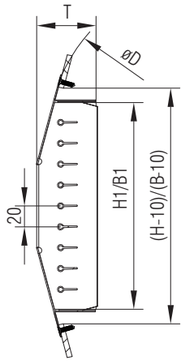
CCH 1

- one row of horizontal individually adjustable blades
- frame and blades made out of galvanized steel
- fixing with screws
- installation on round duct



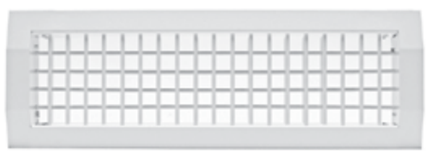
CCH 2

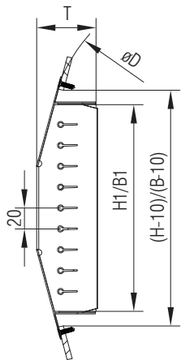
- front row of horizontal individually adjustable blades
- back row of vertical individually adjustable blades
- frame and blades made out of galvanized steel
- fixing with screws
- installation on round duct



CCV 1

- one row of vertical individually adjustable blades
- frame and blades made out of galvanized steel
- fixing with screws
- installation on round duct





CCV 2

- front row of vertical individually adjustable blades
- back row of horizontal individually adjustable blades
- frame and blades made out of galvanized steel
- fixing with screws
- installation on round duct

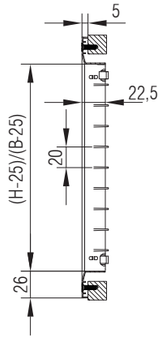
Standard dimensions steel grille	
B	225 - 1225 mm, in increments 100mm
H	75, 125 or 225 mm

* B > H

*Options pg. 19
**Installation pg. 20

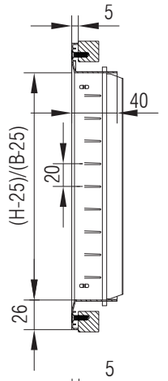
Design changes reserved

STEEL GRILLES



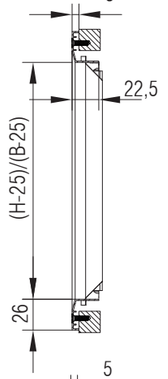
CRH 1

- frame and blades made out of galvanized steel
- one row of horizontal individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing without visible screws (UR) only in wall



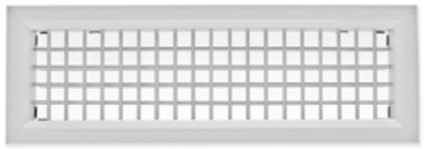
CRH 2

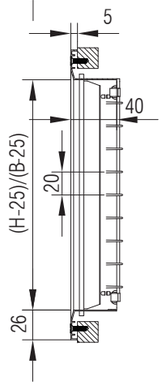
- frame and blades made out of galvanized steel
- front row of horizontal individually adjustable blades
- back row of vertical individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing without visible screws (UR) only in wall



CRV 1

- frame and blades made out of galvanized steel
- one row of vertical individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing without visible screws (UR) only in wall





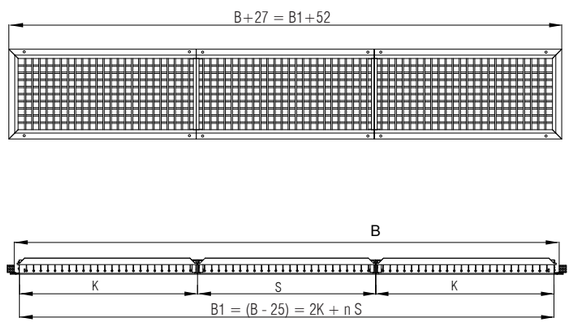
CRV 2

- frame and blades made out of galvanized steel
- front row of vertical individually adjustable blades
- back row of horizontal individually adjustable blades
- fixing with visible screws (wall and ceiling)
- fixing without visible screws (UR) only in wall

*Options pg. 19
**Installation pg. 20
***Standard dimensions pg. 13

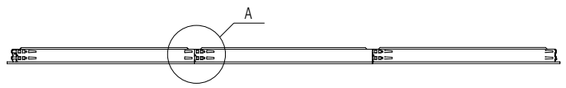
Design changes reserved

Linear grille (B > 1225mm)

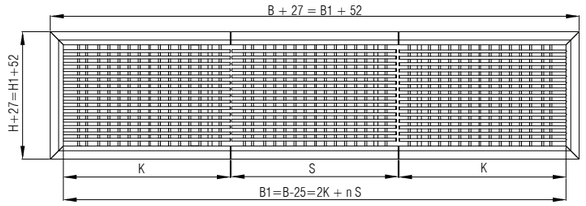


* K – end section
S – connecting section
n – number of connecting sections
(1200<B1<2400) – two end sections
(B1>2400) – two end sections and n connecting sections

Inline connection of subframes



Linear grille OAB1-0 + BxH (B1 > 2400mm)



LINEAR GRILLES

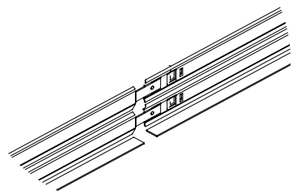
OAV, OAB

- for width more than 1225mm
- fixing with screws
- standard sizes H: 75, 125, 225, 325

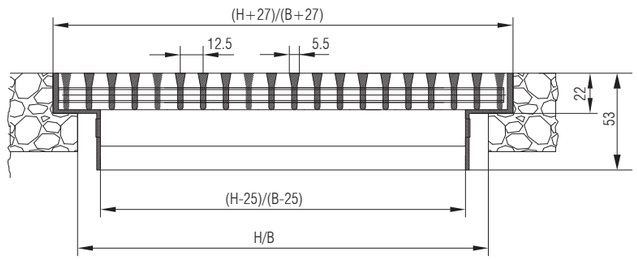
Options

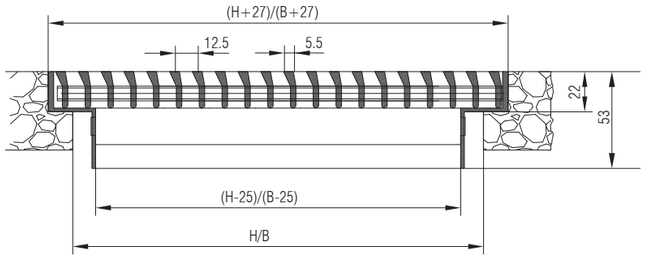
- installation subframe
- flow damper
- plenum box
- installation subframe and damper made from multiple parts

Detail A (subframe joint)



Design changes reserved





FLOOR GRILLES

NRA 0

- frame and blades made out of anodized aluminium profiles
- one row of fixed horizontal blades
- blade insert detachable from the frame
- fixing in floor

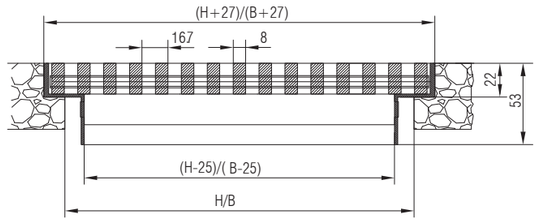
NRA 15

- frame and blades made out of anodized aluminium profiles
- one row of fixed horizontal blades
- blade insert detachable from the frame
- fixing in floor

Standard dimensions for floor grilles NRA	
B	225 - 1225 mm, in increments of 100mm
H	125 - 525 mm, in increments of 100mm

* B > H

Design changes reserved

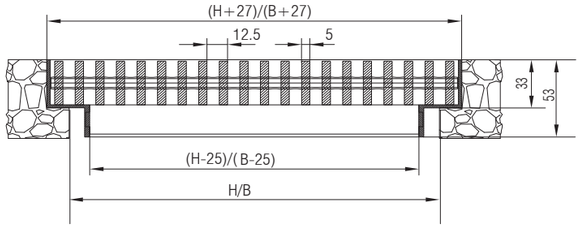


NRB

- frame and blades made out of anodized aluminium profiles
- one row of fixed horizontal blades
- blade insert detachable from the frame
- fixing in floor

Standard dimensions for floor grilles NRB	
B	225 - 1225 mm, in increments of 100mm
H	125 - 425 mm, in increments of 100mm

* B > H

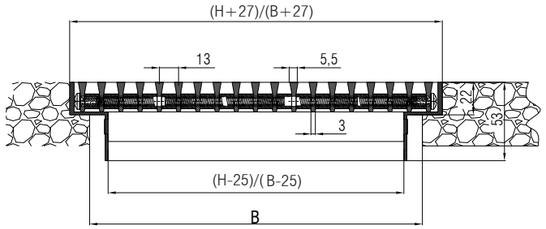


NRE

- frame and blades made out of anodized aluminium profiles
- one row of fixed horizontal blades
- blade insert detachable from the frame
- fixing in floor (height 33mm)

Standard dimensions for floor grilles NRB	
B	400, 500, 600 mm
H	155 - 405 mm, in increments of 50mm

* B > H



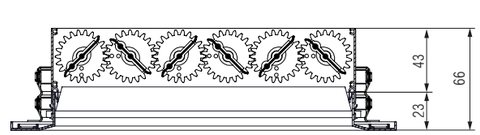
NRK

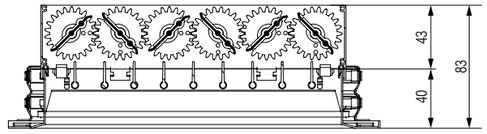
- frame and blades made out of anodized aluminium profiles
- one row of fixed horizontal blades
- blade insert detachable from the frame
- fixing in floor
- standard widths: 254, 344, 444mm, other widths on special demand
- maximum grille length, 5m

Design changes reserved

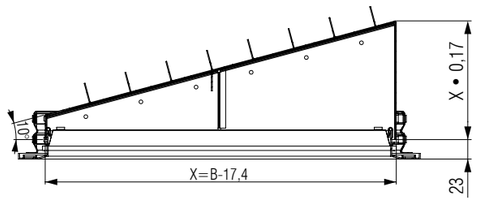
DAMPERS

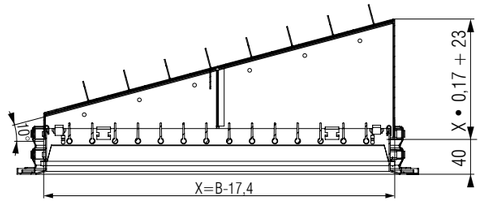
L - damper





S - damper





Design changes reserved

OPTIONS

GRILLE	OPTIONS						
	Damper		Installation with subframe	RAL...	Linear grille B> 1225mm	Plenum box PK1, PK2, PK3	Removable filter insert
	L	S					
OAH	•	•	•	•		•	•
OAV	•	•	•	•	•	•	•
OAB	•	•	•	•	•	•	•
OAS			•	•			
OAS-R				•			
OAK	•	•	•	•		•	•
OAN	•		•	•		•	•
OAM	•	•	•	•		•	
OCM	•	•	•	•		•	•
CCH	•	•		•			
CCV	•	•		•			
NRA	•			•	•	•	
NRB	•			•	•	•	
NRE	•		•	•			
NRK			•		•	•	
PCR				•			•
ORP				•			•
PTR			•	•		•	

Ordering key:

Grille type	**OAH1 - L - UR - 425x125 - G2 - RAL..**
Damper type	
Installation subframe	
Dimensions	
Filter G2..G4	

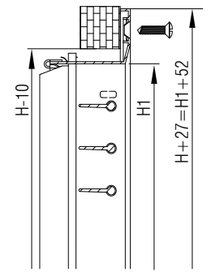
* Screws are not supplied with grilles

Design changes reserved

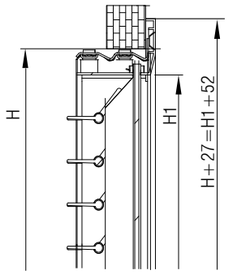
INSTALLATION INSTRUCTIONS

Wall installation

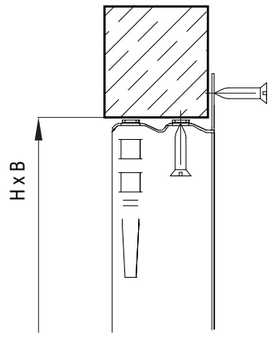
- without subframe

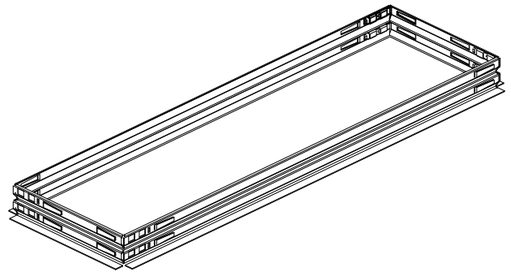


- with subframe

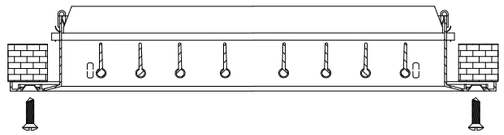


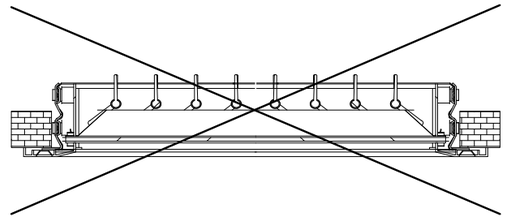
Subframe installation





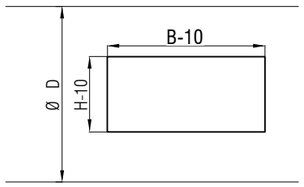
Ceiling installation

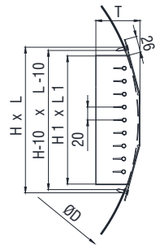




* Screws are not supplied with grilles
* Screws for grille fastening 3,9xL (DIN 7972, 7973, 7982, 7983)

Design changes reserved





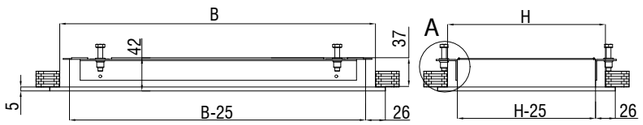
Installation CCV, CCH

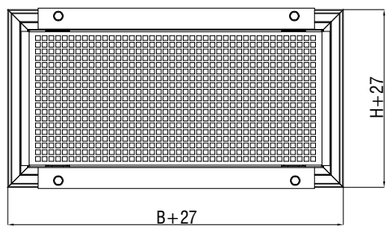
- Note: make sure that the grille height H fits for installation on a round duct with diameter øD

B [mm]		H [mm]	T [mm]	øD [mm]
225	x	75		150
325	x	75		
425	x	75		
525	x	75	40	
625	x	75		
825	x	75		
1125	x	75		400

B [mm]		H [mm]	T [mm]	øD [mm]
225	x	125		300
325	x	125		
425	x	125		
525	x	125	45	
625	x	125		
825	x	125		
1125	x	125		900

B [mm]		H [mm]	T [mm]	øD [mm]
225	x	225		600
325	x	225		
425	x	225		
525	x	225	55	
625	x	225		
825	x	225		
1125	x	225		2400

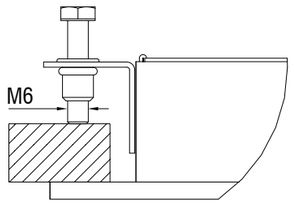




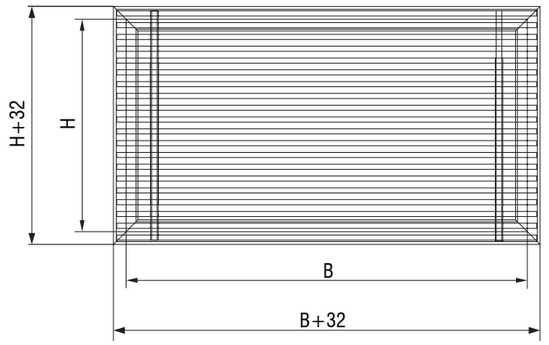
ORP installation

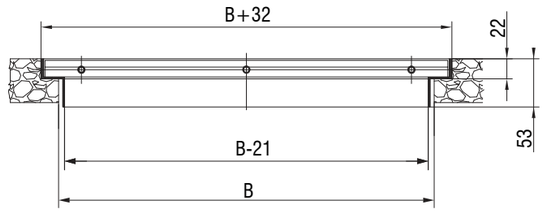
- First, the grille subframe is placed into the ceiling and then the bracelets suspension are fixed to the inner side of the ceiling.
- Perforated plate is then pushed trough the installation subframe above the ceiling, to be finally lowered to the frame.

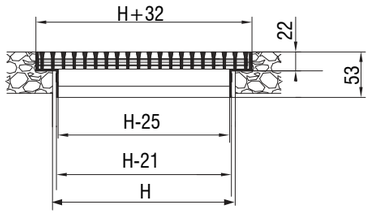
Detail A



Design changes reserved

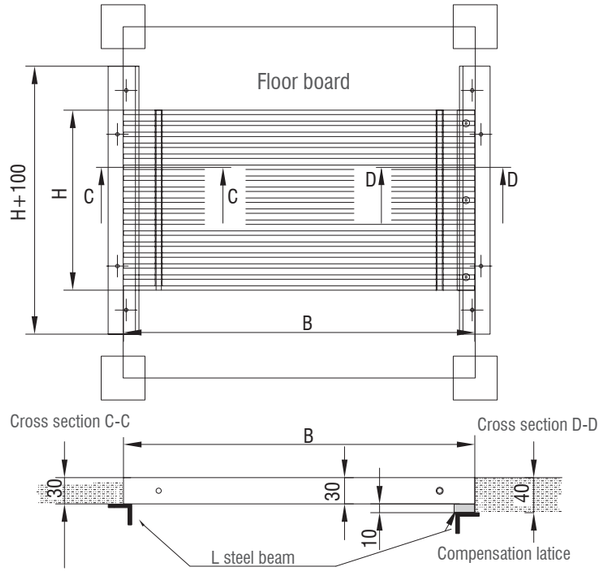






NRA, NRB and NRK installation

- fix the frame in the floor opening
- grille core is laid loose in the frame so it can be easily removed

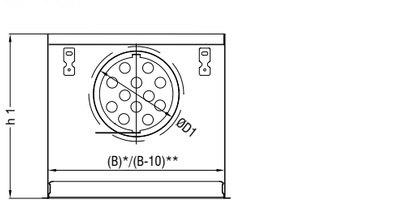


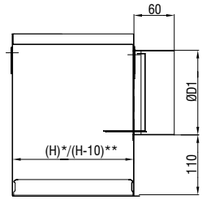
NRE installation

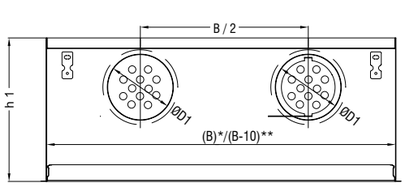
- Cut an opening in the floor board with dimensions:
  (B+1) x (H+1)
- Fix the L steel beam onto a lower side of the opening
- Grille is not for external installation
- Not intended for loads higher than one persons weight
- For floor heights above 40mm, a compen-staion latice of 10mm is added
- L steel beam and compensation latice are not supplied with grille

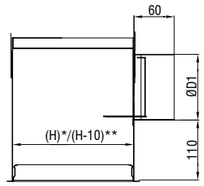
Design changes reserved

PLENUM BOX - PK1









PK1 / PK1-UR				
B mm	H mm	øD mm	Number of connections	h1 mm
225	75	123	1	265
325	75	158	1	300
425	75	158	1	300
525	75	158	1	300
625	75	158	1	300
725	75	158	1	300
825	75	158	2	300
925	75	158	2	300
1025	75	158	2	300
1125	75	158	2	300
1225	75	158	2	300
225	125	158	1	300
325	125	158	1	300
425	125	158	1	300
525	125	158	1	300
625	125	158	1	300
725	125	158	1	300
825	125	158	2	300
925	125	158	2	300
1025	125	158	2	300
1125	125	158	2	300
1225	125	158	2	300
225	225	158	1	300
325	225	158	1	300
425	225	198	1	340
525	225	198	1	340
625	225	198	1	340
725	225	198	1	340
825	225	198	2	340
925	225	198	2	340
1025	225	198	2	340
1125	225	198	2	340
1225	225	198	2	340

Note:

* Dimensions PK for installation with subframe
** Dimensions PK for installation without subframe

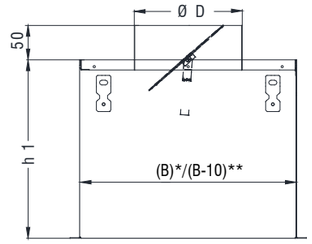
PK1 / PK1-UR				
B mm	H mm	øD mm	Number of connections	h1 mm
325	325	248	1	390
425	325	248	1	390
425	325	248	1	390
425	325	248	1	390
425	325	248	1	390
425	325	248	2	390
425	325	248	2	390
425	325	248	2	390
425	325	248	1	390
425	425	248	1	390
425	425	248	1	390
425	425	248	1	390
425	425	248	2	390
425	425	248	2	390
425	425	248	2	390
425	425	248	2	390
425	425	248	2	390
425	525	313	1	455
425	525	313	1	455
425	525	313	1	455
425	525	313	2	455
425	525	313	2	455
425	525	313	2	455
425	525	313	2	455
425	525	313	2	455

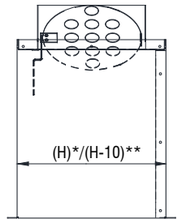
Ordering key:

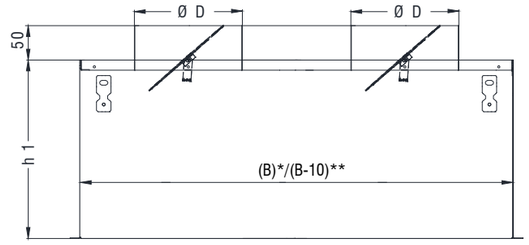
Plenum box type	**PK1 - UR - 525x225 - Z**
Installation subframe	
Dimensions	
Insulation	

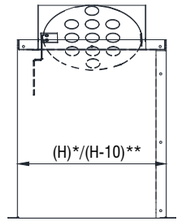
Design changes reserved

PLENUM BOX - PK2









PK2 / PK2-UR				
B mm	H mm	øD mm	Number of connections	h1 mm
225	125	98	2	250
325	125	98	2	250
425	125	98	2	250
525	125	98	3	250
625	125	98	3	250
725	125	98	3	250
825	125	98	3	250
925	125	98	3	250
1025	125	98	3	250
1125	125	98	3	250
1225	125	98	3	250
225	225	158	1	300
325	225	198	1	340
425	225	198	1	340
525	225	198	1	340
625	225	198	2	340
725	225	198	2	340
825	225	198	2	340
925	225	198	2	340
1025	225	198	2	340
1125	225	198	2	340
1225	225	198	2	340
325	325	248	1	390
425	325	248	1	390
525	325	248	1	390
625	325	248	1	390
725	325	248	1	390
825	325	248	2	390
925	325	248	2	390
1025	325	248	2	390
1125	325	248	2	390
1225	325	248	2	390

PK2 / PK2-UR				
B mm	H mm	øD mm	Number of connections	h1 mm
425	425	248	1	390
525	425	248	1	390
625	425	248	1	390
725	425	248	1	390
825	425	248	2	390
925	425	248	2	390
1025	425	248	2	390
1125	425	248	2	390
1225	425	248	2	390
525	525	313	1	455
625	525	313	1	455
725	525	313	1	455
825	525	313	2	455
925	525	313	2	455
1025	525	313	2	455
1125	525	313	2	455
1225	525	313	2	455

Ordering key:

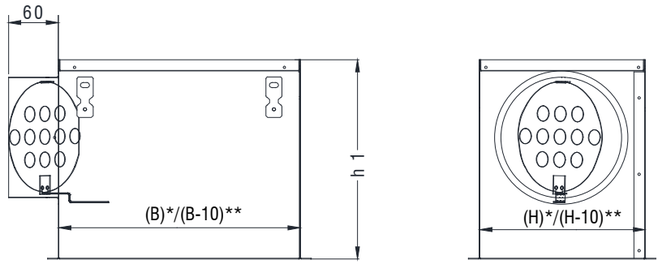
Plenum box type	**PK2 - UR - 525x225 - Z**
Installation subframe	
Dimensions	
Insulation	

Note:

* Dimensions PK for installation with subframe
** Dimensions PK for installation without subframe

Design changes reserved

PLENUM BOX - PK3



PK3 / PK3-UR				
B mm	H mm	øD mm	Number of connections	h1 mm
225	125	98	2	250
325	125	98	2	250
425	125	98	2	250
525	125	98	3	250
625	125	98	3	250
725	125	98	3	250
825	125	98	3	250
925	125	98	3	250
1025	125	98	3	250
1125	125	98	3	250
1225	125	98	3	250
225	225	158	1	300
325	225	198	1	340
425	225	198	1	340
525	225	198	1	340
625	225	198	2	340
725	225	198	2	340
825	225	198	2	340
925	225	198	2	340
1025	225	198	2	340
1125	225	198	2	340
1225	225	198	2	340
325	325	248	1	390
425	325	248	1	390
525	325	248	1	390
625	325	248	1	390
725	325	248	1	390
825	325	248	2	390
925	325	248	2	390
1025	325	248	2	390
1125	325	248	2	390
1225	325	248	2	390

PK3 / PK3-UR				
B mm	H mm	øD mm	Number of connections	h1 mm
425	425	248	1	390
525	425	248	1	390
625	425	248	1	390
725	425	248	1	390
825	425	248	2	390
925	425	248	2	390
1025	425	248	2	390
1125	425	248	2	390
1225	425	248	2	390
525	525	313	1	455
625	525	313	1	455
725	525	313	1	455
825	525	313	2	455
925	525	313	2	455
1025	525	313	2	455
1125	525	313	2	455
1225	525	313	2	455

Ordering key:

Plenum box type	**PK3 - UR - 525x225 - Z**
Installation subframe	
Dimensions	
Insulation	

Note:

* Dimensions PK for installation with subframe
** Dimensions PK for installation without subframe

Design changes reserved

EFFECTIVE SUPPLY AREA TABLE - A_{ef} (m^2)

OAH, OAV, CCH, CCV								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,0070	0,0110	0,0150	0,0180	0,0220	0,0290	0,0360	0,0430
125	0,0150	0,0220	0,0290	0,0360	0,0440	0,0580	0,0730	0,0870
225	-	0,0410	0,0590	0,0730	0,0870	0,1160	0,1450	0,1740
325	-	-	0,0880	0,1090	0,1310	0,1740	0,2170	0,2610
425	-	-	-	-	0,1750	0,2320	0,2900	0,3480
525							0,3620	0,4340

OAB, NRA								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,0060	0,0090	0,0110	0,0140	0,0170	0,0220	0,0280	0,0340
125	0,0110	0,0170	0,0220	0,0280	0,0340	0,0440	0,0550	0,0660
225	-	0,0340	0,0440	0,0550	0,0660	0,0870	0,1080	0,1290
325	-	-	0,0660	0,0810	0,0960	0,1290	0,1690	0,1930
425	-	-	-	-	0,1290	0,1690	0,2140	0,2560
525	-	-	-	-	-	-	0,2688	0,3264

OCM								
H ↓ B →	225	325	425	525	625	825	1025	1225
75								
125	0,0085	0,0128	0,0170	0,0213	0,0255	0,0340	0,0425	0,0510
225	0,0170	0,0255	0,0340	0,0425	0,0510	0,0680	0,0850	0,1020
325	0,0255	0,0383	0,0510	0,0638	0,0765	0,1020	0,1275	0,1530
425	0,034	0,0510	0,0680	0,0850	0,1020	0,1360	0,1700	0,2040
525	-	-	-	0,1063	0,1275	0,1700	0,2125	0,2550

OAM								
H ↓ B →	225	325	425	525	625	825	1025	1225
75								
125	0,0033	0,0050	0,0067	0,0083	0,0100	0,0133	0,0166	0,0200
225	0,0067	0,0100	0,0133	0,0166	0,0200	0,0266	0,0333	0,0399
325	0,0100	0,0150	0,0200	0,0250	0,0300	0,0399	0,0499	0,0599
425	0,0133	0,0200	0,0266	0,0333	0,0399	0,0533	0,0666	0,0799
525	-	-	-	0,0416	0,0499	0,0667	0,0832	0,0998

PTR								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,0070	0,0100	0,0140	0,0170	0,0210	0,0260	0,0340	0,0390
125	0,0130	0,0190	0,0250	0,0310	0,0380	0,0500	0,0630	0,0750
225	0,0240	0,0340	0,0500	0,0610	0,0740	0,0970	0,1210	0,1460
325	-	0,0520	0,0720	0,0880	0,1060	0,1390	0,1740	0,2080
425	-	-	0,0970	0,1200	0,1420	0,1880	0,2340	0,2610
525	-	-	-	0,1520	0,1800	0,2360	0,2920	0,3510

Design changes reserved

EFFECTIVE EXHAUST AREA TABLE - A_{ef} (m^2)

OAH, OAV, CCH, CCV								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,006	0,009	0,011	0,014	0,016	0,022	0,028	0,033
125	0,011	0,016	0,022	0,028	0,033	0,044	0,055	0,066
225	-	0,033	0,044	0,055	0,066	0,090	0,110	0,134
325	-	-	0,066	0,083	0,100	0,134	0,170	0,200
425	-	-	-	-	0,134	0,180	0,220	0,270
525	-	-	-	-	-	-	0,280	0,340

OAB, NRA								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,006	0,009	0,011	0,014	0,016	0,022	0,028	0,033
125	0,011	0,016	0,022	0,028	0,033	0,044	0,055	0,066
225	-	0,033	0,044	0,055	0,066	0,090	0,110	0,134
325	-	-	0,066	0,083	0,100	0,134	0,170	0,200
425	-	-	-	-	0,134	0,180	0,220	0,270
525	-	-	-	-	-	-	0,280	0,340

OAK								
H ↓ B →	225	325	425	525	625	825	1025	1225
75								
125	0,012	0,018	0,025	0,031	0,038	0,050	0,063	0,075
225	-	0,038	0,050	0,063	0,075	0,105	0,126	0,155
325	-	-	0,075	0,096	0,117	0,155	0,197	0,236
425	-	-	-	-	0,155	0,210	0,260	0,310
525	-	-	-	-	-	-	0,330	0,400

OAN								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,006	0,01	0,013	0,016	0,019	0,026	0,032	0,038
125	0,009	0,014	0,019	0,024	0,029	0,038	0,048	0,057
225	-	0,032	0,043	0,053	0,064	0,086	0,107	0,129
325	-	-	0,066	0,083	0,100	0,134	0,167	0,200
425	-	-	-	-	0,136	0,181	0,227	0,272
525	-	-	-	-	-	-	0,287	0,344

Design changes reserved

EFFECTIVE EXHAUST AREA TABLE - A_{ef} (m^2)

OCM								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	-	-	-	-	-	-	-	-
125	0,0085	0,0128	0,0170	0,0213	0,0255	0,0340	0,0425	0,0510
225	0,0170	0,0255	0,0340	0,0425	0,0510	0,0680	0,0850	0,1020
325	0,0255	0,0383	0,0510	0,0638	0,0765	0,1020	0,1275	0,1530
425	0,0340	0,0510	0,0680	0,0850	0,1020	0,1360	0,1700	0,2040
525	-	-	-	0,1063	0,1275	0,1700	0,2125	0,2550

PCR								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	-	-	-	-	-	-	-	-
125	0,0049	0,0076	0,0103	0,0130	0,0158	0,0212	0,0266	0,320
225	-	0,0171	0,0232	0,0293	0,0354	0,0477	0,0599	0,0721
325	-	-	0,0361	0,0456	0,0551	0,0741	0,0932	0,1122
425	-	-	-	0,0619	0,0748	0,1006	0,1264	0,1522
525	-	-	-	0,0782	0,0945	0,1271	0,1597	0,1923

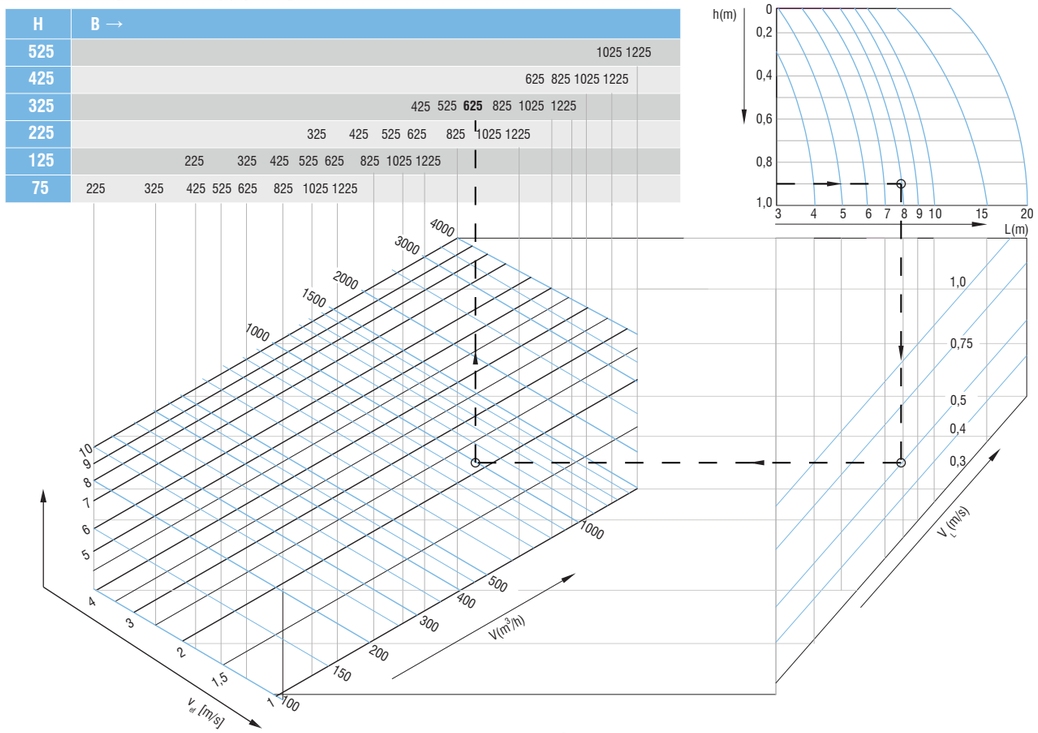
OAS								
H ↓ B →	225	325	425	525	625	825	1025	1225
75	0,0040	0,0059	0,0079	0,0099	0,0119	0,0158	0,0199	0,0239
125	0,0079	0,0119	0,0158	0,0199	0,0239	0,0321	0,0397	0,0476
225	0,0158	0,0239	0,0318	0,0397	0,0476	0,0635	0,0794	0,0952
325	-	0,0357	0,0476	0,0598	0,0715	0,0952	0,1191	0,1429
425	-	-	0,0635	0,0794	0,0952	0,1270	0,1588	0,1905
525	-	-	-	0,1042	0,1240	0,1637	0,2034	0,2431

ORP								
B [mm]	500	600	700	800	900	1000	1100	1200
H [mm]	500	600	700	800	900	1000	1100	1200
A_{EF} [m^2]	0,099	0,147	0,204	0,270	0,346	0,431	0,525	0,629

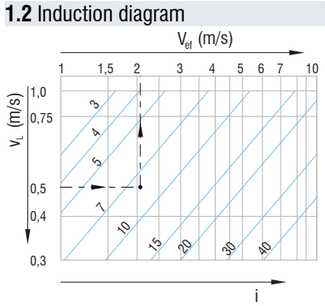
Design changes reserved

SELECTION DIAGRAMS

1.1 Selection diagrams for supply air grilles: OAH, OAV, CCH, CCV



1.2 Induction diagram



Example:

Given:

L = 8 m
V = 1000 m³/h
v_L = 0,5 m/s
Δt_Z = 4K
h = 0,9 m

Grille type : OAV

Select:

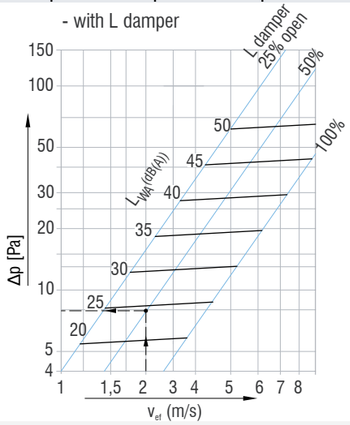
From 1.1 :
BxH 625x325;
A_{ef} = 0,131 m²;
v_{ef} = 2,2 m/s;
From 1.2 :
i = 8;
From 1.3 :
Sound power level
(50% open): 24 dB (A);
Correction: 24+1 = 25 dB(A);

From 2.6 :
$b_{0,2}$ = 0,9 m;
From $\Delta t_L = k_1 * \Delta t_Z * \frac{v_L}{v_{ef}}$
Δt_L =0,68 K;
From 2.7 and 2.8:
k = 0,85
y = k * Δt_z = 3,4 m

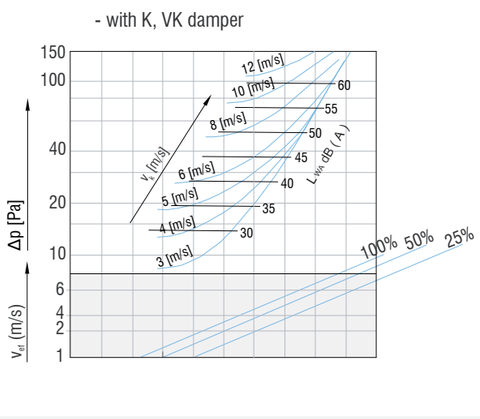
Horizontal distance
D> 0,2 L > 1,6m

1.3 Air pressure drop and sound power level OAH, OAV, CCH, CCV

- with L damper

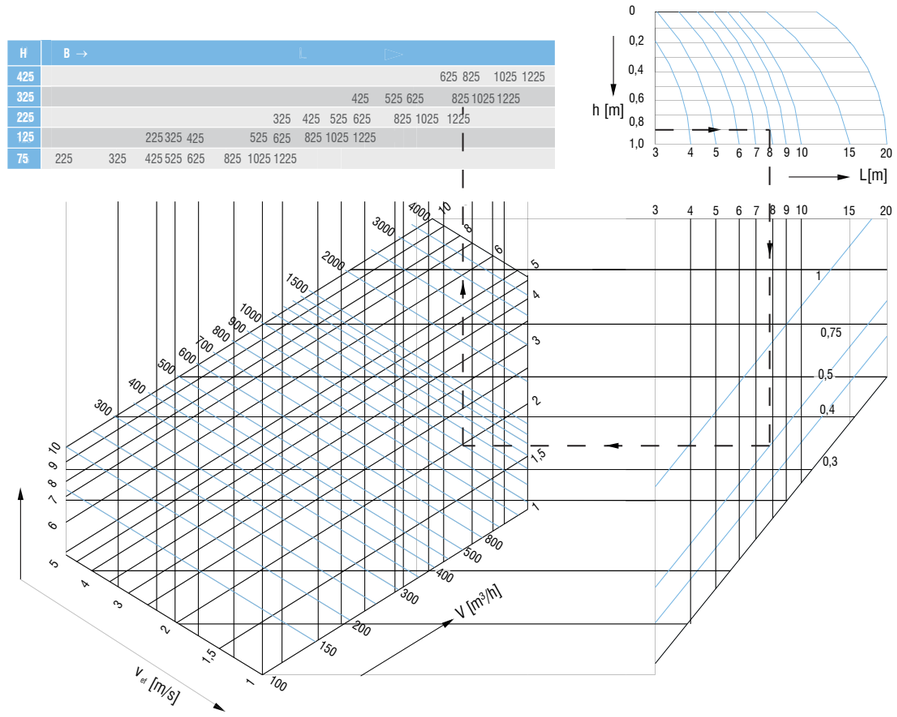


- with K, VK damper

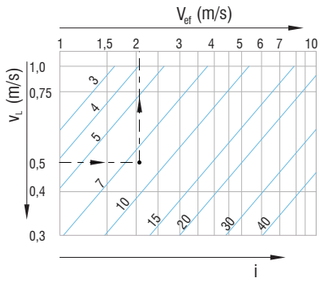


Design changes reserved

1.4 Selection diagrams for exhaust air grilles: OAB, NRA, NRB, NRE, NRK



1.5 Induction diagram



Example:

Given:

L = 8 m
V = 1000 m³/h
v_L = 0,5 m/s
Δt_Z = 4K
h = 0,9 m

Grille type : OAB

Select:

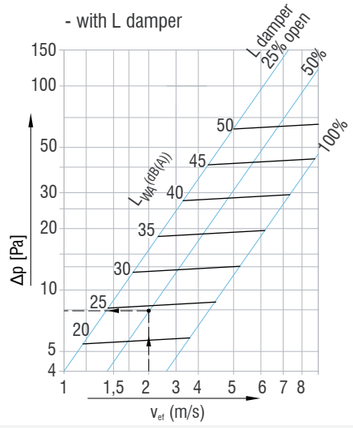
From 1.1 :
BxH 825x325;
A_{ef} = 0,129 m²;
v_{ef} = 2 m/s;
From 1.2 :
i = 8;
From 1.3 :
Sound power level
(50% open): 24 dB (A);
Correction: 24+0 = 24 dB(A);

From 2.6 :
$b_{0,2}$ = 0,9 m;
From $\Delta t_L = k_1 * \Delta t_Z * \frac{v_L}{v_{ef}}$
Δt_L =0,68 K;
From 2.7 and 2.8:
k = 0,85
y = k * Δt_z = 3,4 m

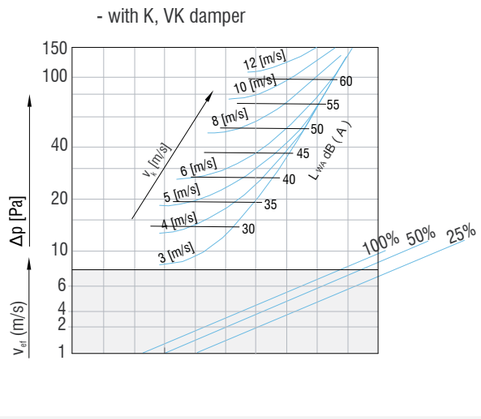
Horizontal distance
D> 0,2 L > 1,6m

1.6 Air pressure drop and sound power level OAB, NRA, NRB, NRE, NRK

- with L damper

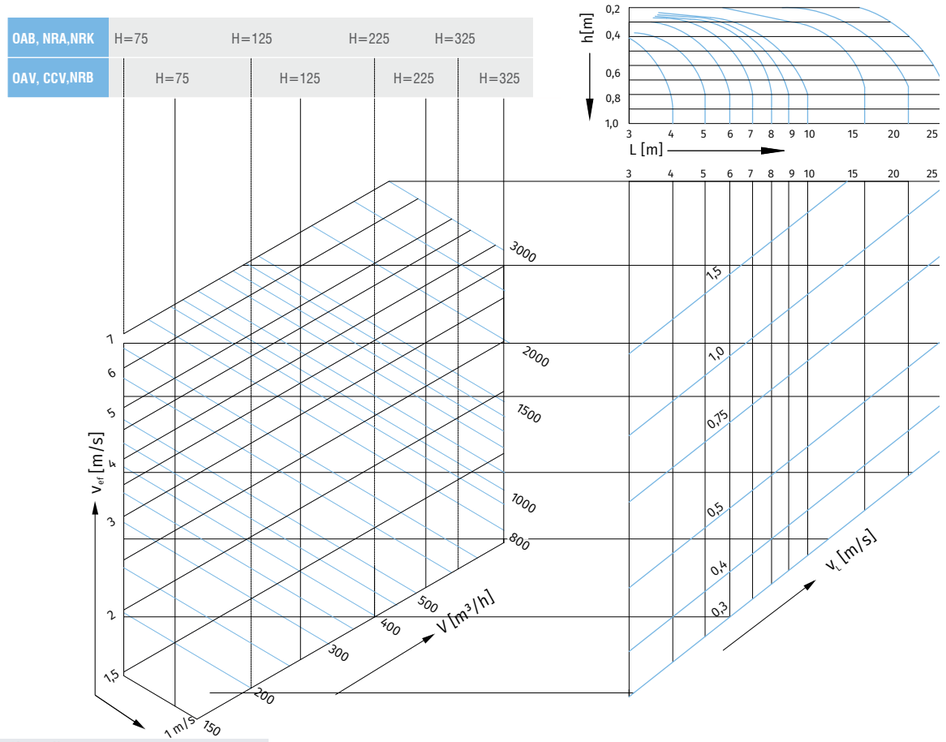


- with K, VK damper

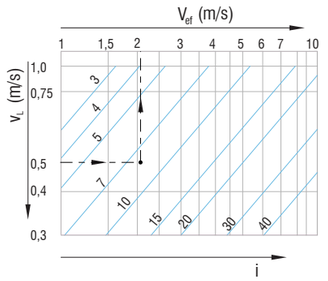


Design changes reserved

1.7 Selection diagrams for supply air grilles: OAB, NRA, NRB, NRE, NRK

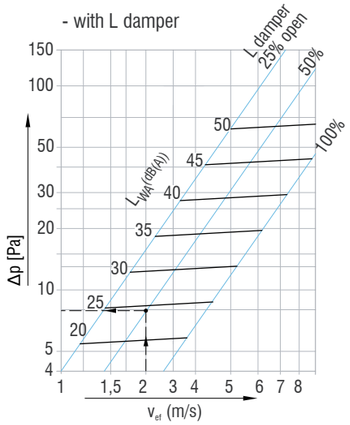


1.8 Induction diagram

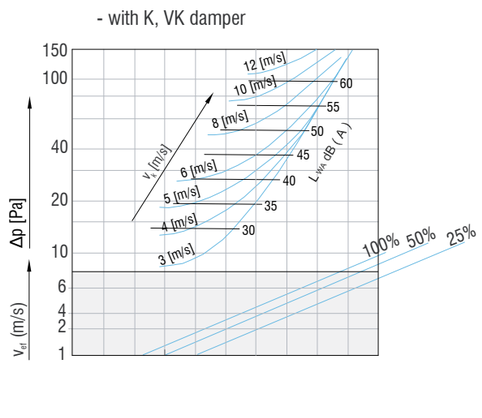


1.9 Air pressure drop and sound power level for linear grilles OAB, NRA, NRB, NRE, NRK

- with L damper

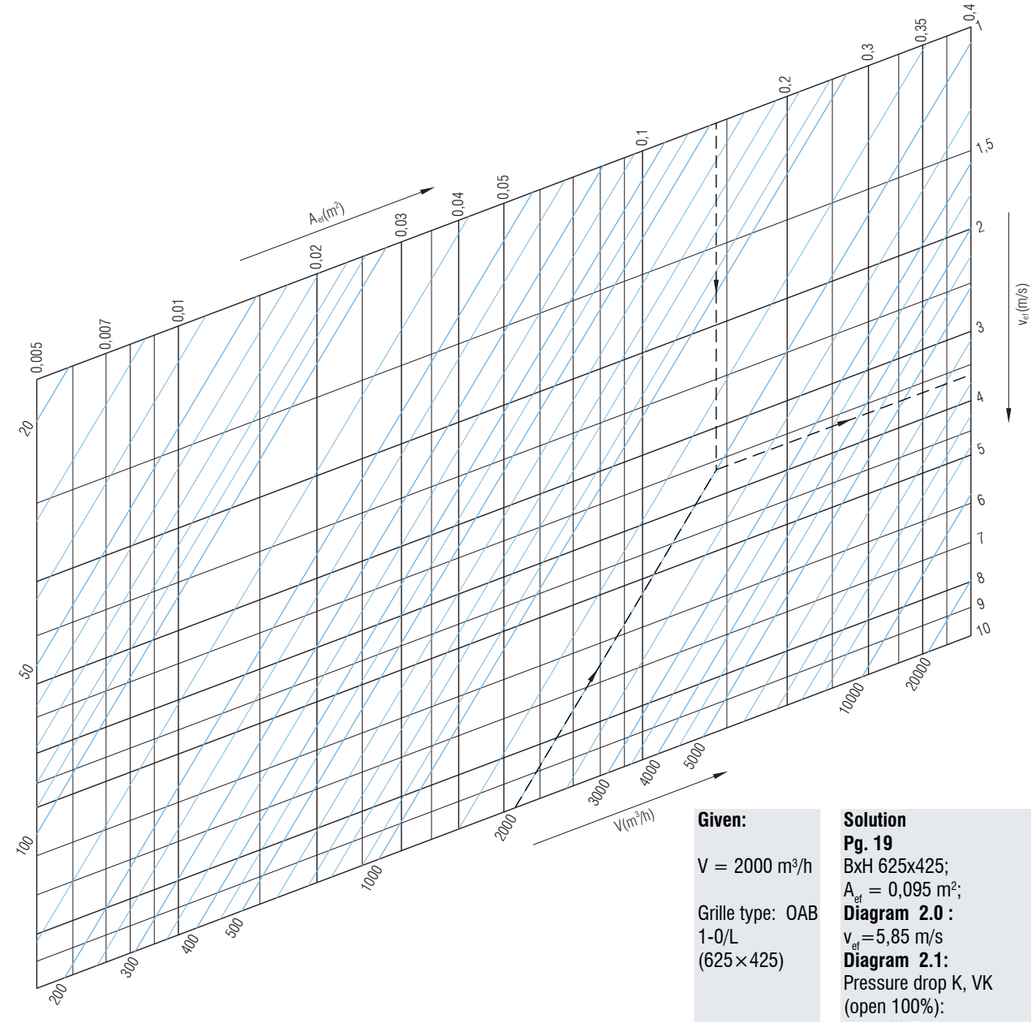


- with K, VK damper



Design changes reserved

2.0 Selection diagrams for exhaust air grilles: OAH, OAV, CCH, CCV, OAB, OAN, NRA, NRB, NRE, NRK



Given:

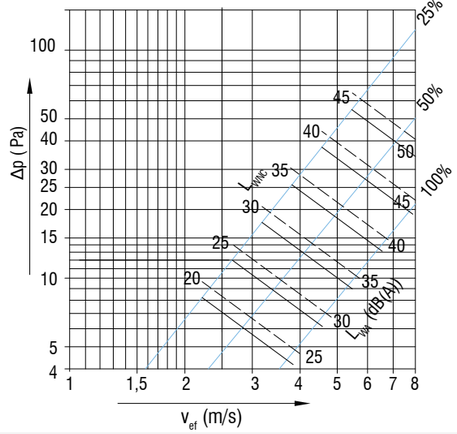
V = 2000 m³/h

Grille type: OAB 1-0/L (625×425)

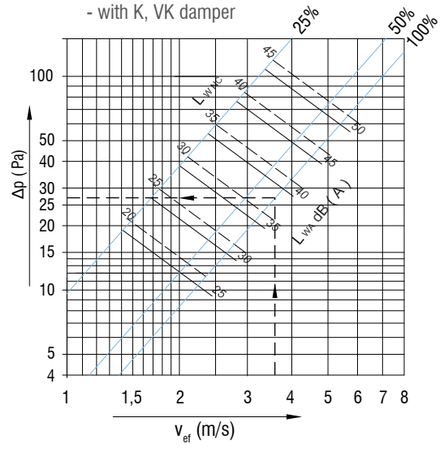
Solution
Pg. 19
BxH 625x425;
A_{ef} = 0,095 m²;
Diagram 2.0 :
v_{ef}=5,85 m/s
Diagram 2.1:
Pressure drop K, VK (open 100%):
Δp =12 Pa

2.1 Air pressure drop and sound power level

-with L damper



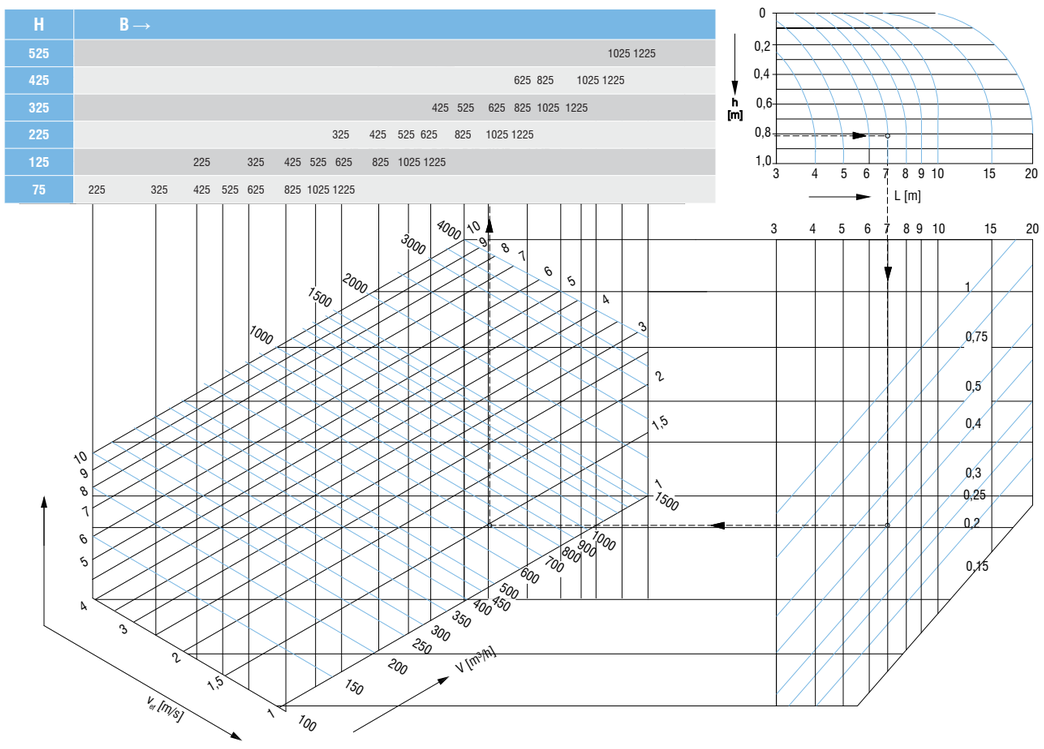
- with K, VK damper



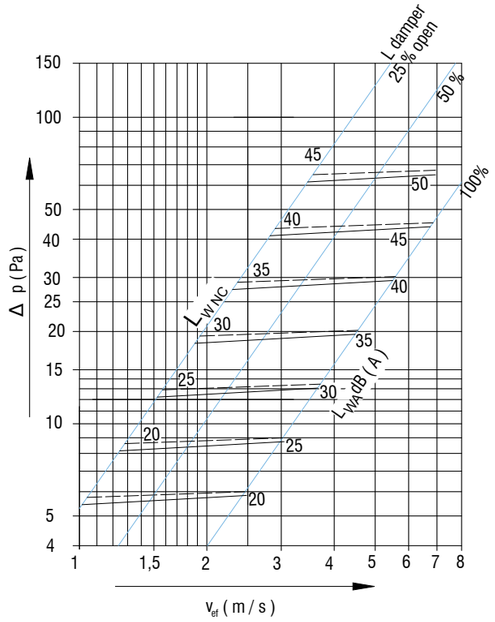
Design changes reserved

2.2 Selection diagram for PTR grille

H	B →
525	1025 1225
425	625 825 1025 1225
325	425 525 625 825 1025 1225
225	325 425 525 625 825 1025 1225
125	225 325 425 525 625 825 1025 1225
75	225 325 425 525 625 825 1025 1225



2.3 Air pressure drop and sound power level for PTR grille with L-damper



2.4 Pressure drop for PCR grille without filter

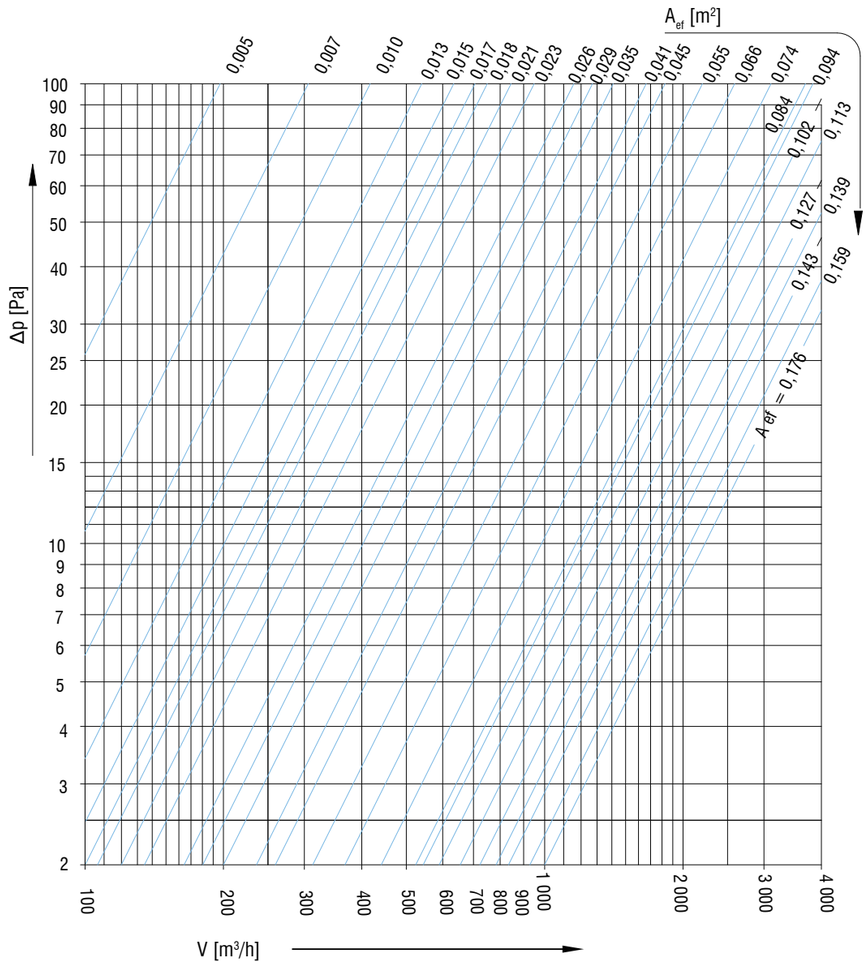
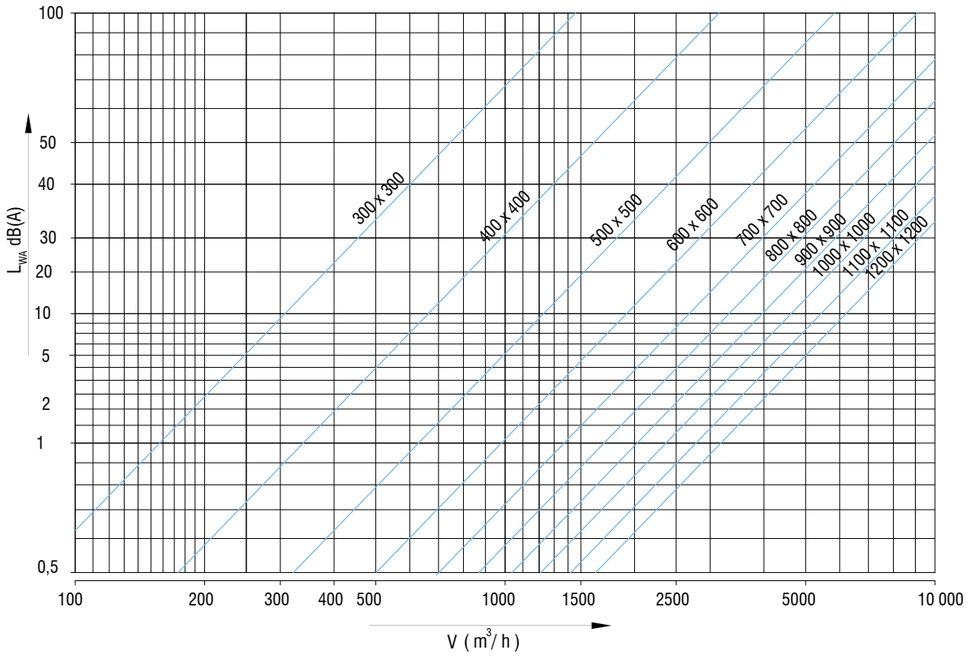


Table of additional pressure loss for PCR grille with filter

Vef (m/s)	Filter G2		Filter G4	
	Δp_1 (Pa)	Δp_2 (Pa)	Δp_1 (Pa)	Δp_2 (Pa)
	Initial	End	Initial	End
1	4	114	6	176
2	6	116	9	179
3	8	118	12	182
4	10	120	15	185
5	12	122	18	188
6	14	124	21	191
7	16	126	24	194
8	18	128	27	197
9	20	130	30	200
10	21	131	34	204
11	23	133	37	207
12	24	134	41	211

Design changes reserved
Design changes reserved

2.5 Diagram of sound power level for ORP grille



Correction table for sound power levels

A_{ef}(m²)	0,005	0,01	0,02	0,05	0,1	0,2	0,4
ΔL_S	-13	-10	-7	-3	0	3	6

L_{WA} dB [A] - Sound power level on grille (A_{ef} = 0,1)

L_{WA} dB [A] = $L_{WA\ 0,1\ m2} + \Delta L_S$

ΔL_S [dB] - Sound power correction $A_{ef} \neq 0,1$ (m²)

Correction values for blade deflection

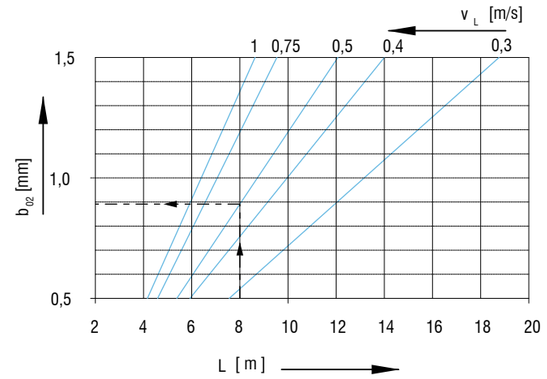
Blade divergence angle	β	90°	45°
Jet disapation angle	α	60°	35°
Max. jet velocity	v_L	0,5 x v_L	0,7 x v_L
Max. temperature difference	Δt_L / Δt_Z	0,5 x	0,7 x
Induction	i	2 x i	1,4 x i
Distance between two neighbouring grille. Case A - free discharge	D	> 0,3L	>0,25L
Distance between two grille. Case B - discharge with Coanda effect	D	> 0,3L	>0,25L
Jet deflection	y	2 x y	1,4 x y

Pressure drop for grilles that are not mentioned in diagrams above (OAM, OCM and OAS)

OAM/OCM → $\Delta p = 0,67194 \times v_{ef}^2$

OAS → $\Delta p = 3,72 \times v_{ef}^2$

2.6 Jet width diagram $b_{0,2}$ (for h>0,8m)

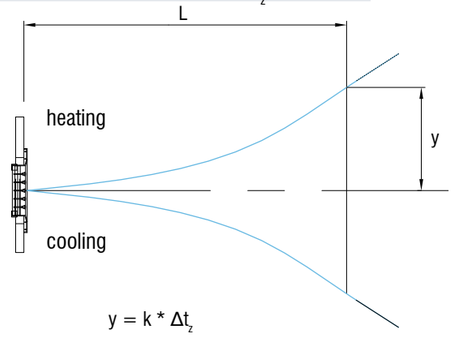


$\Delta t L = k1 \times \Delta t Z \times (V_L / V_{ef})$

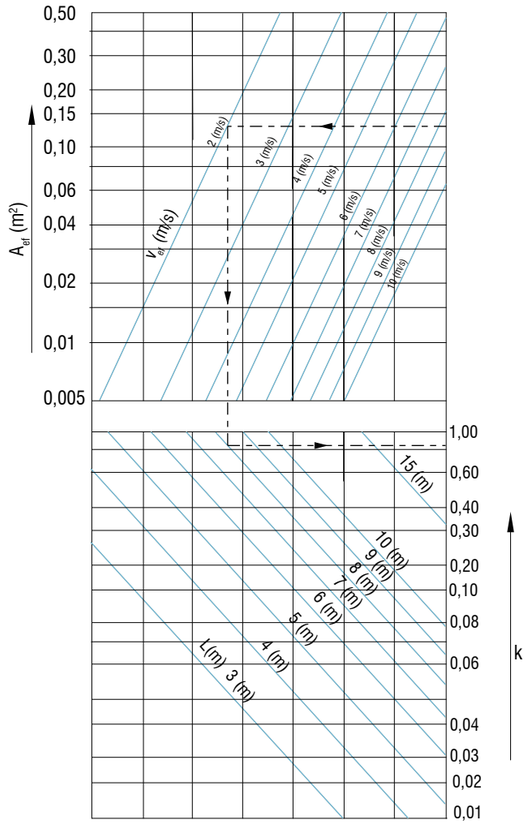
k_1 = 0,9 h ≤ 0,3 m

k_1 = 0,75 h ≥ 0,8 m

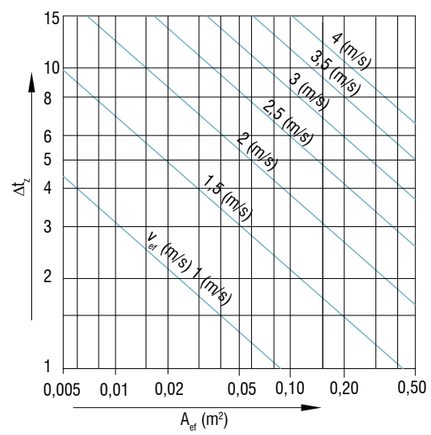
2.6a Jet deflection because of Δt_z



2.7 Discharge with Coanda effect



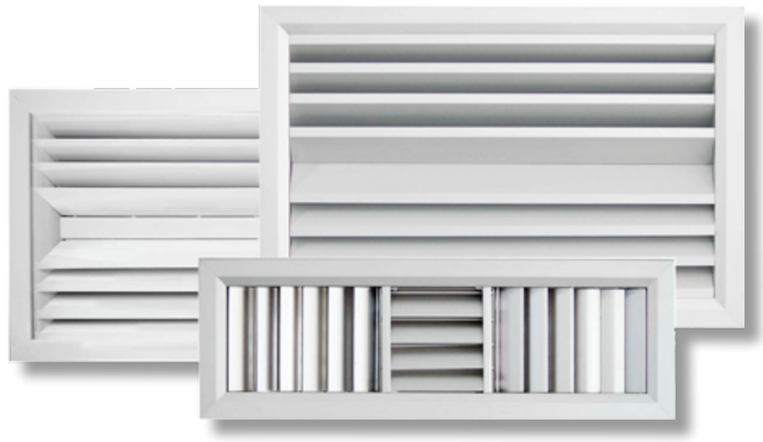
2.8 Discharge without Coanda effect



2/S1
v 3.3 (en)

CEILING DIFFUSERS

ANA, ANE, AND



klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow
V_{uk} [m³/h]	- Total air volume in motion
h [m]	- Distance from the ceiling to the occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance from wall
L [m]	- Throw distance (x+h)
A_{ef} [m2]	- Effective discharge area
v_{ef} [m/s]	- Effective jet velocity
v_L [m/s]	- Average core velocity at distance L (m) from diffuser
v_h [m/s]	- Average core velocity at distance h (m) from diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Air temperature in the room
t_z [°C]	- Supply air temperature
$t_{m,L}$ [°C]	- Core air temperature
$Δt_z$ [°C]	- $(t_z - t_p)$
$Δt_L$ [C°]	- $(t_{m,L} - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

Design changes reserved

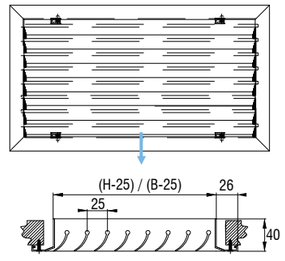
ANA

- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame and blades made out of anodized aluminium
- Induividually adjustable blades
- Fixing with visible screws

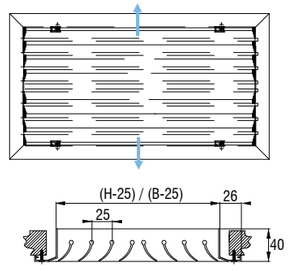
Options:

- Fixing with subframe (UR) only in wall
- Damper (L)
- RAL...
- Plenum box

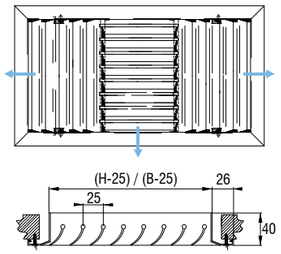
ANA 1



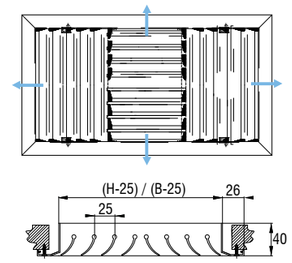
ANA 2



ANA 3



ANA 4



Ordering key:

Type	ANA	- 3	- UR	- 625x325	- L
Number of airflow directions					
Installation subframe					
Standard size B x H					
Flow damper					

*Screws are not delivered

Standard dimensions ANA	
B	225 - 1225 mm, in increments 100mm
H	125 - 525 mm, in increments 100mm

* B > H

Design changes reserved

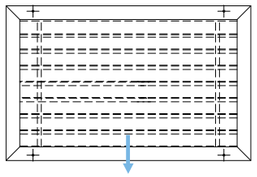
ANE

- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame and blades from anodized aluminium profiles
- Fixed blades
- Fixing with visible screws

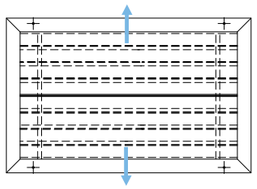
Options:

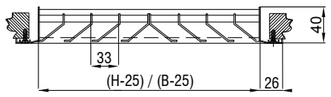
- Fixing with subframe (UR) only in wall
- Damper (L)
- RAL...
- Plenum box

ANE 1



ANE 2





Ordering key:

Type	**ANE**	**- 2**	**- UR**	**- 600x282**	**- L**
Number of airflow directions					
Installation subframe					
Standard size B x H					
Flow damper					

*Screws are not delivered

Standard dimensions ANE1	
B	500 - 1800 mm, in increments 100 mm
H	155, 254, 353 mm

Standard dimensions ANE2	
B	500 - 2000 mm, in increments 100 mm
H	218, 282, 414 mm

Design changes reserved

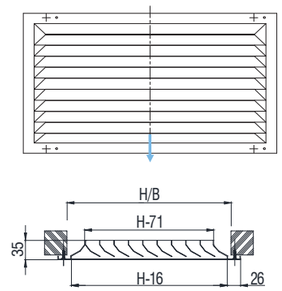
AND

- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame and blades from steel sheet
- Fixed blades
- Fixing with visible screws

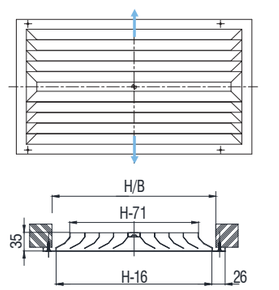
Options:

- Fixing with central screw (AND2, AND3, AND4)
- Damper (L)
- RAL...
- Plenum box

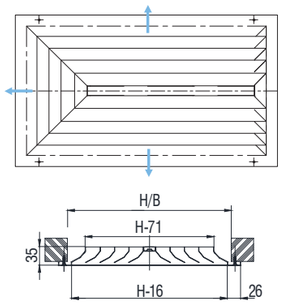
AND 1



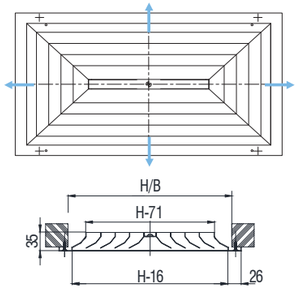
AND 2



AND 3



AND 4



Ordering key:

Type	**AND**	**- 3**	**- 871x264**	**- L**	
Number of airflow directions					
Standard size B x H					
Flow damper					

*Screws are not delivered

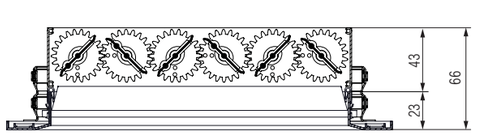
Standard dimensions AND	
B	371 - 1271 mm, in increments 100 mm
H	208 - 544 mm, in increments 56 mm

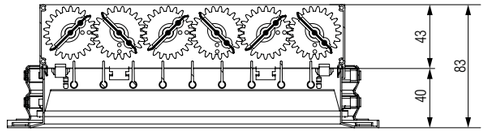
* B > H

Design changes reserved

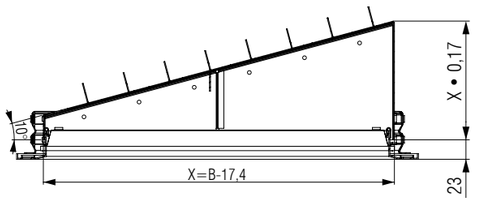
DAMPERS

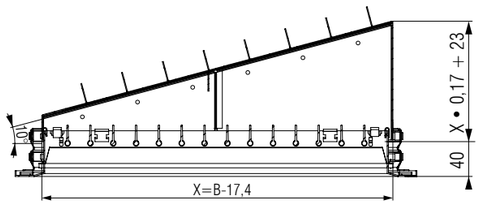
L - damper





S - damper



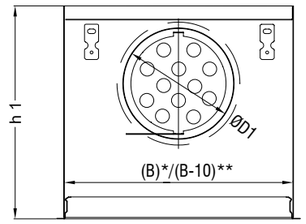


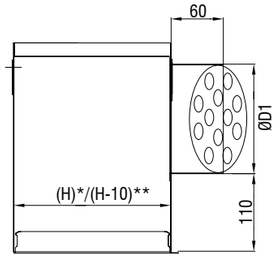
Diffuser	OPTIONS					
	Damper		Installation with subframe	RAL...	Linear grille B>1225mm	Plenum box PK1, PK2, PK3
	L	S				
ANA	•	•	•	•		
ANE	•	•	•	•	•	
AND	•			•	•	•

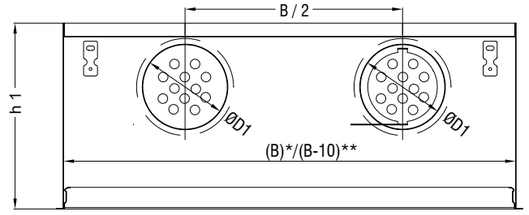
Design changes reserved

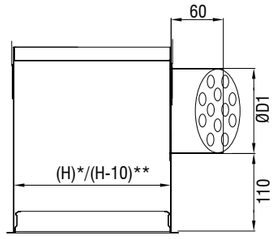
PLENUM BOXES

Plenum box - PK1

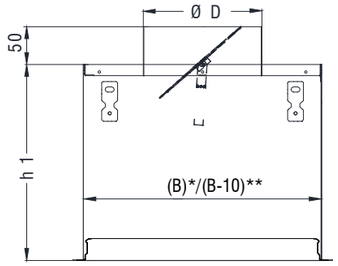


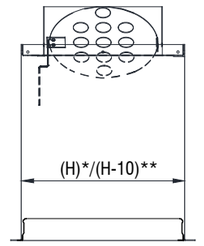


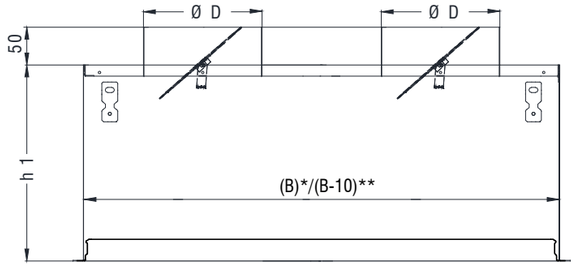


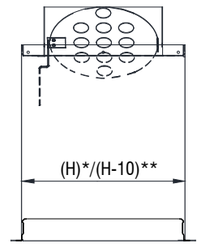


Plenum box - PK2









Note:

* Plenum box dimensions for installation with subframe
** Plenum box dimensions for installation without subframe

Design changes reserved

Plenum boxes ANE 1

Size		One connection		Two connections		V_{min} [m³/h]	V_{max} [m³/h]
B [mm]	H [mm]	D1 [mm]	h1 [mm]	D2 [mm]	h2 [mm]		
500	155	158	300			64	387
600		158	300			79	468
700		198	340			92	550
800		198	340			105	631
900		198	340			119	713
1000		248	390			132	794
1100		248	390	158	300	146	875
1200		248	390	198	340	159	957
1300		248	390	198	340	173	1038
1400		248	390	198	340	187	1120
1500		313	455	198	340	200	1200
1600		313	455	198	340	214	1284
1700		313	455	198	340	227	1364
1800		313	455	198	340	241	1446
1900		313	455	198	340	254	1528
2000		313	455	198	340	268	1610
500	254	198	340			127	768
600		248	390			154	926
700		248	390			180	1084
800		313	455			208	1256
900		313	455			234	1407
1000		313	455			260	1570
1100		313	455	198	340	288	1728
1200		353	495	248	390	314	1890
1300		353	495	248	390	342	2050
1400		353	495	248	390	368	2210
1500		353	495	248	390	395	2372
1600				298	440	420	2534
1700				298	440	450	2694
1800				298	440	474	2853
1900				298	440	500	3014
2000				298	440	530	3176
500	353	248	390			196	1170
600		313	455			240	1405
700		313	455			280	1650
800		313	455			323	1894
900		353	495			362	2140
1000		353	495			403	2380
1100		398	540	313	455	446	2630
1200		398	540	313	455	485	2870
1300		398	540	313	455	528	3120
1400		398	540	313	455	568	3360
1500		448	590	313	455	610	3600
1600				353	495	649	3850
1700				353	495	693	4095
1800				353	495	732	4340

Plenum boxes ANE 2

Size		One connection		Two connections		V_{min} [m³/h]	V_{max} [m³/h]
B [mm]	H [mm]	D1 [mm]	h1 [mm]	D2 [mm]	h2 [mm]		
500	216	158	300			87	510
600		198	340			104	620
700		198	340			122	725
800		198	340			139	830
900		248	390			157	940
1000		248	390			174	1046
1100		248	390	198	340	192	1156
1200		248	390	198	340	210	1260
1300		313	455	198	340	230	1370
1400		313	455	248	390	246	1476
1500		313	455	248	390	264	1585
1600		313	455	248	390	282	1692
1700				248	390	299	1800
1800				248	390	317	1905
1900				248	390	334	2015
2000				248	390	352	2120
500	282	198	340			134	790
600		198	340			160	955
700		248	390			190	1130
800		248	390			218	1290
900		313	455			244	1460
1000		313	455			270	1625
1100		313	455	198	340	300	1790
1200		353	495	248	390	328	1960
1300		353	495	248	390	354	2120
1400		353	495	248	390	382	2290
1500		353	495	248	390	410	2460
1600		398	540	248	390	434	2622
1700				313	455	461	2790
1800				313	455	488	2950
1900				313	455	515	3120
2000				313	455	542	3290
500	414	248	390			214	1277
600		313	455			260	1550
700		313	455			305	1815
800		353	495			350	2085
900		353	495			392	2350
1000		398	540			437	2620
1100		398	540			482	2890
1200		398	540			530	3160
1300				313	455	573	3430
1400				313	455	615	3700
1500				353	495	663	3965
1600				353	495	707	4240
1700				353	495	750	4510
1800				353	495	796	4780
1900				398	540	840	5045
2000				398	540	886	5320

Design changes reserved

CEILING DIFFUSERS

Plenum boxes ANA

Size		One connection		Two connections		V_{min} [m³/h]	V_{max} [m³/h]
B [mm]	H [mm]	D1 [mm]	h1 [mm]	D2 [mm]	h2 [mm]		
225	125	98	240			20	120
325		98	240			27	160
425		123	265			37	230
525		123	265			47	280
625		158	300			57	330
825		158	300	123	265	77	450
1025		198	340	123	265	97	560
1225		198	340	158	300	117	680
325	225	158	300			60	330
425		158	300			80	450
525		198	340			90	550
625		198	340			110	650
825		248	390	158	300	150	900
1025		248	390	198	340	190	1150
1225		313	455	198	340	230	1350
425	325	198	340			120	760
525		248	390			160	950
625		248	390			190	1150
825		298	440	198	340	260	1550
1025		313	455	248	390	320	1900
1225		353	495	248	390	380	2260
625	425	313	455			260	1560
825		353	495			350	2100
1025		398	540			440	2600
1225		448	590			520	3120
1025	525	448	590			560	3260
1225		498	640			670	3900

Plenum boxes AND

Size		One connection		Two connections		V_{min} [m³/h]	V_{max} [m³/h]
B [mm]	H [mm]	D1 [mm]	h1 [mm]	D2 [mm]	h2 [mm]		
371	208	198	340			74	446
471		198	340			94	564
571		198	340			115	691
671		248	390			136	820
871		248	390	198	340	178	1070
1071		313	455	198	340	220	1325
1271		313	455	248	390	263	1585
471	264	198	340			130	783
571		248	390			160	963
671		248	390			190	1142
871		313	455	198	340	250	1506
1071		353	495	248	390	315	1899
1271		353	495	248	390	370	2230
571	320	313	455			210	1266
671		313	455			250	1507
871		353	495			325	1956
1071		398	540			400	2410
1271		398	540			480	2892
671	376	353	495			310	1870
871		398	540			410	2472
1071		448	590			505	3045
1271		498	640			600	3614
871	432	398	540			488	2940
1071		448	590			600	3616
1271		498	640			712	4291
462	462	313	455			270	1627
962		448	590			590	3553
562	562	398	540			406	2445
1162		553	695			875	5272
587	587	398	540			443	2668
1212		628	770			960	5787

Ordering key:

Type	**PK1 - UR - 525x225 - Z**
Installation subframe	
Standard dimensions B x H	
Insulation	

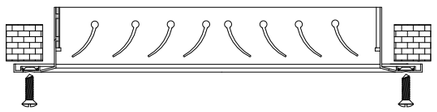
*Screws are not delivered

Design changes reserved

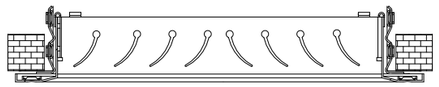
INSTALLATION

Ceiling installation

- without subframe

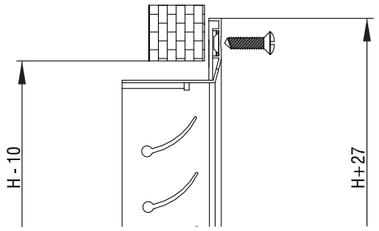


- with subframe

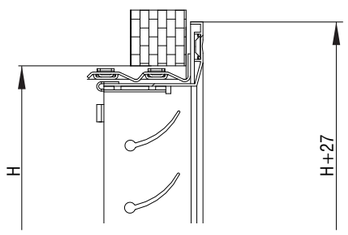


Wall installation

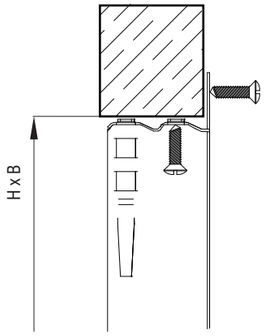
- without subframe

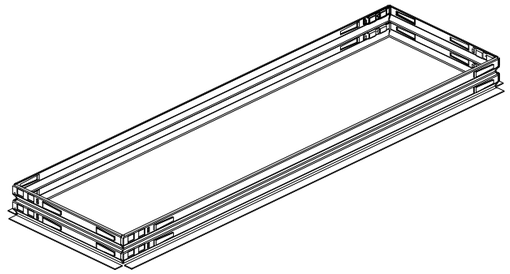


- with subframe

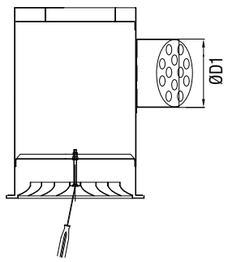


Subframe installation





Installation to plenum box with central screw (AND2, AND3, AND4)



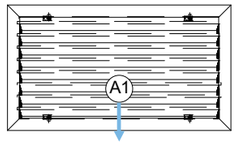
* Screws are not delivered

** Screws for diffuser fixing 3,9xL(DIN 7972, 7973, 7983)

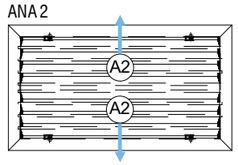
Design changes reserved

EFFECTIVE DISCHARGE AREA TABLE

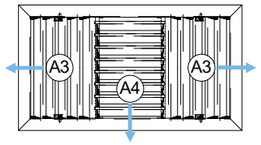
ANA 1



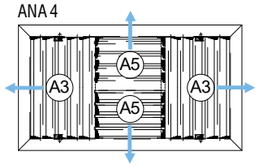
ANA 2



ANA 3

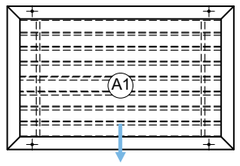


ANA 4

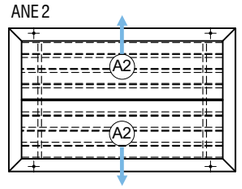


ANA A_{ef} [m²]							
B x H [mm]			A_{ef} [m² / per outlet section]				
B	x	H	A1	A2	A3	A4	A5
225	x	125	0,005				
325			0,007				
425			0,010				
525			0,012				
625			0,015				
825			0,021				
1025			0,026				
1225			0,031				
325	x	225	0,017	0,007	0,005	0,005	0,002
425			0,024	0,010	0,006	0,007	0,003
525			0,030	0,012	0,008	0,010	0,004
625			0,035	0,014	0,011	0,010	0,005
825			0,047	0,020	0,014	0,016	0,007
1025			0,058	0,025	0,020	0,020	0,008
1225			0,069	0,030	0,025	0,022	0,009
425	x	325	0,035	0,016	0,010	0,012	0,005
525			0,046	0,020	0,012	0,016	0,007
625			0,055	0,024	0,017	0,019	0,009
825			0,072	0,032	0,022	0,025	0,011
1025			0,090	0,041	0,029	0,029	0,013
1225			0,108	0,049	0,036	0,034	0,015
625	x	425	0,074	0,032	0,022	0,022	0,010
825			0,098	0,045	0,029	0,034	0,016
1025			0,122	0,057	0,038	0,040	0,019
1225			0,143	0,068	0,049	0,046	0,021
1025	x	525	0,153	0,073	0,048	0,051	0,025
1225			0,186	0,087	0,060	0,058	0,028

ANE1



ANE 2

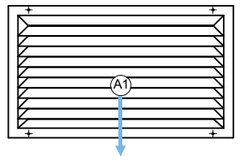


ANE A_{ef} [m²/ m]			
H [mm]	ANE1 [m²/m]	H [mm]	ANE 2 [m²/m]
155	0,037	216	0,024
254	0,073	282	0,037
353	0,110	414	0,061

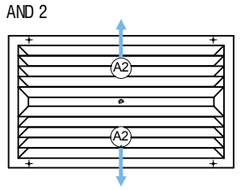
Design changes reserved

EFFECTIVE DISCHARGE AREA TABLE

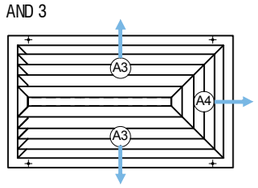
AND 1



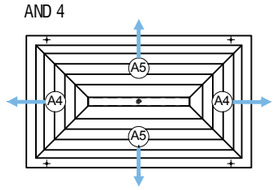
AND 2



AND 3



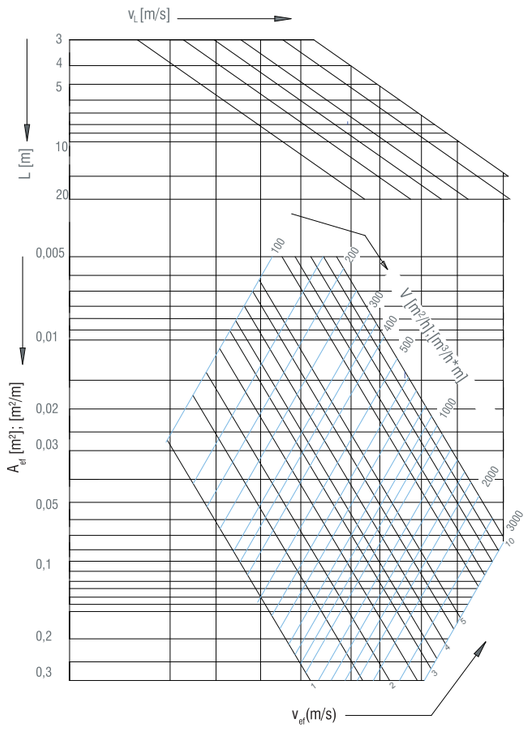
AND 4



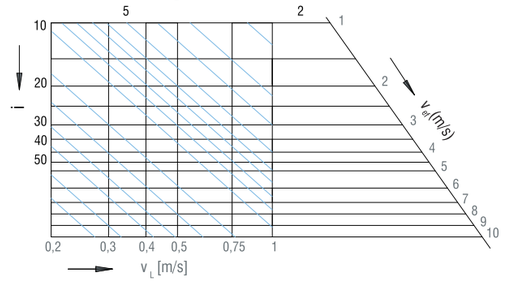
AND A_{ef} [m²]							
B x H [mm]			A_{ef} [m²/ per outlet section]				
B	x	H	A1	A2	A3	A4	A5
371	x	208	0,020	0,008			
471			0,026	0,010			
571			0,033	0,013			
671			0,039	0,016			
871			0,052	0,021			
1071			0,065	0,026			
1271			0,078	0,031			
471	x	264	0,036	0,015	0,014	0,0046	0,011
571			0,045	0,020	0,018	0,0046	0,015
671			0,054	0,023	0,021	0,0046	0,018
871			0,073	0,031	0,029	0,0046	0,026
1071			0,091	0,039	0,037	0,0046	0,034
1271			0,109	0,047	0,045	0,0046	0,042
571	x	320	0,058	0,026	0,022	0,0074	0,018
671			0,070	0,031	0,027	0,0074	0,023
871			0,094	0,042	0,038	0,0074	0,034
1071			0,117	0,052	0,048	0,0074	0,044
1271			0,140	0,062	0,058	0,0074	0,054
671	x	376	0,086	0,039	0,033	0,0110	0,028
871			0,114	0,052	0,046	0,0110	0,041
1071			0,143	0,065	0,060	0,0110	0,054
1271			0,172	0,078	0,072	0,0110	0,067
871	x	432	0,135	0,062	0,054	0,0157	0,046
1071			0,169	0,078	0,070	0,0157	0,062
1271			0,203	0,094	0,086	0,0157	0,078
462	x	462	0,071	0,036	0,027	0,0182	0,018
982			0,162	0,081	0,072	0,0182	0,063
562	x	562	0,115	0,057	0,042	0,0293	0,029
1162			0,255	0,128	0,113	0,0293	0,099
587	x	587	0,127	0,060	0,044	0,0320	0,032
1212			0,282	0,133	0,117	0,0320	0,101

Design changes reserved

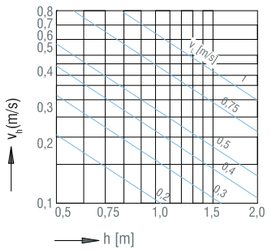
SELECTION DIAGRAMS



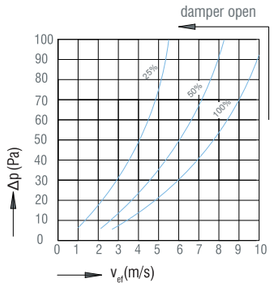
2. Induction diagram



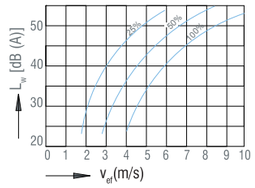
3. Vertical jet velocity between two diffusers



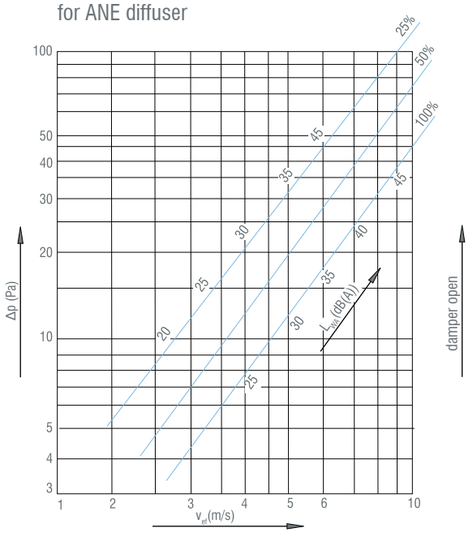
4. Pressure drop



5. Sound power level



6. Pressure drop and sound power level for ANE diffuser

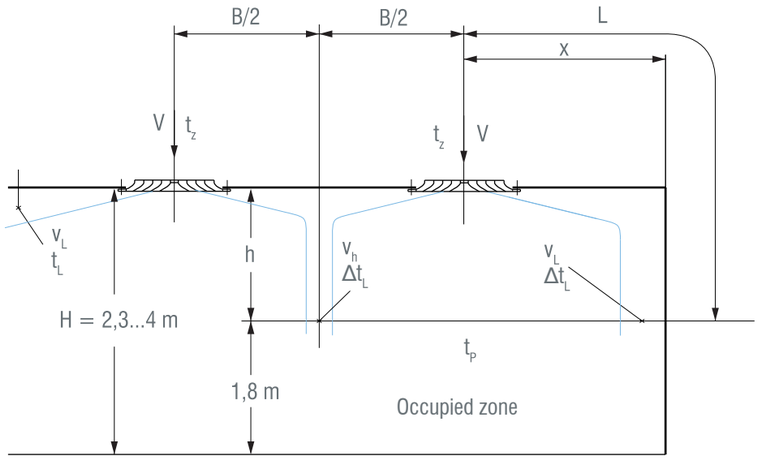


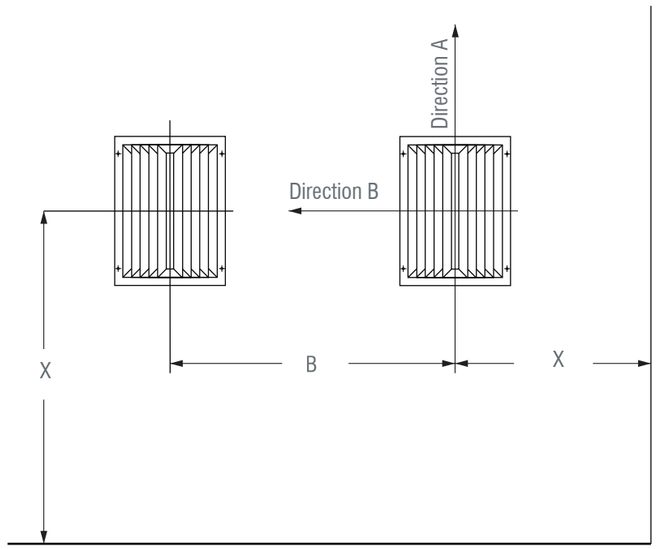
Sound power level correction table

A_{ef} [m²]	0,005	0,01	0,02	0,05	0,07	0,10	0,15	0,20	0,30
Correction [dB(A)]	-4	-4	-3	-1	0	3	6	8	11

Design changes reserved

DISCHARGE DIAGRAM





Design changes reserved

NOTES:

Design changes reserved

2/S2
v 3.3 (en)

CEILING DIFFUSERS

ANK, ANO

klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow
V_{uk} [m³/h]	- Total air volume in motion
h [m]	- Distance from the ceiling to the occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance from wall
L [m]	- Throw distance (x+h)
A_{ef} [m2]	- Effective discharge area
v_{ef} [m/s]	- Effective jet velocity
v_L [m/s]	- Average core velocity at distance L (m) from diffuser
v_h [m/s]	- Average core velocity at distance h (m) from diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Air temperature in the room
t_z [°C]	- Supply air temperature
t_m [°C]	- Core air temperature
$Δt_z$ [°C]	- $(t_z - t_p)$
$Δt_L$ [C°]	- $(t_m - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

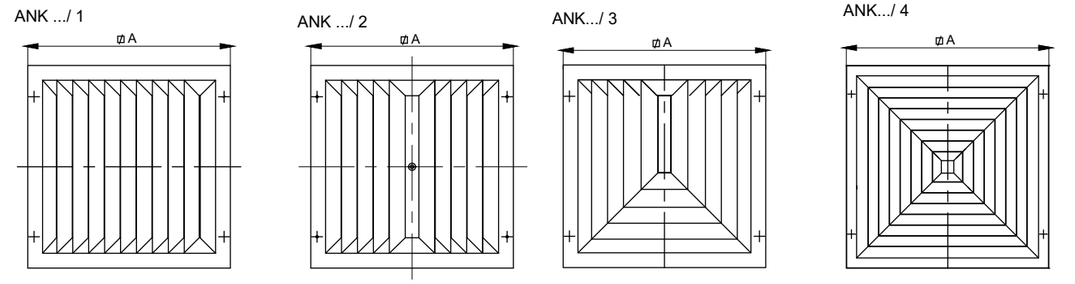
Design changes reserved

ANK

- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame and blades made out of steel sheet, standard RAL 9010
- Fixed blades
- Fixing with visible screws

Options

- Damper (L, KL)
- RAL...
- Plenum box
- Fixing with central screw (ANK../2, ANK../3, ANK../4)



*C - installation without plenum box

ANK	Size	1	2	3	4	5	6	7	8
	A[mm]	244	300	355	412	468	498	598	623
	C[mm]	208	264	320	375	432	462	562	587
	D[mm]	192	248	304	360	416	445	546	571

Ordering key:

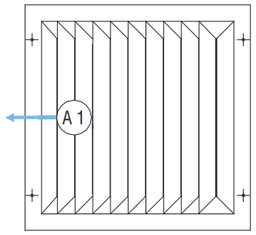
Type	**ANK**	**- 4**	**- CR**	**- KL**	**- A**	**- H**	**- ød**	**- Z**
Size								
Central screw								
Flow damper (only without UPK)								
A - supply air **B** - exhaust air								
H - horizontal connection **V** - vertical connection								
Conection diameter								
Insulation								

*Screws are not delivered
**Ordering key for Plenum box on page 184
***Only plenum box UPK1

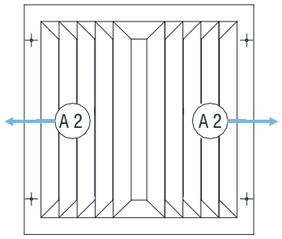
Design changes reserved

Diffuser ANK with 1, 2, 3 or 4 discharge directions

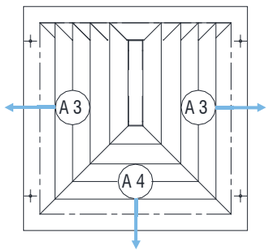
ANK .../1



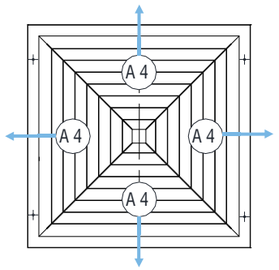
ANK .../ 2



ANK.../ 3

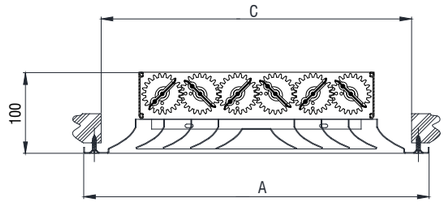


ANK.../ 4

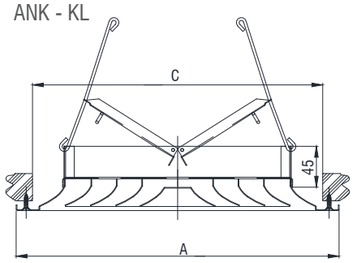


Dampers

ANK - L



ANK - KL



Effective discharge area table

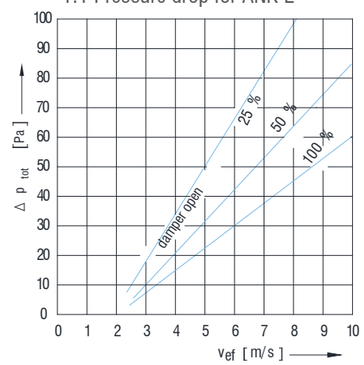
ANK A_{ef} [m^2/(per outlet section)]	Size	1	2	3	4	5	6	7	8
	A1	0,011	0,021	0,033	0,048	0,067	0,071	0,115	0,127
	A2	0,005	0,011	0,015	0,022	0,031	0,036	0,057	0,057
	A3	0,004	0,004	0,011	0,021	0,024	0,027	0,042	0,044
	A4	0,0027	0,0046	0,0074	0,0110	0,0157	0,0182	0,0293	0,0320

*C - installation without plenum box

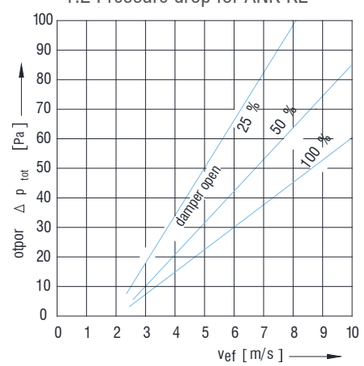
Design changes reserved

Selection diagrams

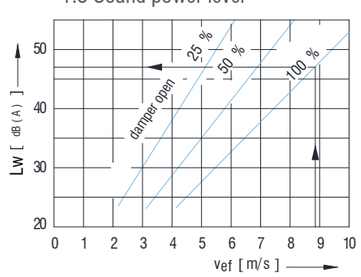
1.1 Pressure drop for ANK-L



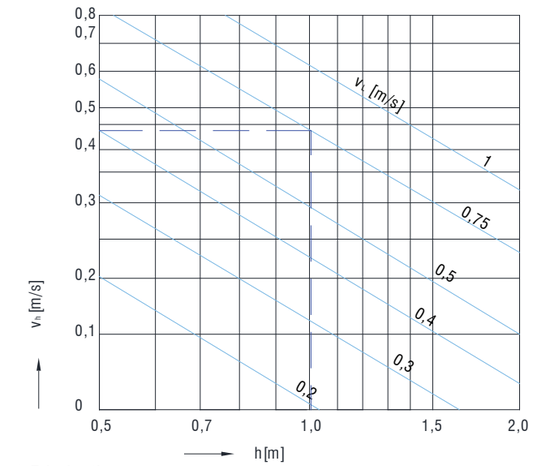
1.2 Pressure drop for ANK-KL



1.3 Sound power level



1.4 Vertical air-stream velocity between two ceilling diffusers



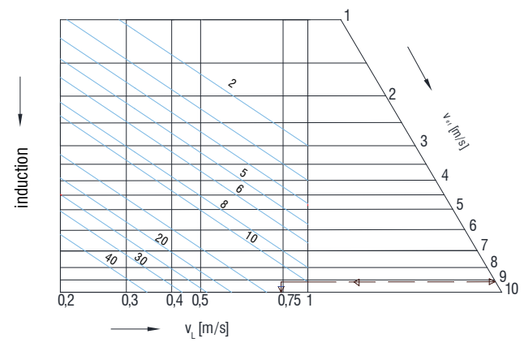
ANK

Size	Aef [m^2]
1	0,0104
2	0,0185
3	0,0295
4	0,0440
5	0,0628
6	0,0728
7	0,1175
8	0,1280

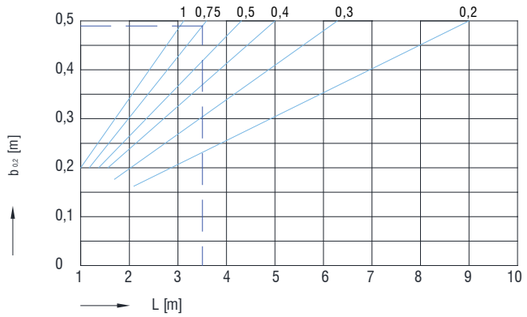
Sound power level correction 1.3

Size	Correction [dB(A)]
1	-3
2	-3
3	-2
4	-1
5	0
6	0
7	4
8	5

1.5 Induction



1.6 $b_{0,2}$ diagram



Design changes reserved

Example 1:

Given:

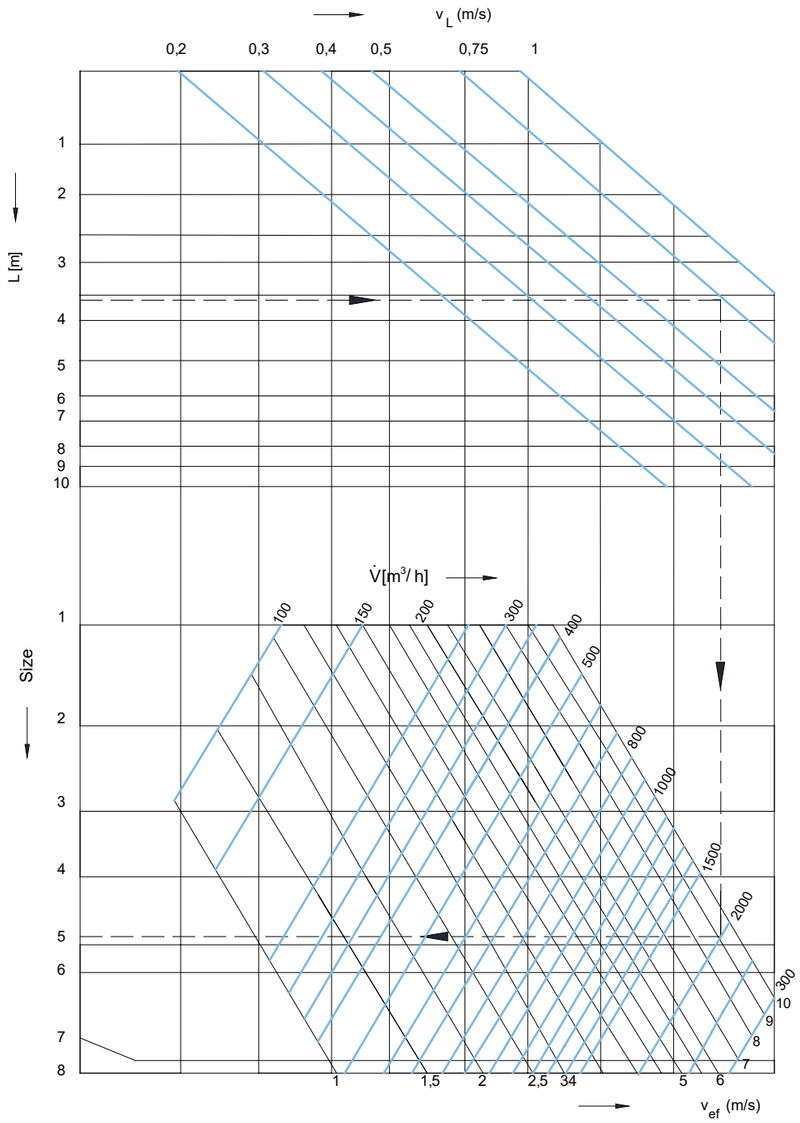
ANK-L
L = 3.6 m
V = 2000 m³/h
v_L=0.75 m/s
h=1 m
(damper 100% open)

Solution:

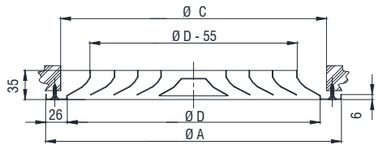
Diagram 1.7
Model 5
v_{ef} =9 m/s
Diagram 1.5
i = 11
Diagram 1.6
b_{02}=0.49 m

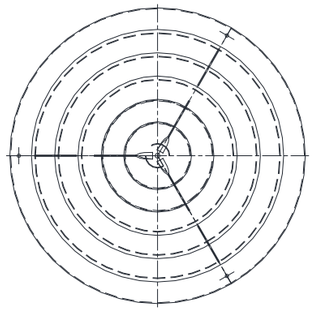
Diagram 1.4
v_h =0.44 m/s
Diagram 1.1
Δp=54
Diagram 1.3
L_{WA}= 47 dB (A)
Correction L_{WA}= 47-0=47 dB (A)

1.7 Selection diagram for ANK



Design changes reserved





ANO

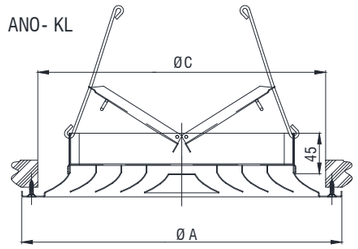
- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame and blades made out of steel sheet, standard RAL 9010
- Fixed blades
- Fixing with visible screws

Options

- Damper (KL)
- RAL...
- Plenum box
- Fixing with central screw

Size	ØA [mm]	ØC [mm]	ØD [mm]
1	244	208	192
2	300	264	248
3	356	320	304
4	412	376	360
5	468	432	416
6	542	506	472
7	598	562	528
8	654	618	584

Flow damper



Ordering key:

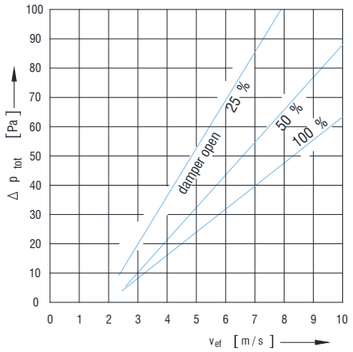
Type **ANO - 4 - CR - KL - A - H - ød - Z**
Size
Central screw
Flow damper (only without UPK)
A - supply air
B - exhaust air
H - horizontal connection
V - vertical connection
Conection diameter
Insulation

*Screws are not delivered
**Ordering key for Plenum box on page 184
***Only plenum box UPK2

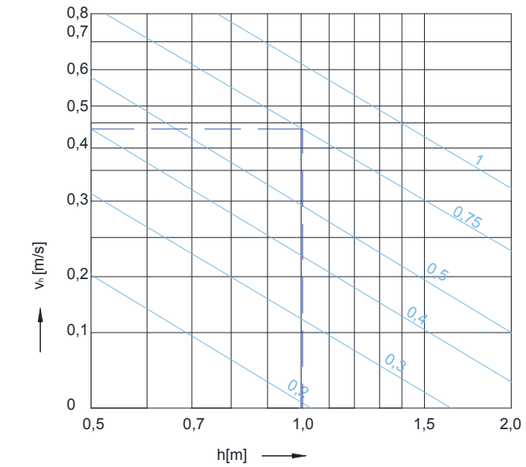
Design changes reserved

SELECTION DIAGRAM

2.2 Pressure drop for ANO-KL



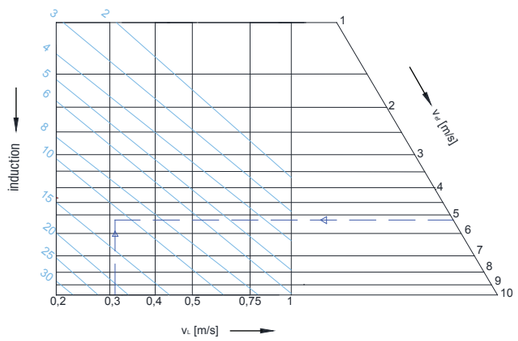
2.4 Vertical air-stream velocity between two ceilling diffusers



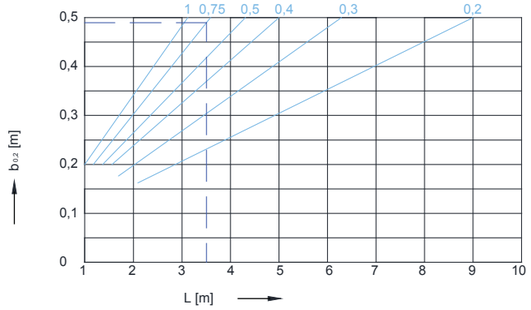
ANO	
Size	A_{ef} [m²]
1	0,0085
2	0,0157
3	0,0257
4	0,0381
5	0,0536
6	0,0730
7	0,0955
8	0,1150

Sound power level correction 2.3	
Size	Correction [dB(A)]
1	-3
2	-3
3	-2
4	-1
5	0
6	0
7	4
8	5

2.5 Induction diagram



2.6 $b_{0,2}$ diagram



Design changes reserved

Example 2:

Given:

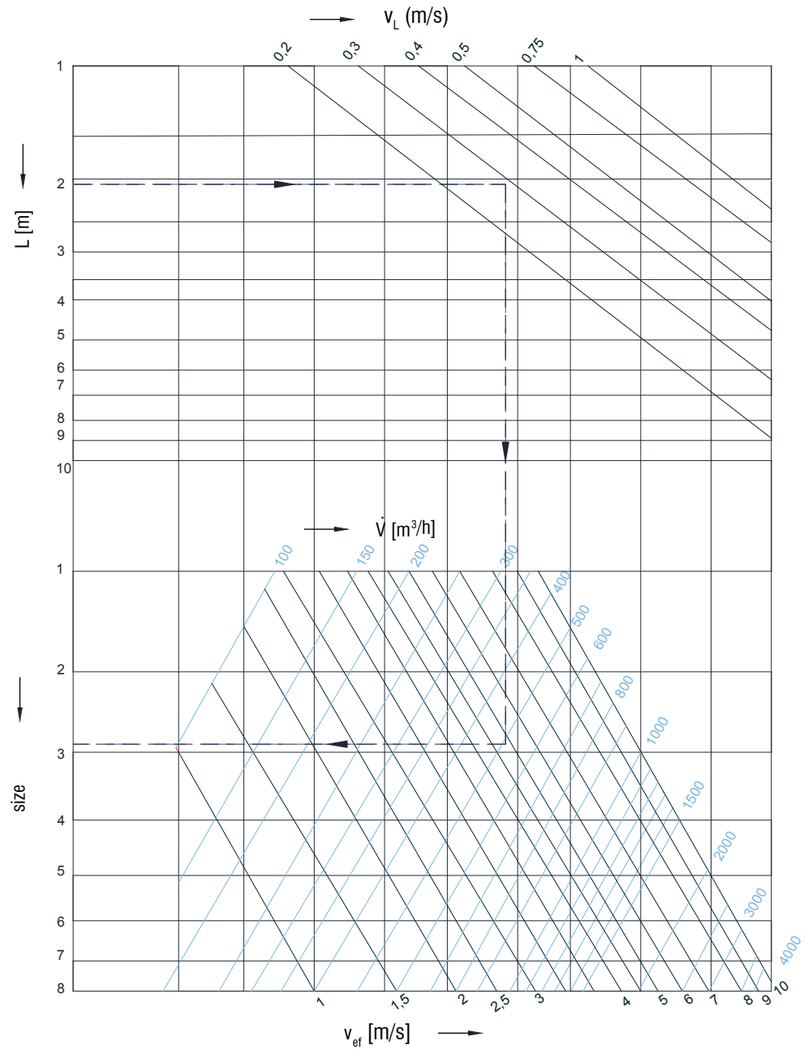
ANO
L = 2 m
V = 500 m³/h
v_L=0.3 m/s
h=0.6 m
(damper open 100%)

Solution:

Diagram 2.7
Model 3
v_{ef} =4.8 m/s
Diagram 2.5
i = 11
Diagram 2.6
b_{02}=0.2 m
Diagram 2.4
v_h =0.27 m/s

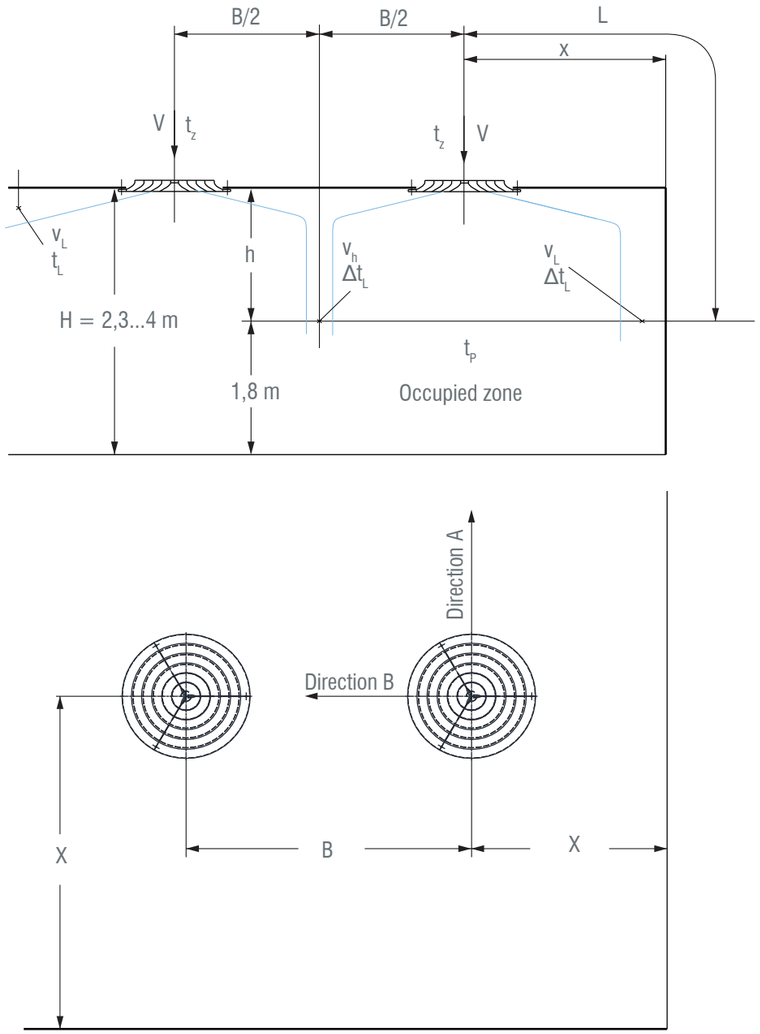
Diagram 2.2
Δp=23 Pa
Diagram 2.3
L_{WA}= 27 dB (A)
Correction L_{WA}= 27-1=26 dB (A)

2.7 Selection diagram for ANO



Design changes reserved

DISCHARGE DIAGRAM



Design changes reserved

NOTES:

Design changes reserved

2/S3
v 3.3 (en)

CEILING SWIRL DIFFUSER

DVF

klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow	v_h [m/s]	- Average core velocity at distance h (m) from diffuser
V_{uk} [m³/h]	- Total air volume in motion		
h [m]	- Distance from the ceiling to the occupied zone	Δp [Pa]	- Total pressure drop
		t_p [°C]	- Air temperature in the room
H [m]	- Room height	t_z [°C]	- Supply air temperature
A,B [m]	- Distance between diffusers	t_m [°C]	- Core air temperature
x [m]	- Distance from wall	Δt_z [°C]	- $(t_z - t_p)$
L [m]	- Throw distance (x+h)	Δt_L [C°]	- $(t_m - t_p)$
A_{ef} [m2]	- Effective discharge area	i	- Induction V_{uk}/V
v_{ef} [m/s]	- Effective jet velocity	L_{WA} [dB(A)]	- Sound power level
v_L [m/s]	- Average core velocity at distance L (m) from diffuser		

Design changes reserved

DVF

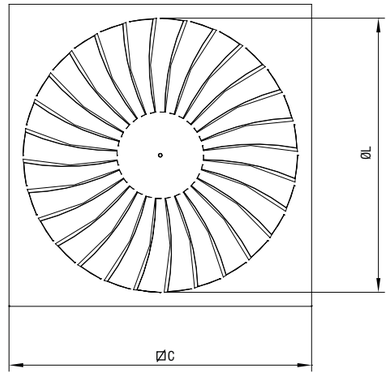
- Ceiling swirl diffuser for room heights from 2,6 to 4m.
- Made out of steel sheet, standard RAL 9010
- Plenum box made out of galvanized steel sheet

Options

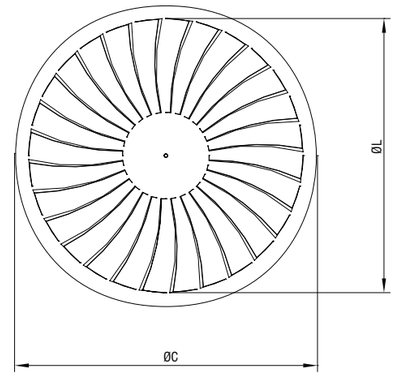
- Plenum box
- RAL...

Diffuser dimensions

DVF - K



DVF - O



Size	C [mm]	L [mm]	A_{ef} [m²]
300	295	254	0,0145
400	395	350	0,0301
500	495	450	0,0386
600	595	540	0,0580

Ordering key:

Type	DVF	- K	- 600	- A	- H	- ød	- Z
K - rectangular plate **O** - round plate							
Size							
A - supply air **B** - exhaust air							
H - horizontal connection **V** - vertical connection							
Connection diameter							
Insulation							

*Screws are not delivered
**Ordering key for Plenum box on page 184

Design changes reserved

SELECTION DIAGRAM

Pressure drop and sound power levels - DVF-K-...-H

Size	Q [m³/h]	Damper blade angle					
		0°		45°		90°	
		Δp_t [Pa]	dB(A)	Δp_t [Pa]	dB(A)	Δp_t [Pa]	dB(A)
300	40	1	>20	1	>20	2	>20
	120	14	27	16	26	29	26
	220	40	40	46	39	86	41
	280	71	50	83	49	153	53
400	60	1	>20	1	>20	3	>20
	240	13	24	17	22	34	24
	420	40	39	52	39	107	41
	580	76	50	101	51	206	52
500	100	1	>20	2	>20	5	>20
	280	12	23	16	22	47	26
	80	34	37	45	37	134	43
	700	71	50	95	51	280	56
600	150	2	>20	2	>20	5	>20
	420	12	23	16	22	39	26
	660	32	38	41	36	101	41
	940	62	50	82	49	200	52

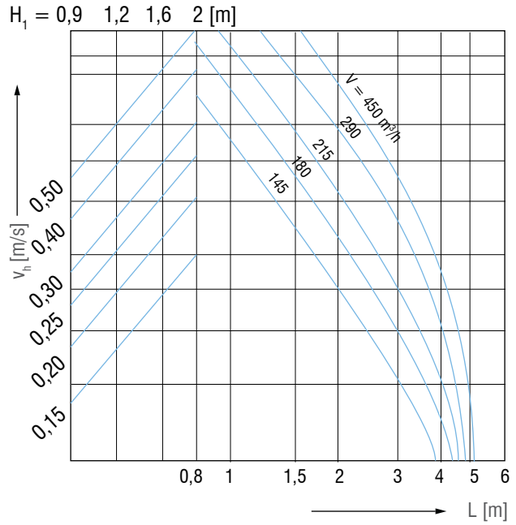
Pressure drop and sound power levels - DVF-O-...-H

Size	Q [m³/h]	Damper blade angle					
		0°		45°		90°	
		Δp_t [Pa]	dB(A)	Δp_t [Pa]	dB(A)	Δp_t [Pa]	dB(A)
300	40	1	<20	1	<20	2	<20
	120	17	29	20	28	38	28
	220	53	45	63	45	118	45
	280	70	50	82	51	154	51
400	60	1	<20	1	<20	3	<20
	240	12	23	15	22	35	24
	420	39	38	45	38	110	41
	580	76	50	88	50	212	51
500	100	1	<20	2	<20	5	<20
	280	15	23	22	24	58	28
	80	45	39	65	40	171	45
	700	75	50	108	50	287	55
600	150	2	<20	2	<20	5	<20
	420	16	26	21	25	50	30
	660	43	41	56	40	137	46
	940	65	50	86	48	208	53

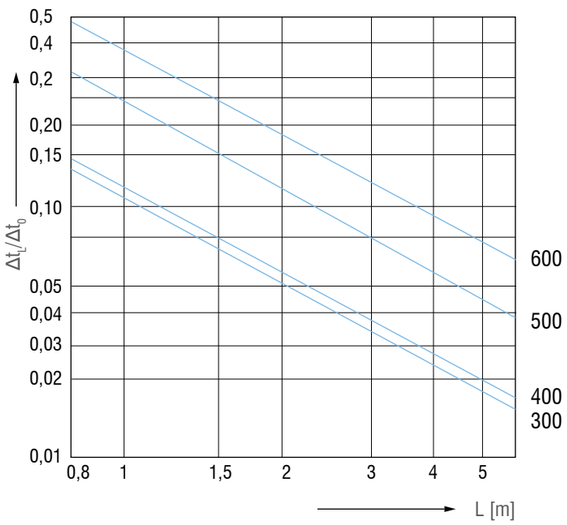
Pressure drop and sound power levels - DVF-K-...-V

Size	Q [m³/h]	Damper blade angle					
		0°		45°		90°	
		Δp_t [Pa]	dB(A)	Δp_t [Pa]	dB(A)	Δp_t [Pa]	dB(A)
300	40	1	<20	1	<20	2	<20
	120	14	26	16	25	29	25
	220	40	40	46	39	85	40
	280	71	50	83	50	153	51
400	60	1	<20	1	<20	3	<20
	240	12	23	16	25	35	24
	420	39	39	50	40	110	42
	580	71	50	91	51	200	53
500	100	1	<20	2	<20	5	<20
	280	12	23	16	25	46	28
	80	31	37	42	39	121	44
	700	59	50	81	53	232	55
600	150	2	<20	2	<20	5	<20
	420	13	26	19	28	42	32
	660	35	41	48	44	108	48
	940	54	49	74	52	166	57

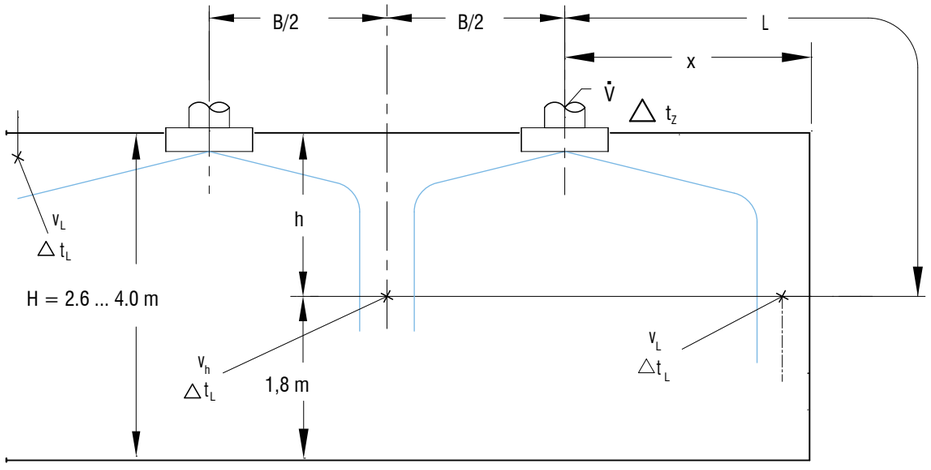
Core jet velocity



Temperature ratio at a distance L



DISCHARGE DIAGRAM



Design changes reserved

CEILING SWIRL DIFFUSER

NOTES:

Design changes reserved

2/S4
v 3.3 (en)

NOZZLE DIFFUSERS

DOS, DRS

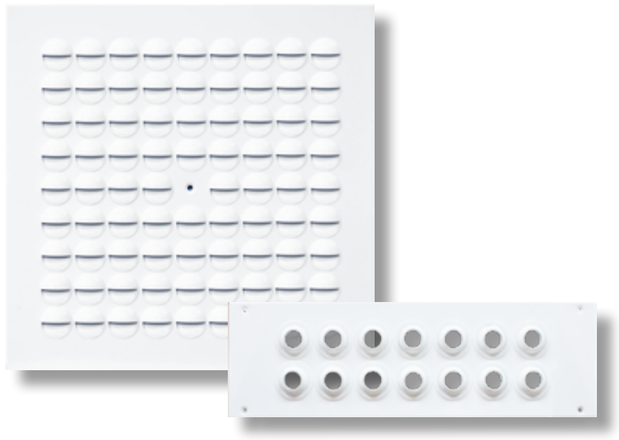


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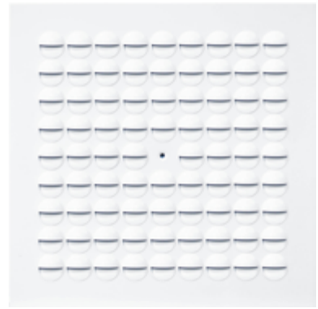
TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow
V_{uk} [m³/h]	- Total air volume in motion
h [m]	- Distance from the ceiling to the occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance from wall
L [m]	- Throw distance (x+h)
A_{ef} [m2]	- Effective discharge area
v_{ef} [m/s]	- Effective jet velocity
v_L [m/s]	- Average core velocity at distance L (m) from diffuser
v_h [m/s]	- Average core velocity at distance h (m) from diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Air temperature in the room
t_z [°C]	- Supply air temperature
t_m [°C]	- Core air temperature
Δt_z [°C]	- $(t_z - t_p)$
Δt_L [C°]	- $(t_m - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

Design changes reserved



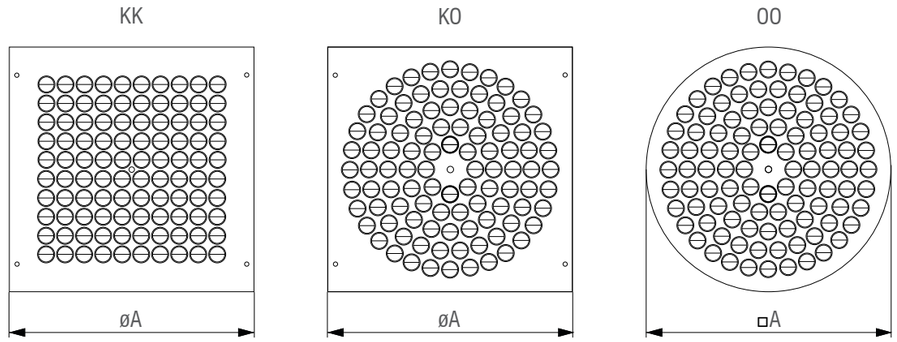
DOS

- Ceiling nozzle diffuser for room heights up to 4 m
- Made out of steel sheet, standard RAL 9010
- Individually adjustable discharge elements
- Fixing with visible screws

Options

- RAL...
- Plenum box

Diffuser shape



Dimensions

Size	300			400			500			600			625		
Shape	KK	KO	OO	KK	KO	OO	KK	KO	OO	KK	KO	OO	KK	KO	OO
(ø, □) A	295	295	300	395	395	400	495	495	500	595	595	600	620	620	625
No. of nozzles	36	22	22	64	42	42	80	68	68	100	100	100	100	100	100

Ordering key:

Nozzle diffusers	**DOS - KK - 600 - UPK - A - H - ød - Z**
Diffuser shape	
Size	
Plenum box	
A - supply air **B -** exhaust air	
H - horizontal connection **V -** vertical connection	
Connection diameter	
Insulation	

*Ordering key for Plenum box on page 184

Design changes reserved

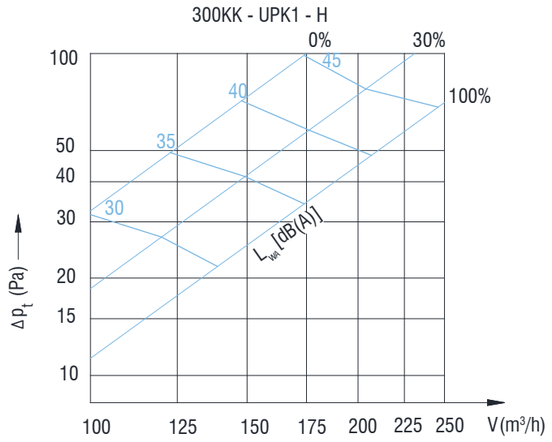
Fast selection table

Type	V [m³/h]	125	150	175	200	225	250
DOS 300-KK - H	L_{WA} [dB(A)]	28	31	36	39	43	45
	Δp_t [Pa]	18	25	34	45	57	70
	$L_{0,2}$ [m]		3,8	4,6	4,8	5,0	5,2
DOS 300-KK - V	L_{WA} [dB(A)]	27	30	34	38	41	44
	Δp_t [Pa]	17	24	33	43	54	67
DOS 300-KO - H	L_{WA} [dB(A)]	27	31	37	40	43	49
	Δp_t [Pa]	11	17	26	37	51	66
	$L_{0,2}$ [m]		3,9	4,7	4,9	5,1	5,3
DOS 400-KK - H	L_{WA} [dB(A)]	26	28	3,4	39	43	45
	Δp_t [Pa]	9	14	21	28	37	47
	$L_{0,2}$ [m]	2,8	3,2	3,6	4	4,2	4,6
DOS 400-KK - V	L_{WA} [dB(A)]	26	28	33	38	42	45
	Δp_t [Pa]	10	15	22	29	3,8	49
DOS 400-KO - H	L_{WA} [dB(A)]	28	31	35	38	41	43
	Δp_t [Pa]	11	15	19	24	30	43
	$L_{0,2}$ [m]	2,9	3,3	3,7	4,1	4,3	4,7
DOS 500-KK - H	L_{WA} [dB(A)]	26	29	33	37	41	44
	Δp_t [Pa]	13	18	25	32	41	50
	$L_{0,2}$ [m]	1,8	2,2	2,4	2,8	3,2	3,6
DOS 500-KK - V	L_{WA} [dB(A)]	26	28	32	37	41	44
	Δp_t [Pa]	12	17	24	31	39	48
DOS 500-KO - H	L_{WA} [dB(A)]	28	32	36	40	44	47
	Δp_t [Pa]	10	15	22	29	39	49
	$L_{0,2}$ [m]	1,9	2,3	2,5	2,9	3,3	3,7
DOS 600/625 -KK - H	L_{WA} [dB(A)]	29	32	35	39	41	44
	Δp_t [Pa]	13	16	21	26	31	37
	$L_{0,2}$ [m]	2,6	3	3,6	4,4	5,2	5,8
DOS 600/625 -KK - V	L_{WA} [dB(A)]	29	31	35	38	41	44
	Δp_t [Pa]	13	17	21	27	32	38
DOS 600/625 -KO - H	L_{WA} [dB(A)]	30	33	37	40	43	45
	Δp_t [Pa]	13	17	21	26	32	38
	$L_{0,2}$ [m]	2,8	3,2	3,8	4,7	5,4	6,2

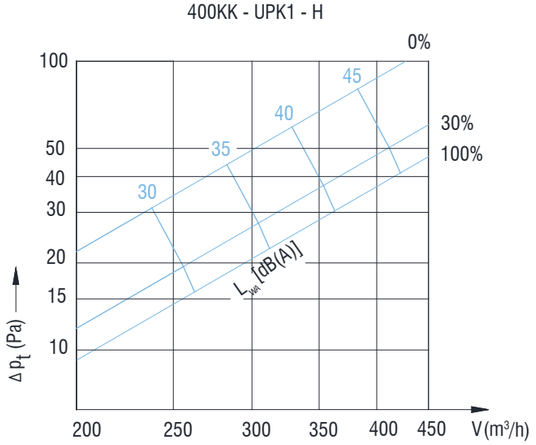
Design changes reserved

SELECTION DIAGRAMS - DOS

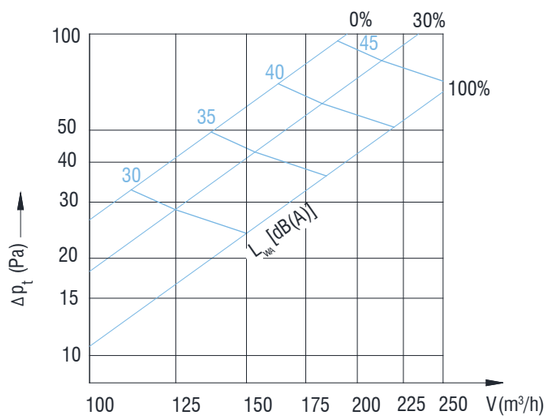
300KK - UPK1 - H



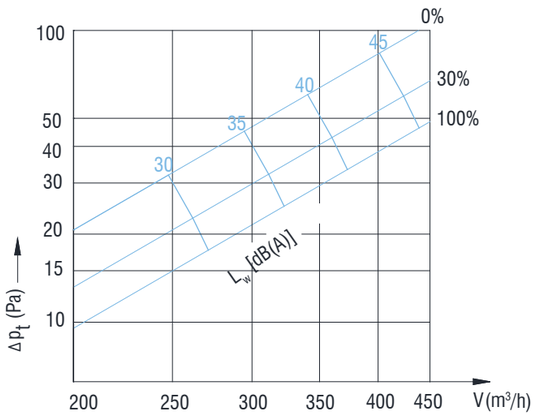
400KK - UPK1 - H



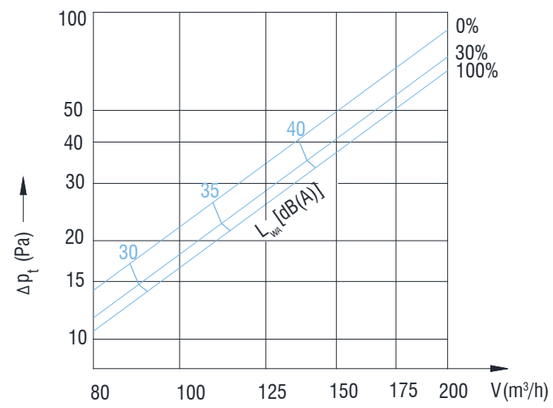
300KK - UPK1 - V



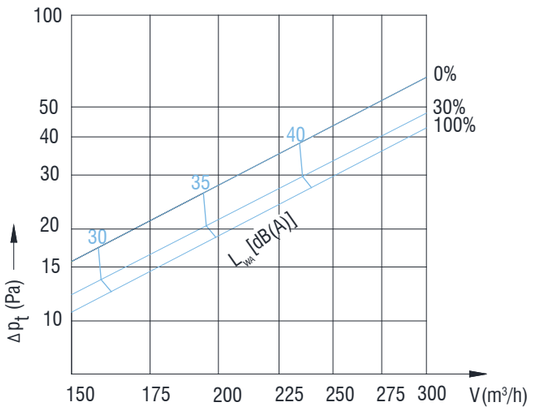
400KK - UPK1 - V



300KO - UPK2

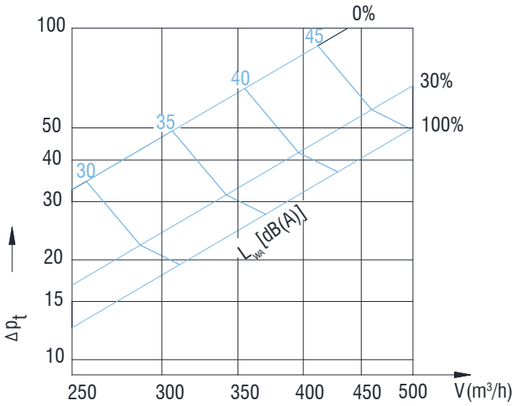


400KO - UPK2

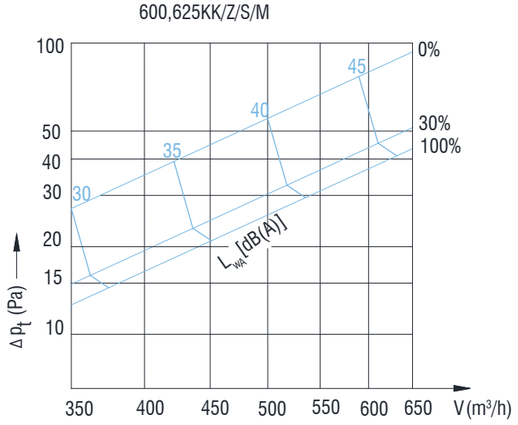


Design changes reserved

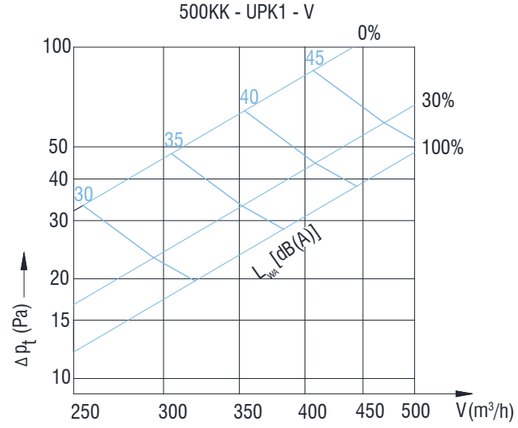
500KK - UPK1 - H



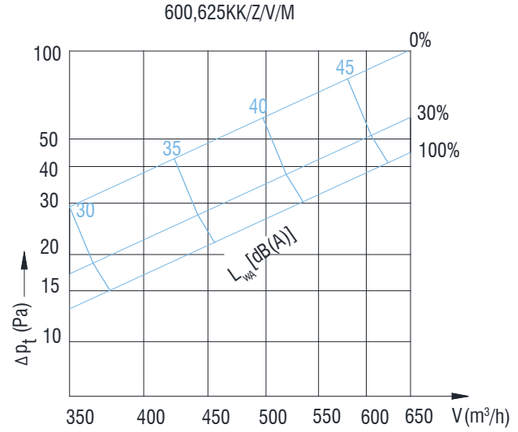
600,625KK/Z/S/M



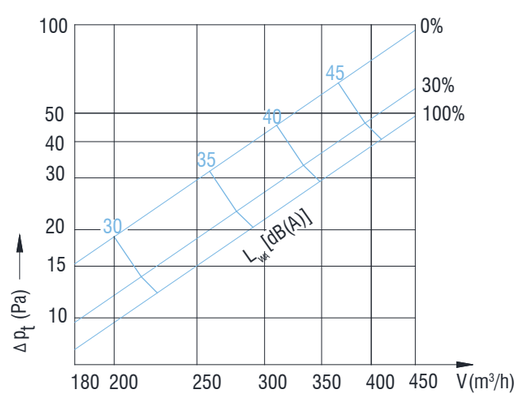
500KK - UPK1 - V



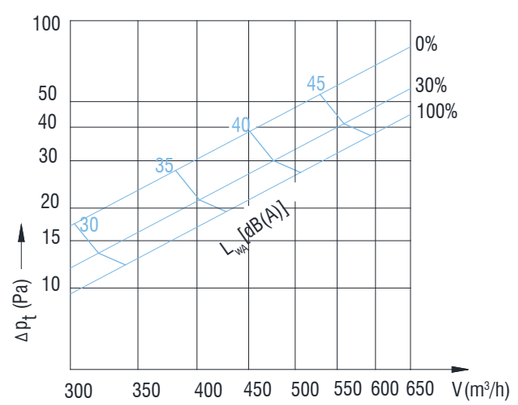
600,625KK/Z/V/M



500KR - UPK2



600,625KR/ZR/S/M



Design changes reserved

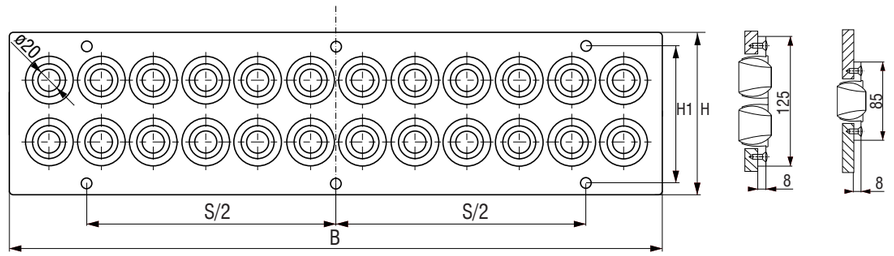
DRS

- Ceiling swirl diffuser for room heights up to 4 m
- Made out of steel sheet, standard RAL 9010
- Individually adjustable discharge elements
- Fixing with visible screws

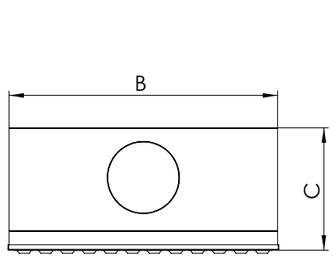
Options

- RAL...
- Plenum box

Dimensions



B [m]	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
S [m]	552	652	752	852	952	1052	1152	1252	1352	1452	1552	1652	1752	1852	1952
No. of nozzles (1-row)	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
No. of nozzles (2-rows)	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80



	H	H1	C	K
1-row	85	65	216,5	117
2-rows	125	105	236,5	162

Ordering key:

Nozzle diffuser **DRS - 600 - 1 - PK - A - H - ød - Z**

Size

1 - one row
2 - two rows

Plenum box

A - supply air
B - exhaust air

H - horizontal connection
V - vertical connection

Connection diameter

Insulation

*Ordering key for Plenum box on page 184

Design changes reserved

Horizontal isothermal discharge (ΔT=0K)

Type		V	[m³/h]	50	100	150	200	250	300	400
1 - row	600	L_{WA}	[dB(A)]	20	33,8	41	/	/	/	/
		Δp_t	[Pa]	13,5	35,6	74,8	/	/	/	/
		$L_{0,2}$	[m]	6,6	>10	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	11	23,2	30	36	/	/	/
		Δp_t	[Pa]	12	22	43	76	/	/	/
		$L_{0,2}$	[m]	3,8	6,6	9,3	>10	/	/	/
	1500	L_{WA}	[dB(A)]	8	14,5	25	31	35	37,5	43
		Δp_t	[Pa]	5,5	12,5	25	39,6	55	86,4	136,8
		$L_{0,2}$	[m]	2,1	3,5	5	6,4	7,9	9,3	>10
	2000	L_{WA}	[dB(A)]	/	11	21	26,5	31	34,7	40
		Δp_t	[Pa]	/	7,5	15	23,7	33	45,5	75,2
		$L_{0,2}$	[m]	/	2,5	38	4,6	5,7	6,7	7,5
2 - rows	600	L_{WA}	[dB(A)]	14	25	31	/	/	/	/
		Δp_t	[Pa]	2	8,3	18,3	/	/	/	/
		$L_{0,2}$	[m]	4,2	9,1	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	/	19	24	27,8	31	/	/
		Δp_t	[Pa]	/	4	8	15	22	/	/
		$L_{0,2}$	[m]	/	7,1	8,9	>10	>10	/	/
	1500	L_{WA}	[dB(A)]	/	14,6	20,4	24	27	28,5	32,5
		Δp_t	[Pa]	/	2,4	4,7	7,6	13	17	28,5
		$L_{0,2}$	[m]	/	4,3	5,3	6,2	7,3	8,1	8,9
	2000	L_{WA}	[dB(A)]	/	11	17	21,5	24	26,3	30,3
		Δp_t	[Pa]	/	1,4	20,4	4,2	6,5	8,2	14,4
		$L_{0,2}$	[m]	/	2,8	3,5	4,0	4,7	5,3	5,8

Horizontal discharge (ΔT=-5K)

Type		V	[m³/h]	50	100	150	200	250	300	400
1 - row	600	L_{WA}	[dB(A)]	20	33,8	41	/	/	/	/
		Δp_t	[Pa]	13,5	35,6	74,8	/	/	/	/
		$L_{0,2}$	[m]	6,6	>10	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	11	23,2	30	36	/	/	/
		Δp_t	[Pa]	12	22	43	76	/	/	/
		$L_{0,2}$	[m]	2,9	6,9	8,8	>10	/	/	/
	1500	L_{WA}	[dB(A)]	8	14,5	25	31	35	37,5	43
		Δp_t	[Pa]	5,5	12,5	25	39,6	55	86,4	136,8
		$L_{0,2}$	[m]	1,6	3,5	4,8	6,4	7,9	9,8	>10
	2000	L_{WA}	[dB(A)]	/	11	21	26,5	31	34,7	40
		Δp_t	[Pa]	/	7,5	15	23,7	33	45,5	75,2
		$L_{0,2}$	[m]	/	2,5	3,4	4,6	5,8	7,0	8,1
2 - rows	600	L_{WA}	[dB(A)]	14	25	31	/	/	/	/
		Δp_t	[Pa]	2	8,3	18,3	/	/	/	/
		$L_{0,2}$	[m]	7,3	9,1	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	/	19	24	27,8	31	/	/
		Δp_t	[Pa]	/	4	8	15	22	/	/
		$L_{0,2}$	[m]	/	4,7	7,1	9,3	>10	/	/
	1500	L_{WA}	[dB(A)]	/	14,6	20,4	24	27	28,5	32,5
		Δp_t	[Pa]	/	2,4	4,7	7,6	13	17	28,5
		$L_{0,2}$	[m]	/	2,8	5,3	6,2	7,3	8,2	9,3
	2000	L_{WA}	[dB(A)]	/	11	17	21,5	24	26,3	30,3
		Δp_t	[Pa]	/	1,4	2,7	4,2	6,5	8,2	14,4
		$L_{0,2}$	[m]	/	1,8	3,5	4,0	4,5	5,3	6,0

Design changes reserved

Horizontal discharge (ΔT=-10K)

Type		V	[m³/h]	50	100	150	200	250	300	400
1 - row	600	L_{WA}	[dB(A)]	20	33,8	41	/	/	/	/
		Δp_t	[Pa]	13,5	35,6	74,8	/	/	/	/
		$L_{0,2}$	[m]	3,5	8,5	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	11	23,2	30	36	/	/	/
		Δp_t	[Pa]	12	22	43	76	/	/	/
		$L_{0,2}$	[m]	2	4,9	8,1	>10	/	/	/
	1500	L_{WA}	[dB(A)]	8	14,5	25	31	35	37,5	43
		Δp_t	[Pa]	5,5	12,5	25	39,6	55	86,4	136,8
		$L_{0,2}$	[m]	1,1	2,6	4,4	5,9	7,3	9,1	>10
	2000	L_{WA}	[dB(A)]	/	11	21	26,5	31	34,7	40
		Δp_t	[Pa]	/	7,5	15	23,7	33	45,5	75,2
		$L_{0,2}$	[m]	/	1,9	3,1	4,2	5,3	6,6	7,5
2 - rows	600	L_{WA}	[dB(A)]	14	25	31	/	/	/	/
		Δp_t	[Pa]	2	8,3	18,3	/	/	/	/
		$L_{0,2}$	[m]	3,4	4,3	7,74	/	/	/	/
	1000	L_{WA}	[dB(A)]	/	19	24	27,8	31	/	/
		Δp_t	[Pa]	/	4	8	15	22	/	/
		$L_{0,2}$	[m]	/	2,5	4,5	6,7	9,7	/	/
	1500	L_{WA}	[dB(A)]	/	14,6	20,4	24	27	28,5	32,5
		Δp_t	[Pa]	/	2,4	4,7	7,6	13	17	28,5
		$L_{0,2}$	[m]	/	1,5	2,7	4,0	5,8	6,9	8,3
	2000	L_{WA}	[dB(A)]	/	11	17	21,5	24	26,3	30,3
		Δp_t	[Pa]	/	1,4	2,7	4,2	6,5	8,2	14,4
		$L_{0,2}$	[m]	/	1,0	1,8	2,6	3,8	4,5	5,4

Vertical discharge (ΔT=0K)

Type		V	[m³/h]	50	100	150	200	250	300	400
1 - row	600	L_{WA}	[dB(A)]	20	33,8	41	/	/	/	/
		Δp_t	[Pa]	13,5	35,6	74,8	/	/	/	/
		$L_{0,2}$	[m]	5,2	>10	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	11	23,2	30	36	/	/	/
		Δp_t	[Pa]	12	22	43	76	/	/	/
		$L_{0,2}$	[m]	3,2	7,4	9,4	>10	/	/	/
	1500	L_{WA}	[dB(A)]	8	14,5	25	31	35	37,5	43
		Δp_t	[Pa]	5,5	12,5	25	39,6	55	86,4	136,8
		$L_{0,2}$	[m]	1,5	3,9	6,6	9,8	>10	>10	>10
	2000	L_{WA}	[dB(A)]	/	11	21	26,5	31	34,7	40
		Δp_t	[Pa]	/	7,5	15	23,7	33	45,5	75,2
		$L_{0,2}$	[m]	/	2,6	4,6	6,6	9	>10	7,5
2 - rows	600	L_{WA}	[dB(A)]	14	25	31	/	/	/	/
		Δp_t	[Pa]	2	8,3	18,3	/	/	/	/
		$L_{0,2}$	[m]	2,7	5,4	8,8	/	/	/	/
	1000	L_{WA}	[dB(A)]	/	19	24	27,8	31	/	/
		Δp_t	[Pa]	/	4	8	15	22	/	/
		$L_{0,2}$	[m]	/	3	5,4	7,2	8,9	/	/
	1500	L_{WA}	[dB(A)]	/	14,6	20,4	24	27	28,5	32,5
		Δp_t	[Pa]	/	2,4	4,7	7,6	13	17	28,5
		$L_{0,2}$	[m]	/	3,3	4,6	6,1	7,7	9,4	>10
	2000	L_{WA}	[dB(A)]	/	11	17	21,5	24	26,3	30,3
		Δp_t	[Pa]	/	1,4	2,7	4,2	6,5	8,2	14,4
		$L_{0,2}$	[m]	/	1,9	2,6	3,4	4,2	5,1	7,1

Design changes reserved

Vertical discharge (ΔT=+10K)

Type		V	[m³/h]	50	100	150	200	250	300	400
1 - row	600	L_{WA}	[dB(A)]	20	33,8	41	/	/	/	/
		Δp_t	[Pa]	13,5	35,6	74,8	/	/	/	/
		$L_{0,2}$	[m]	2,6	6,3	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	11	23,2	30	36	/	/	/
		Δp_t	[Pa]	12	22	43	76	/	/	/
		$L_{0,2}$	[m]	1,5	3,6	6,2	8,8	/	/	/
	1500	L_{WA}	[dB(A)]	8	14,5	25	31	35	37,5	43
		Δp_t	[Pa]	5,5	12,5	25	39,6	55	86,4	136,8
		$L_{0,2}$	[m]	1,5	2	3,3	4,8	6,5	8,3	>10
	2000	L_{WA}	[dB(A)]	/	11	21	26,5	31	34,7	40
		Δp_t	[Pa]	/	7,5	15	23,7	33	45,5	75,2
		$L_{0,2}$	[m]	/	1,4	2,4	3,4	4,6	5,8	8,5
2 - rows	600	L_{WA}	[dB(A)]	14	25	31	/	/	/	/
		Δp_t	[Pa]	2	8,3	18,3	/	/	/	/
		$L_{0,2}$	[m]	1,5	4,5	8,2	/	/	/	/
	1000	L_{WA}	[dB(A)]	/	19	24	27,8	31	/	/
		Δp_t	[Pa]	/	4	8	15	22	/	/
		$L_{0,2}$	[m]	/	2	3,6	5,3	7,4	/	/
	1500	L_{WA}	[dB(A)]	/	14,6	20,4	24	27	28,5	32,5
		Δp_t	[Pa]	/	2,4	4,7	7,6	13	17	28,5
		$L_{0,2}$	[m]	/	1,1	2,1	3,3	4,6	6,1	9,2
	2000	L_{WA}	[dB(A)]	/	11	17	21,5	24	26,3	30,3
		Δp_t	[Pa]	/	1,4	2,7	4,2	6,5	8,2	14,4
		$L_{0,2}$	[m]	/	0,7	1,3	2,1	3	3,9	6,1

Vertical discharge (ΔT=+5K)

Type		V	[m³/h]	50	100	150	200	250	300	400
1 - row	600	L_{WA}	[dB(A)]	20	33,8	41	/	/	/	/
		Δp_t	[Pa]	13,5	35,6	74,8	/	/	/	/
		$L_{0,2}$	[m]	3,9	>10	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	11	23,2	30	36	/	/	/
		Δp_t	[Pa]	12	22	43	76	/	/	/
		$L_{0,2}$	[m]	2	5,1	8,6	>10	/	/	/
	1500	L_{WA}	[dB(A)]	8	14,5	25	31	35	37,5	43
		Δp_t	[Pa]	5,5	12,5	25	39,6	55	86,4	136,8
		$L_{0,2}$	[m]	1,2	3	5,1	7,5	>10		
	2000	L_{WA}	[dB(A)]	/	11	21	39,6	31	34,7	40
		Δp_t	[Pa]	/	7,5	15	26,5	33	45,5	75,2
		$L_{0,2}$	[m]	/	2,1	3,6	5,2	7	9,1	>10
2 - rows	600	L_{WA}	[dB(A)]	14	25	31	/	/	/	/
		Δp_t	[Pa]	2	8,3	18,3	/	/	/	/
		$L_{0,2}$	[m]	2,3	5,9	>10	/	/	/	/
	1000	L_{WA}	[dB(A)]	/	19	24	27,8	31	/	/
		Δp_t	[Pa]	/	4	8	15	22	/	/
		$L_{0,2}$	[m]	/	3	5,4	7,2	8,4	/	/
	1500	L_{WA}	[dB(A)]	/	14,6	20,4	24	27	28,5	32,5
		Δp_t	[Pa]	/	2,4	4,7	7,6	13	17	28,5
		$L_{0,2}$	[m]	/	1,85	3,1	7,6	6,2	7,9	>10
	2000	L_{WA}	[dB(A)]	/	11	17	21,5	24	26,3	30,3
		Δp_t	[Pa]	/	1,4	2,7	4,2	6,5	8,2	14,4
		$L_{0,2}$	[m]	/	1,6	2,2	3,2	4,3	5,4	8

Design changes reserved

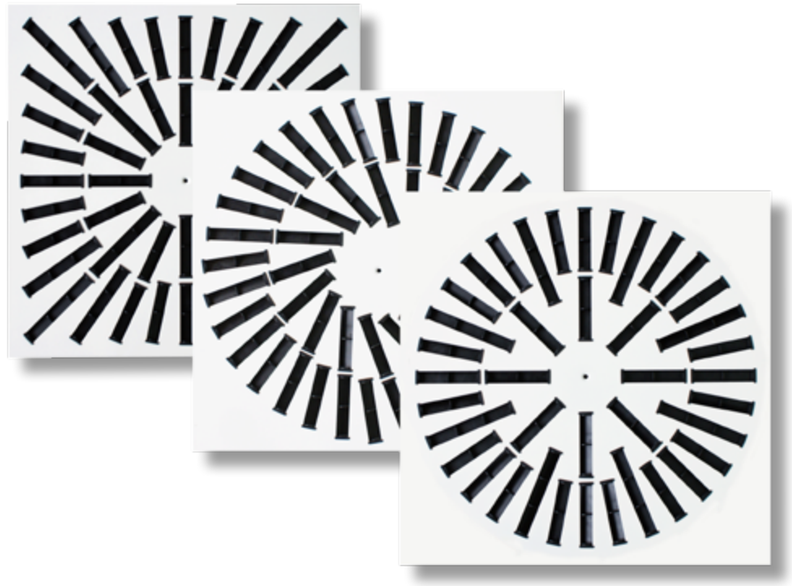
NOTES:

Design changes reserved

2/S5
v 3.3 (en)

ADJUSTABLE CEILING DIFFUSERS

DEV, DEK, DEU



klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow
V_{uk} [m³/h]	- Total air volume in motion
h [m]	- Distance from the ceiling to the occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance from wall
L [m]	- Throw distance (x+h)
A_{ef} [m2]	- Effective discharge area
v_{ef} [m/s]	- Effective jet velocity
v_L [m/s]	- Average core velocity at distance L (m) from diffuser
v_h [m/s]	- Average core velocity at distance h (m) from diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Air temperature in the room
t_z [°C]	- Supply air temperature
t_m [°C]	- Core air temperature
Δt_z [°C]	- $(t_z - t_p)$
Δt_L [C°]	- $(t_m - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

Design changes reserved

ADJUSTABLE CEILING DIFFUSERS

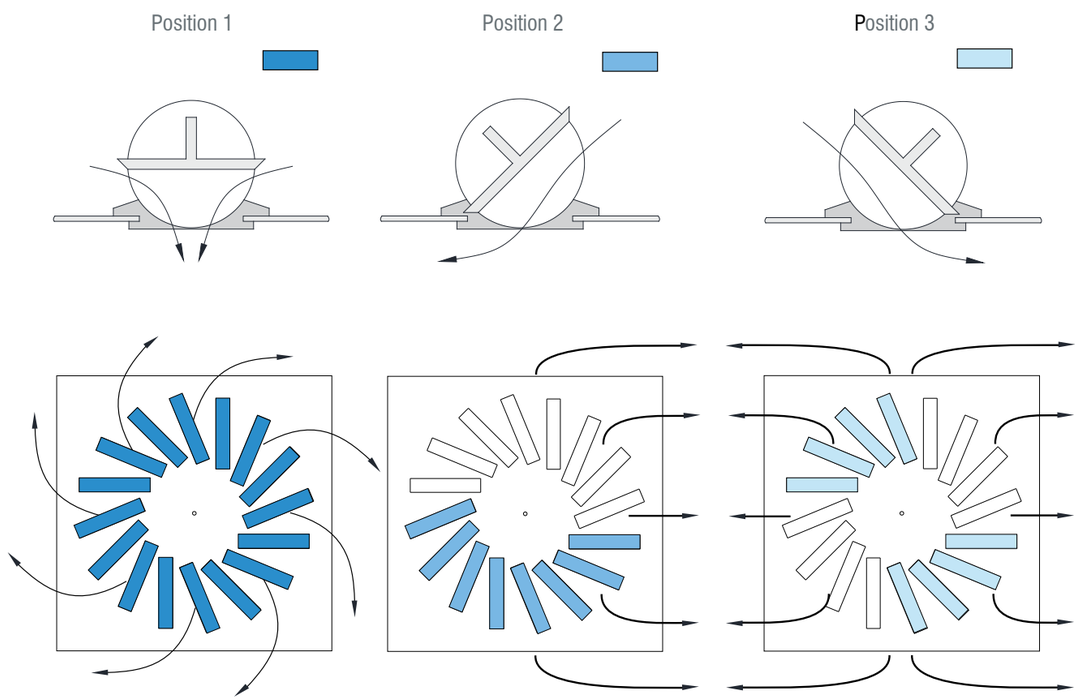
DEV, DEK, DEU

- Ceiling diffuser for room heights from 2,3 to 4m.
- Made out of steel sheet, standard RAL 9010
- Individually adjustable black discharge elements
- Central screw fixing

Options

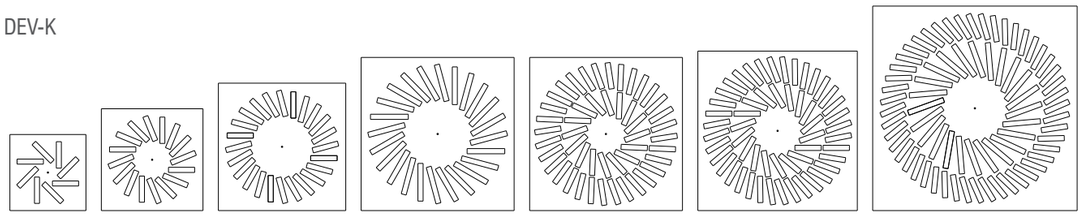
- RAL...
- Plenum box
- White discharge elements

Adjusting discharge direction

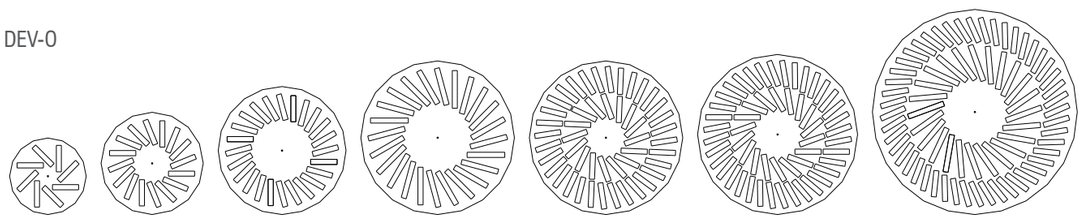


Design changes reserved

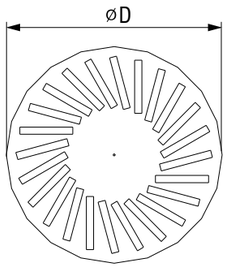
DEV-K

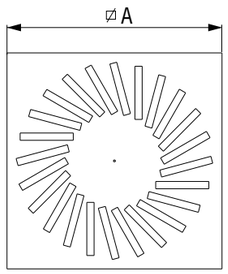


DEV-O



DEV	⍁A [mm]	øD [mm]	Number of outlets	A_{ef} [m²]	ød [mm]
300/8	298	298	8	0,0095	158
400/16	398	398	16	0,0189	198
500/16	498	498	16	0,0189	198
500/24	498	498	24	0,0284	198
600/16	595	595	16	0,0189	198
600/24	595	595	24	0,0449	248
600/48	595	595	48	0,0568	248
625/16	623	623	16	0,0189	198
625/24	623	623	24	0,0449	248
625/48	623	623	48	0,0568	248
625/54	623	623	54	0,0639	248
800/72	798	798	72	0,1017	313





Ordering key:

Type	DEV	- K	- 600/16	- C	- A	- H	- ød	- Z
K - squre diffuser **O** - round diffuser								
Size								
B - white discharge elements **C** - black discharge elements								
A - supply air **B** - exhaust air								
H - horizontal connection **V** - vertical connection								
Connection diameter								
Insulation								

*Screws are not delivered
**Ordering key for Plenum box on page 184

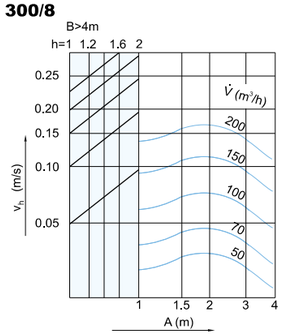
Design changes reserved

ADJUSTABLE CEILING DIFFUSERS

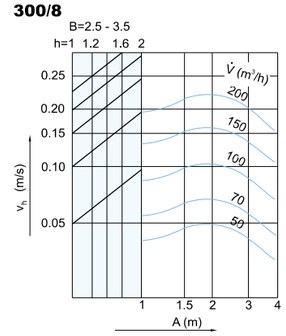
SELECTION DIAGRAMS FOR DEV-K I DEV-O

Diagrams of mean jet velocity v_h at distance B and diagrams of mean jet velocity along the wall v_L and temperature ratio for diffuser DEV (300/8 - 625/24)

300/8



300/8



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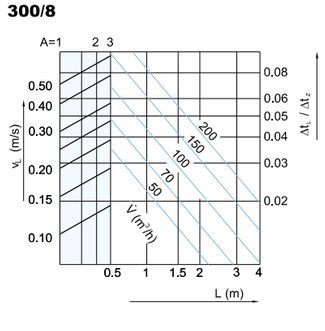
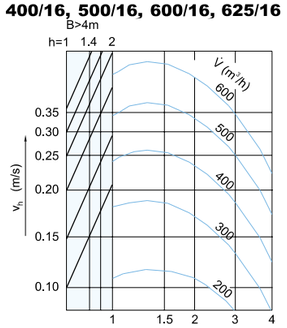
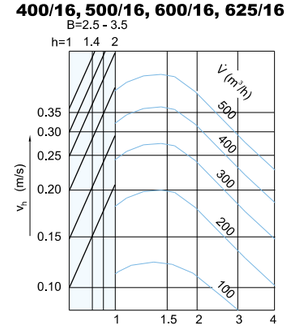


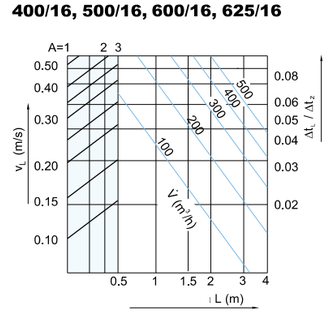
400/16, 500/16, 600/16, 625/16



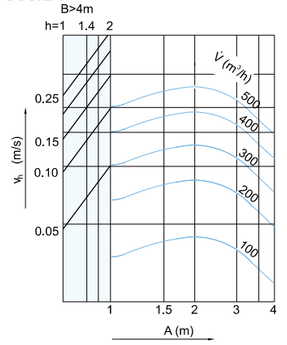
400/16, 500/16, 600/16, 625/16



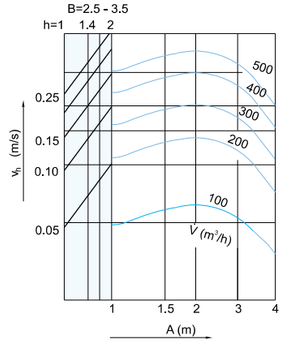
400/16, 500/16, 600/16, 625/16



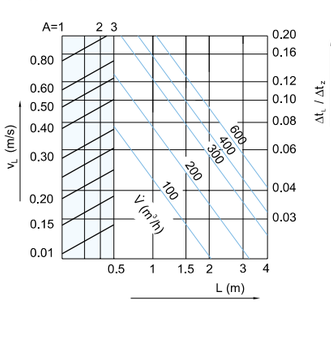
500/24



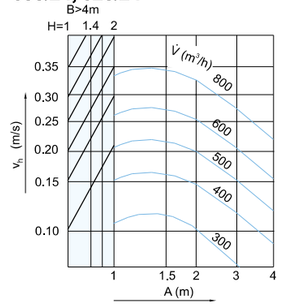
500/24



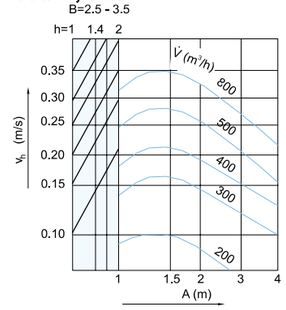
500/24



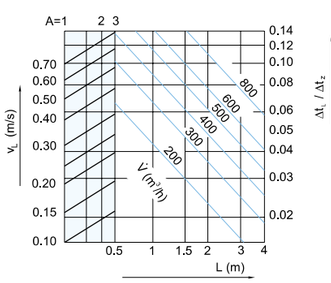
600/24, 625/24



600/24, 625/24



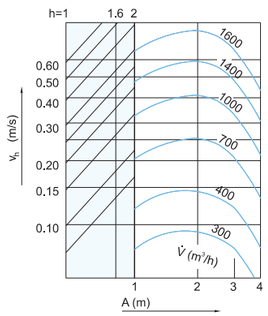
600/24, 625/24



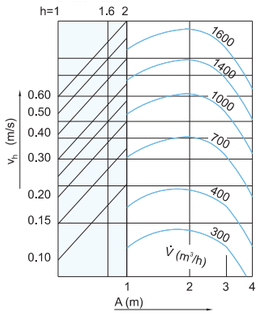
Design changes reserved

Diagrams of mean jet velocity v_h at distance B and diagrams of mean jet velocity along the wall v_L and temperature ratio for diffuser DEV (625/48 - 825/72)

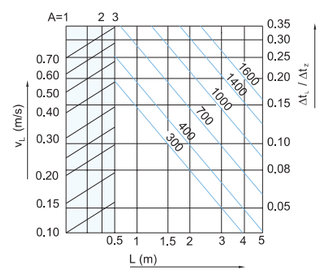
600/48



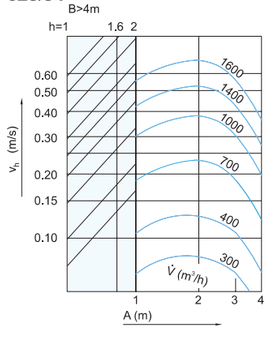
600/48



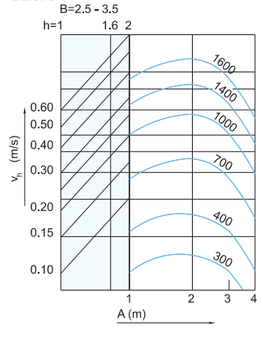
600/48



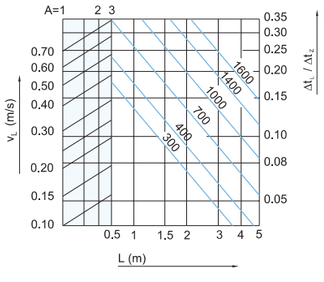
625/54



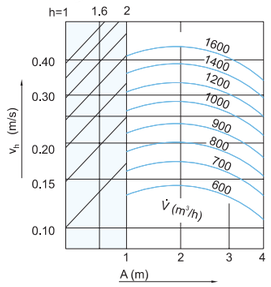
625/54



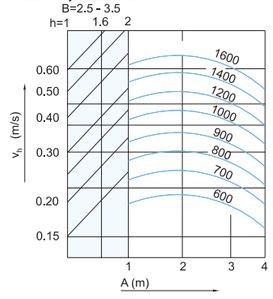
625/54



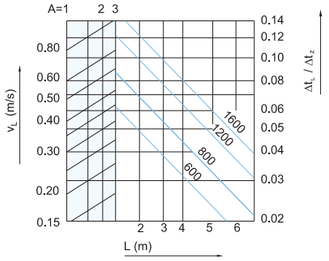
800/72, 825/72



800/72, 825/72



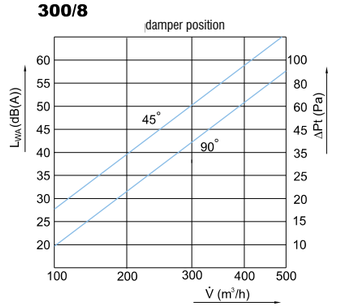
800/72, 825/72



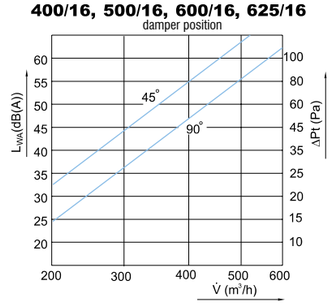
Design changes reserved

Air pressure drop and sound power level diagrams depending on damper position

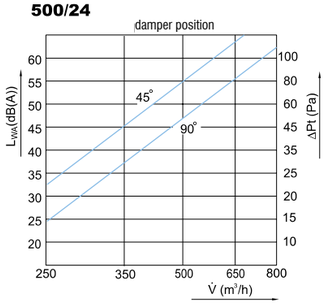
300/8



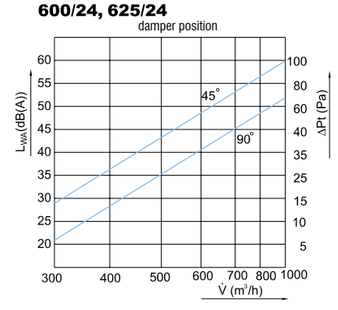
400/16, 500/16, 600/16, 625/16



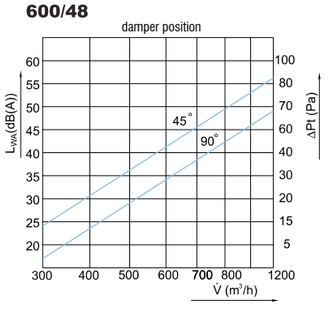
500/24



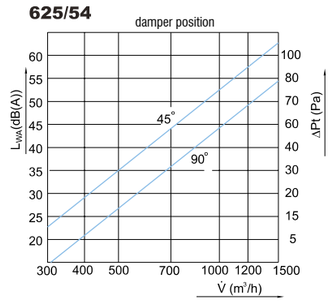
600/24, 625/24



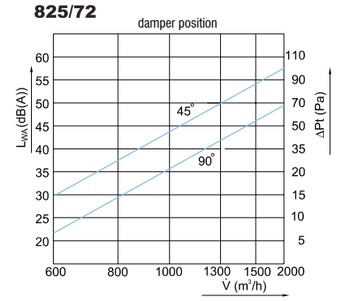
600/48



625/54

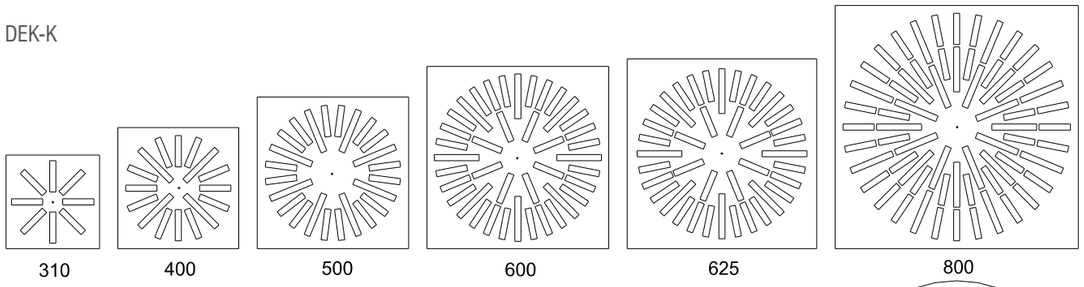


825/72

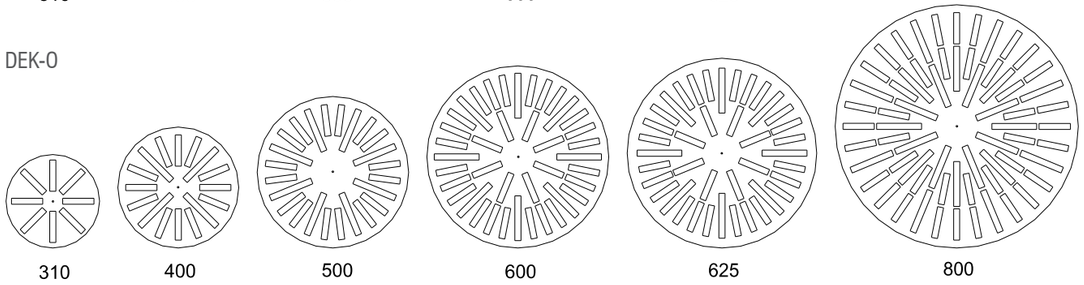


Design changes reserved

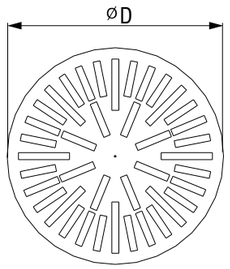
DEK-K

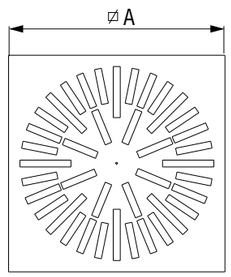


DEK-O



DEK	⍁ A [mm]	øD [mm]	Number of outlets	A_{ef} [m^2]	ød [mm]
310	308	308	8	0,012	158
400	398	398	16	0,0248	198
500	498	498	24	0,0392	248
600	595	595	40	0,0565	248
625	623	623	40	0,0565	248
800	798	798	64	0,0938	313





Ordering key:

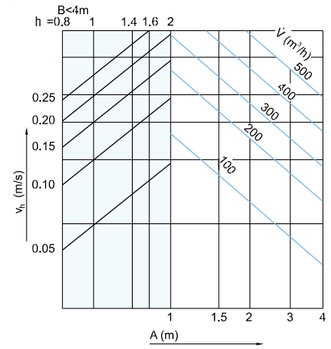
Type	DEK	- K	- 400	- C	- A	- H	- ød	- Z
K - square diffuser **O** - round diffuser								
Size								
B - white discharge elements **C** - black discharge elements								
A - supply air **B** - exhaust air								
H - horizontal connection **V** - vertical connection								
Connection diameter								
Insulation								

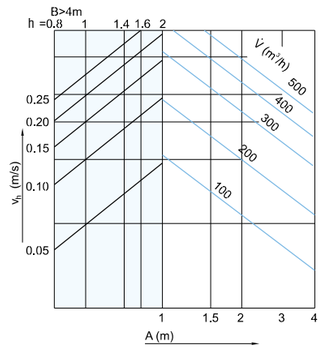
*Screws are not delivered
**Ordering key for Plenum box on page 184

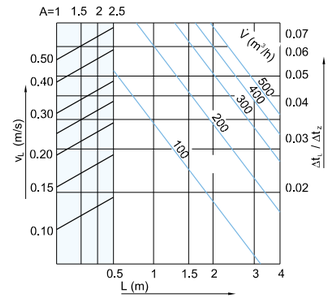
SELECTION DIAGRAMS FOR DEK-K AND DEK-O

Diagrams of mean jet velocity v_h at distance B and diagrams of mean jet velocity along the wall v_L and temperature ratio for diffuser DEK (310 - 500)

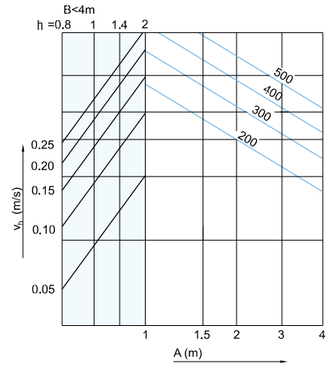
310

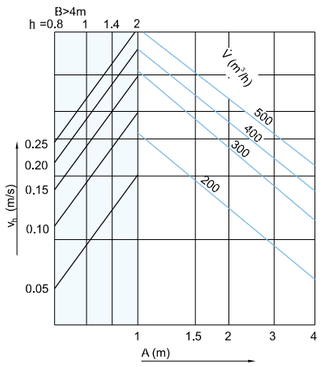


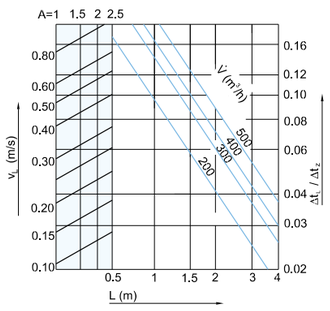




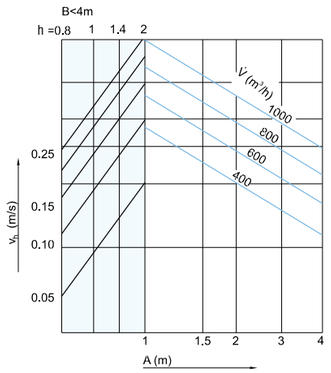
400

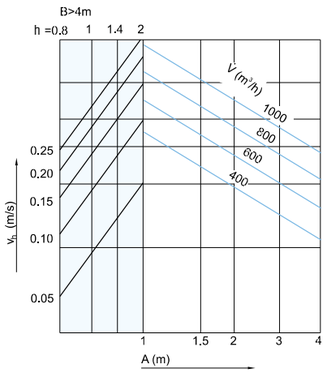


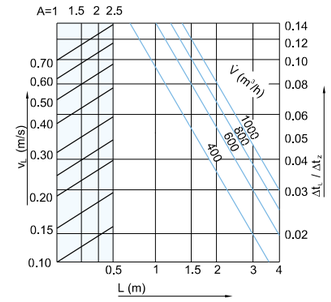




500

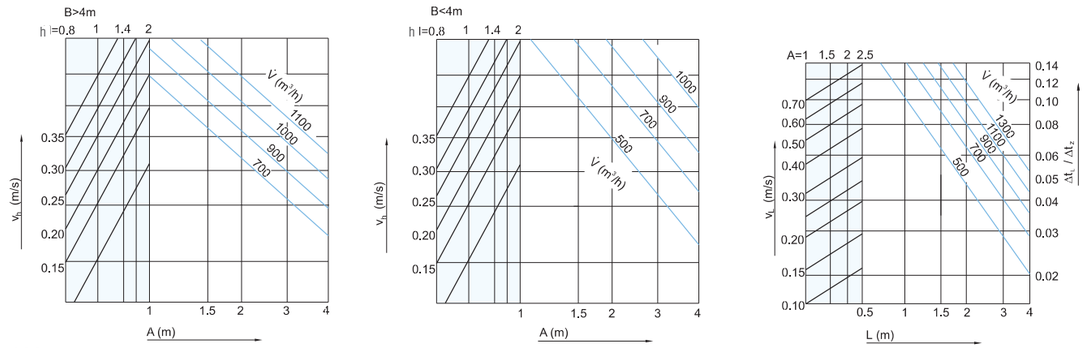




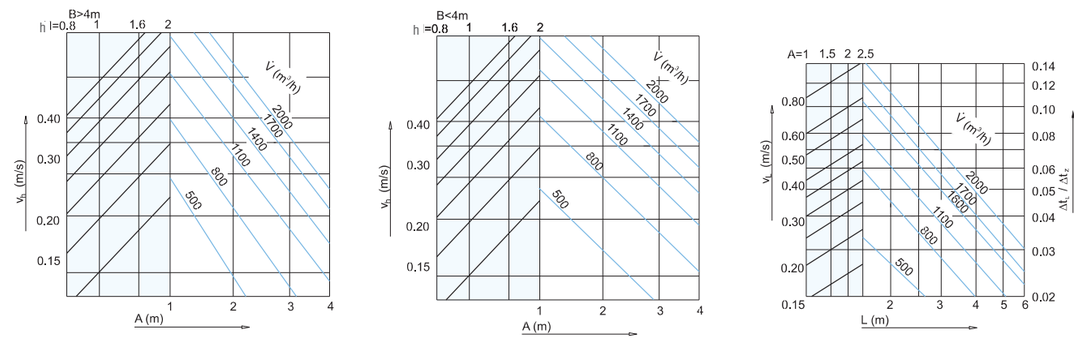


Diagrams of mean jet velocity v_h at distance B and diagrams of mean jet velocity along the wall v_L and temperature ratio for diffuser DEK (600 - 800)

600,625

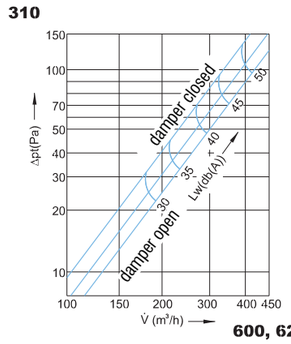


800

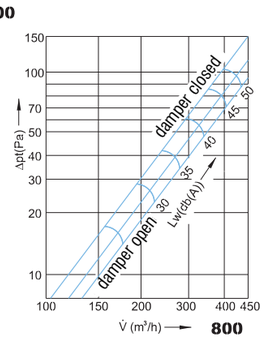


Air pressure drop and sound power level diagrams depending on damper position (for diffuser with plenum box)

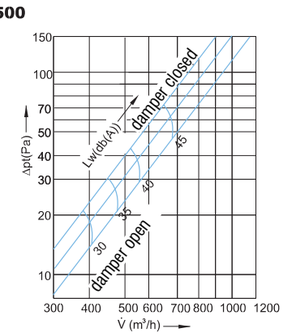
310



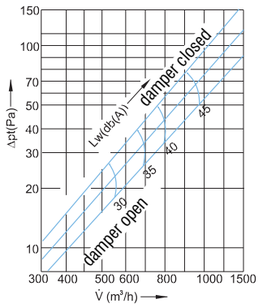
400



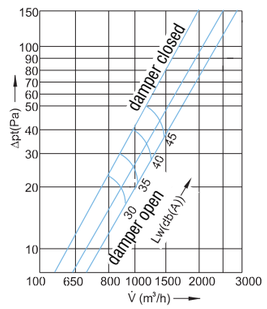
500



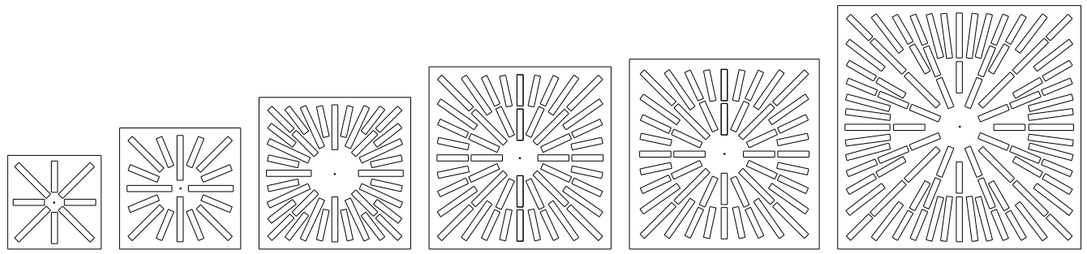
600, 625



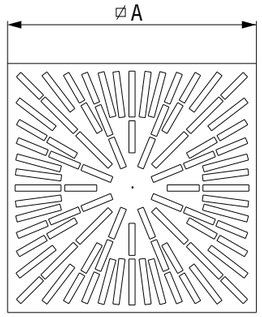
800



DEU



DEU	⍁A [mm]	øD [mm]	Number of outlets	A_{ef} [m²]	ød [mm]
310	308	-	8	0,0192	158
400	398	-	16	0,0248	198
500	498	-	36	0,0517	248
600	595	-	48	0,0718	248
625	623	-	48	0,0718	248
800	798	-	84	0,1359	313



Ordering key:

Type **DEU - 600 - C - A - H - ød - Z**

Size
B - white discharge elements
C - black discharge elements

A - supply air
B - exhaust air

H - horizontal connection
V - vertical connection

Connection diameter

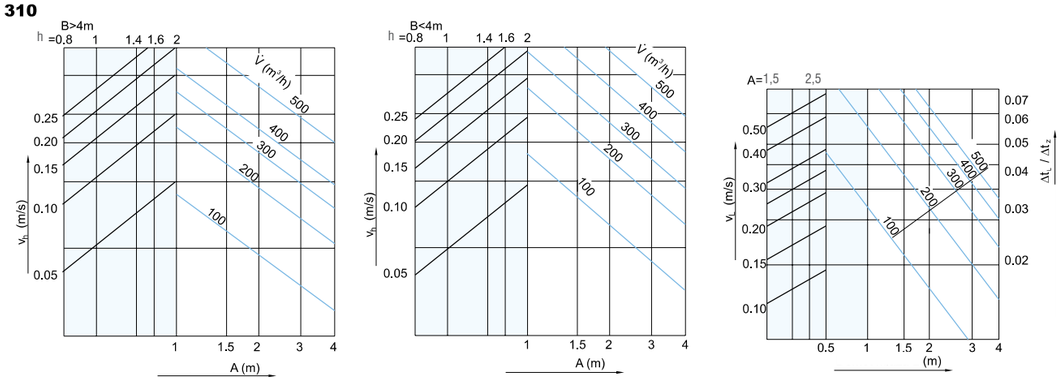
Insulation

*Screws are not delivered
**Ordering key for Plenum box on page 184

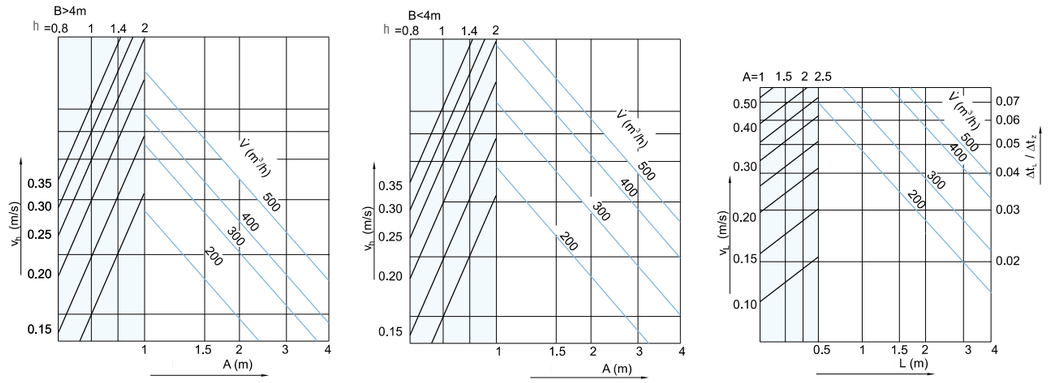
SELECTION DIAGRAM FOR DEU

Diagrams of mean jet velocity v_h at distance B and diagrams of mean jet velocity along the wall v_L and temperature ratio for diffuser DEU (310 - 500)

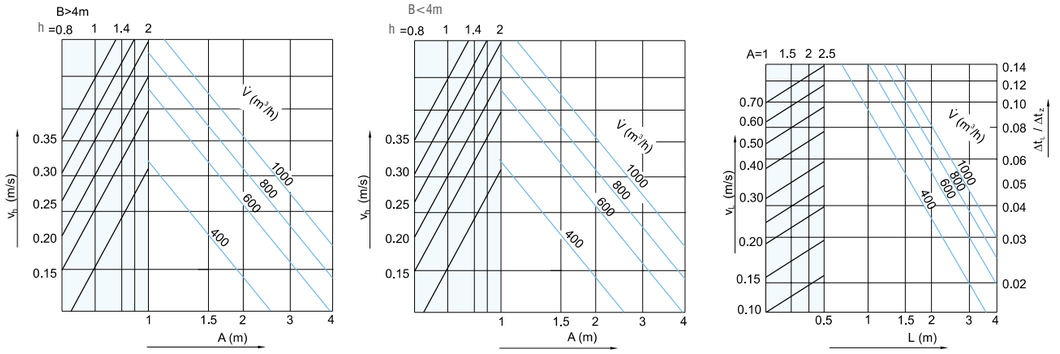
310



400

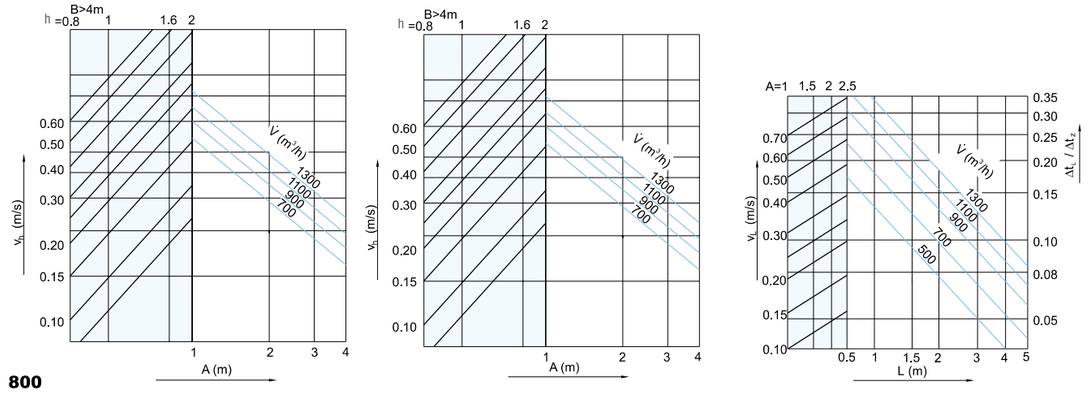


500

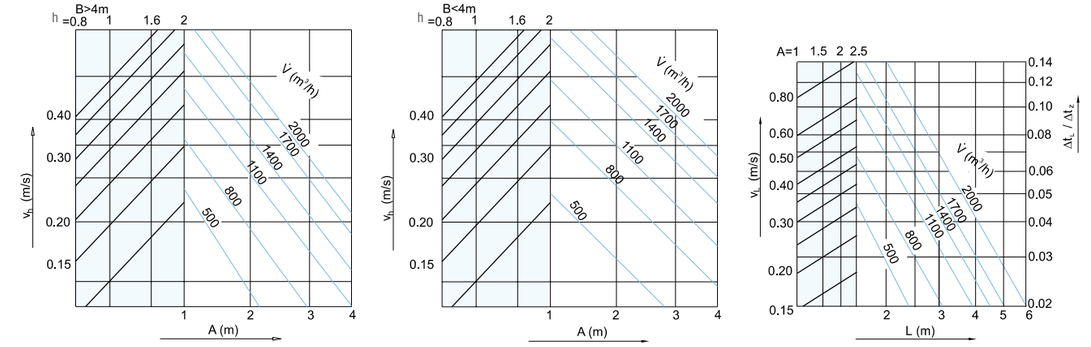


Diagrams of mean jet velocity v_h at distance B and diagrams of mean jet velocity along the wall v_L and temperature ratio for diffuser DEU (600 - 800)

600, 625

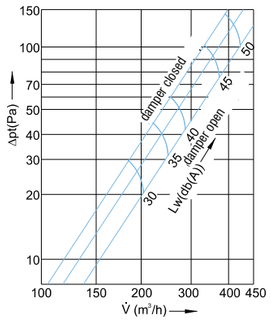


800

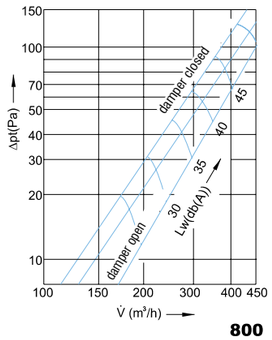


Air pressure drop and sound power level diagrams depending on damper position (for diffuser with plenum box)

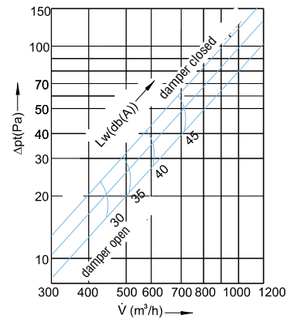
310



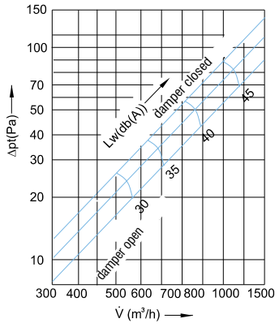
400



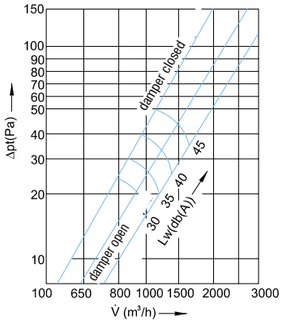
500



600, 625



800



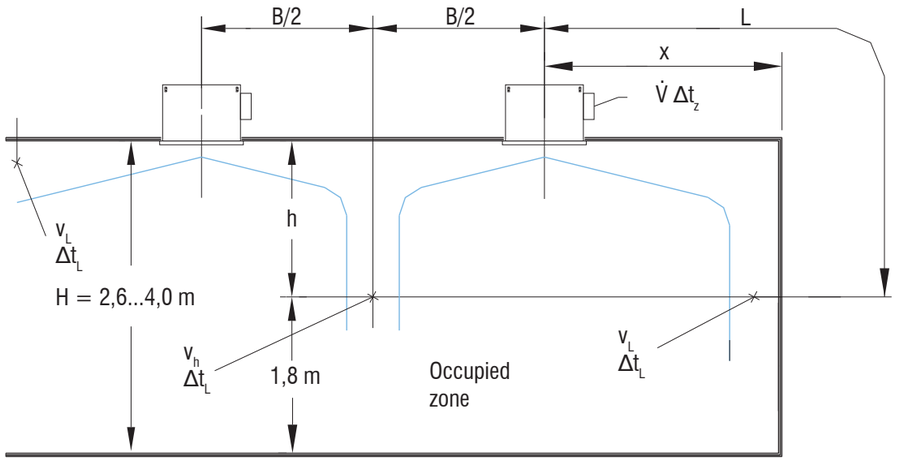
Example 1:

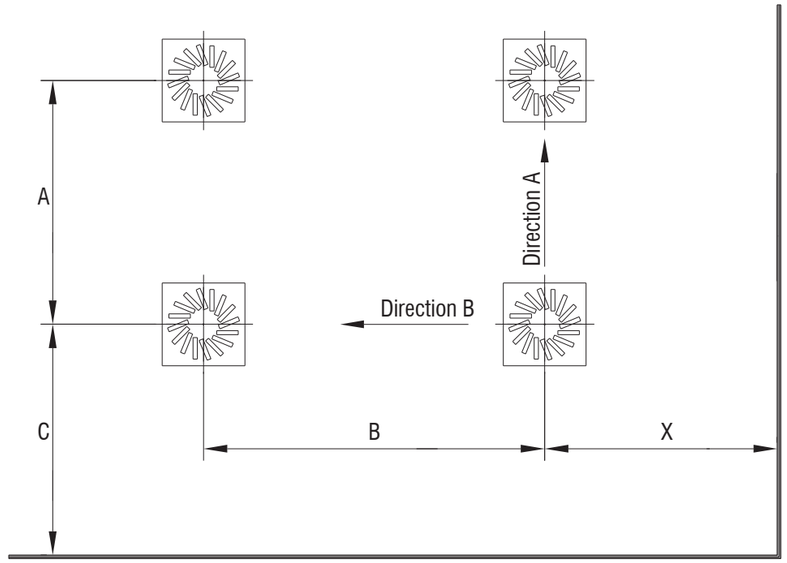
Given:

Type DEV 300/8
A = 2 m
h =1.6 m
L =3 m
B > 4 m
V = 150 m³/h

Solution:

Diagram pg. 5
v_h = 0.07 m/s
v_L = 0.13 m/s
Diagram pg. 7
Damper open 45%
p= 24 Pa
L_{WA}= 34 dB (A)





Design changes reserved

NOTES:

Design changes reserved

2/S6
v 3.3 (en)

CEILING SWIRL DIFFUSER

DVS

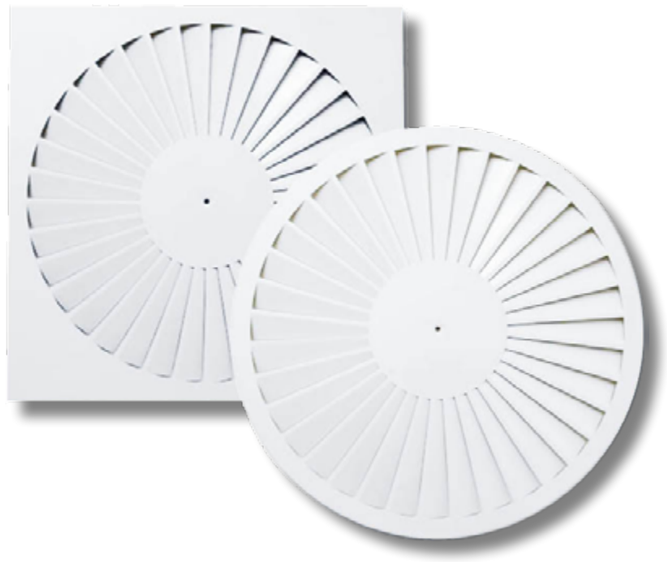


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TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow	v_h [m/s]	- Average core velocity at distance h (m) from diffuser
V_{uk} [m³/h]	- Total air volume in motion		
h [m]	- Distance from the ceiling to the occupied zone	Δp [Pa]	- Total pressure drop
		t_p [°C]	- Air temperature in the room
H [m]	- Room height	t_z [°C]	- Supply air temperature
A,B [m]	- Distance between diffusers	t_m [°C]	- Core air temperature
x [m]	- Distance from wall	Δt_z [°C]	- $(t_z - t_p)$
L [m]	- Throw distance (x+h)	Δt_L [C°]	- $(t_m - t_p)$
A_{ef} [m2]	- Effective discharge area	i	- Induction V_{uk}/V
v_{ef} [m/s]	- Effective jet velocity	L_{WA} [dB(A)]	- Sound power level
v_L [m/s]	- Average core velocity at distance L (m) from diffuser		

Design changes reserved

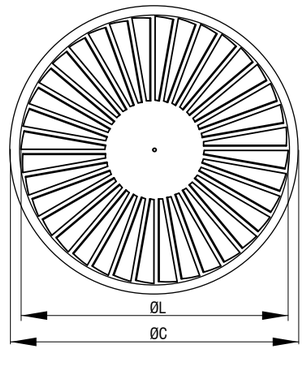
DVS

- Ceiling swirl diffuser for room heights from 2,6 to 4m.
- Made out of steel sheet, standard RAL 9010
- Plenum box made out of galvanized steel sheet

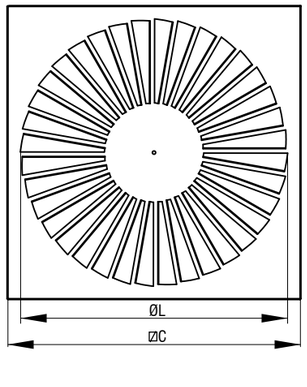
Options

- Plenum box
- RAL...

Diffuser DVS-O



Diffuser DVS-K



Dimensions

Size	C [mm]	L [mm]	A_{ef} [m²]
400	398	350	0,0180
500	498	350	0,0180
600	595	538	0,0295
625	623	538	0,0295

Ordering key

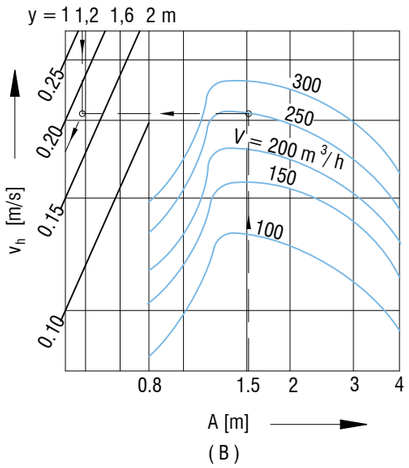
Type	DVS	- K	- 600	- A	- H	- ød	- Z
K - rectangular plate **O** - round plate							
Size							
A - supply air **B** - exhaust air							
H - horizontal connection **V** - vertical connection							
Connection diameter							
Insulation							

*Screws are not delivered
**Ordering key for Plenum box on page 184

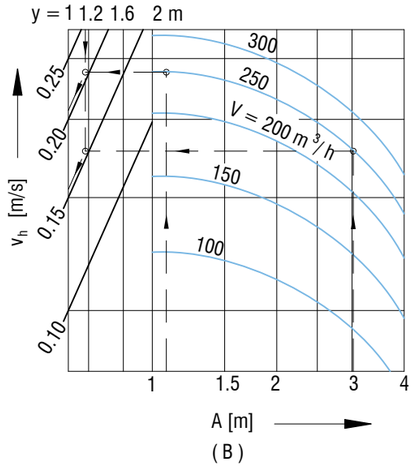
Design changes reserved

SELECTION DIAGRAMS

1. Air velocity between two diffusers by single-or multiple-row arrangement, if spacing B ≥ 4 m.



2. Air velocity between two diffusers by multiple-row arrangement, if spacing B = 2,8 ... 3,5 m.



Example 1

Given:

DVS-O/400-A/H 1 diffuser row
A = 1.5m
h = 1.16 m
x = 1.5 m
H = 2.96 m
V = 250 m³/h
Δt_z = -7°C

Solution:

Diagram 1
Velocity between two diffusers
v_h = 0.18 m/s
Diagram 4
between wall and diffuser
L=x+h=1.5+1.16=2.66 m
v_L = 0.16 m/s
$\Delta t_L / \Delta t_z$ = 0,055
Δt_L = -7 x 0,055 = -0,385
Diagram 9
L_{WA} = 33 dB (A)

Δp_t = 14 Pa

Example 2

Given:

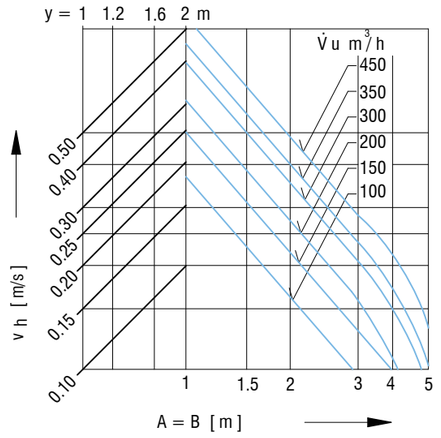
DVS-O/400-A/H 2 diffuser rows
A = 1.2 m
B = 3.0 m
h = 1.16 m
x = 1.5 m
H = 2.96 m
V = 250 m³/h
Δt_z = -7°C

Solution:

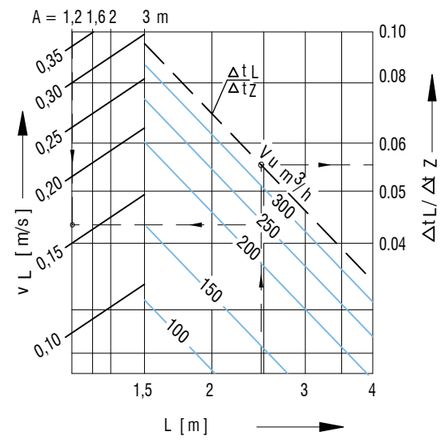
Diagram 2
Velocity between two diffusers, direction A
v_h = 0.22 m/s
Velocity between two diffusers, direction B
v_h = 0.16 m/s
Diagram 4
between wall and diffuser
L=x+h=1.5+1.16=2.66 m
v_L = 0.16 m/s
$\Delta t_L / \Delta t_z$ = 0,055
Δt_L = -7 x 0,055 = -0,385
Diagram 7
L_{WA} = 33 dB (A)
Δp_t = 14 Pa

Design changes reserved

3. Air velocity between two diffusers - square arrangement (A = B).

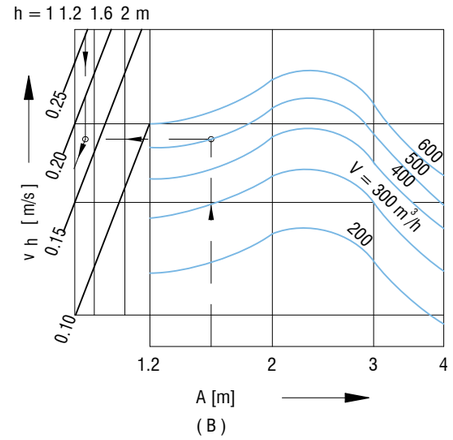


4. Air velocity at the wall and temperature ratio

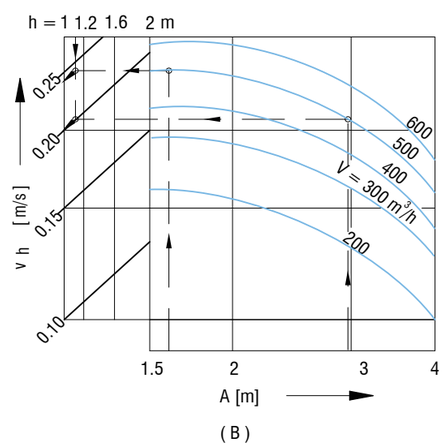


DVS 600 and 625

5. Air velocity between two diffusers by single-or multiple-row arrangement, if spacing B≥4 m.



6. Air velocity between two diffusers by multiple-row arrangement, if spacing B = 2,8 ... 3,5 m.



Design changes reserved

Example 3

Given: DVS-O/600-A/H 1 diffuser row

A = 1.5 m
h = 1.16 m
x = 1.8 m
H = 2.96 m
V = 500 m³/h
Δt_z = -7˚C

Solution:

Diagram 5
Velocity between two diffusers
v_h = 0.18 m/s
Diagram 8
between wall and diffuser
L=x+h=1.8+1.16=2.96 m
v_L = 0.22 m/s
$\Delta t_L / \Delta t_z$ = 0,061
Δt_L = -7 x 0,061 = -0,4 ˚C
Diagram 11
L_{WA} = 38 dB (A)
Δp_t = 23 Pa

Example 4

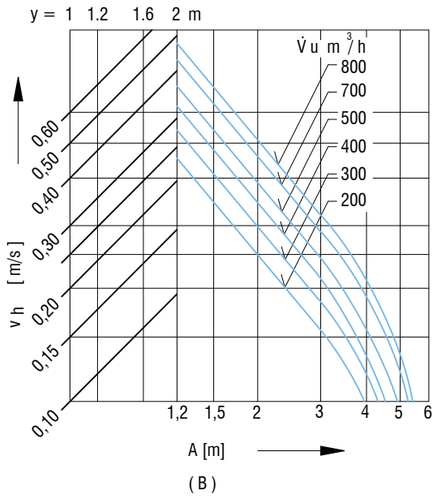
Given: DVS-O/600-A/H 2 diffuser rows

A = 1.6 m
B = 3 m
h = 1.16 m
x = 1.5 m
V = 500 m³/h
Δt_z = -7˚C

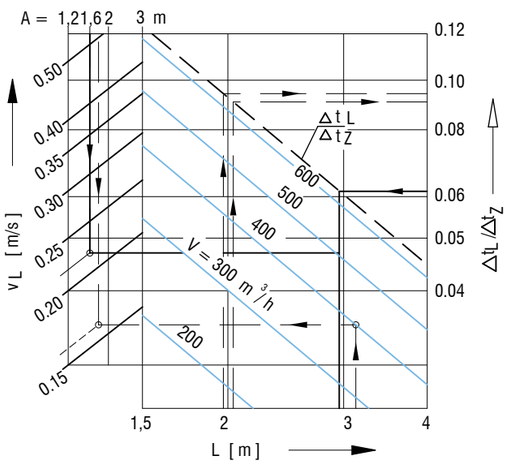
Solution:

Diagram 6
Velocity between two diffusers, direction A
v_h = 0.24 m/s
Velocity between two diffusers, direction B
v_h = 0.20 m/s
Diagram 8
between wall and diffuser
L=x+h=1.5+1.16=2.66 m
v_L = 0.22 m/s
$\Delta t_L / \Delta t_z$ = 0,065
Δt_L = -7 x 0,065 = -0,46 ˚C
Diagram 11
L_{WA} = 23 dB (A)
Δp_t = 23 Pa

7. Air velocity between two diffusers - square arrangement (A = B).



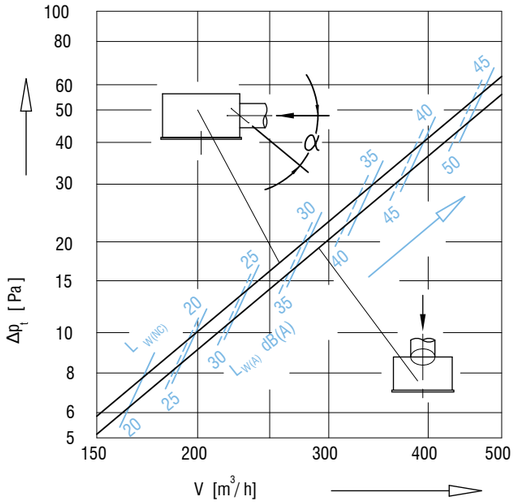
8. Air velocity at the wall and temperature ratio



Design changes reserved

Sound power level and pressure drop

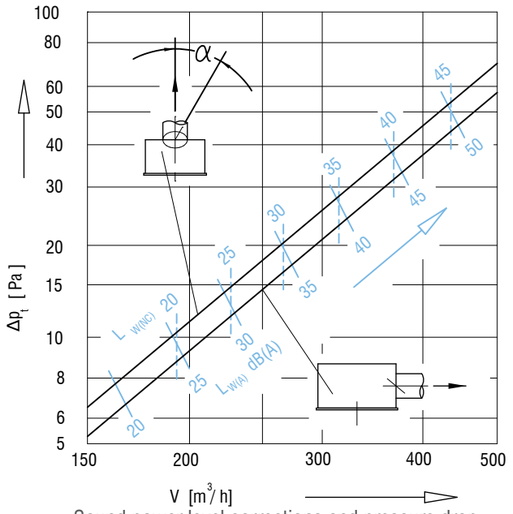
Diagram 9: Type DVS 400 and 500-A



Sound power level corrections and pressure drop from diagram 9

Damper angle α	0°	45°	90°
Δp_t	x 1,0	x 1,2	x 2,1
L_{WA}	-	+1	+3
L_{WNC}	-	+1	+3

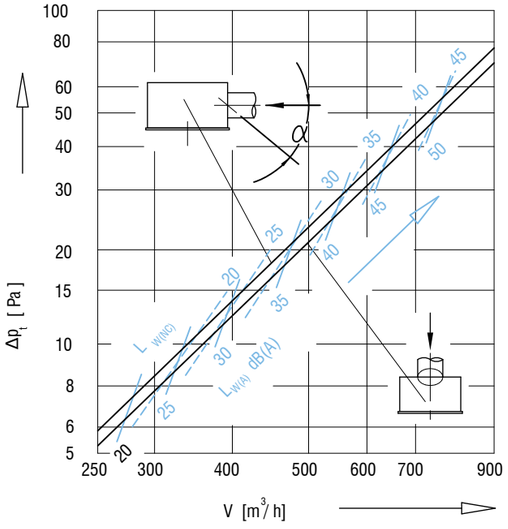
Diagram 10: Type DVS 400 and 500-B



Sound power level corrections and pressure drop from diagram 10

Damper angle α	0°	45°	90°
Δp_t	x 1,0	x 1,1	x 2,1
L_{WA}	-	+1	+2
L_{WNC}	-	+1	+2

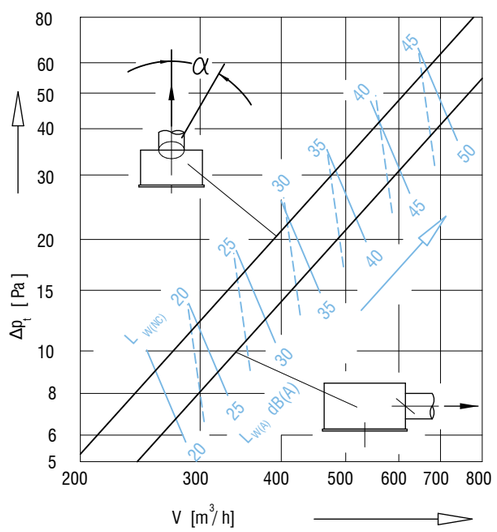
Diagram 11: Type DVS 600 and 625-A



Sound power level corrections and pressure drop from diagram 11

Damper angle α	0°	45°	90°
Δp_t	x 1,0	x 1,2	x 2,5
L_{WA}	-	+1	+2
L_{WNC}	-	+1	+2

Diagram 12: Type DVS 600 and 625-B

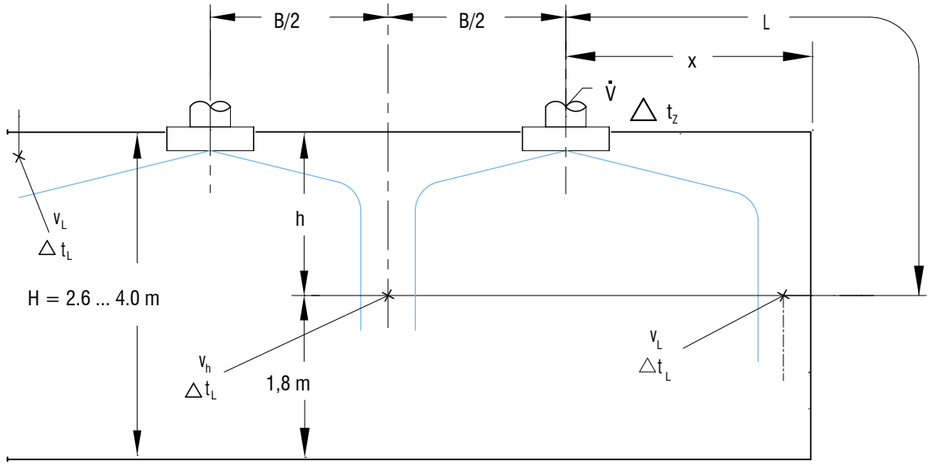


Sound power level corrections and pressure drop from diagram 12

Damper angle α	0°	45°	90°
Δp_t	x 1,0	x 1,1	x 2,2
L_{WA}	-	+1	+4
L_{WNC}	-	+1	+4

Design changes reserved

DISCHARGE DIAGRAM



Design changes reserved

NOTES:

Design changes reserved

2/S7
v 3.3 (en)

CEILING SWIRL DIFFUSER

DK

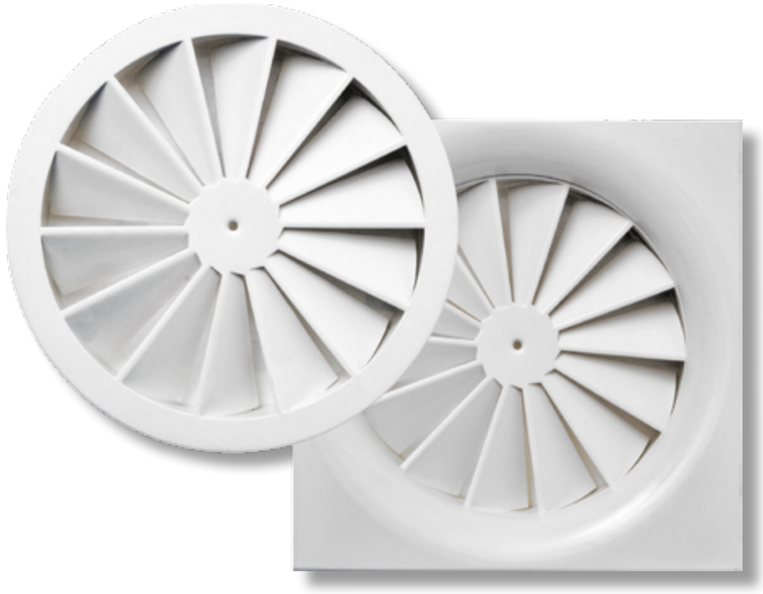


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TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow
V_{uk} [m³/h]	- Total air volume in motion
h [m]	- Distance from the ceiling to the occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance from wall
L [m]	- Throw distance (x+h)
A_{ef} [m2]	- Effective discharge area
v_{ef} [m/s]	- Effective jet velocity
v_L [m/s]	- Average core velocity at distance L (m) from diffuser
v_h [m/s]	- Average core velocity at distance h (m) from diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Air temperature in the room
t_z [°C]	- Supply air temperature
t_m [°C]	- Core air temperature
Δt_z [°C]	- $(t_z - t_p)$
Δt_L [C°]	- $(t_m - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

Design changes reserved

DK

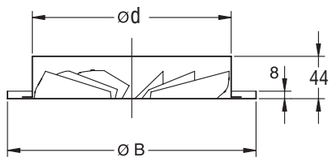
- Ceiling swirl diffuser for room heights from 2,6 to 4m.
- Made out of steel sheet, standard RAL 9010
- Designed for air supply in heating or cooling operations
- Plenum box made from galvanized steel sheet
- Fixing with central screw

Options

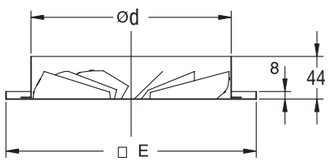
- Plenum box
- Round or square model

Models and dimensions

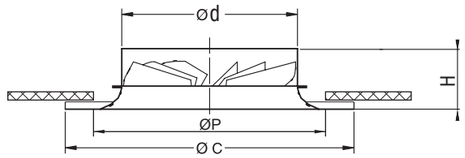
DK - O



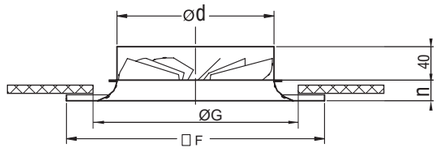
DK - K



DK - O - I



DK - K - I



**Minimal ceiling opening: øP - for round diffuser plate
øG - for square diffuser plate

Round model dimensions

Size	ød [mm]	øB [mm]	øC [mm]	H [mm]	øP [mm]	□E [mm]	□F [mm]	øG [mm]	Z [mm]	A_{ef} [m²]	UPK2
125	132	178	200	62	185	178	198	180	50	0,0029	300/ø98
160	158	195	250	80	220	195	248	190	50	0,0062	300/ø123
200	198	248	300	100	280	248	248	230	50	0,0095	300/ø158
250	248	296	350	120	345	296	298	280	50	0,0158	500/ø198
315	313	363	450	150	425	363	398	350	50	0,027	600/ø248
400	398	600	570	180	530	600	594	570	65	0,036	625/ø313

Design changes reserved

Ordering key

Type	DK	- O	- I	- 250	- A	- H	- ød	- Z

K - square diffuser plate
O - round diffuser plate

Discharge nozzle

Standard size

A - supply air
B - exhaust air

H - horizontal connection
V - vertical connection

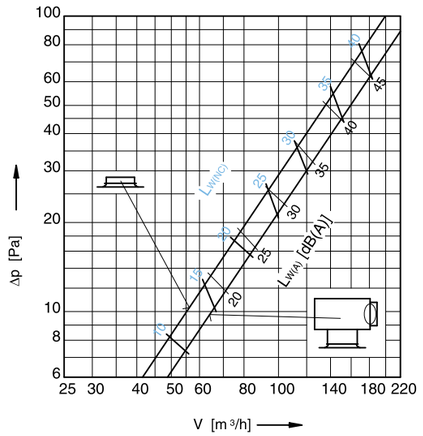
Connection diameter

Insulation

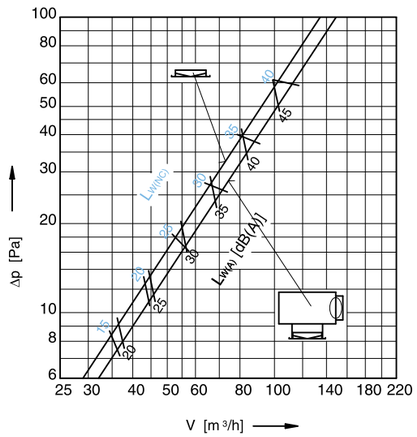
*Ordering key for Plenum box on page 184
**Only plenum box UPK2

SELECTION DIAGRAMS

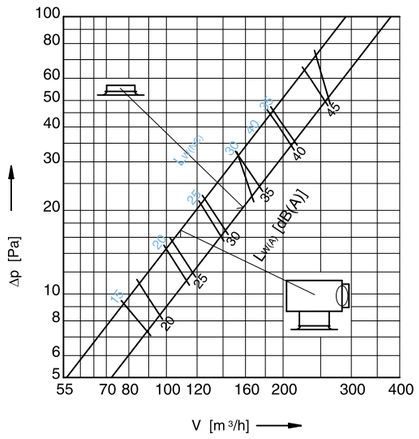
Sound power level and pressure drop diagram DK - I 125



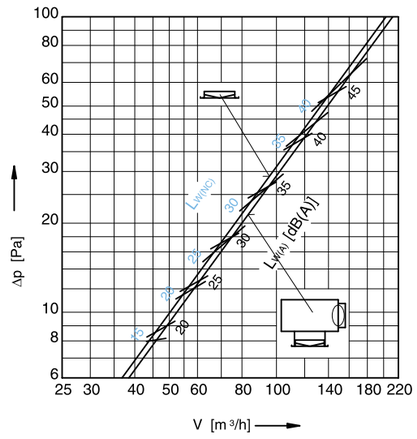
Sound power level and pressure drop diagram DK 125



Sound power level and pressure drop diagram DK - I 160

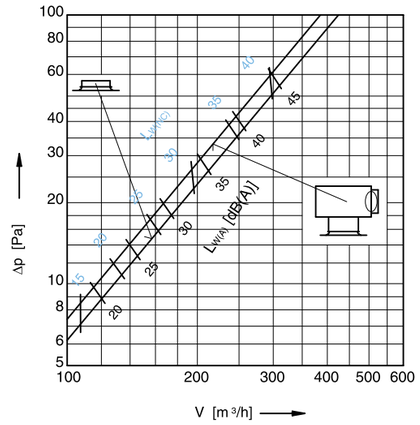


Sound power level and pressure drop diagram DK 160

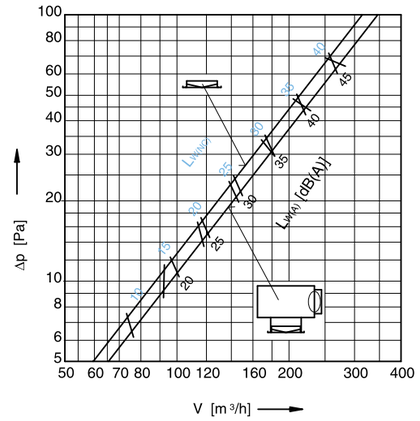


Design changes reserved

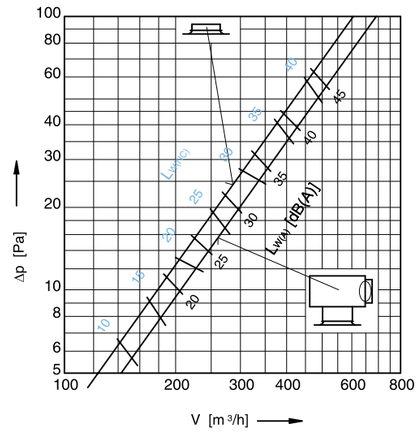
Sound power level and pressure drop diagram DK 200 - I



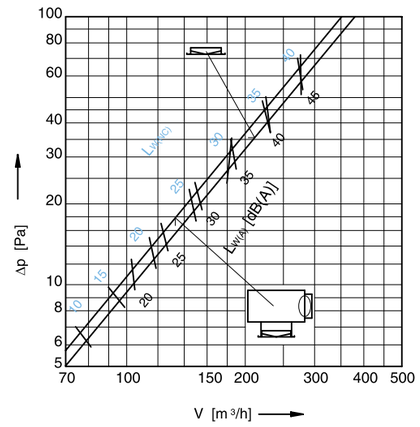
Sound power level and pressure drop diagram DK 200



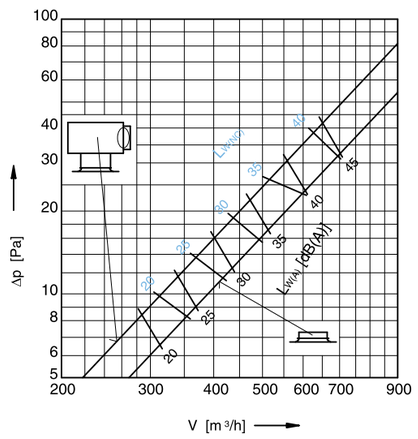
Sound power level and pressure drop diagram DK 250 - I



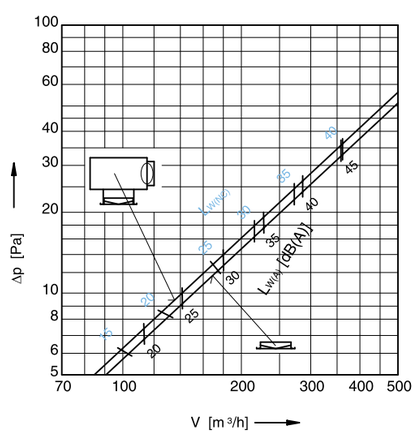
Sound power level and pressure drop diagram DK 250



Sound power level and pressure drop diagram DK 315 - I

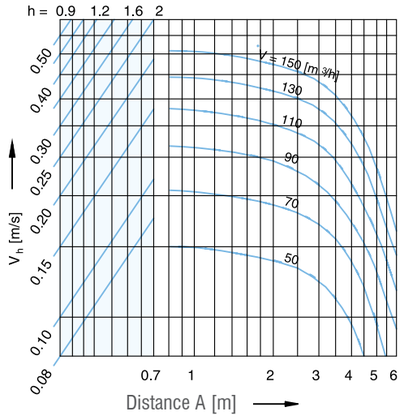


Sound power level and pressure drop diagram DK 315

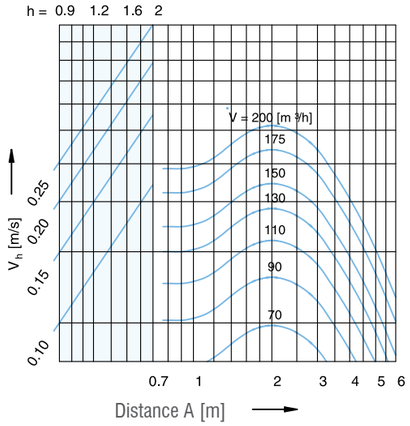


Design changes reserved

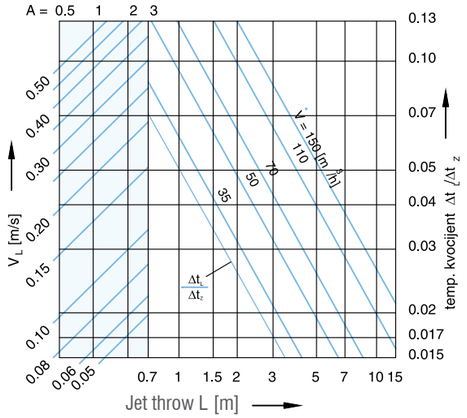
Diffuser arrangement - DK 125
(more than one row, if B = 2,80 m)



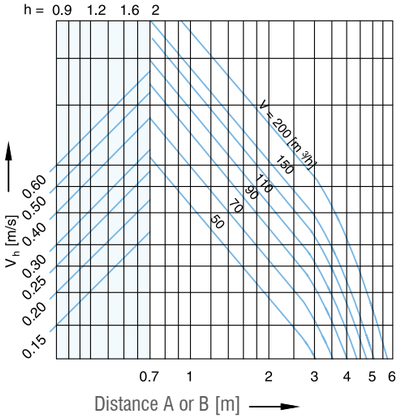
Diffuser arrangement - DK 125
(single or more than one row, if B ≥ 4,00 m)



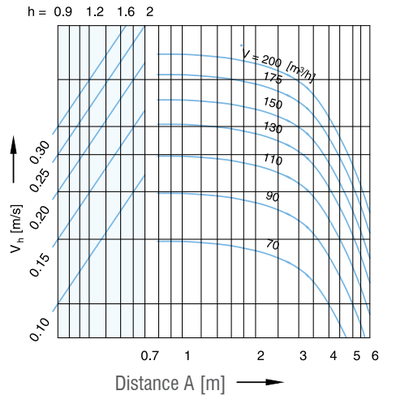
Air velocity at the wall - DK 125



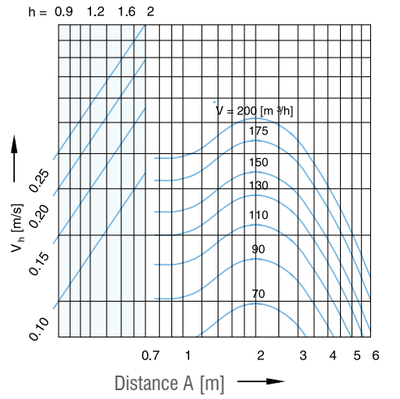
Square diffuser - DK 125



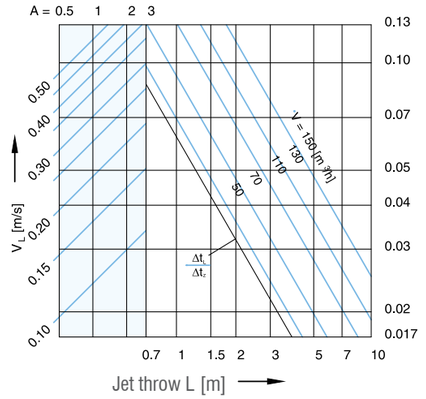
Diffuser arrangement - DK 160
(more than one row, if B = 2,80 m)



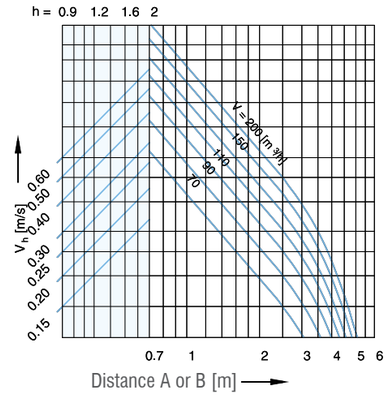
Diffuser arrangement - DK 160
(single or more than one row, if B ≥ 4,00 m)



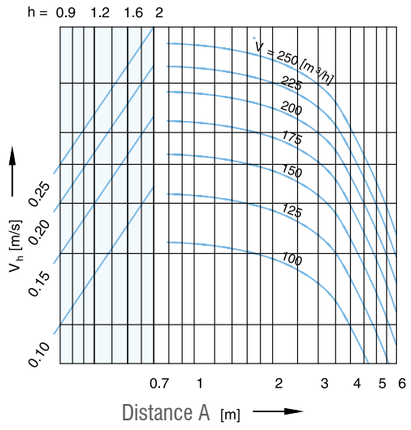
Air velocity at the wall - DK 160



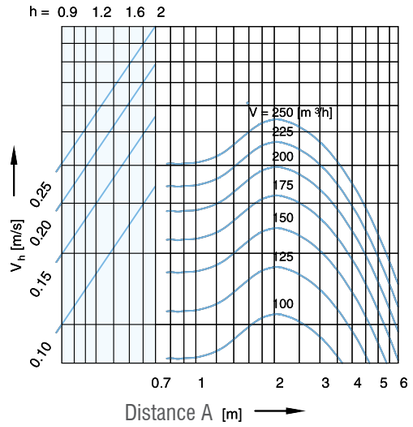
Square diffuser - DK 160



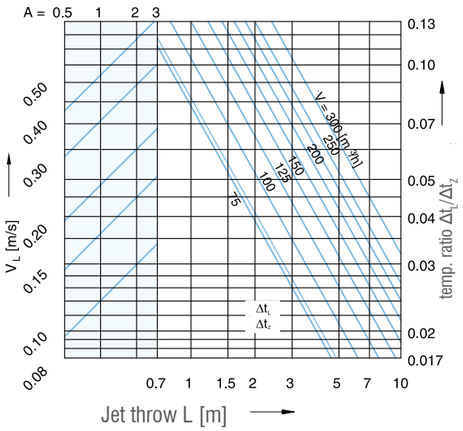
Diffuser arrangement - DK 200
(more than one row, if B = 2,80 m)



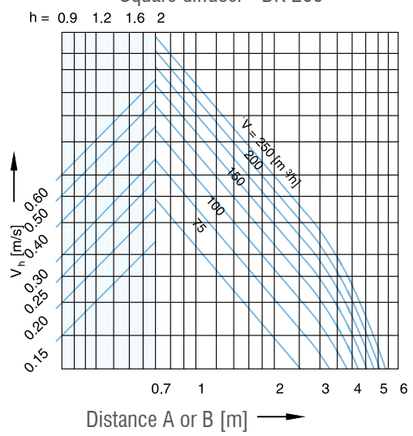
Diffuser arrangement - DK 200
(single or more than one row, if B ≥ 4,00 m)



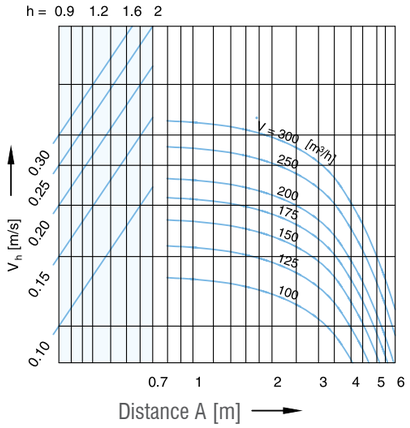
Air velocity at the wall - DK 200



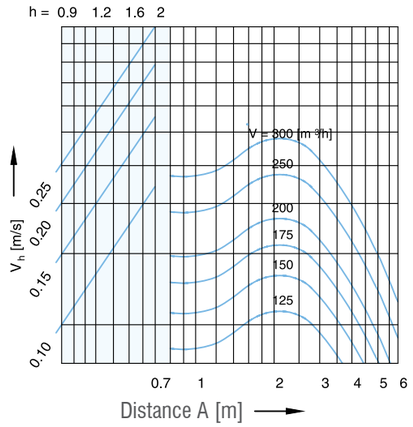
Square diffuser - DK 200



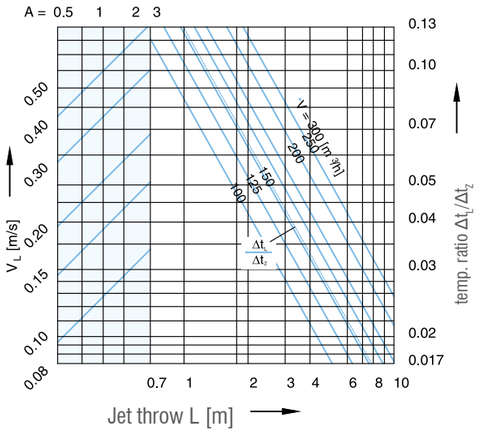
Diffuser arrangement - DK 250
(more than one row, if B = 2,80 m)



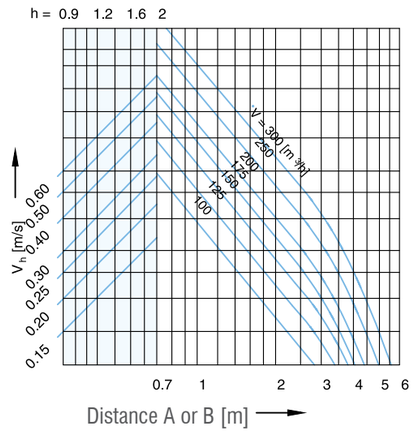
Diffuser arrangement - DK 250
(single or more than one row, if B ≥ 4,00 m)



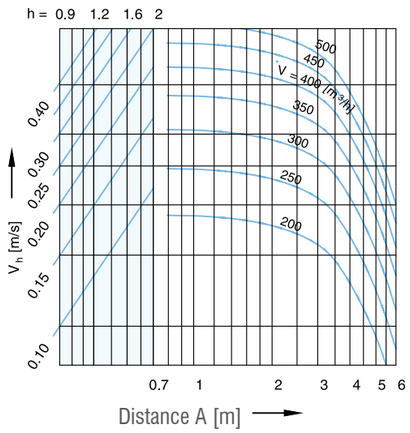
Air velocity at the wall - DK 250



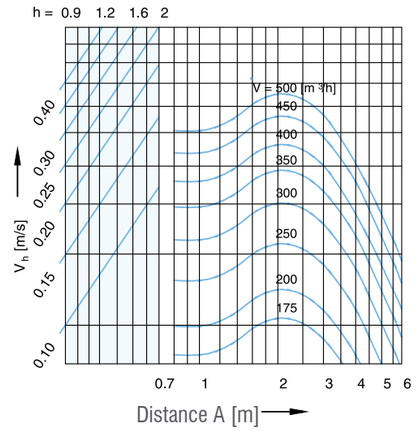
Square diffuser - DK 250



Diffuser arrangement - DK 315
(more than one row, if B = 2,80 m)

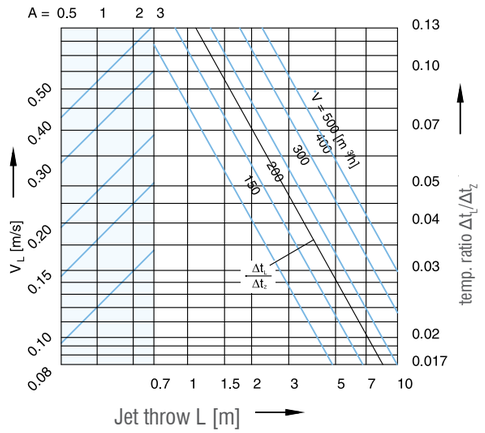


Diffuser arrangement - DK 315
(single or more than one row, if B ≥ 4,00 m)

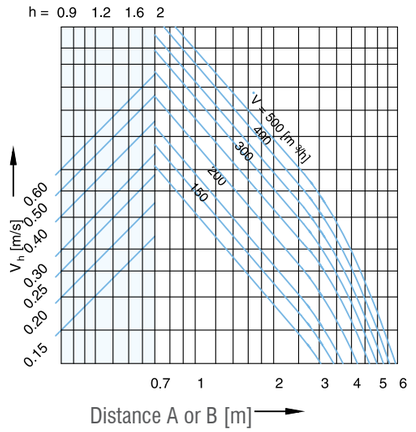


Design changes reserved

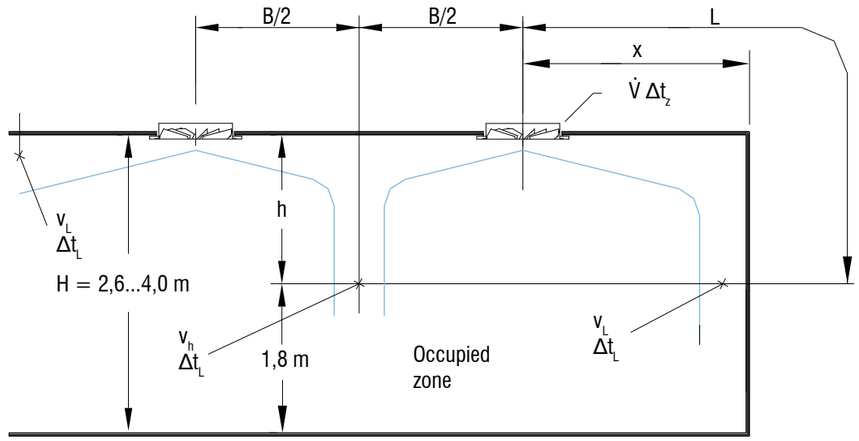
Air velocity at the wall - DK 315

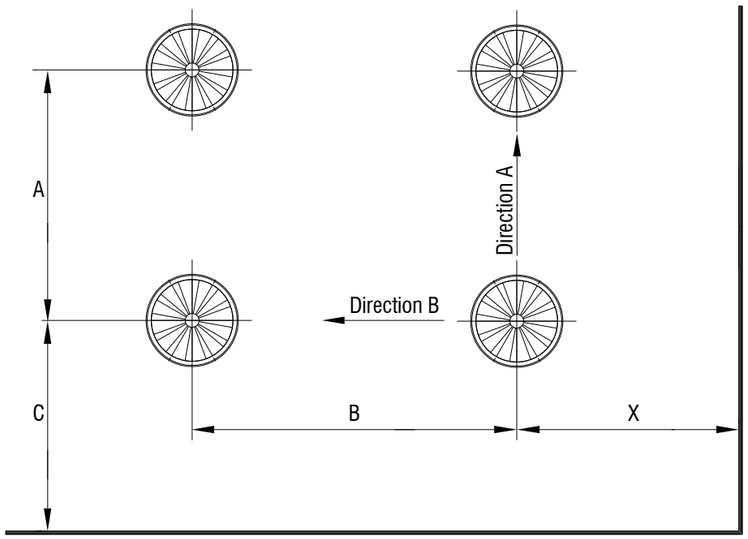


Square diffuser - DK 315



DISCHARGE DIAGRAM



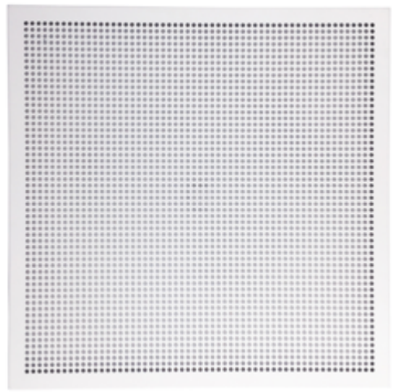


Design changes reserved

2/S8
v 3.3 (en)

PERFORATED DIFFUSER

ANP



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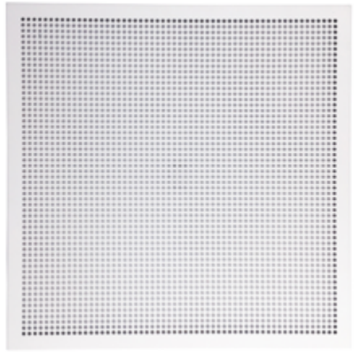
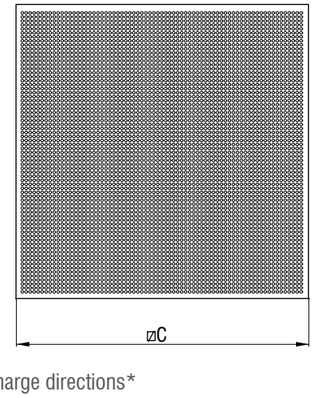
Definition of symbols:

V [m³/h]	- Air flow
x [m]	- Distance from wall
A, B [m]	- Distance between diffusers
C, X [m]	- Distance between diffusers and walls
L [m]	- Throw distance L = x + h
v_L [m/s]	- Average core velocity at distance from a diffuser
h [m]	- Distance from the ceiling to the occupied zone
v_h [m/s]	- Average core velocity between two diffusers at distance h [m]
H [m]	- Room height
t_z [°C]	- Supply air temperature
t_p [°C]	- Air temperature in a room
t_m [°C]	- Core air temperature
Δt_z [K]	- $(t_z - t_p)$
Δt_L [K]	- $(t_m - t_p)$
Δp_t [Pa]	- Total pressure drop
L_{WA} [dB(A)]	- Sound power level





ANP

- Ceiling diffuser for room heights from 2,5 to 4m.
- Made out of steel sheet, standard RAL 9010
- Fixing with central screw

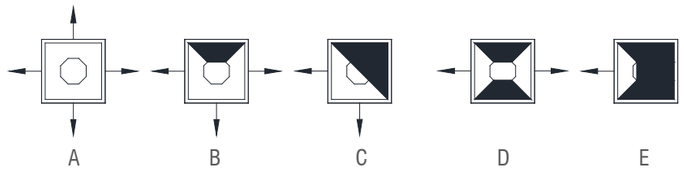
Options

- RAL...
- Plenum box

Diffuser dimensions

ANP			
Size	⧄C [mm]	Outlet area Direction A	
		Free A_s [m²]	Effective A_{ef} [m²]
300	298	0,01834	0,01687
400	398	0,03746	0,03448
500	498	0,06057	0,05572
600	595	0,09253	0,08512
625	623	0,10128	0,09318

Air discharge directions*



• in cases B, C, D and E, discharge patterns in the same RAL are delivered.

Technical diagrams given on the subsequent pages apply only to the discharge direction pattern “A”

Outlet areas for pattern [m²]:

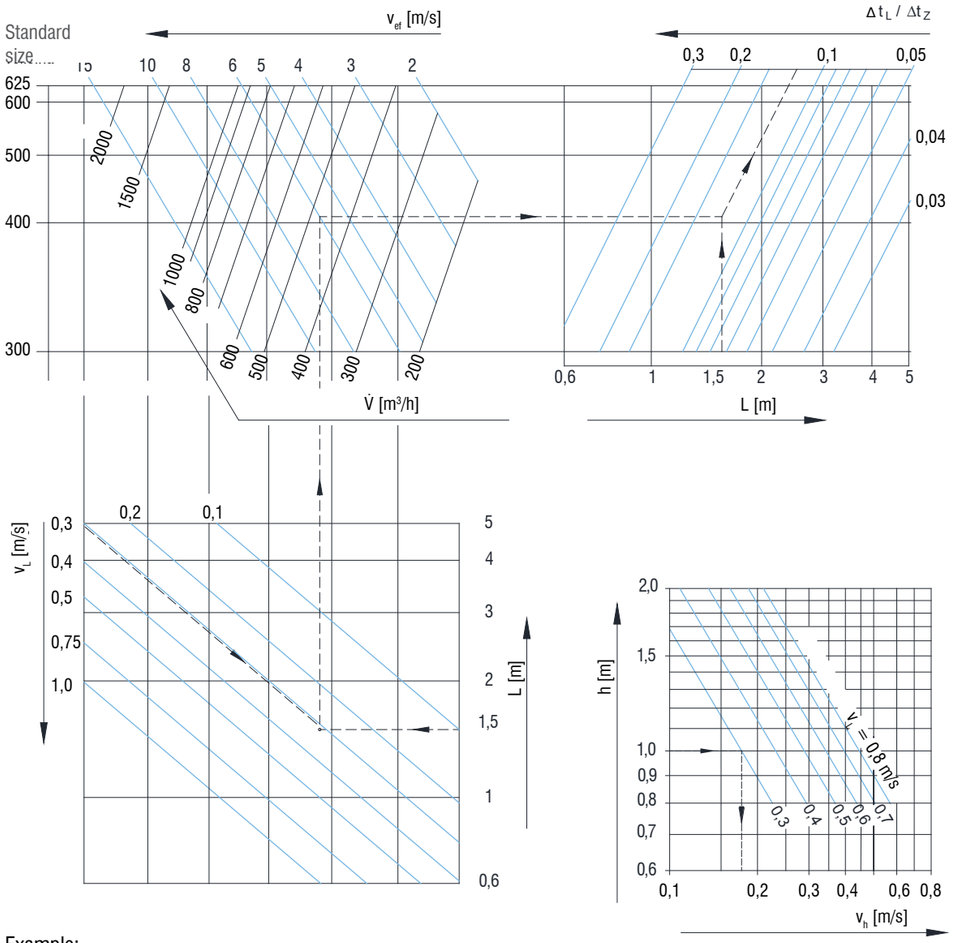
Direction “B”→ 0,75 ·A_s, or 0,75 · A_{ef}
Direction “C”→ 0,5
Direction “D”→ 0,5
Direction “E”→ 0,25

Ordering key

Perforated diffuser	**ANP**	**- 500**	**- A**	**- A**	**- H**	**- ød**	**- Z**
Size							
Discharge direction **(A, B, C, D, E)**							
A - supply air **B -** exhaust air							
H - horizontal connection **V -** vertical connection							
Connection diameter							
Insulation							

*Screws are delivered only for central screw version
**Ordering key for Plenum box on page 184
***Only plenum box UPK1

SELECTION DIAGRAM

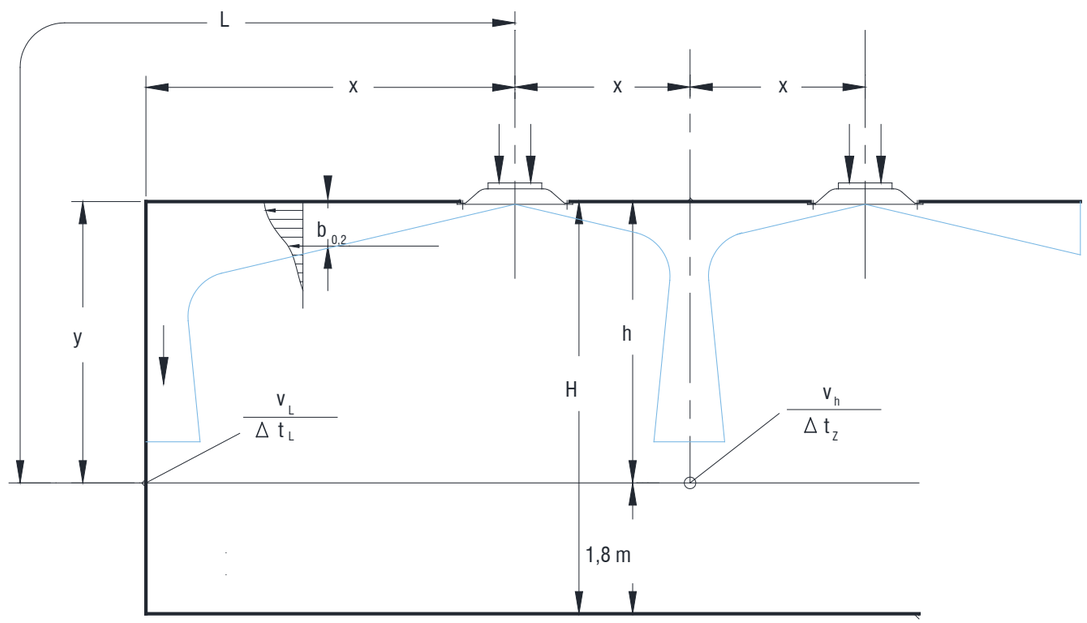


Example:

Given:
ANP
V = 480 m³/h
H = 2,8 m
L = 1,5 m
v_L = 0,3 m/s
Δt_z = 5°C
The room has normal acoustic characteristics

Solution:
ANP
v_{ef} = 6 m/s
Temperature ratio
$\Delta t_L / \Delta t_z$ = 0,12
Temperature difference
Δt_L =0,125= 0,6°C
v_h = 0,17 m/s

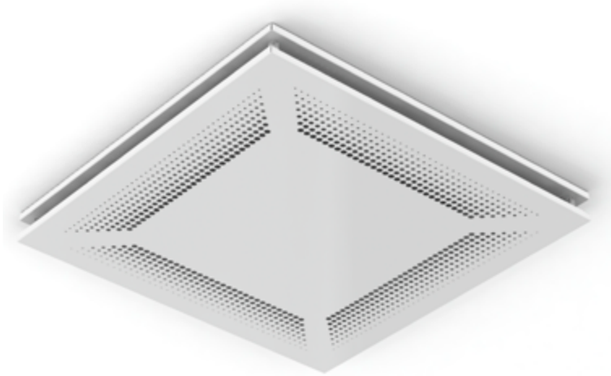
DISCHARGE DIAGRAM



2/S9
v 3.3 (en)

CEILING DIFFUSER

KDP, ODP



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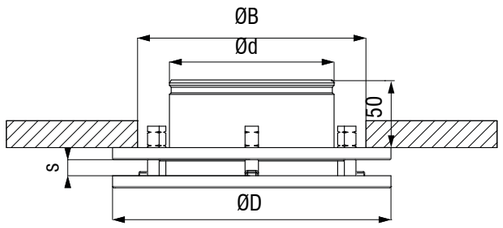
ODP

- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame made out of steel sheet, standard RAL 9010
- Suitable for horizontal supply of cooled air
- Easy face plate removal
- Easy slot width adjustment (10, 20, 30mm)

Options

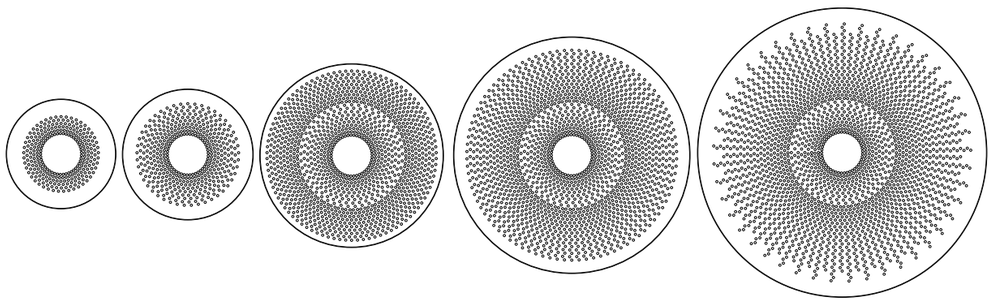
- RAL...
- Plenum box
- Various perforation (-E)



Dimensions

ODP	ØD	Ød	ØB	s
125	210	125	190	10, 20, 30
160	250	160	227	10, 20, 30
200	350	200	327	10, 20, 30
250	450	250	427	10, 20, 30
315	550	315	527	10, 20, 30

ODP 125 ODP 160 ODP 200 ODP 250 ODP 315

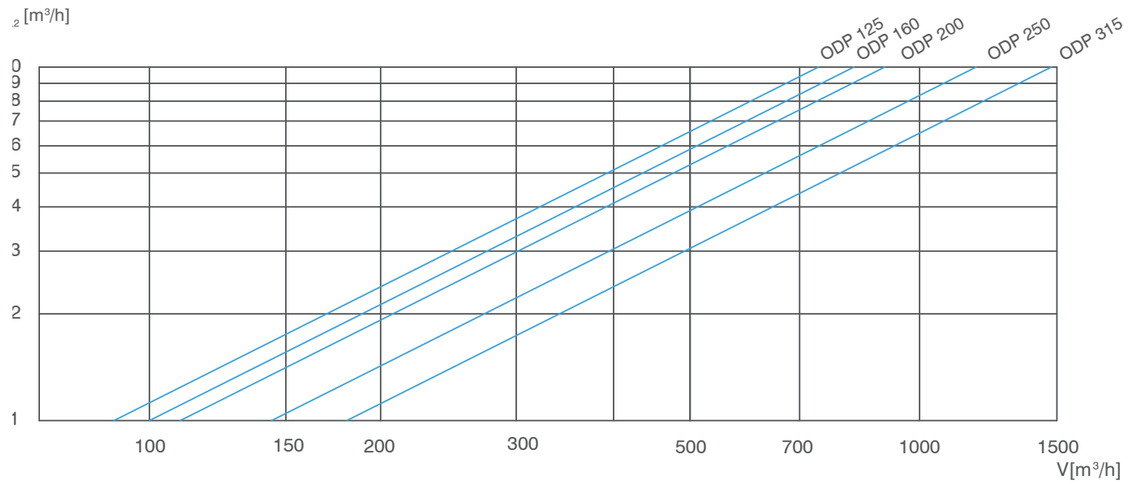


Air diffuser without connection box

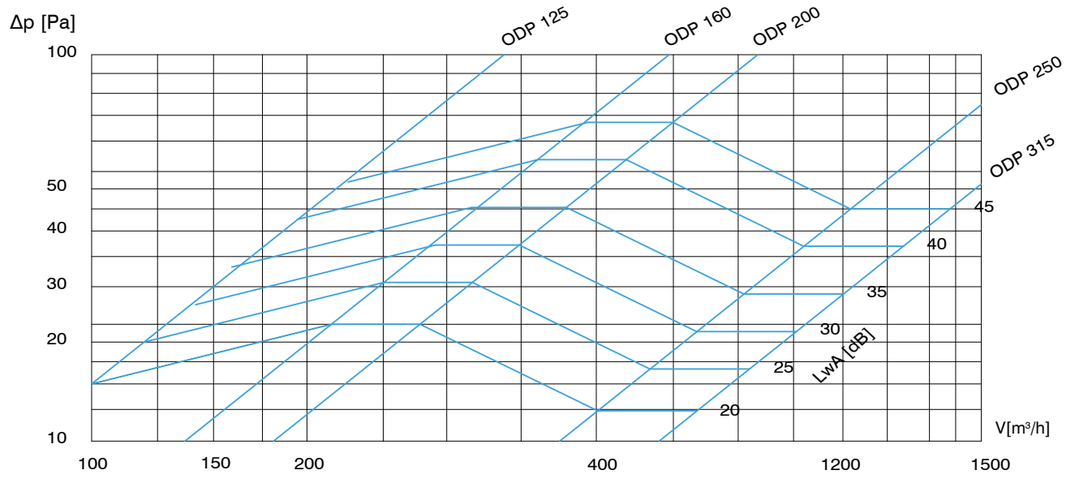
ODP	Sound attenuation							
	63	125	250	500	1000	2000	4000	8000
125	20	15	10	4	3	2	3	4
160	18	12	8	4	3	2	4	5
200	16	8	7	5	3	1	3	4
250	14	8	5	5	3	3	5	6
315	12	7	6	6	2	3	4	5

Design changes reserved

Selection diagram



Pressure drop and sound power level



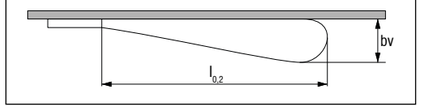
Ordering key

Ceiling diffuser	ODP	- E	- 250
Perforated plate (standard) -E - without perforation			
Size			

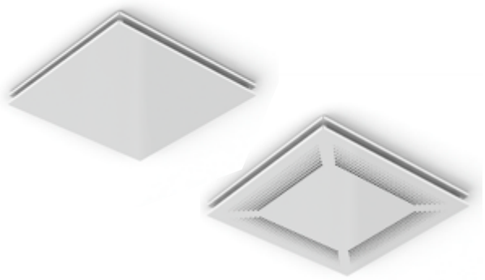
*Ordering key for Plenum box on page 184
**Only plenum box UPK2

Air stream diffusion

Vertical
bv = 0,07 x $l_{0,2}$



Design changes reserved

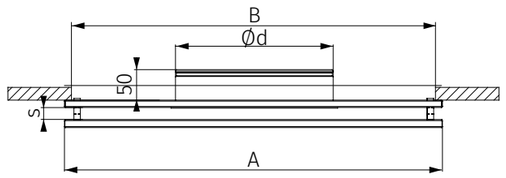


KDP

- Ceiling diffuser for room heights from 2,3 to 4m.
- Frame made out of steel sheet, standard RAL 9010
- Suitable for horizontal supply of cooled air
- Easy face plate removal
- Easy slot width adjustment (10, 20, 30mm)

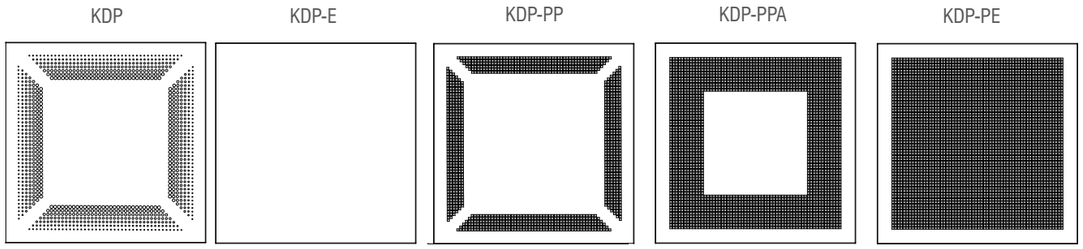
Options

- RAL...
- Plenum box
- Square perforation (-PP)



Dimensions

KDP	A	Ød	ØB	s
125	395	125	210	10, 20, 30
160	395	160	270	10, 20, 30
200	395	200	375	10, 20, 30
250	595	250	370	10, 20, 30
315	595	315	575	10, 20, 30

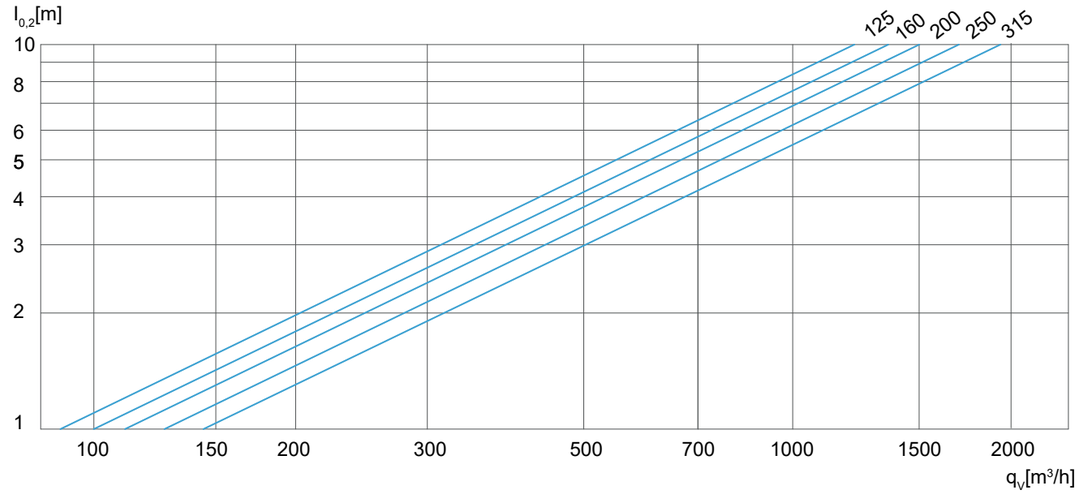


Air diffuser without connection box

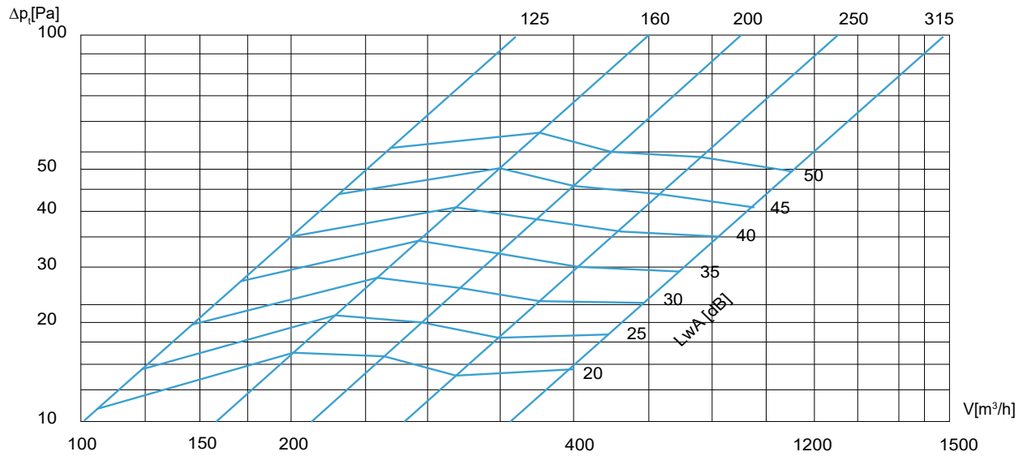
KDP	Sound attenuation							
	63	125	250	500	1000	2000	4000	8000
125	18	12	5	6	6	2	4	6
160	18	11	5	6	6	2	4	6
200	16	11	5	6	4	3	5	5
250	14	7	3	3	2	3	5	5
315	12	7	4	3	3	4	6	5

Design changes reserved

Selection diagram



Pressure drop and sound power level



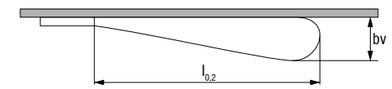
Ordering key

Ceiling diffuser	KDP	-A	-600	-250
A - round perforation				
E - without perforation				
PP - square perforation				
PPA - square perforation around perimiter				
PE - full square perforation				
Size				
Connection				

*Ordering key for Plenum box on page 184
**Only plenum box UPK2

Air stream diffusion

Vertical
bv = 0,07 x $l_{0,2}$

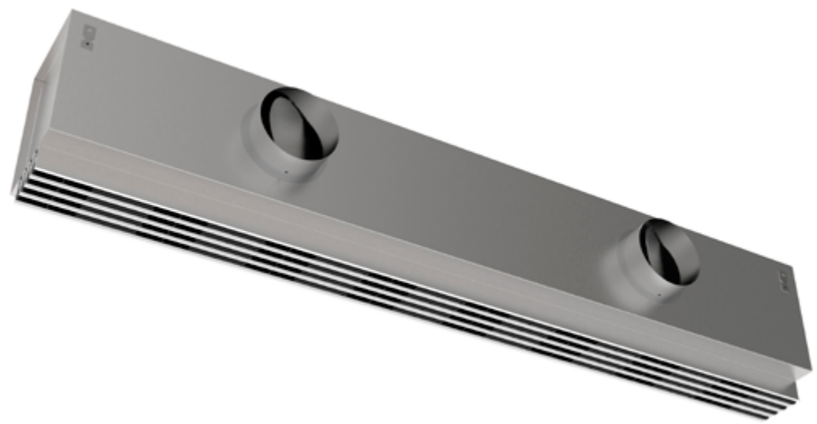


Design changes reserved

2/S10
v 3.3 (en)

SLOT DIFFUSER

SR



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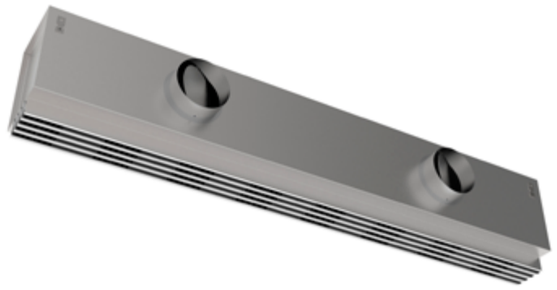
Definition of symbols:

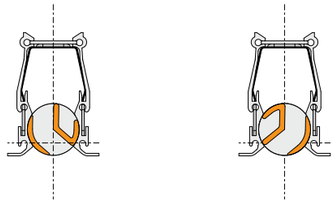
V_p [m³/h]	- Airflow rate
V' [m³/hm]	- Airflow rate per meter length
V_2 [m³/hm²]	- Airflow rate per room area
A_{ef} [m²]	- Effective outlet area
v_L [m/s]	- Core velocity
v_h [m/s]	- Air velocity between two diffusers
L [m]	- Diffuser length
B_{min} [m]	- Distance between two diffusers
h [m]	- Installation height
L_{WA} [dB(A)]	- Sound power level
Δp [Pa]	- Pressure drop

Design changes reserved

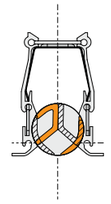


SR

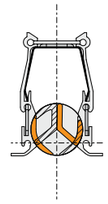
- Ceiling diffuser for room heights from 2,7 to 5m.
- Made out of anodized aluminium profiles
- 1-row, 2-row, 3-row and 4-row version
- Length from 300 to 2000 mm (step 100 mm).
- Individually adjustable discharge elements SR30 and SR50.



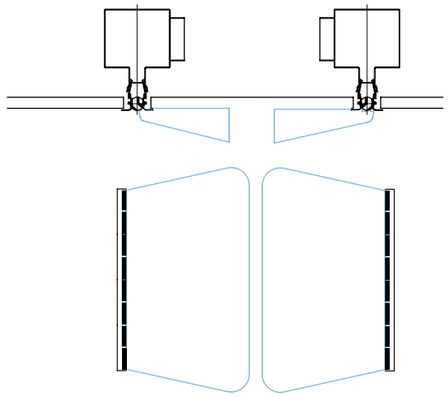
Horizontal one-sided discharge



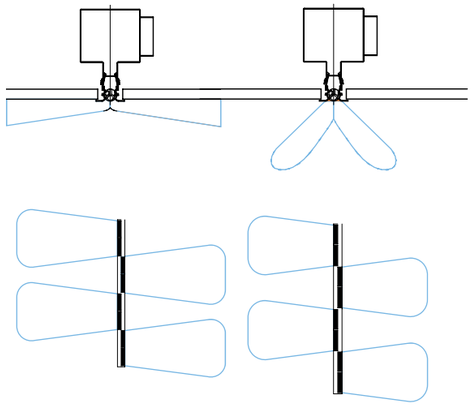
Horizontal two-sided discharge



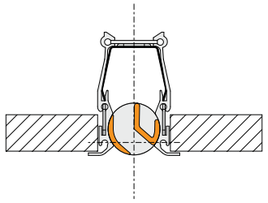
Two-sided discharge at an angle

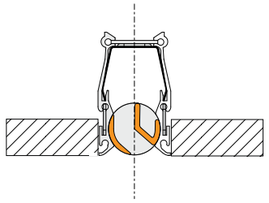


Slot diffuser



Narrow slot diffuser

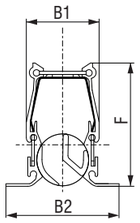


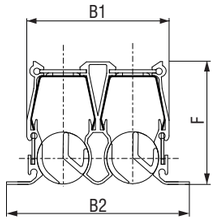


Design changes reserved

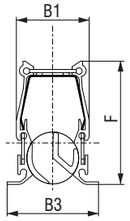
Dimensions

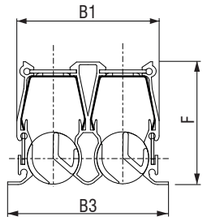
Slot diffuser





Narrow slot diffuser



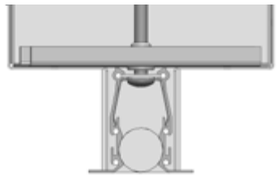


Type	No. of rows	A_{ef} [m²/m]	L [mm]	V [m³/h m]	h [m]	B1 [mm]	B2 [mm]	B3 [mm]	A [mm]	B [mm]	C [mm]	øD [mm]	No. of connections	E [mm]	F [mm]	G [mm]
SR 30	1	0,00752	do 1000	40 -130	2,7 -4,0	28	47,5	35	221	120	174	98	1	L / 2	47,5	47
			1100-1500									98	2	300		
			1600-2000									123	2	400		
	2	0,01504	do 1000	70 -240	2,7 -4,5	55	74,5	62	236	150	189	138	1	L / 2		47
			1100-1500									123	2	300		
			1600-2000									138	2	400		
	3	0,02256	do 1000	120 -320	3,0 -5,0	82	101,5	89	261	179	215	158	1	L / 2		47
			1100-1500									138	2	300		
			1600-2000									158	2	400		
	4	0,03008	do 1000	160 -400	3,5 -5,0	109	128,5	119	301	210	255	198	1	L / 2		47
			1100-1500									158	2	300		
			1600-2000									198	2	400		

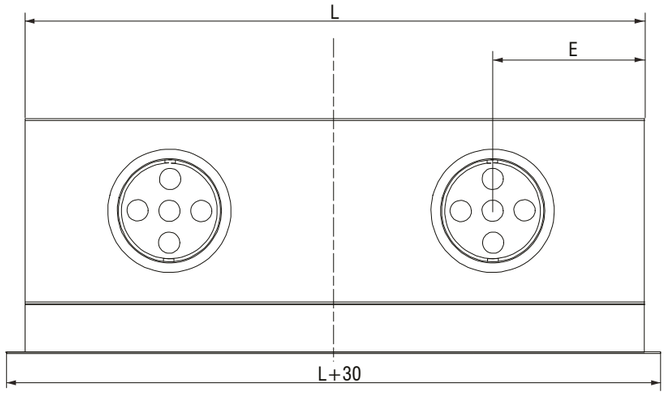
Type	No. of rows	A_{ef} [m²/m]	L [mm]	V [m³/h m]	h [m]	B1 [mm]	B2 [mm]	B3 [mm]	A [mm]	B [mm]	C [mm]	ø D [mm]	No. of connections	E [mm]	F [mm]	G [mm]
SR 50	1	0,01504	do 1000	75 -210	2,7 -4,0	43,5	71	51	252	130	195	123	1	L / 2	57,5	57
			1100-1500									123	2	300		
			1600-2000									138	2	400		
	2	0,03008	do 1000	130 -390	2,7 -4,5	93,5	121	101	272	180	215	158	1	L / 2		57
			1100-1500									138	2	300		
			1600-2000									158	2	400		
	3	0,04512	do 1000	195 -520	3,0 -5,0	143,5	171	151	312	230	255	198	1	L / 2		57
			1100-1500									158	2	300		
			1600-2000									198	2	400		
	4	0,06016	do 1000	260 -650	3,5 -5,0	193,5	221	201	337	280	280	223	1	L / 2		57
			1100-1500									198	2	300		
			1600-2000									223	2	400		

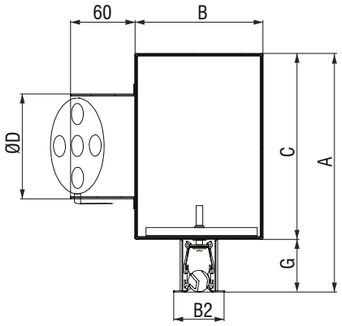
Design changes reserved

Fixing onto plenum box

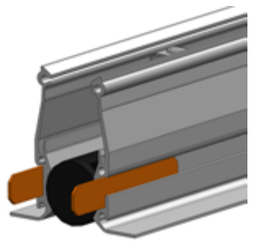


- fixing with cross-member

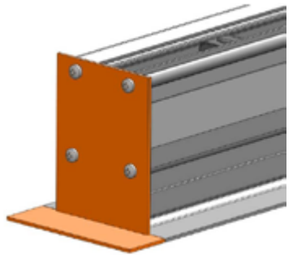




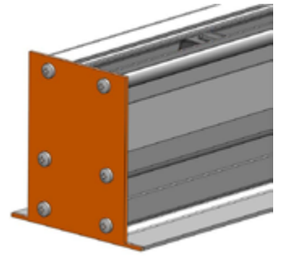
Connecting slot diffusers in series with connecting plate



End profile L1 (L2)



End plate I1 (I2)



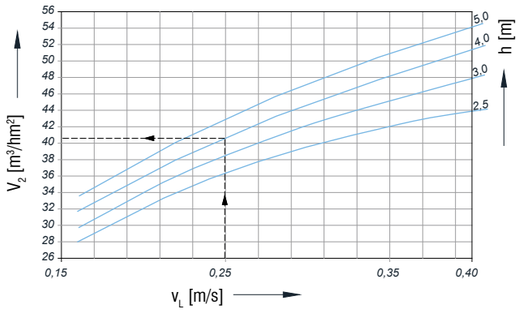
Design changes reserved

SELECTION DIAGRAM - SR30

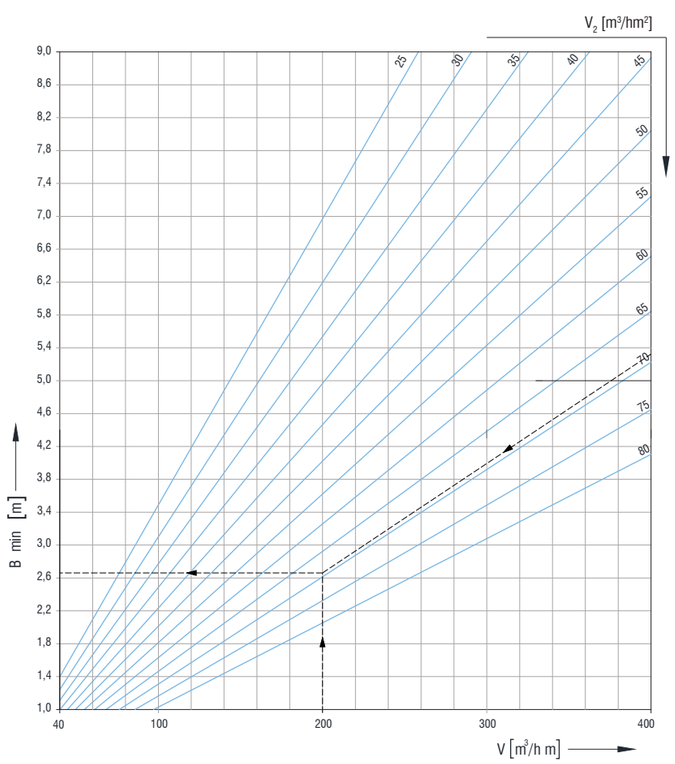
Maximum flow correction factor per 1 m² of room area, in regards to maximum temperature diference Δt

	Δt=-12K	Δt=-10K	Δt=-8K	Δt=-6K	Δt=-6K
$\Delta V_p =$	x 1,00	x 1,00	x 1,15	x 1,35	x1,70

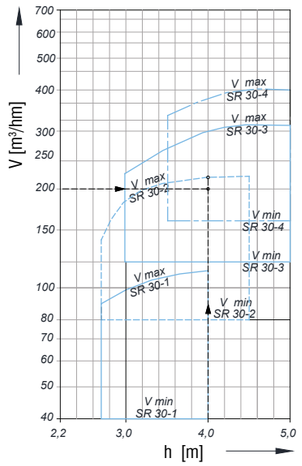
Maximum airflow rate of SR30 per 1m² of room area, for maximum temperature difference Δt=-12K



Minimum distance between two slot diffusers SR30



Airflow rate per 1 meter length



Example:

Given:

SR 30-2

V = 400 m³/h L= 2 m
v_L = 0,25 m/s Δt_z = - 4°C
h = 4 m Supply

Solution:

Diagram 1:
V_2= 40,5 m³/hm²
Correction = 40,5 x 1,70 = 68,85 m³/hm²
Diagram 2:
V_{max} = 210 m³/hm
V= 200 m³/hm
Diagram 3:
B_{min} = 2,7 m
Diagram 4:
L_{WA} = 36 dB(A)
Correction (damper open 50%):
36+2= 38 dB(A)
Diagram 5:
Δp = 33 Pa
Correction (damper open 50%):
33 x 1,4 = 46,2 Pa

Design changes reserved

Sound power level correction factor L_{WA} [dB(A)] in regard to airflow damper position

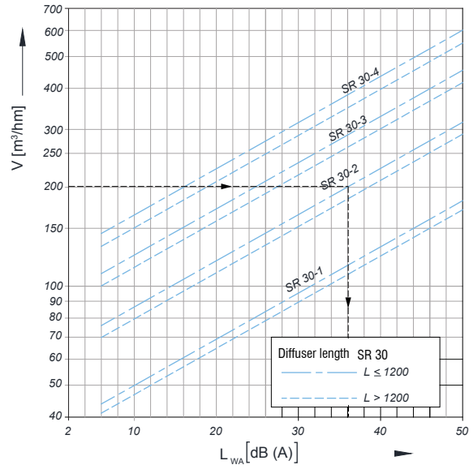
Damper position	100% open	75% open	50% open	25% open	0% open
ΔL_{WA} =	+0	+1	+2	+4	+6

Pressure drop correction factor L_{WA} [dB(A)] in regard to airflow damper position

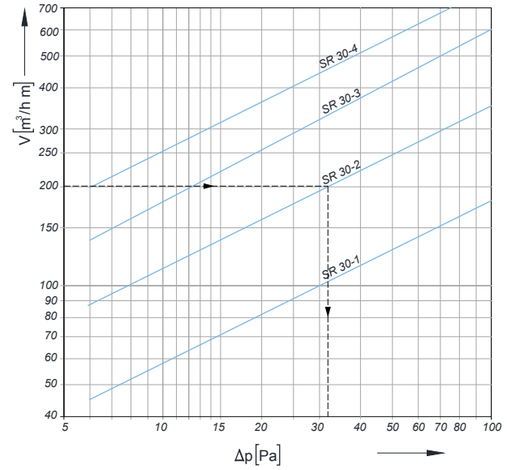
Damper position	100% open	75% open	50% open	25% open	0% open
Δp =	x1,00	x1,2	x1,4	x1,7	x2,2

For insulated plenum boxes sound power level is decreased by additional 2 dB(A)

SR 30 Sound power level - Supply air
(damper position 100% open)
- Non insulated plenum box



SR 30 Pressure drop - Supply air
(damper position 100% open)



Sound power level correction factor L_{WA} [dB(A)] in regard to airflow damper position

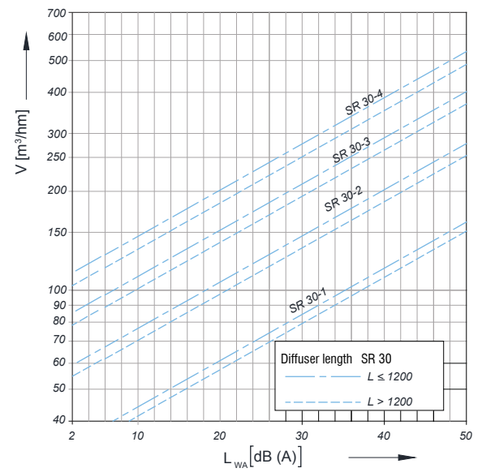
Damper position	100% open	75% open	50% open	25% open	0% open
ΔL_{WA} =	+0	+0	+1	+2	+2

Pressure drop correction factor L_{WA} [dB(A)] in regard to airflow damper position

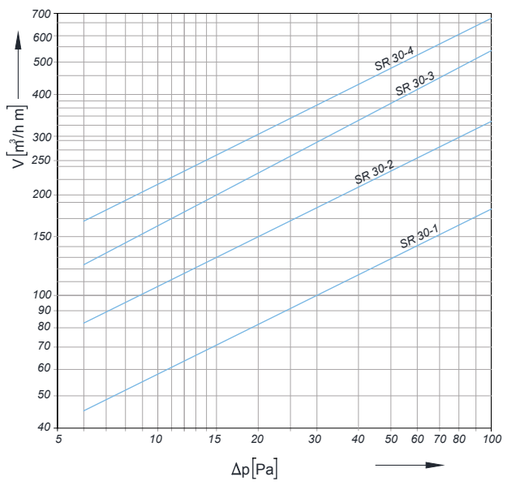
Damper position	100% open	75% open	50% open	25% open	0% open
Δp =	x1,00	x1,6	x2,0	x2,4	x3,0

For insulated plenum boxes sound power level is decreased by additional 2 dB(A)

SR 30 Sound power level - Exhaust air
(damper position 100% open)
- Non insulated plenum box



SR 30 Pressure drop - Exhaust air
(damper position 100% open)



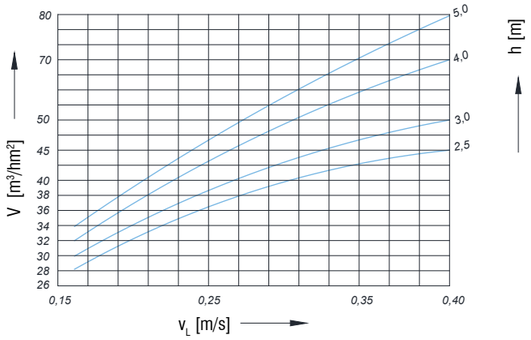
Design changes reserved

SELECTION DIAGRAM - SR 50

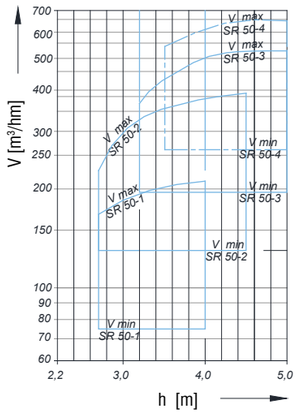
Maximum flow correction factor per 1 m2 of room area, in regards to maximum temperature diference Δt

	Δt=-12K	Δt=-10K	Δt=-8K	Δt=-6K	Δt=-6K
ΔV_p =	x 1,00	x 1,00	x 1,15	x 1,35	x1,70

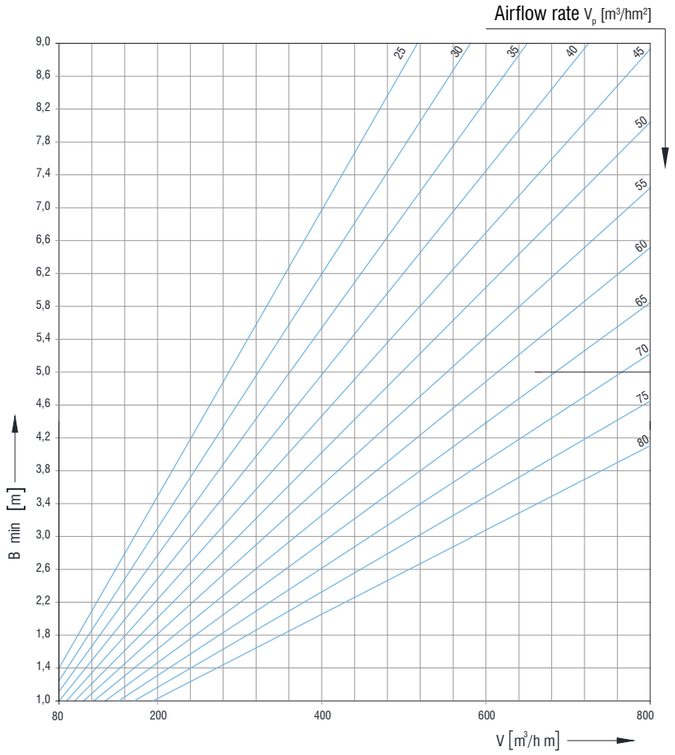
Maximum airflow rate of SR50 per 1m2 of room area, for maximum temperature difference Δt=-12K



Airflow rate per 1 meter length



Minimum distance between two slot diffusers SR50



Design changes reserved

Sound power level correction factor LWA [dB(A)] in regard to airflow damper position

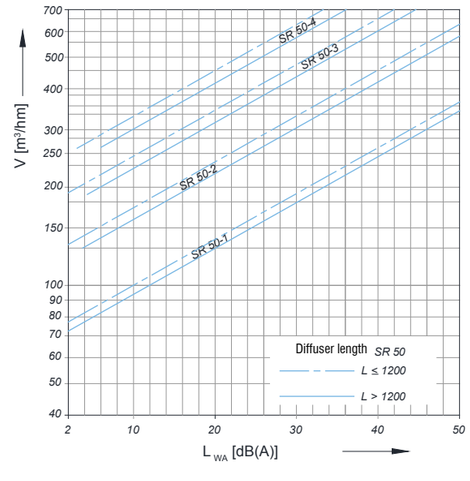
Damper position	100% open	75% open	50% open	25% open	0% open
ΔL_{WA} =	+0	+1	+2	+4	+6

Pressure drop correction factor LWA [dB(A)] in regard to airflow damper position

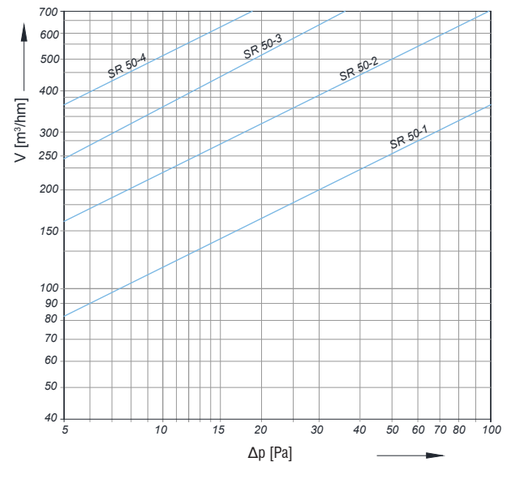
Damper position	100% open	75% open	50% open	25% open	0% open
Δp =	x1,00	x1,2	x1,4	x1,7	x2,2

For insulated plenum boxes sound power level is decreased by additional 2 dB(A)

SR 50 Sound power level - Supply air
(damper position 100% open)
- Non insulated plenum box



SR 50 Pressure drop - Supply air
(damper position 100% open)



Sound power level correction factor LWA [dB(A)] in regard to airflow damper position

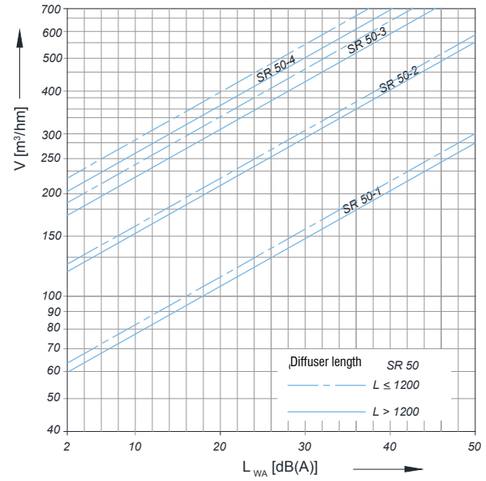
Damper position	100% open	75% open	50% open	25% open	0% open
ΔL_{WA} =	+0	+0	+1	+2	+2

Pressure drop correction factor LWA [dB(A)] in regard to airflow damper position

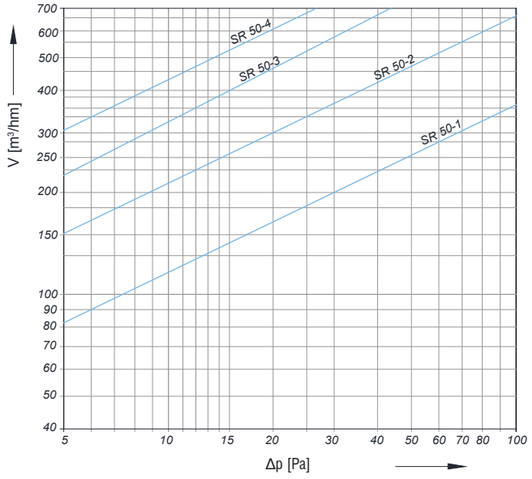
Damper position	100% open	75% open	50% open	25% open	0% open
Δp =	x1,00	x1,2	x2,0	x2,4	x3,0

For insulated plenum boxes sound power level is decreased by additional 2 dB(A)

SR 50 Sound power level - Exhaust air
(damper position 100% open)
- Non insulated plenum box



SR 50 Pressure drop - Exhaust air
(damper position 100% open)



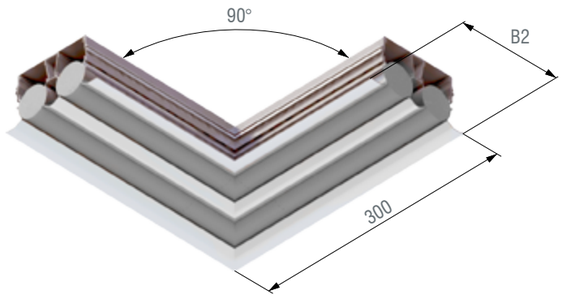
Design changes reserved

Ordering key:

Type (SR30, SR50)	**SR30**	**- 2**	**- 1,4**	**- KZ**	**- T**	**- N**	**- B**	**- L2**	**- RAL..**
Number of slots (1, 2, 3, 4)									
Diffuser length (1..2m, in increments of 0,1m)									
K - plenum box **Z -** insulation									
T - cross-member fixing **F -** fixing with rivets									
N - slot diffuser **U -** narrow slot diffuser									
C - black discharge elements **B -** white discharge elements **S -** grey discharge elements									
L1 - end profile on one side **L2 -** end profile on both sides **I1 -** end plate on one side **I2 -** end plate on both sides									

Corner section

- Corner section doesn't have air supply function
- Outter dimensions: - L=300 / 300 mm
  - Angle 90°
- Dimensions are referred to maximum outter dimensions (see image)



Corner section ordering key:

Type (SR30, SR50)	**SR30**	**- 2**	**- 90**	**- B**	**- RAL..**
Number of slots (1, 2, 3, 4)					
Corner section angle					
C - black discharge elements **B -** white discharge elements **S -** grey discharge elements					

Design changes reserved

NOTES:

Design changes reserved

2/S11

v 3.3 (en)

VARIABLE SWIRL DIFFUSER

DVV

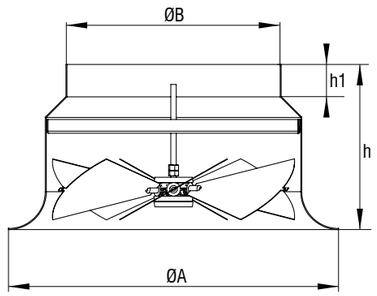
klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow	v_h [m/s]	- Average core velocity at distance h (m) from diffuser
V_{uk} [m³/h]	- Total air volume in motion		
h [m]	- Distance from the ceiling to the occupied zone	Δp [Pa]	- Total pressure drop
		t_p [°C]	- Air temperature in the room
H [m]	- Room height	t_z [°C]	- Supply air temperature
A,B [m]	- Distance between diffusers	t_m [°C]	- Core air temperature
x [m]	- Distance from wall	Δt_z [°C]	- $(t_z - t_p)$
L [m]	- Throw distance (x+h)	Δt_L [C°]	- $(t_m - t_p)$
A_{ef} [m2]	- Effective discharge area	i	- Induction V_{uk}/V
v_{ef} [m/s]	- Effective jet velocity	L_{WA} [dB(A)]	- Sound power level
v_L [m/s]	- Average core velocity at distance L (m) from diffuser		

Design changes reserved



DVV

- Ceiling diffuser for room heights from 4 to 10m.
- Made out of steel sheet, standard RAL 9010
- Adjustable blade angle
- Fixing with screws

Options

- Plenum box
- Manual drive
- Motor drive
- Thermostat drive
- RAL...

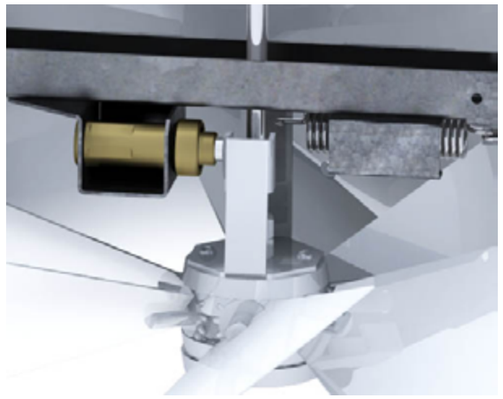
Dimensions

Size	A_{ef} [m²]	øB [mm]	øA [mm]	h [mm]	h1 [mm]	⌀K [mm]	H [mm]	ød [mm]
250	0,048	248	417	230	40	384	290	198
315	0,077	313	491	250	40	484	340	248
400	0,125	398	615	265	50	590	405	313
500	0,195	498	796	320	50	590	405	313
630	0,310	628	935	370	40	650	540	448
800*	0,503	798	1142	451	40	950	590	498

*Size 800 at special request

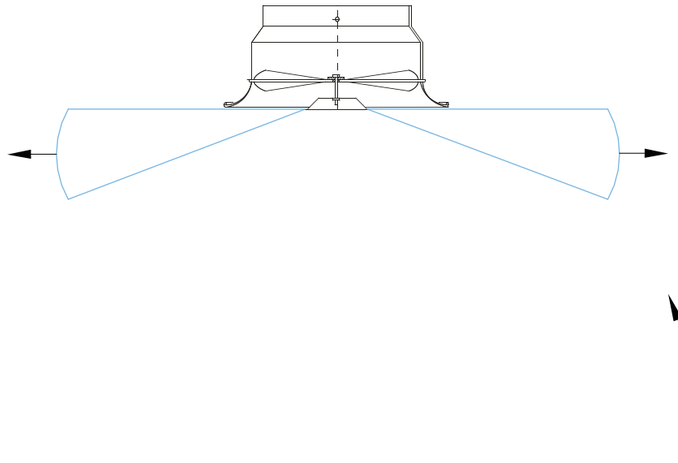
Design changes reserved

Thermostat drive

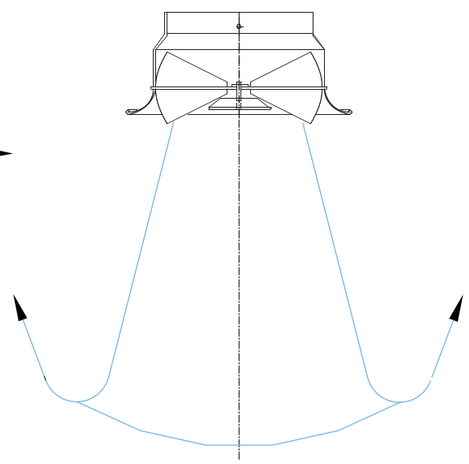


- adjusting throw distance , according to temperature of supply air.
- no additional power supply needed

Cooling mode



Heating mode

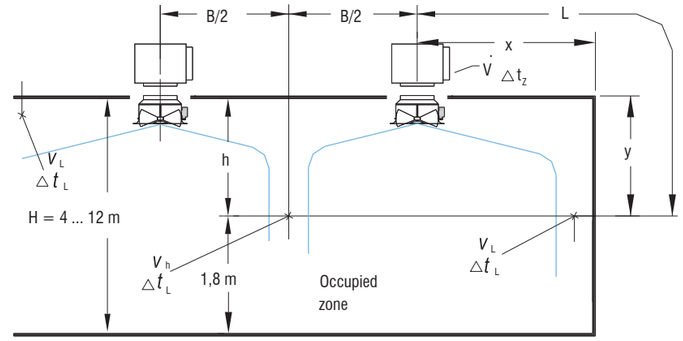


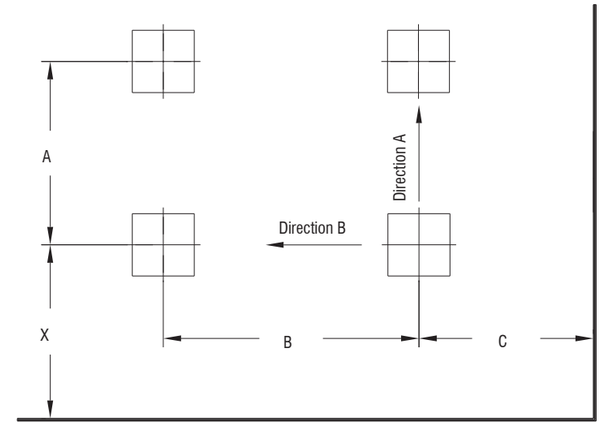
Ordering key:

Type	**DVV**	**- 500**	**- M230**	**- OZ**	**- H**	**- PL**	**- Ød**
Size							
R - manual drive **M230** - motor drive 230V **M24** - motor drive 24V **T** - thermostat drive (no power supply)							
OZ - two positions **K** - continuous							
Horizontal connection							
Plate 595x595 (installation in suspended ceiling)							
Connection diameter							

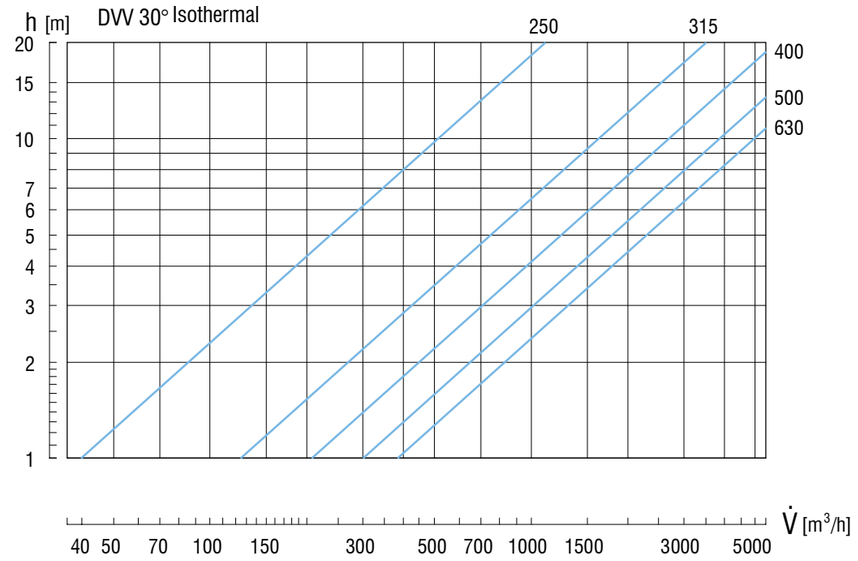
*Screws are not delivered
**Ordering key for Plenum box on page 184
***Only plenum box UPK2

Discharge diagram



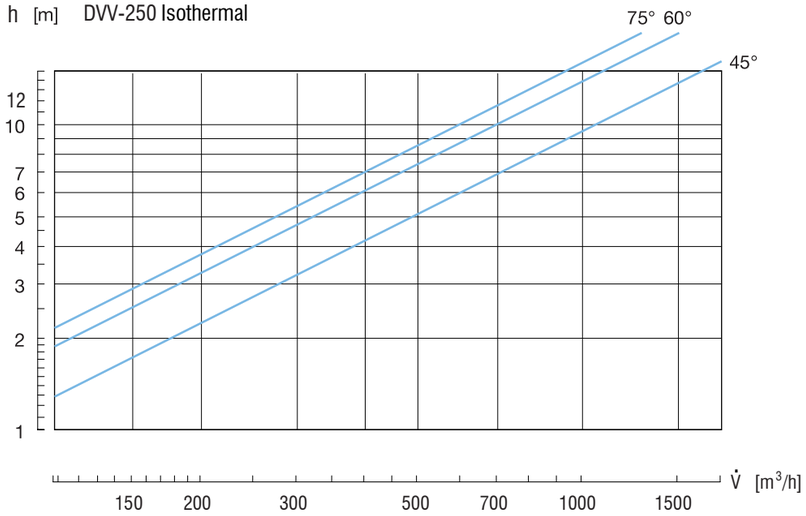


Selection diagram

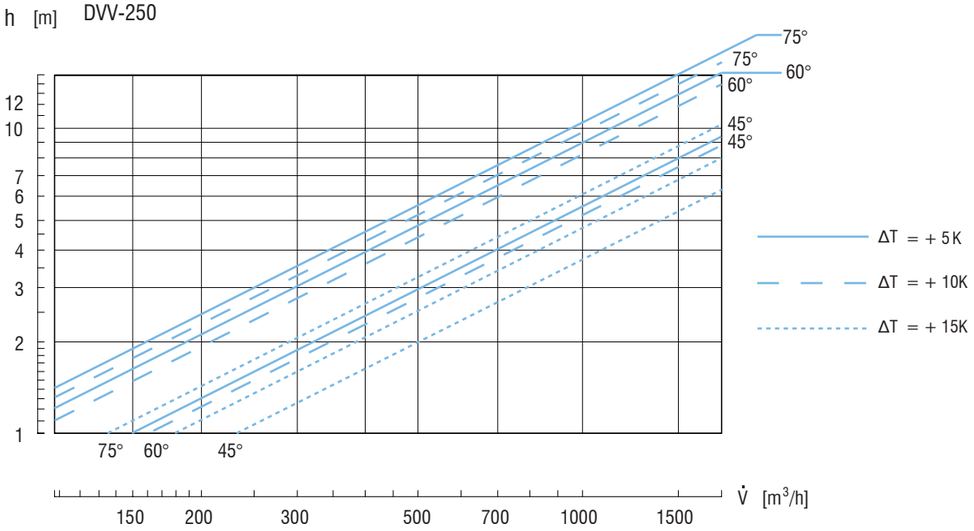


If installed less than 300mm from ceiling, values from diagrams should be multiplied by 1.4

h [m] DVV-250 Isothermal

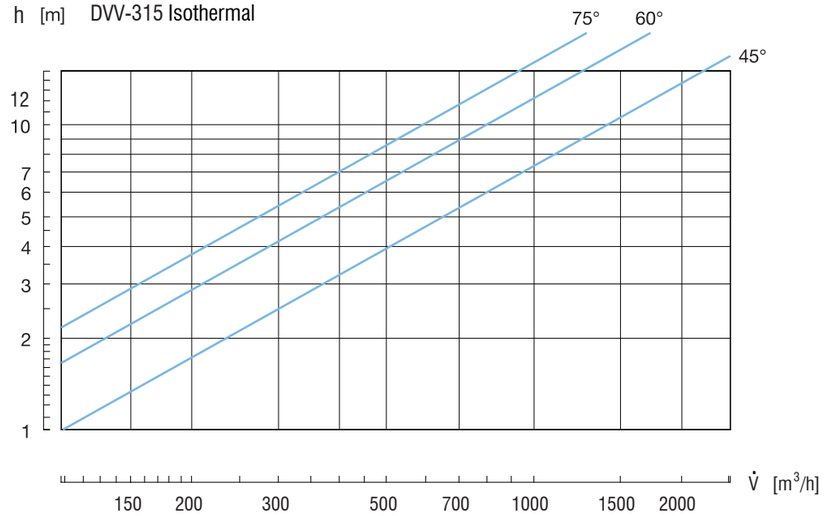


h [m] DVV-250

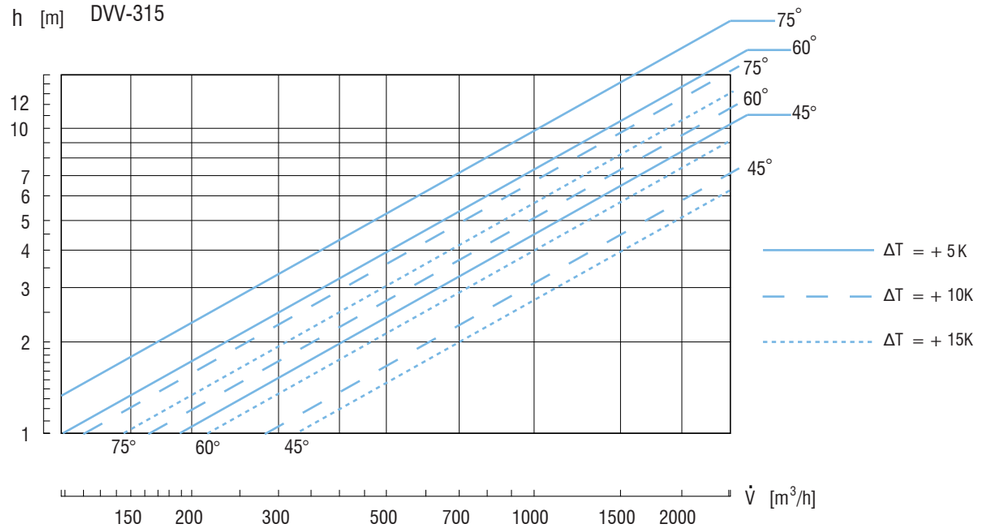


Design changes reserved

h [m] DVV-315 Isothermal

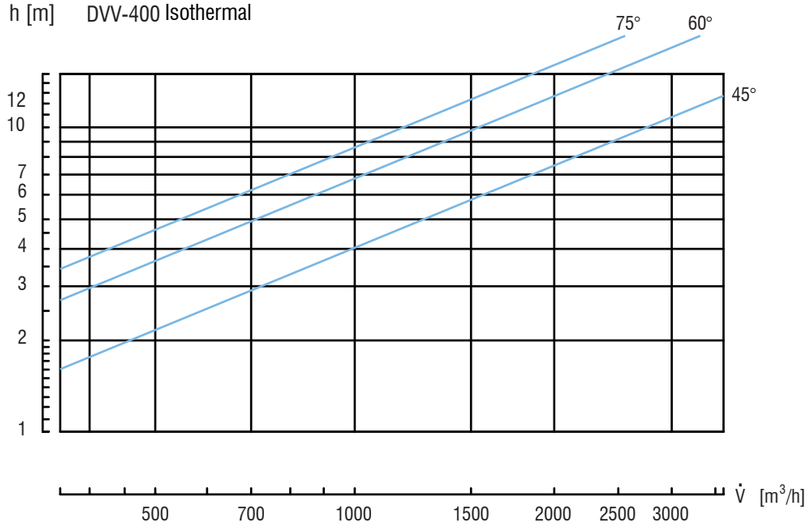


h [m] DVV-315

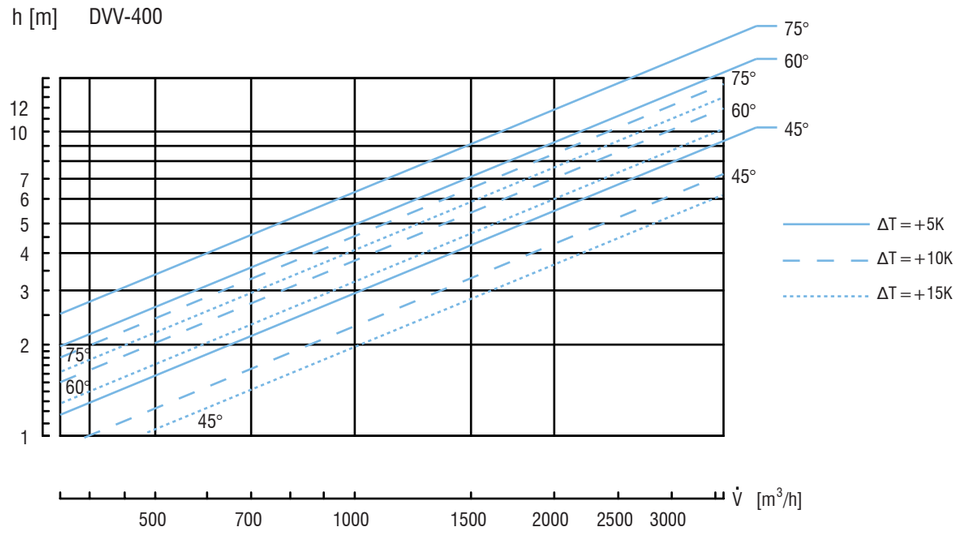


Design changes reserved

h [m] DVV-400 Isothermal



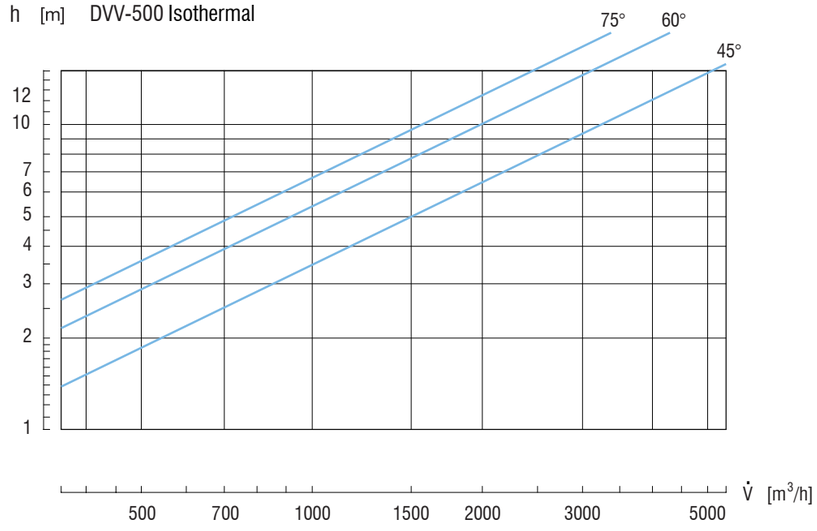
h [m] DVV-400



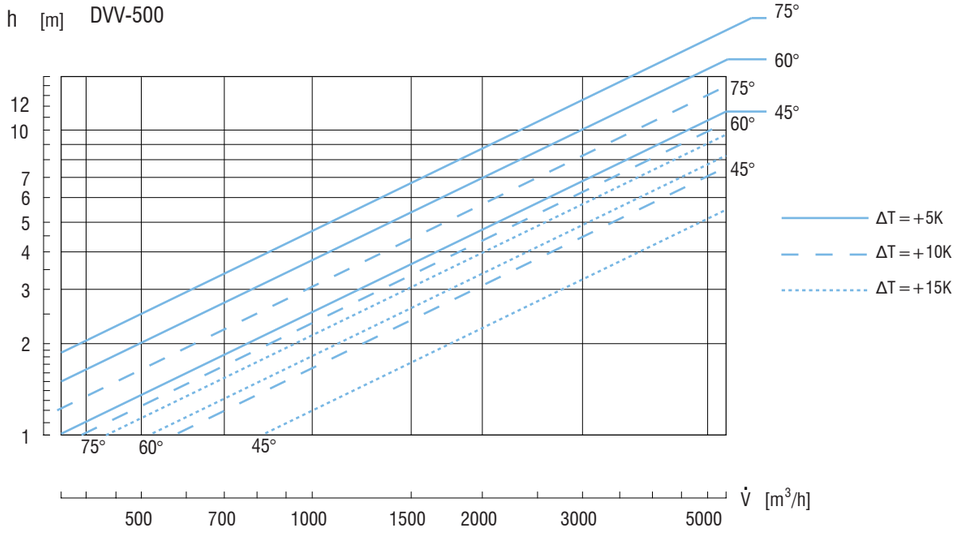
Design changes reserved

VARIABLE SWIRL DIFFUSER

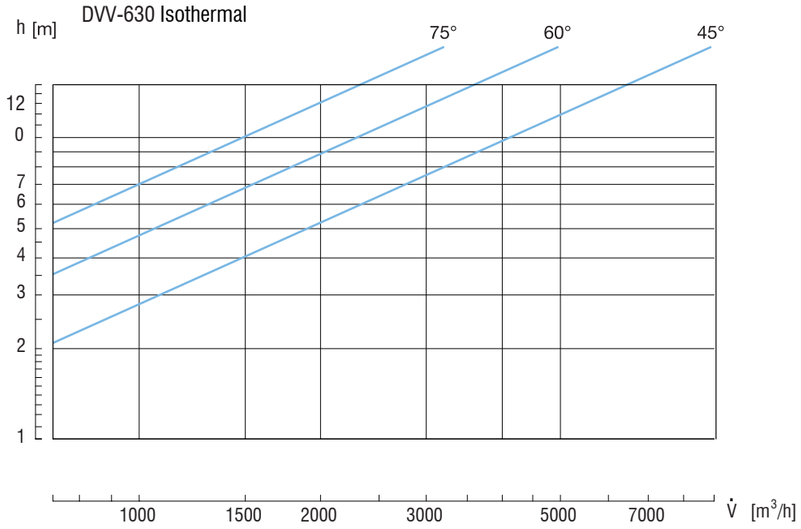
h [m] DVV-500 Isothermal

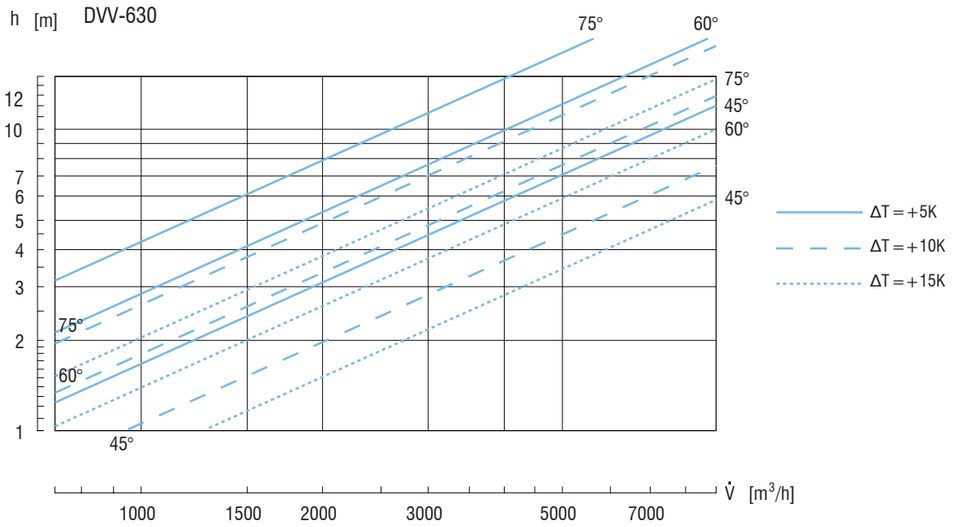


h [m] DVV-500



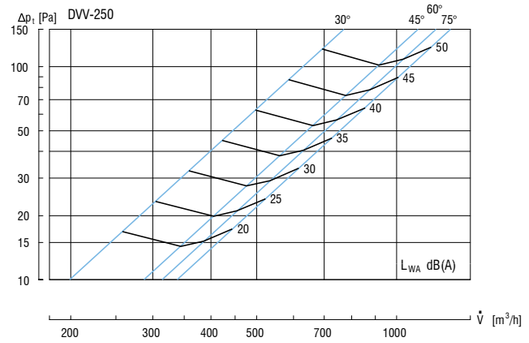
Design changes reserved



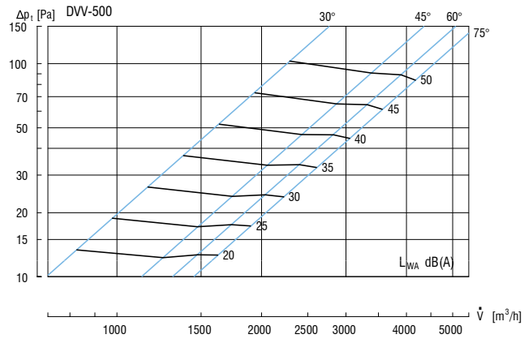


Design changes reserved

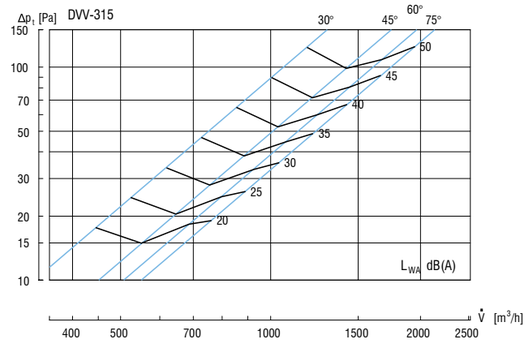
Sound level and pressure drop



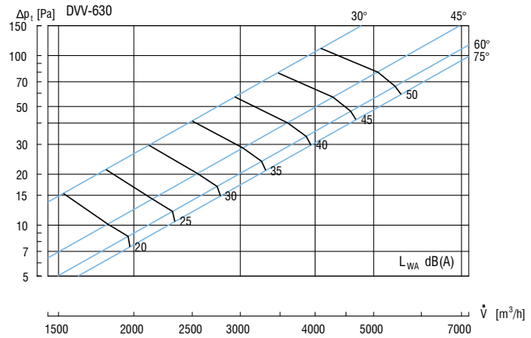
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	7	1	-2	-2	-4	-9	-18	-21



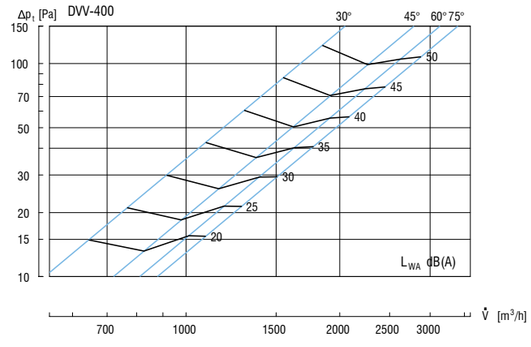
Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	1	-2	-1	-4	-12	-20	-22



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	10	2	-1	-3	-4	-10	-17	-21



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	15	5	0	-2	-5	-12	-18	-22



Hz	63	125	250	500	1K	2K	4K	8K
K_{ok}	12	1	-2	-2	-3	-13	-20	-23

Example:

Given:

Tip DVV 500
isothermal flow
h = 5 m
V = 1500 m³/h

Solution:

Diagram pg. 9
Angle 45°
Diagram pg. 11
Δp = 17Pa
L_{WA} = 25 dB (A)

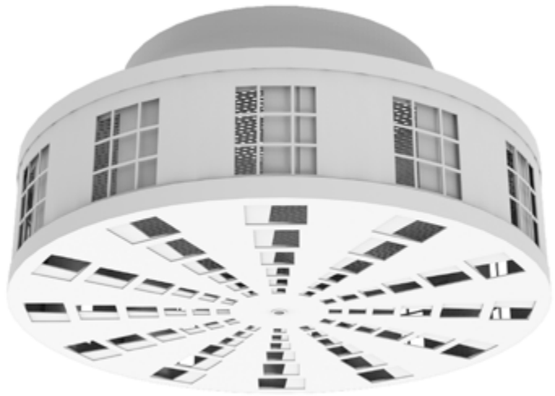
Design changes reserved

2/S12

v 3.3 (en)

DIFFUSER FOR HORIZONTAL OR VERTICAL DISCHARGE

DHV

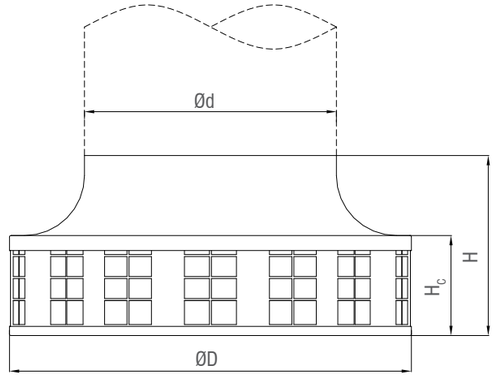


klimaoprema

TABLE OF CONTENTS

Definition of symbols:

- V [m³/h] - Airflow rate
- y [m] - Vertical jet component
- x [m] - Horizontal jet component
- A,B [m] - Distance between diffusers
- C,X [m] - Distance between diffuser and wall
- L [m] - Throw distance (x+h)
- v_L [m/s] - Average air velocity at distance h from diffuser
- h [m] - Distance between ceiling and occupied zone
- v_h [m/s] - Average air velocity between two diffusers at distance h (m) from diffuser
- t_z [°C] - Supply air temperature
- t_L [°C] - Temperature at distance L
- t_P[°C] - Room temperature
- Δt_z [K] - (t_Z-t_P)
- Δt_L [K] - (t_L-t_P)
- Δp [Pa] - Total pressure drop
- L_{WA} [dB(A)] - Sound power level



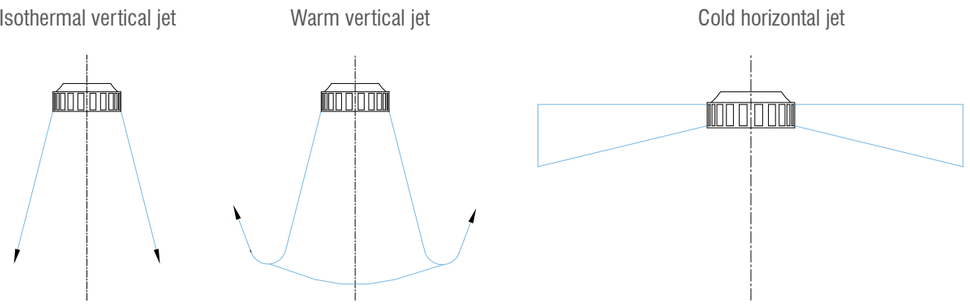
DHV

- Ceiling diffuser for room heights from 4 to 10m.
- Made out of steel sheet, standard RAL 9010
- Adjustable discharge direction

Options

- RAL...
- Plenum box
- Motor drive

Air discharge types



DHV	Dimensions				Characteristics			Cooling		Heating	
	øD [mm]	ød [mm]	H [mm]	H_c [mm]	h [m]	V_{min} [m³/h]	V_{max} [m³/h]	Ah_S [m²]	Ah_{EF} [m²]	Av_S [m²]	Av_{EF} [m²]
300	302	180	145	80	3	200	900	0,03345	0,0268	0,03126	0,0250
400	402	250	180	100	3	300	1800	0,03978	0,0318	0,03781	0,0302
500	502	315	200	120	4	600	2500	0,06115	0,0489	0,05972	0,0478
600	602	400	220	135	5	800	3500	0,08121	0,0650	0,07996	0,0640
800	802	500	310	185	5	1500	6300	0,17523	0,1402	0,15848	0,1268

Ordering key:

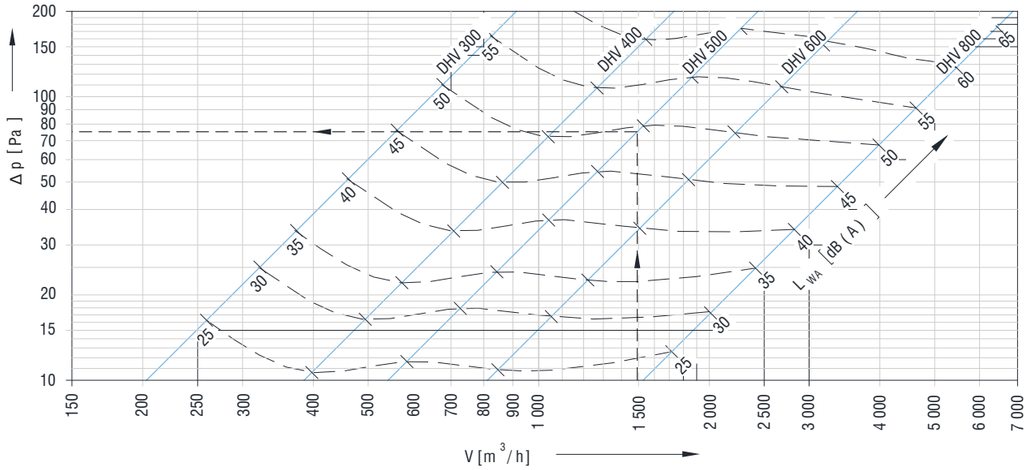
Horizontal-vertical diffuser DHV	- 500	- M230	- OZ	- A	- H	- ød	- Z
Nominal dimension							
R - manual drive **M230 -** motor drive 230V **M24 -** motor drive 24V							
OZ - two positions **K -** continuous							
A - supply air **B -** exhaust air							
H - horizontal connection							
Connection diameter							
Z - insulation							

*Screws are not delivered
**Ordering key for Plenum box on page 184
***Only plenum box UPK2

SELECTION DIAGRAMS

Diagram 1: Pressure drop and sound level diagram for DHV

Connection to duct



DIFFUSER FOR HORIZONTAL OR VERTICAL DISCHARGE

Diagram 2: Pressure drop and sound level diagram for DHV 300

Diffuser with plenum box

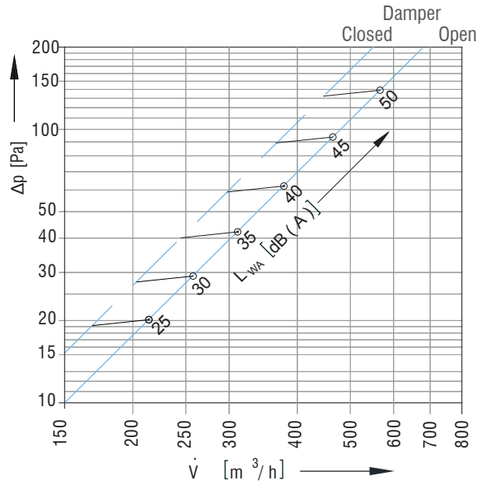


Diagram 3: Pressure drop and sound level diagram for DHV 400

Diffuser with plenum box

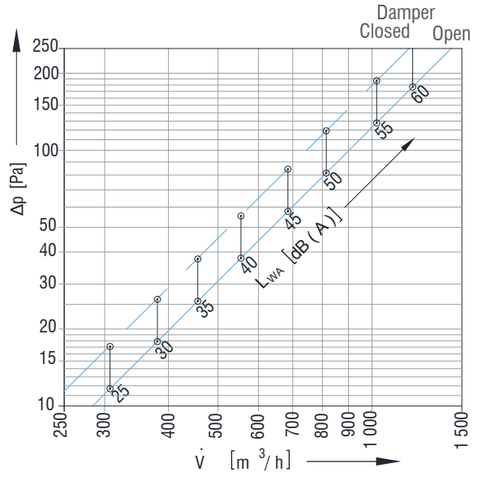


Diagram 4: Pressure drop and sound level diagram for DHV 500

Diffuser with plenum box

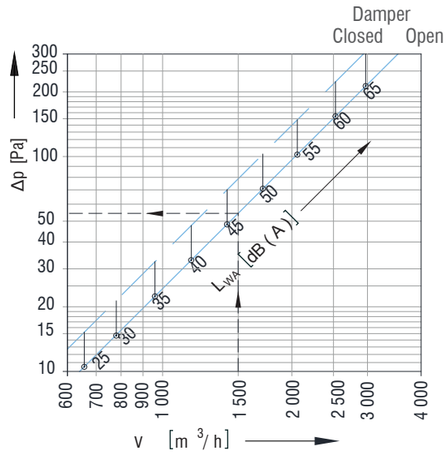


Diagram 5: Pressure drop and sound level diagram for DHV 600

Diffuser with plenum box

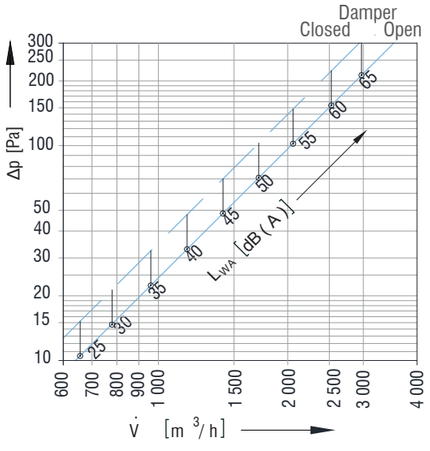


Diagram 5: Pressure drop and sound level diagram for DHV 800

Diffuser with plenum box

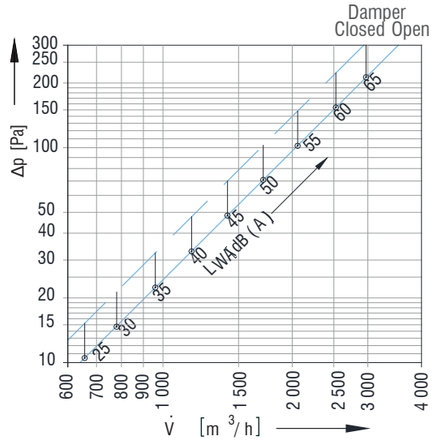


Diagram 7: Vertical warm jet throw diagram for DHV 300

Diagram 8: Vertical isothermal jet throw diagram for DHV 300

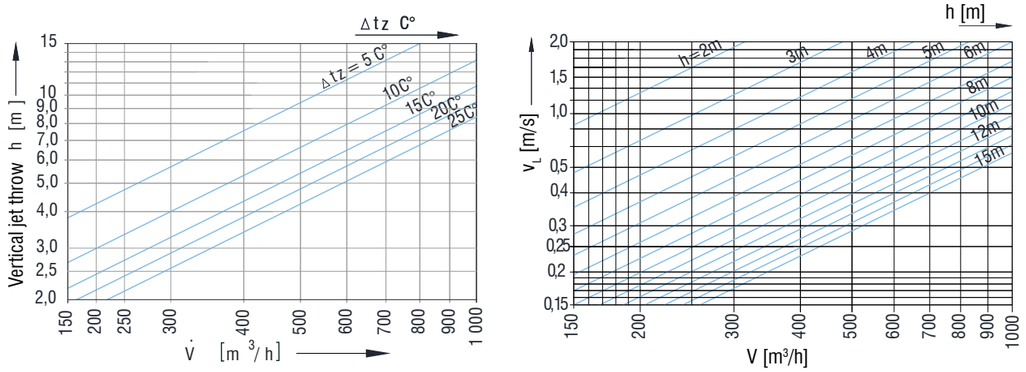
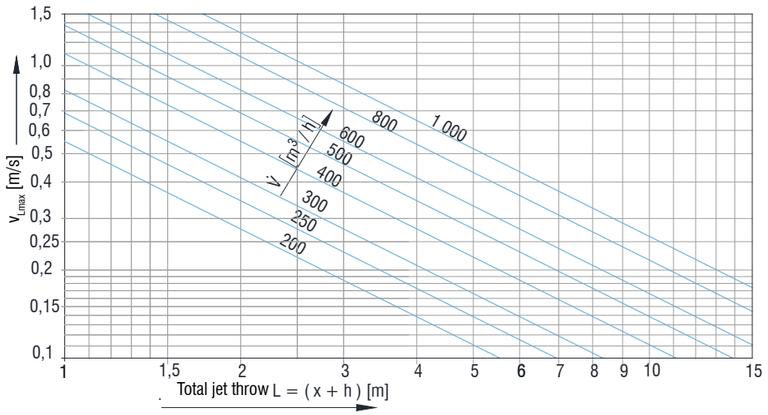


Diagram 9: Maximum jet velocity diagram for DHV 300



Design changes reserved

Diagram 10: Vertical warm jet throw diagram for DHV 400

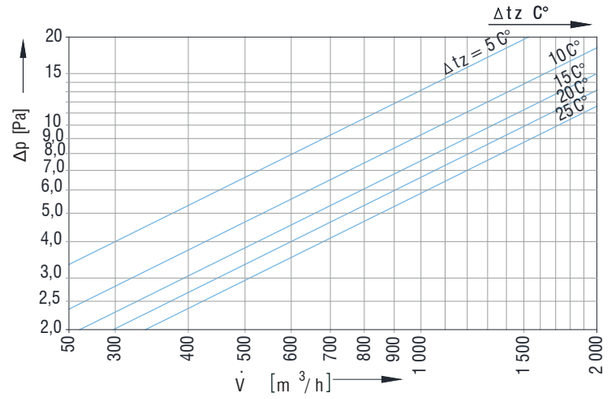


Diagram 11: Vertical isothermal jet throw diagram for DHV 400

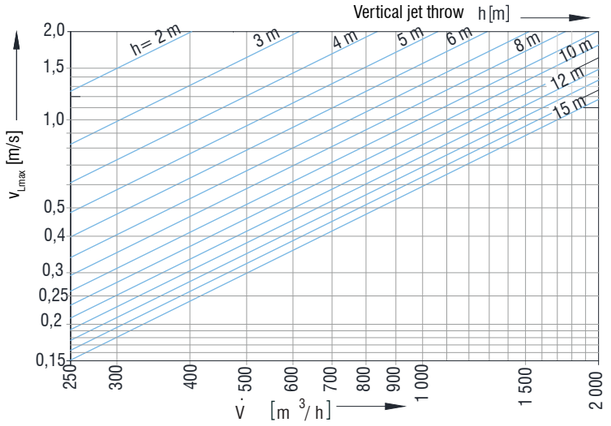
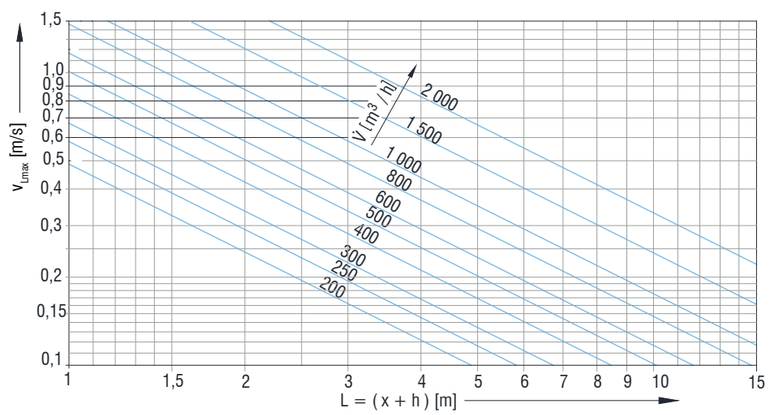


Diagram 12: Maximum jet velocity diagram for DHV 400



Design changes reserved

Diagram 13: Vertical warm jet throw diagram for DHV 500

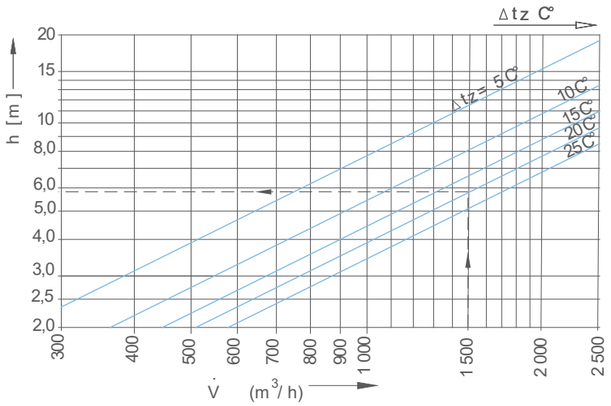


Diagram 14: Vertical isothermal jet throw diagram for DHV 500

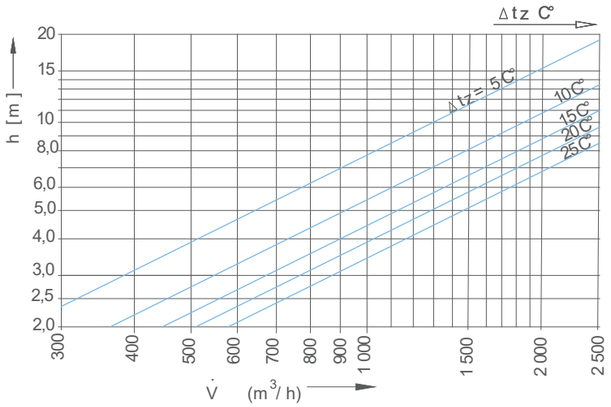


Diagram 15: Maximum jet velocity diagram for DHV 500

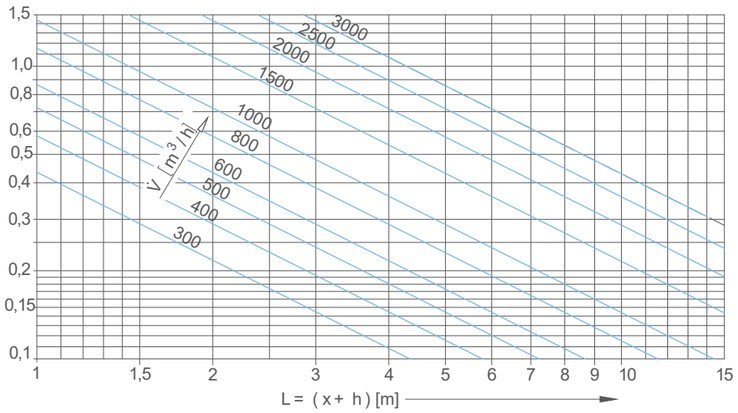


Diagram 16: Vertical warm jet throw diagram for DHV 600

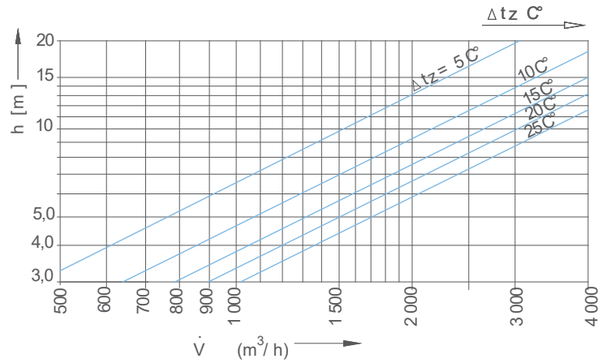


Diagram 17: Vertical isothermal jet throw diagram for DHV 600

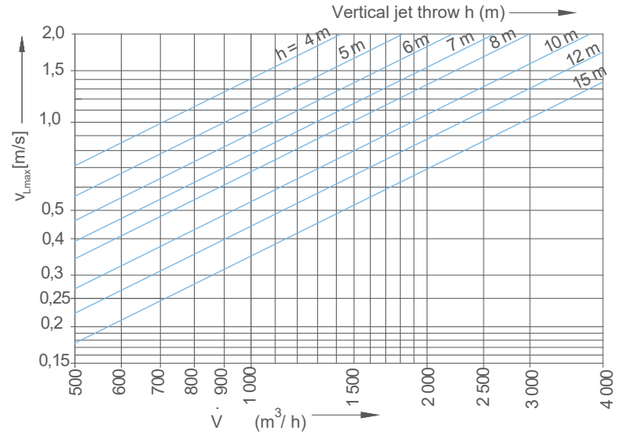


Diagram 18: Maximum jet velocity diagram for DHV 600

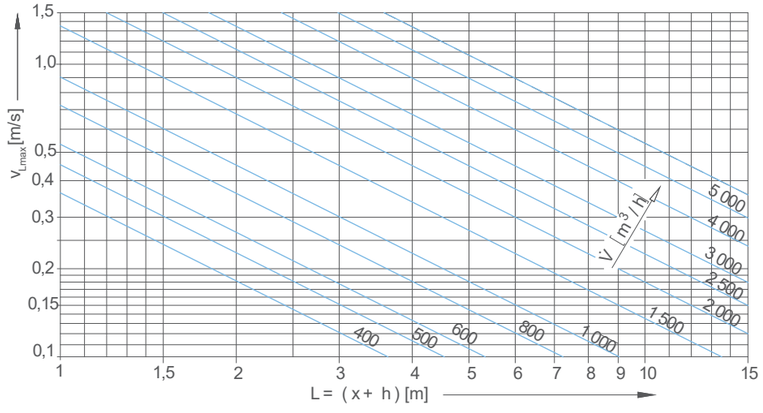


Diagram 19: Vertical warm jet throw diagram for DHV 800

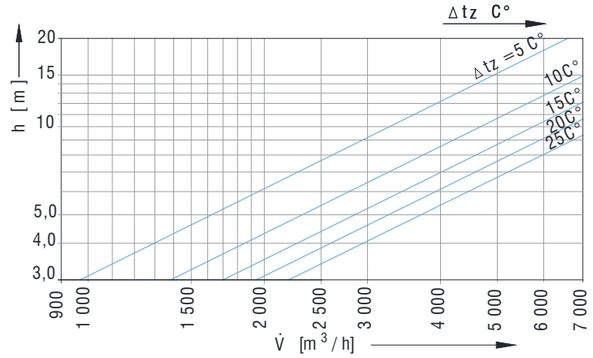


Diagram 20: Vertical isothermal jet throw diagram for DHV 800

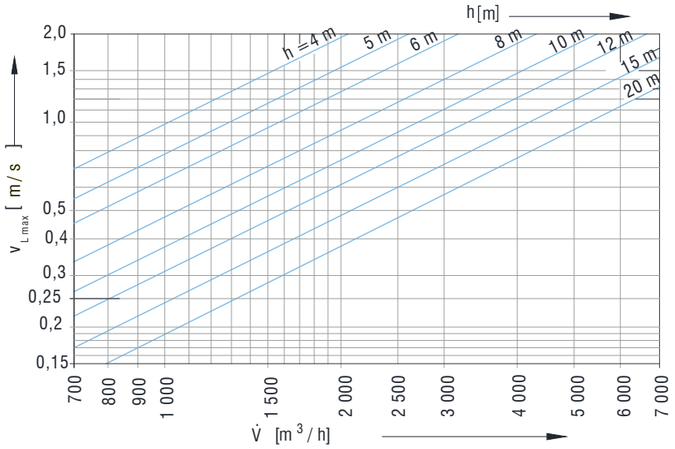
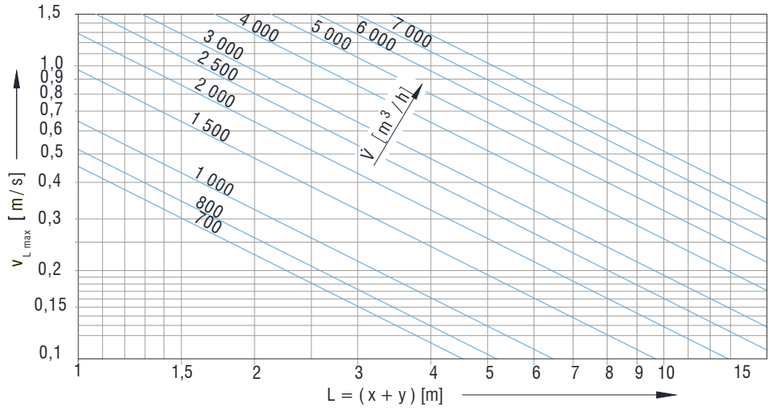


Diagram 21: Maximum jet velocity diagram for DHV 800



Example:

Given:	**Solution:**	
	Installation on duct	**Installation with plenum**
Type DHV 500 V = 1500 m³/h ΔT = +20 °C Damper open 100%	**Diagram 1:** L_{WA} = 50 dB(A) Δp = 78 Pa	**Diagram 4:** L_{WA} = 46dB(A) Δp = 53 Pa **Diagram 13:** h = 6 m

2/S13
v 3.3 (en)

ADJUSTABLE SWIRL DIFFUSER

DKZ

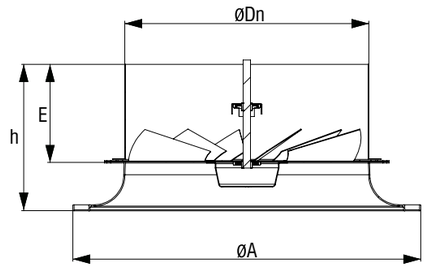
klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Airflow rate
V_n [m³/h]	- Nominal airflow rate
V_{uk} [m³/h]	- Total airflow rate
h [m]	- Distance between ceiling and occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance between diffuser and wall
y[m]	- Vertical jet throw
L [m]	- Throw distance (x+h)
A_{ef} [m2]	- Effective outlet area
v_{ef} [m/s]	- Effective air discharge velocity
v_L [m/s]	- Average air velocity at distance h from diffuser
v_{Lmax} [m/s]	- Maximal air velocity at distance L(m) from diffuser
v_h [m/s]	- Average air velocity between two dif fusers at distance h (m) from diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Room temperature
t_z [°C]	- Supply air temperature
t_m [°C]	- Air-stream core temperature
Δt_z [°C]	- $(t_z - t_p)$
Δt_L [C°]	- $(t_m - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

Design changes reserved



DKZ

- Ceiling diffuser for room heights from 4 to 10m.
- Made out of steel sheet, standard RAL 9010
- Adjustable discharge direction

Options

- RAL...
- Plenum box
- Motor drive

• Vertical discharge (warm jet)

• Discharge at an angle (isothermal jet)

• Horizontal discharge (cold jet)

Table 1: Diffuser dimensions

DKZ	V_{min}	V_{max}	ØA	$ØD_n$	E	h	⍁K	H	ød
	[m³/h]	[m³/h]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
315	300	1200	464	313	143	205	384	340	248
400	600	2200	567	398	158	238	484	405	313
630	1000	4300	871	628	258	383	790	490	398
800	1400	5200	1077	798	408	568	950	590	498

Design changes reserved

Ordering key:

Adjustable industrial swirl diffuser **DKZ - 630 - M230 - OZ - A - H -ød - Z**

Size

M230 - motor drive 230V
M24 - motor drive 24V
R - manual drive

OZ - two positions
K - continuous

A - supply air
B - exhaust air

H - horizontal connection

Connection diameter

Insulation

*Screws are not delivered
**Ordering key for Plenum box on page 184
***Only plenum box UPK2

SELECTION DIAGRAMS

Diagram 1.0 - Effective discharge velocity

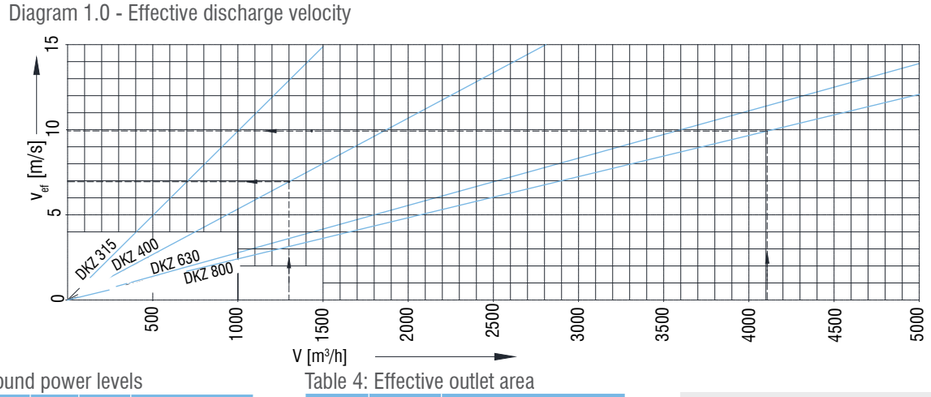


Table 3: Sound power levels

v_{ef}=8 m/s		ΔL	L_{WA}	$L_{WA}=L_{WA}+\Delta L$
Average octave frequency (Hz)	63	4	53	57
	125	1	53	54
	250	0	53	53
	500	-2	53	51
	1000	-5	53	48
	2000	-9	53	44
	4000	-14	53	39
	8000	-23	53	30

Table 4: Effective outlet area

DKZ	A_{ef} [m2]	v_{ef} [m/s]
315	0,028	$v_{ef} = \frac{\dot{V}\ (m^3/h)}{A_{ef}\ (m^2) \times 3600}$
400	0,052	
600	0,100	
800	0,115	

Example 1:
GIVEN
Model DKZ V 400 with plenum
V = 1300 (m³/h)

SOLUTION
Diagram 1.0
v_{ef} = 6,95 (m/s) ≈ 7 (m/s)
Diagram 1.2
Δp = 51 (Pa)
L_{WA} = 53 (dB(A))
$L_W = L_{WA} + \Delta L$ Table 3

Table 5: Relative sound power levels ΔL for DKZ 315

DKZ 315		DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
v_{ef} (m/s)		3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
Average octave frequency (Hz)	63	10	10	7	8	5	6	1	3
	125	2	6	1	5	0	3	-1	1
	250	2	2	1	1	0	-1	-2	-3
	500	-1	-1	-2	-1	-3	-2	-5	-4
	1000	-5	-6	-4	-5	-5	-5	-6	-5
	2000	-18	-18	-14	-13	-9	-9	-7	-7
	4000	-28	-28	-20	-21	-15	-14	-8	-10
	8000	-37	-30	-30	-25	-21	-23	-17	-18

Design changes reserved

Table 6: Relative sound power levels ΔL for DKZ 400

DKZ 315		DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
v_{ef} (m/s)		3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
Average octave frequency (Hz)	63	6	7	4	5	1	2	-1	-1
	125	4	7	4	5	3	3	2	0
	250	2	0	1	-1	0	-3	-1	-5
	500	-1	-1	-1	-2	-2	-3	-3	-5
	1000	-5	-5	-5	-4	-4	-4	-5	-5
	2000	-21	-15	-16	-11	-11	-8	-8	-6
	4000	-36	-26	-28	-19	-21	-13	-15	-9
	8000	-44	-30	-36	-25	-29	-21	-23	-19

Table 7: Relative sound power levels ΔL for DKZ 600

DKZ 315		DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
v_{ef} (m/s)		3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
Average octave frequency (Hz)	63	7	9	5	7	3	4	0	1
	125	3	6	3	5	2	3	2	0
	250	2	1	1	0	0	-2	-1	-4
	500	-1	-1	-1	-1	-2	-3	-3	-5
	1000	-5	-6	-4	-5	-4	-4	-5	-5
	2000	-20	-16	-15	-12	-11	-9	-8	-7
	4000	-33	-27	-25	-20	-18	-14	-12	-10
	8000	-41	-30	-33	-25	-26	-21	-20	-19

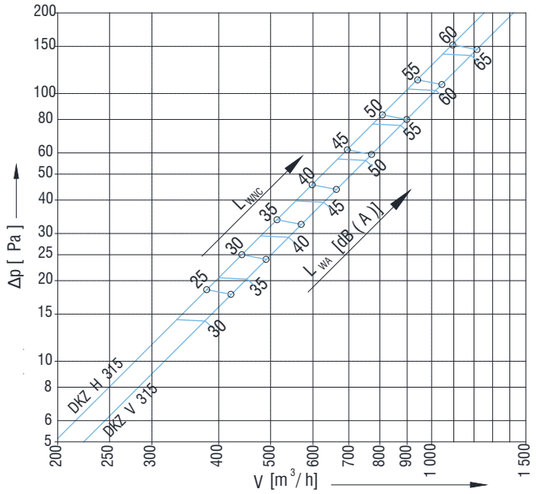
Table 8: Relative sound power levels ΔL for DKZ 800

DKZ 315		DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
v_{ef} (m/s)		3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
Average octave frequency (Hz)	63	7	4	5	12	3	9	0	6
	125	3	6	3	4	2	3	1	1
	250	2	3	1	2	0	1	-1	0
	500	-1	-1	-1	-1	-2	-2	-3	-3
	1000	-5	-7	-5	-6	-4	-5	-5	-5
	2000	-20	-20	-15	-15	-11	-11	-8	-8
	4000	-33	-31	-25	-23	-18	-17	-13	-12
	8000	-42	-31	-35	-27	-26	-21	-22	-17

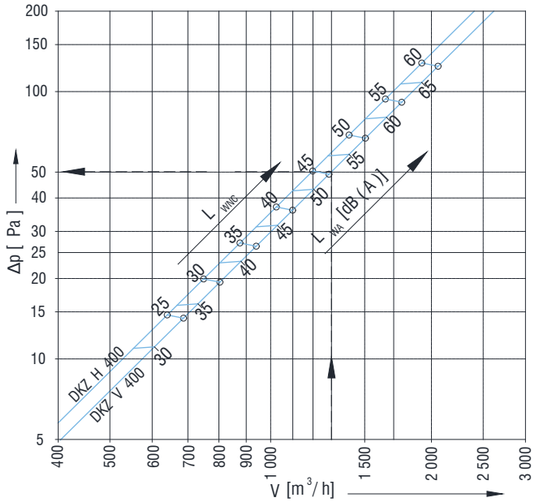
⚠ For determining total sound power levels in a room, number of diffusers and apsorption properties should be considered.

Design changes reserved

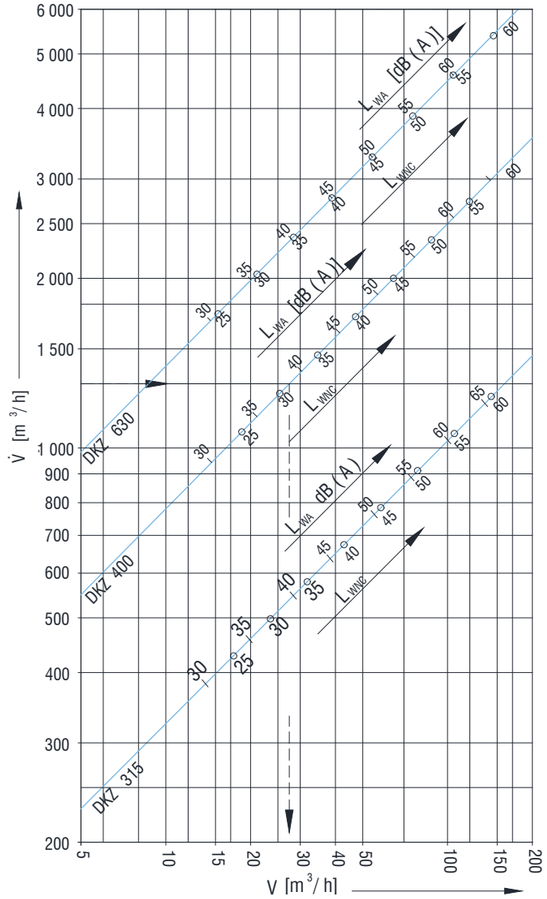
1.1 Total pressure drop and sound power level for DKZ 315 - with plenum box



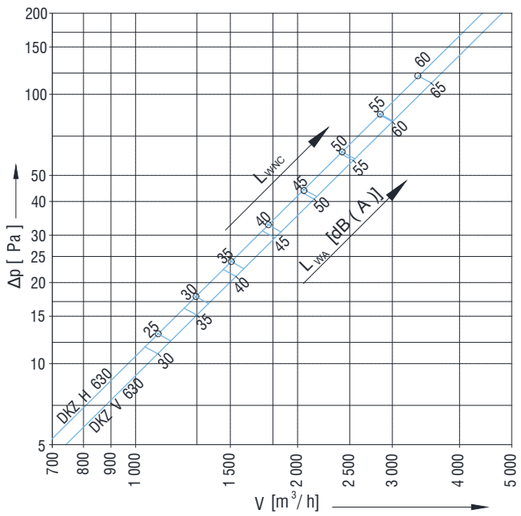
1.2 Total pressure drop and sound power level for DKZ 400 - with plenum box



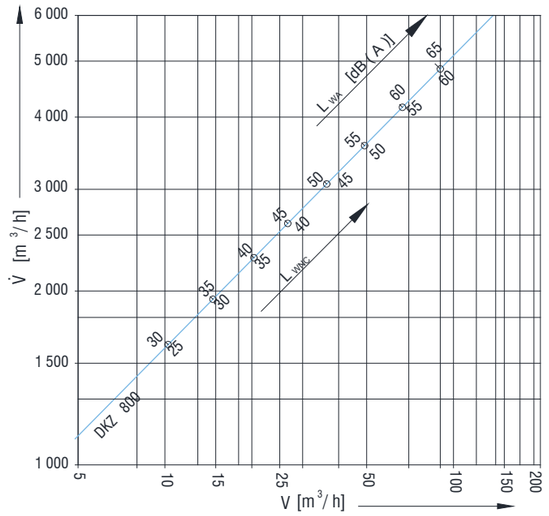
1.4 Total pressure drop and sound power level for DKZ 630 - with plenum box



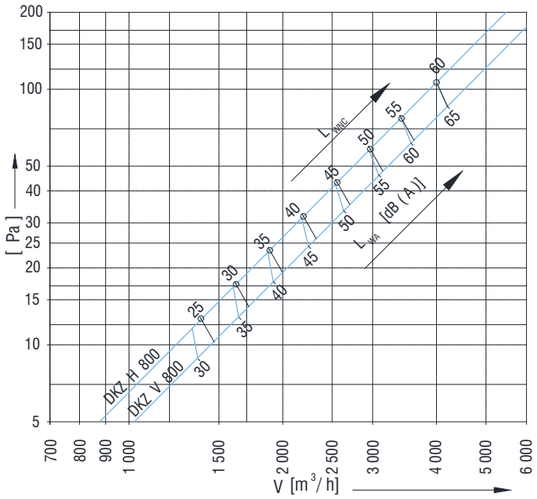
1.3 Total pressure drop and sound power level for DKZ 315, 400, 630 - without plenum box



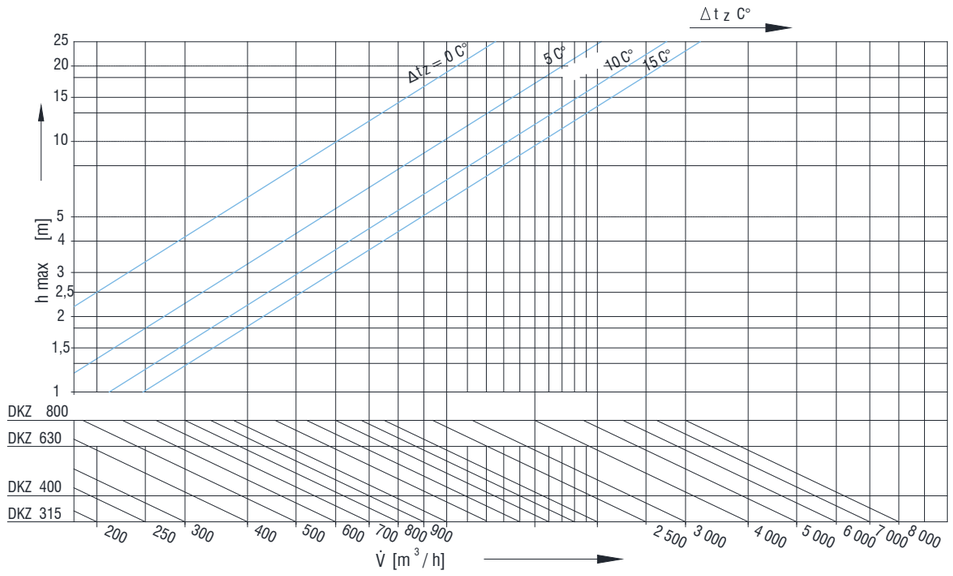
1.5 Total pressure drop and sound power level for DKZ 800 - with plenum box



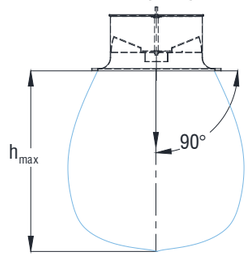
1.6 Total pressure drop and sound power level for DKZ 800 - without plenum box



1.7 Warm vertical jet throw - discharge angle 90°

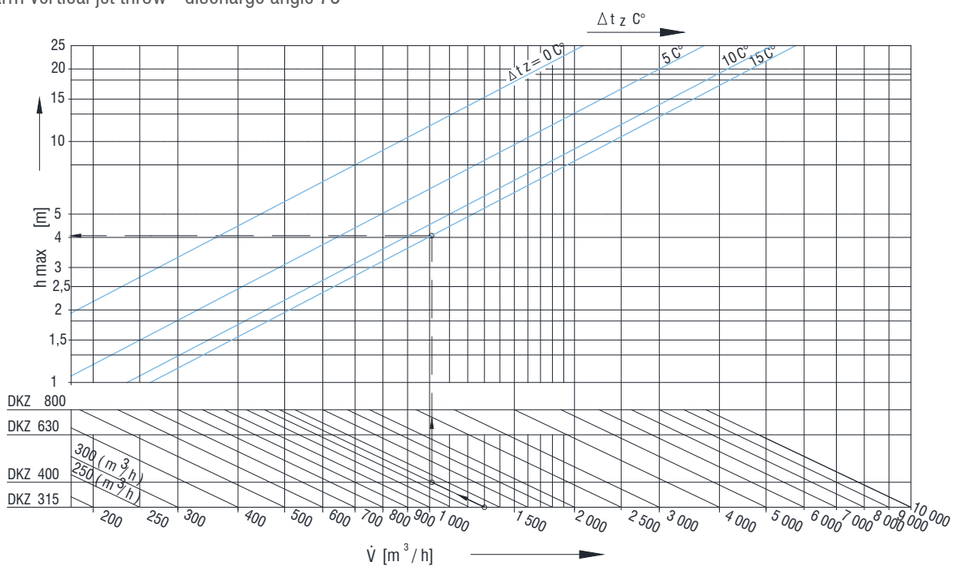


Discharge angle 90°

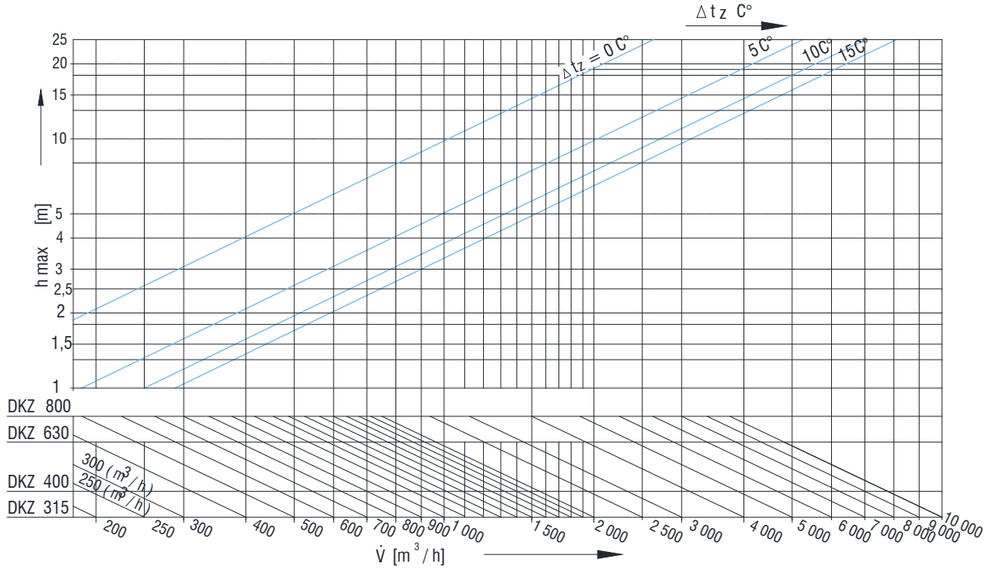


ADJUSTABLE SWIRL DIFFUSER

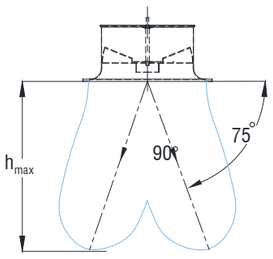
1.8 Warm vertical jet throw - discharge angle 75°



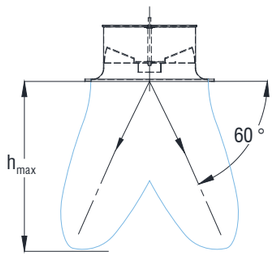
1.9 Warm vertical jet throw - discharge angle 60°



Discharge angle 75°



Discharge angle 60°

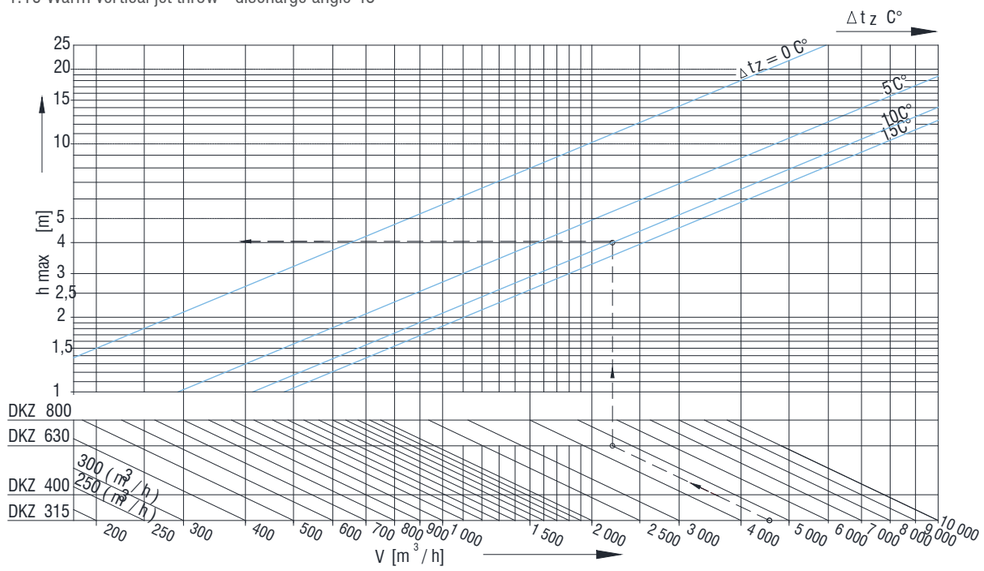


Example 2:
GIVEN
Model: DKZ 400
V = 1400 m³/h
Discharge angle 60°
Δtz = +15 °C

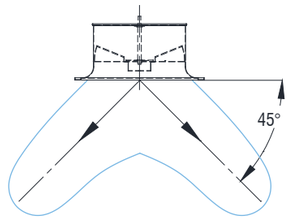
SOLUTION
Diagram 1.6
h_{max} = 3,8 m

Design changes reserved

1.10 Warm vertical jet throw - discharge angle 45°



Discharge angle 45°



Average velocity v_h diagrams at distance B ≥ 5 m

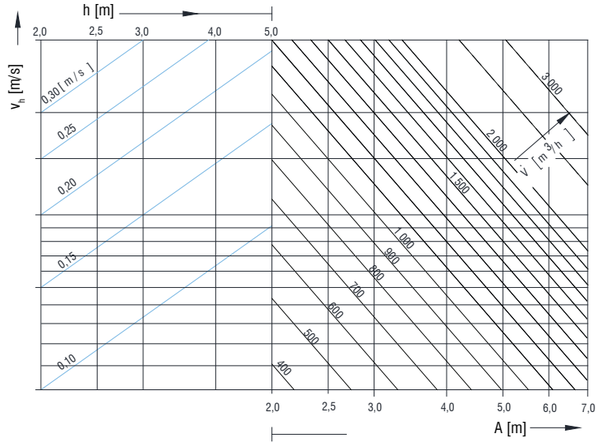
Valid for:
- horizontal cold throw discharge
- free-hanging diffuser installation
- Δt_z = 0 do -10 °C

Example 3:
GIVEN
Model: DKZ 630
V = 4600 m³/h
Discharge angle 45°
Δt_z = +10 °C

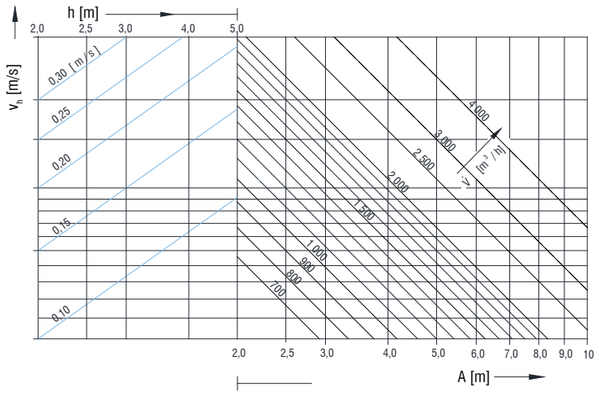
SOLUTION
Diagram 1.7
h_{max} = 4,0 m

Design changes reserved

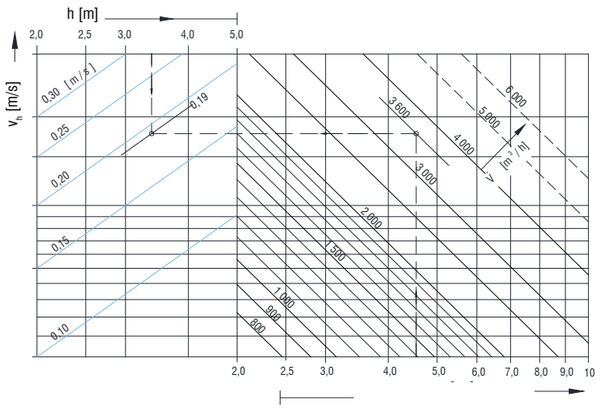
1.11 Average velocity v_h at B ≥ 5 m for DKZ 315



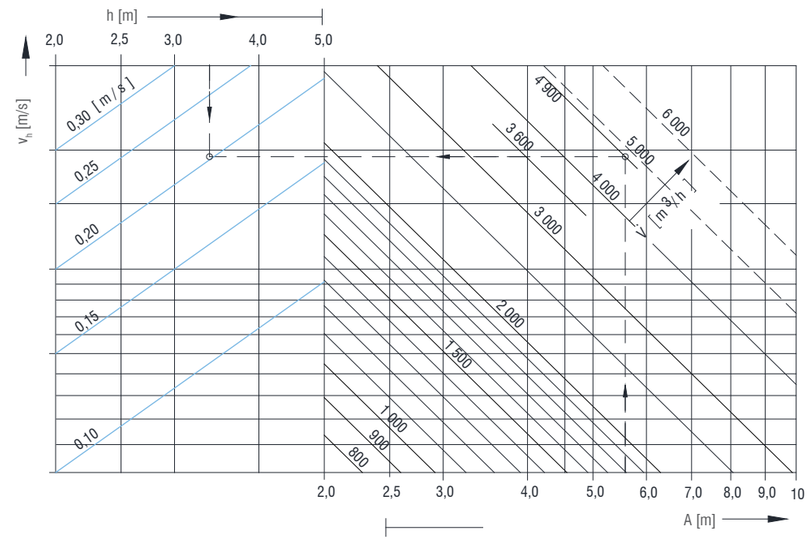
1.12 Average velocity v_h at B ≥ 5 m for DKZ 400

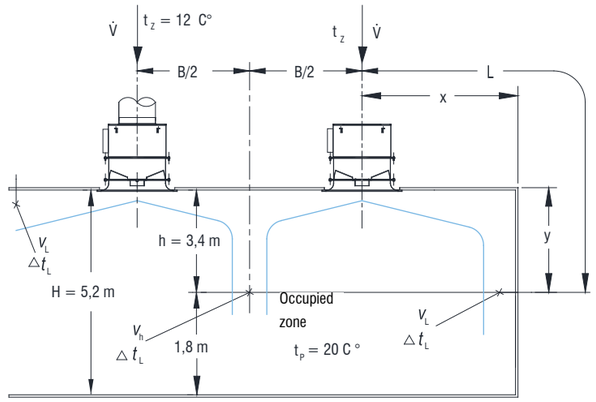


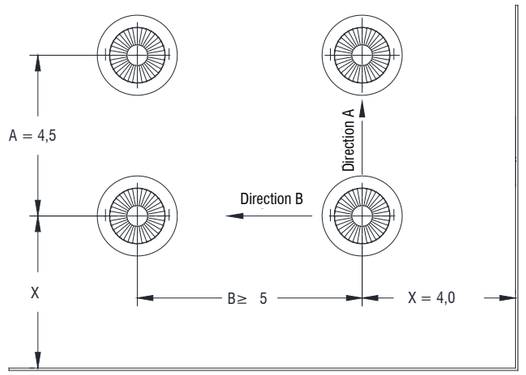
1.13 Average velocity v_h at B ≥ 5 m for DKZ 630



1.14 Average velocity v_h at B ≥ 5 m for DKZ 800







Example 4:

GIVEN
Model: DKZ 630

A = 4,5 m
B ≥ 5 m
V = 3600 m³/h
h = 3,4 m
Δt_z = -8 °C

t_z = 12 °C
t_p = 20 °C
x = 4,0 m
L = 7,4 m

Installation in suspended ceiling

SOLUTION
Diagram 1.10
v_h = 0,19 m/s
Ceiling influence on horizontal discharge
v_h x 1,4 = 0,26 m/s

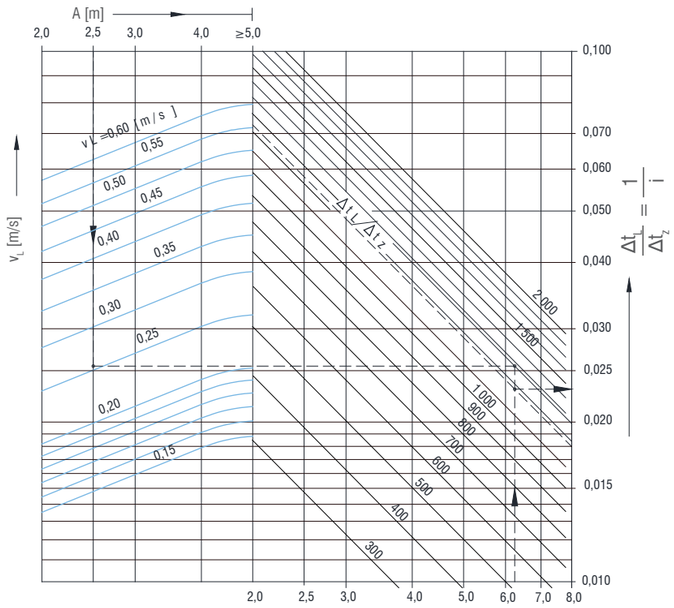
Diagram 2.1
v_L = 0,37 (m/s)
Ceiling influence on horizontal discharge
v_L x 1,4 = 0,52 m/s

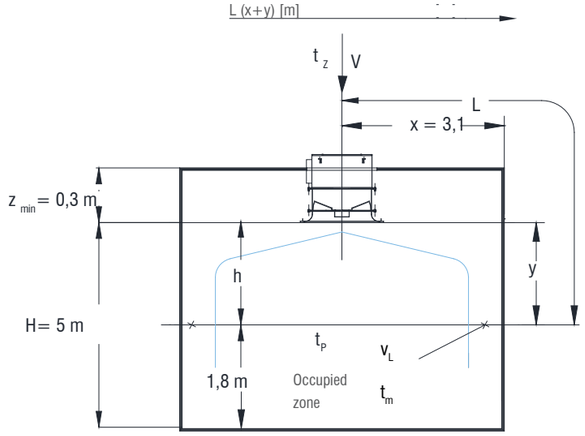
$\frac{\Delta t_L}{\Delta t_z}$ = 0,06 x 1,4 = 0,084

t_L = 19,33 °C
i = 11,9

Average velocity v_L diagrams

2.0 Average velocity v_L and temperature ratio for DKZ 315





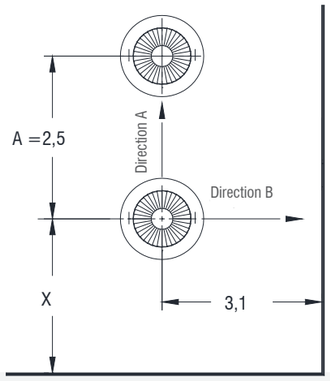


Diagram data valid for:

- cold horizontal air discharge
- free-hanging diffuser installation
- Δt_z = 0 do -10 °C

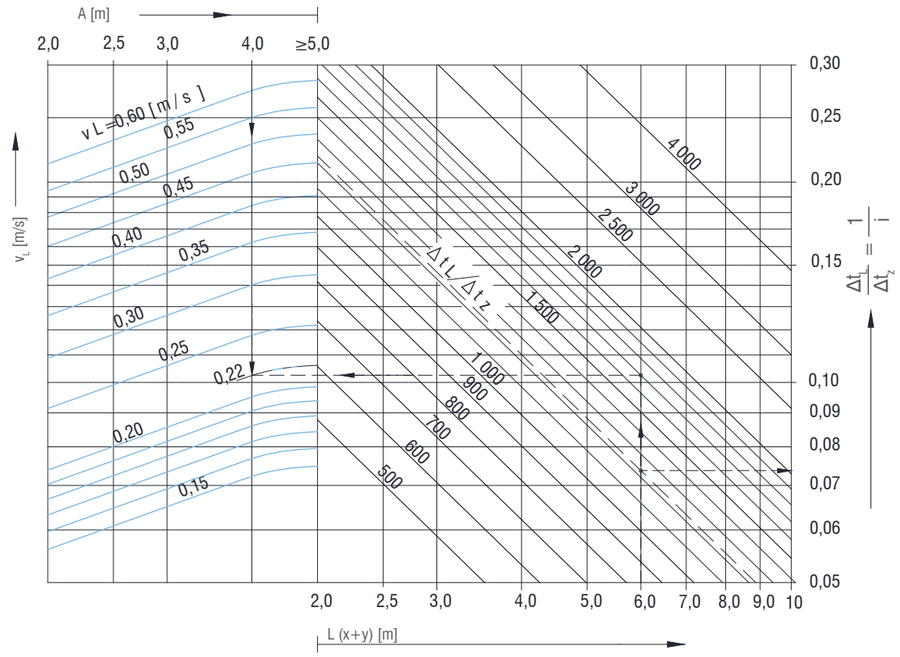
When installing diffuser at suspended ceiling level, $v_L ; v_h ; \frac{\Delta t_L}{\Delta t_z}$ should be multiplied by a factor of 1,4

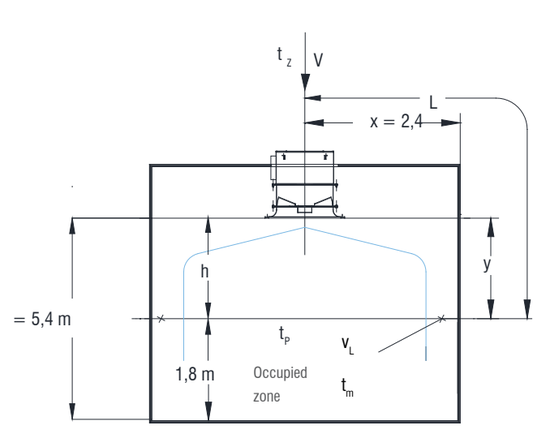
Example 5:
GIVEN
Size: DKZ 315
t_p = 20 °C
V = 1300 m³/h — t_z = 15 °C
H = 5 m — H = h + 1,8
A = 2,5 m
x = 3,1 m
h = 3,2 m
L = 6,3 m — L = x + h
z_{min} = 0,3 m — Free-hanging installation
SOLUTION
Diagram 2.2
v_L = 0,25 m/s

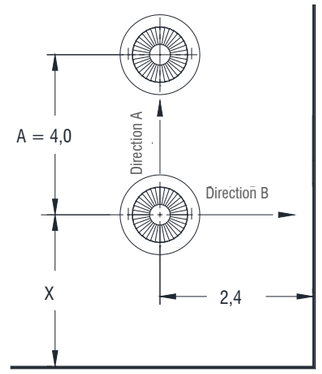
$\frac{\Delta t_L}{\Delta t_z}$ = 0,0235

i = 42,55
t_L = 19,88 °C

2.2 Average velocity v_L and temperature ratio for DKZ 400







Example 6:
GIVEN
Size: DKZ 400
V = 1700 m³/h
H = 5,4 m
A = 4,0 m
x = 2,4 m
h = 3,6 m
L = 6,0 m

SOLUTION
Diagram 2.1
v_L = 0,22 m/s

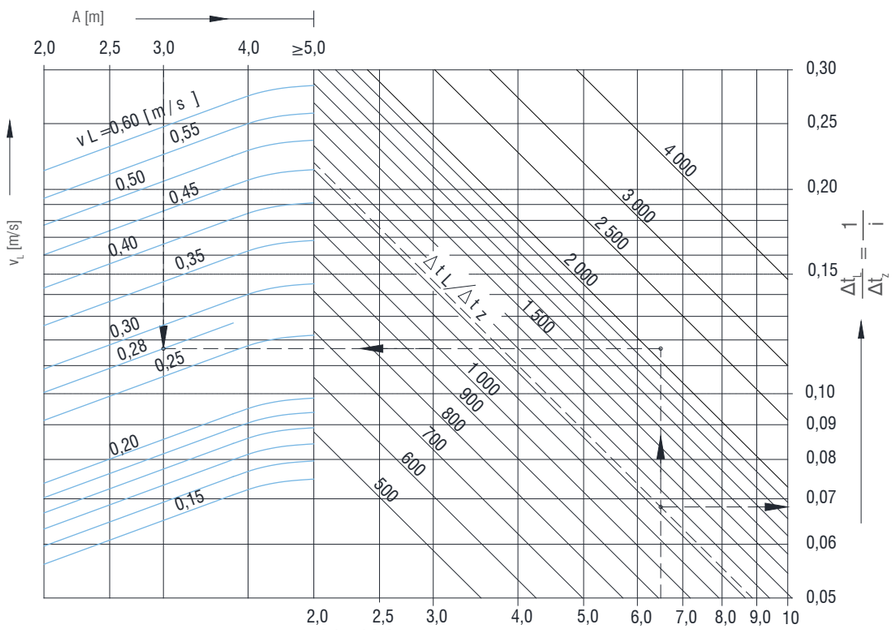
$\frac{\Delta t_L}{\Delta t_z}$ = 0,074

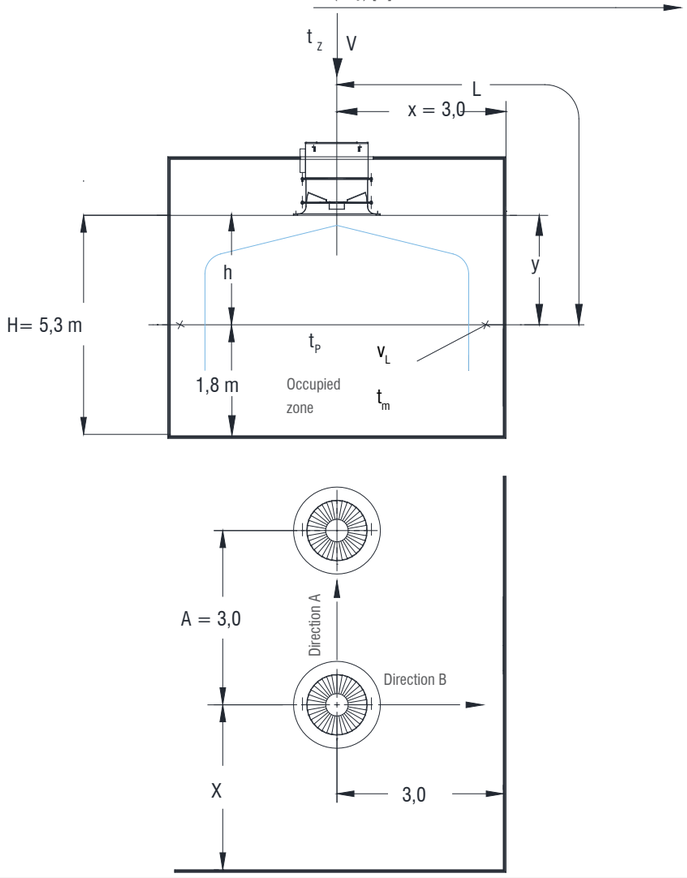
t_p = 20 °C
t_z = 12 °C
Δt_z = 12 - 20 = -8 °C
H = h + 1,8
L = x + h
Ceiling influence:
z < 0,3 m
Ceiling influence:
v_L x 1,4 = 0,31 m/s

$\frac{\Delta t_L}{\Delta t_z}$ x1,4 = 0,1036

i = 9,65
t_L = 19,17 °C

2.3 Average velocity v_L and temperature ratio for DKZ 630





Example 7:
GIVEN
Size: DKZ 630

t_p = 20 °C
t_z = 14 °C
H = h +1,8
L = x + h

V = 2100 m³/h
H = 5,3 m
A = 3,0 m
x = 3,0 m
h = 3,5 m
L = 6,5 m

SOLUTION
Diagram 2.2
v_L = 0,28 m/s
$\frac{\Delta t_L}{\Delta t_z}$ = 0,068
Ceiling influence:
v_L x 1,4 = 0,39 m/s
$\frac{\Delta t_L}{\Delta t_z}$ x 1,4 = 0,0952
i = 10,5
t_L = 19,43 °C

2.4 Average velocity v_L and temperature ratio for DKZ 800

Example 8:
GIVEN
Size: DKZ 800

t_p = 20 °C
t_z = 14 °C
H = h + 1,8
L = x + h
Δt_z = -6°C

V = 4500 m³/h
H = 6,0 m
A = 5,0 m
x = 3,8 m
h = 4,2 m
L = 8,0 m

SOLUTION
Diagram 2.3
v_L = 0,28 m/s
$\frac{\Delta t_L}{\Delta t_z}$ = 0,078
Ceiling influence:
v_L x 1,4 = 0,39 (m/s)
$\frac{\Delta t_L}{\Delta t_z}$ x 1,4 = 0,1092
i = 9,16
t_L = 19, 3 (°C)

2/S14
v 3.3 (en)

PLENUM BOXES

UPK1, UPK2, UPK3, UPK-QC, SPB, FPB

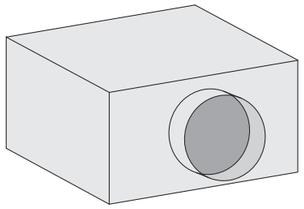
klimaoprema

PLENUM BOXES - UPK

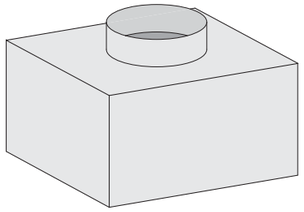
- Plenum box for Klimaoprema diffuser plates both for suppy and exhaust
- Made out of galvanized steel sheet
- Available with next generation sound insulation for high-demanding acoustic areas

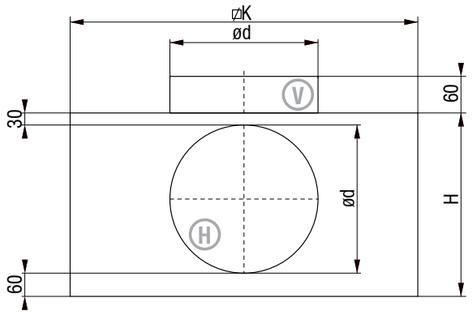
Plenum box **UPK1**

-horizontal connection UPK1 - H

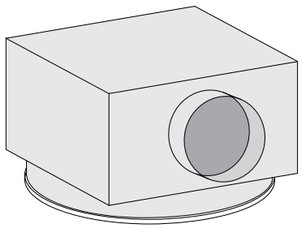


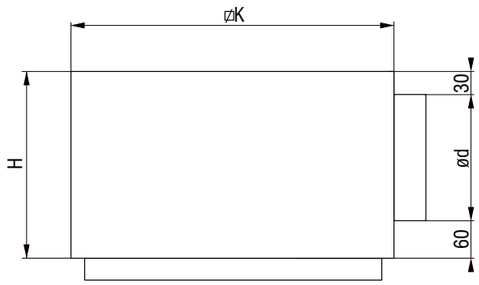
-vertical connection UPK1 - V





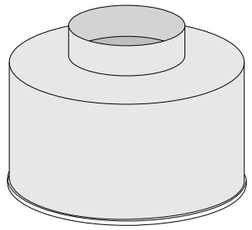
Plenum box for round diffuser **UPK2**

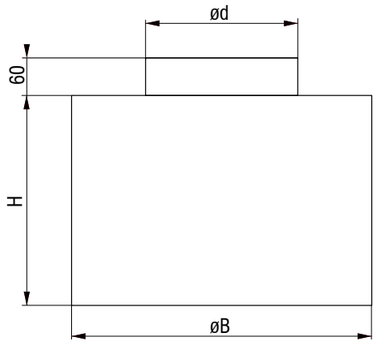




Design changes reserved

Plenum box for round diffuser **UPK3**





Dimensions

UPK1	K [mm]	H [mm]	ød [mm]
300	284	250	158
310	294	250	158
400	384	290	198
500	484	290	198
600	590	340	248
625	615	340	248
800	790	405	313

UPK2	K [mm]	H [mm]	ød [mm]
300	284	250	158
310	294	250	158
400	384	290	198
500	484	290	198
600	590	340	248
625	615	340	248
800	790	405	313

UPK3	øB [mm]	H [mm]	ød [mm]
300	284	200	158
310	294	200	158
400	384	200	198
500	484	200	198
600	590	200	248
625	615	200	248
800	790	300	313

Optional equippment for quick commisioning (“**-QC**”)

UPK-QC

- Equipped with fixed measurement tappings for precise airflow measurement, regulating damper, strings for calibration and seals on duct and diffuser connection
- Available with next generation sound insulation for high-demanding acoustic areas

Ordering key

Type	**UPK**	**- QC**	**- 600**	**- A**	**- H**	**- ød**	**- Z**
Quick commisioning (optional)							
Size							
A - supply air **B -** exhaust air							
H - horizontal connection **V -** vertical connection							
Connection diameter							
Insulation							

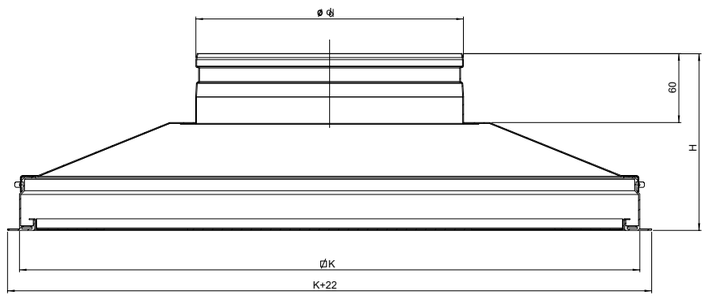
Design changes reserved

Slim Plenum Box - SPB

- Plenum box for Klimaoprema diffuser plates both for suppy and exhaust
- Frame made out of aluminum profiles and connection made of galvanized steel sheet
- Available with next generation sound insulation for high-demanding acoustic areas
- Ideal for low ceiling heights
- Compatible with ceiling grid system
- Quick and easy diffuser installation (without screws)

Dimensions

UPK1	K [mm]	H [mm]	ød [mm]
300	275	160	158
400	375	160	158
500	475	160	198
600	575	160	248
800	775	160	313



Diffuser installation

Ordering key

Type	**UPK**	**- 600**	**- A**		**- V**	**- ød**	**- Z**	
Size								
A - supply air **B -** exhaust air								
V - vertical connection								
Connection diameter								
Insulation								

Design changes reserved

NOTES:

Design changes reserved

3/S1
v 3.3 (en)

JET NOZZLES

SAP-F, SAP-Z

klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Airflow rate	H_{uk} [m]	- Installation height
y [m]	- Jet deflection	α [°]	- Angle of deflection
A [m]	- Horizontal difference between nozzle and point of jet collision	v_L [m/s]	- Medium air velocity at a point of jet collision
B [m]	- Distance between two nozzles in row	v_{H1} [m/s]	- Average air velocity at occupied zone
L [m]	- Throw distance	Δt_{H1} [K]	- Temperature difference between supply air at throw distance and room temperature
L_{max}[m/s]	- Total air throw of isothermal vertical jet	Δt_L [K]	- Difference between core and room temperature
H_1 [m]	- Distance from occupied zone to collision point of two cold jet		
H_2	- Distance from occupied zone to collision point of two warm jet		

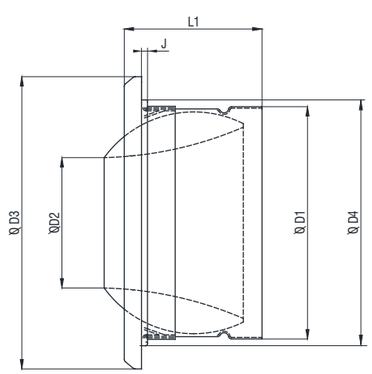
Design changes reserved

SAP - Z

- For air supply with large throw distance and low noise requirements
- Made of anodized aluminium, standard powder coating in RAL 9010.
- Adjustable discharge angle (±30°)

Options

- RAL...
- Motor drive



Dimensions	ø D1	ø D2	ø D3	L1	ø D4	J
100	98	50	135	79	98	2
125	123	64	169	89	123	0
160	148	72	196	118	162	5
200	199	108	255	138	215	5
250	248	136	300	178	260	8
315	313	174	384	195	325	10
400	398	230	462	214	408	10

Fast selection table SAP-Z

	øD2	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)
100	50	47	6,62		<20		94	13,24		31		140	19,86		42	
125	64	61	5,28		<20		122	10,57		27		180	15,54		37	
160	82	83	4,36		<20		166	8,71		<20		248	13,07		32	
200	108	104	3,17	10 m	<20	0,25 m/s	220	6,66	20 m	<20	0,25 m/s	306	9,28	30 m	25	0,25 m/s
250	136	133	2,55		<20		274	5,23		<20		382	7,30		23	
315	174	180	2,10		<20		353	4,12		<20		540	6,31		21	
400	230	234	1,56		<20		464	3,10		<20		702	4,69		<20	

	øD2	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)
100	50	94	13,24		31		187	26,48		51		187	26,48		51	
125	64	122	10,57		27		245	21,14		46		306	26,42		51	
160	82	166	8,71		<20		331	17,42		39		497	26,13		50	
200	108	220	6,66	10 m	<20	0,5 m/s	436	13,21	20 m	36	0,5 m/s	655	19,87	30 m	47	0,5 m/s
250	136	274	5,23		<20		547	10,46		32		824	15,76		43	
315	174	353	4,12		<20		702	8,20		27		1055	12,32		39	
400	230	464	3,10		<20		929	6,21		27		1393	9,31		37	

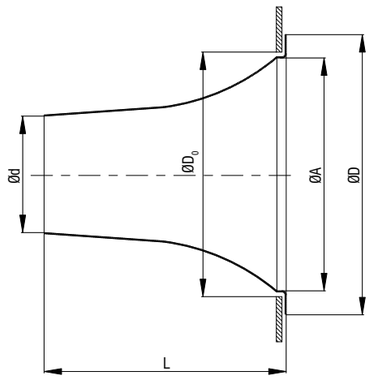
Design changes reserved

SAP - F

- For air supply with large throw distance and low noise requirements
- Made of anodized aluminium, standard powder coating in RAL 9010.

Options

- RAL...



SAP-F	ød [mm]	øD [mm]	øD₀ [mm]	øA [mm]	L [mm]	A ef [m²]
	50	130	105	100	105	0,002
	75	180	156	150	157	0,004
	100	240	210	200	210	0,007
	125	330	295	285	240	0,012
	150	350	310	300	290	0,017
	175	350	310	300	190	0,024
	200	510	460	450	380	0,031

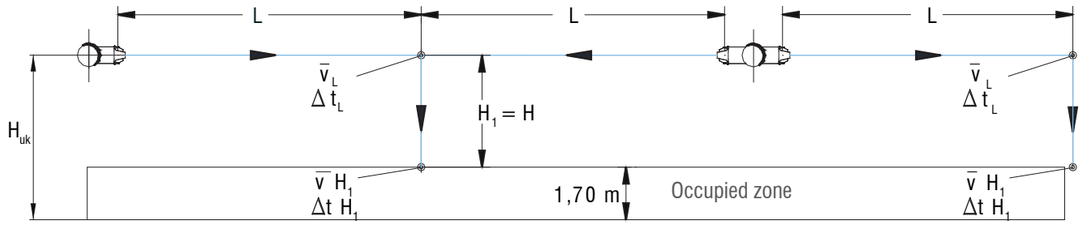
Fast selection table SAP-F

	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)
50	47	6,65		<20		94	13,30		31		140	19,81		42	
75	76	4,78		<20		150	9,43		24		223	14,02		35	
100	97	3,43		<20		195	6,90		<20		324	11,46		28	
125	130	2,94	10 m	<20	0,25 m/s	263	5,95	20 m	<20	0,25 m/s	367	8,31	30 m	24	0,25 m/s
150	137	2,15		<20		288	4,53		<20		430	6,76		22	
175	170	1,96		<20		355	4,10		<20		558	6,44		20	
200	205	1,81		<20		432	3,82		<20		630	5,57		20	

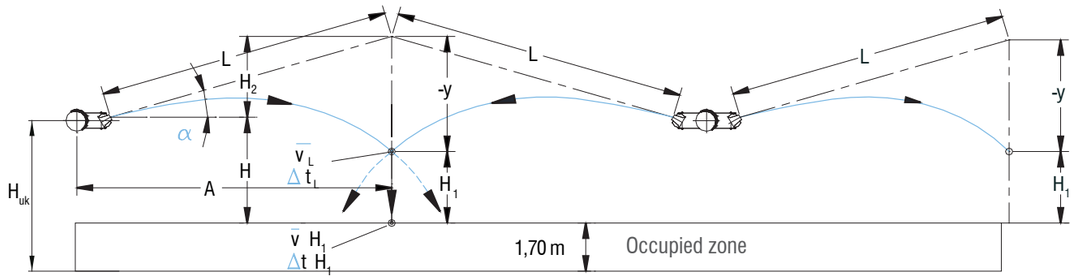
	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)	V (m³/h)	v_{ef} (m/s)	L (m)	L_{WA} (dB(A))	v_L (m/s)
50	94	13,30		31		187	26,46		51		187	26,46		51	
75	155	9,75		25		306	19,24		42		418	26,28		50	
100	225	7,96		<20		432	15,28		37		612	21,65		49	
125	270	6,11	10 m	<20	0,5 m/s	486	11,00	20 m	34	0,5 m/s	756	17,11	30 m	45	0,5 m/s
150	295	4,64		<20		594	9,34		30		900	14,15		42	
175	360	4,16		<20		706	8,15		27		1062	12,26		39	
200	432	3,82		<20		468	4,14		27		1152	10,19		38	

Design changes reserved

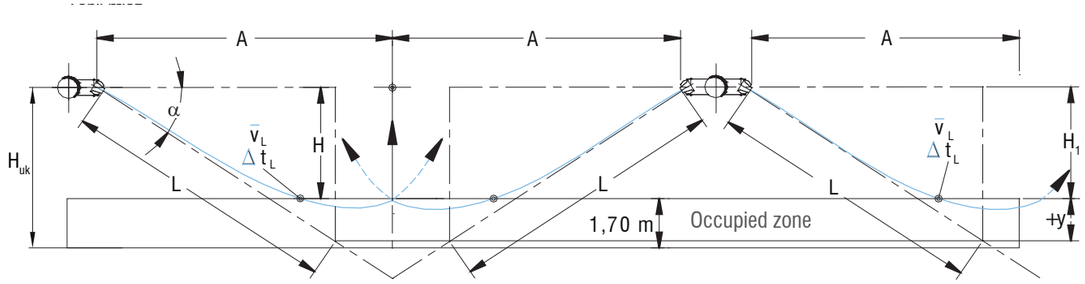
Isothermal air jet



Cold air jet



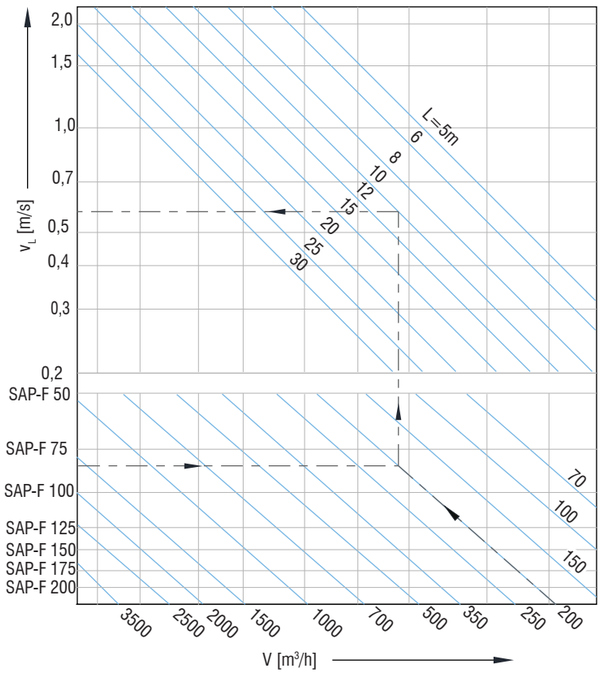
Warm air jet

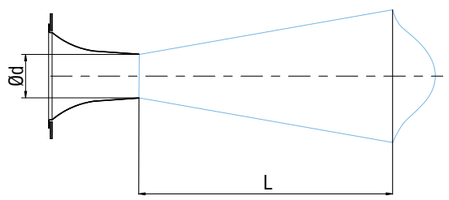


Design changes reserved

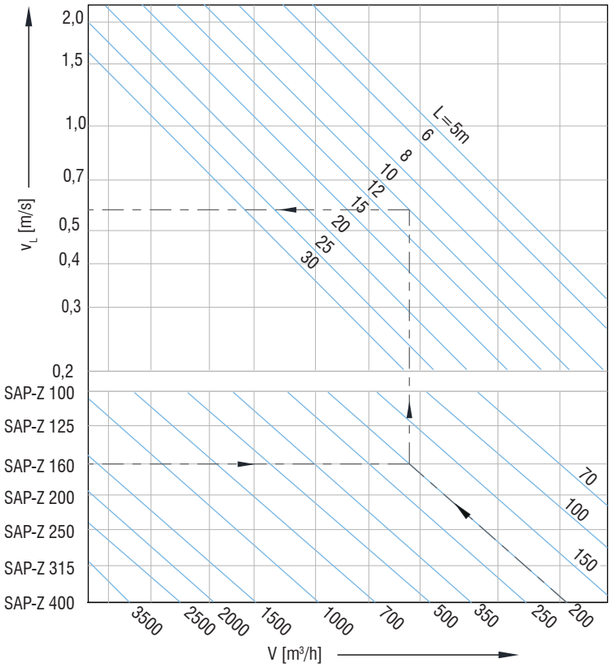
SELECTION DIAGRAMS

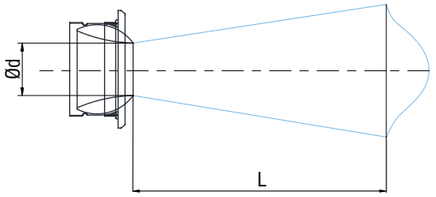
Horizontal isothermal air jet SAP-F





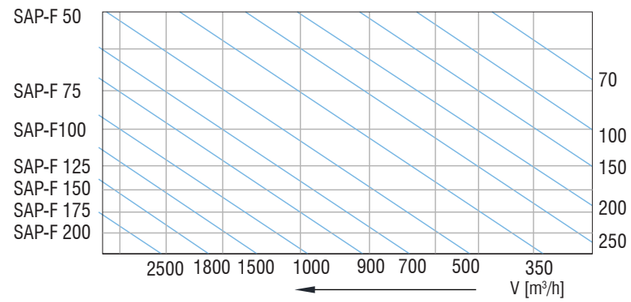
Horizontal isothermal air jet SAP-Z

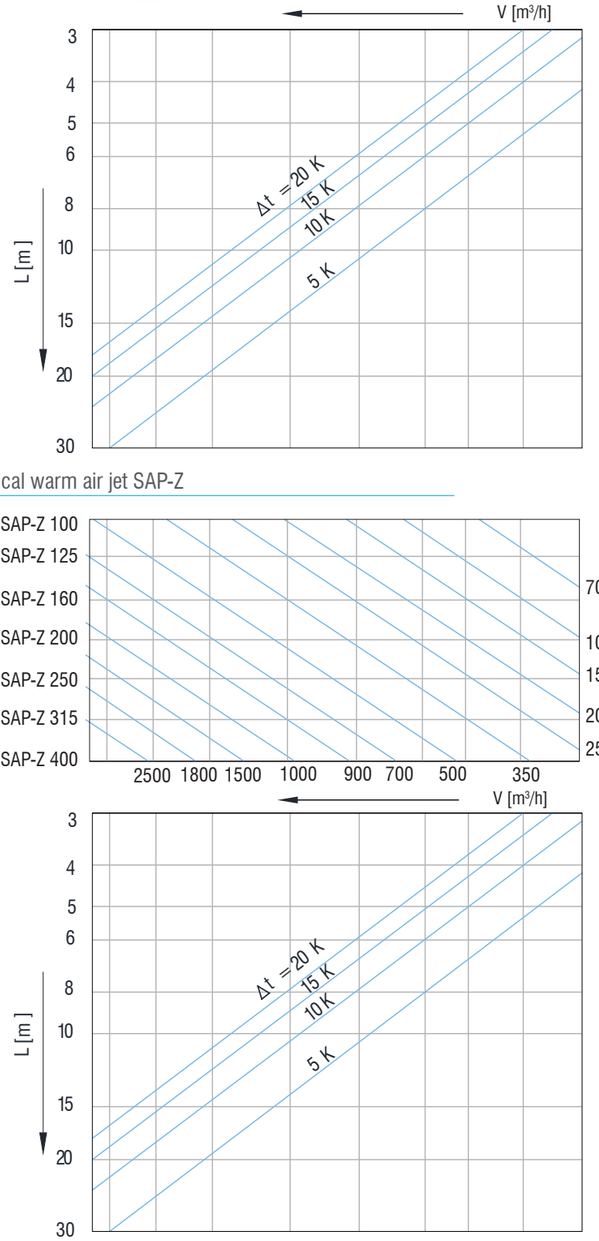


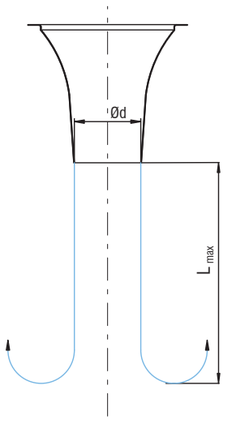


Design changes reserved

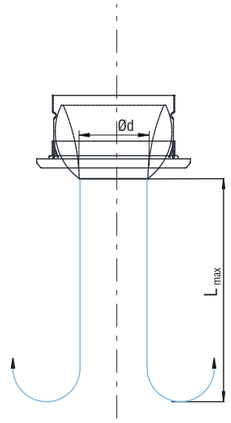
Vertical warm air jet SAP-F





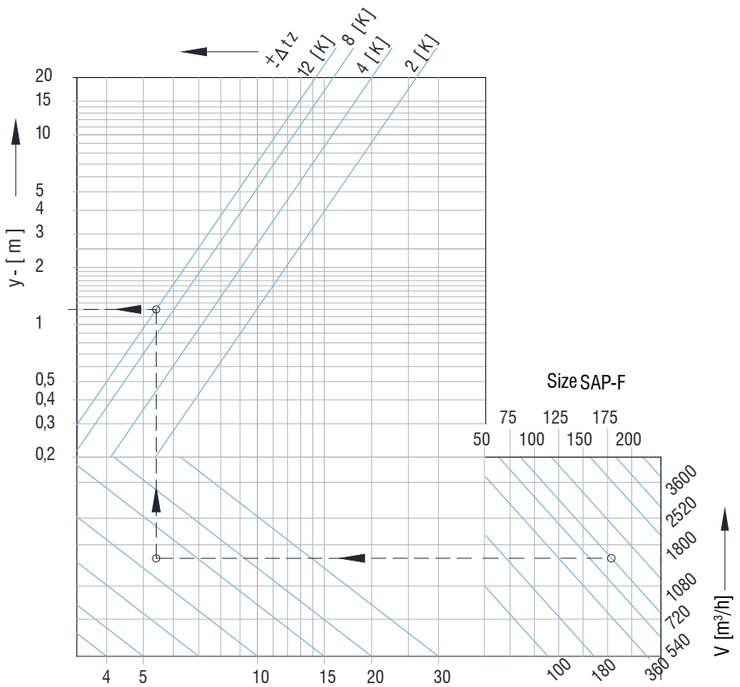


Vertical warm air jet SAP-Z

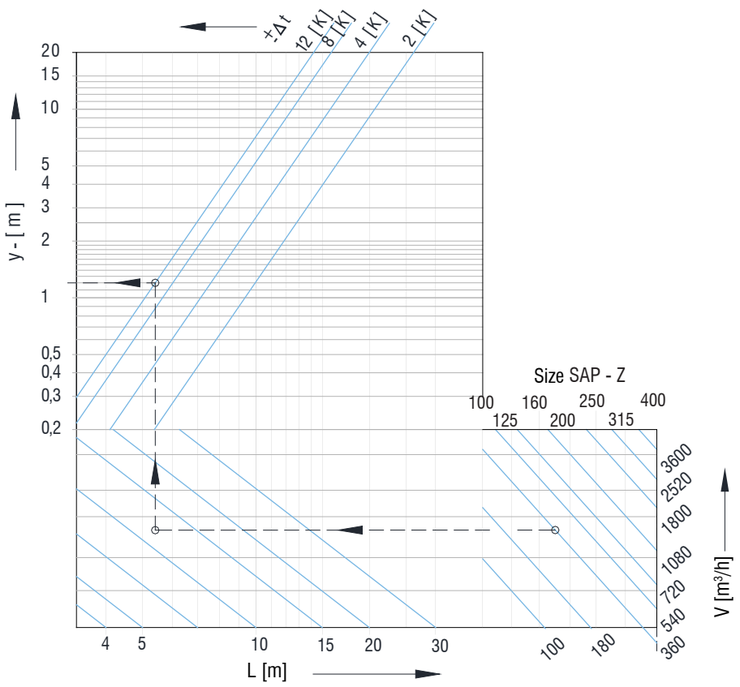


Design changes reserved

Horizontal non isothermal air jet deflection SAP-F

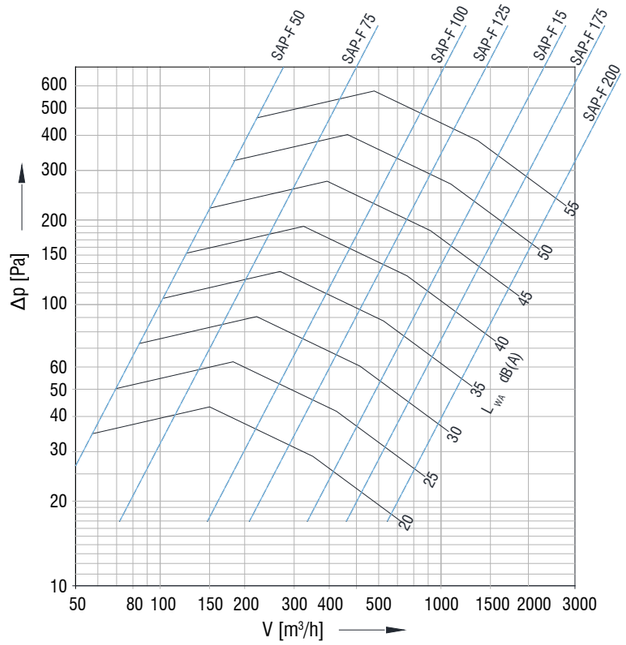


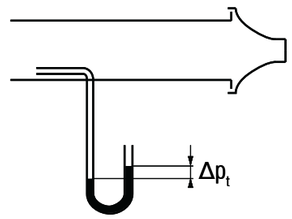
Horizontal non isothermal air jet deflection SAP-Z



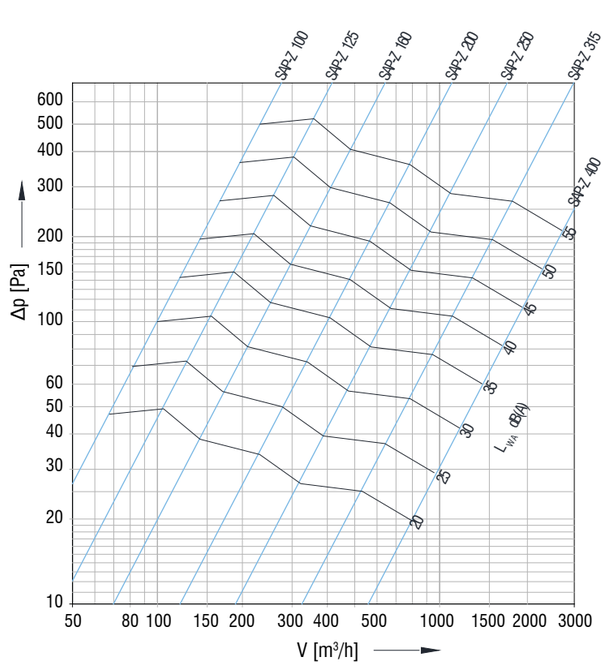
Design changes reserved

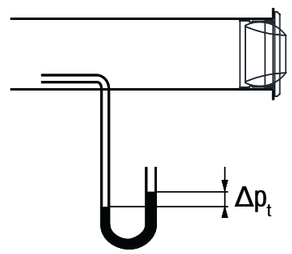
Axial installation SAP-F





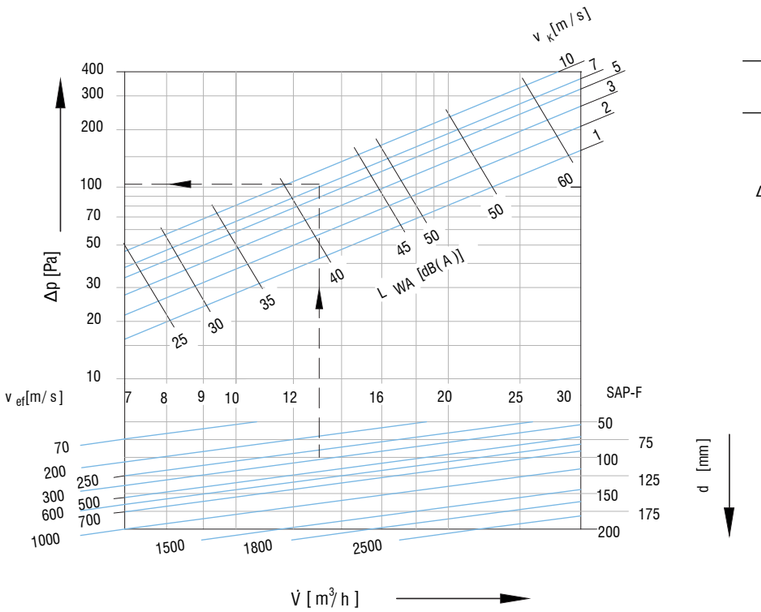
Axial installation SAP-Z

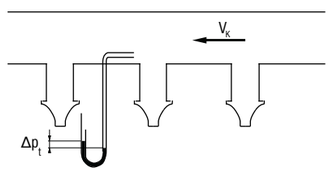




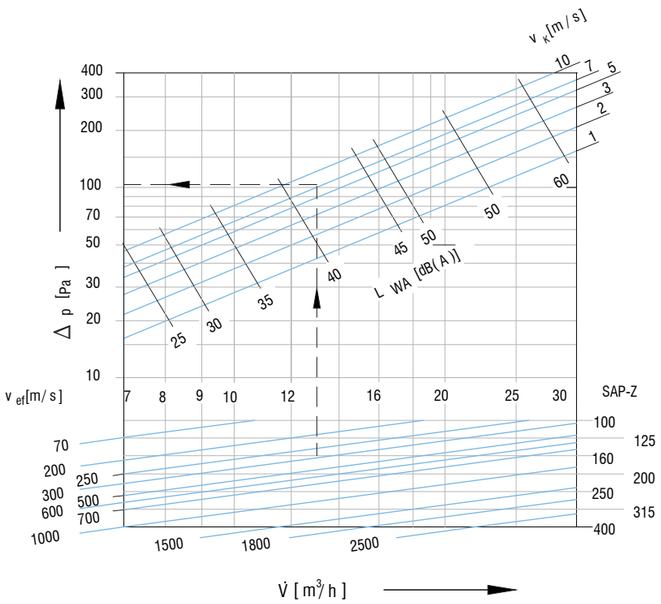
Design changes reserved

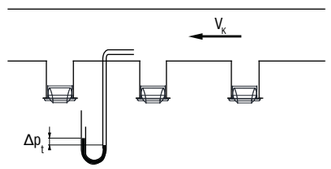
Multiple duct installation SAP-F





Multiple duct installation SAP-Z





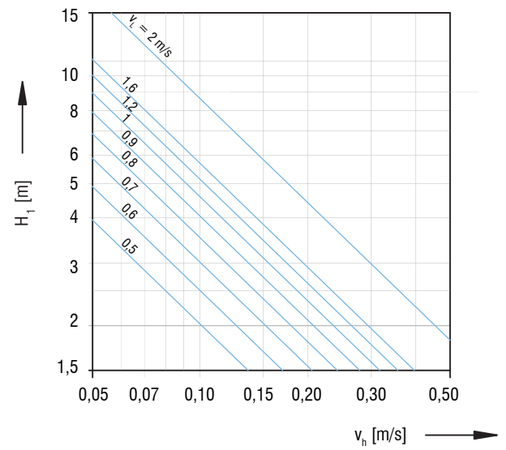
For discharge angle ±30° pressure drop is multiplied by a factor of 1,2

Correction values L_{WA} [dB(A)]

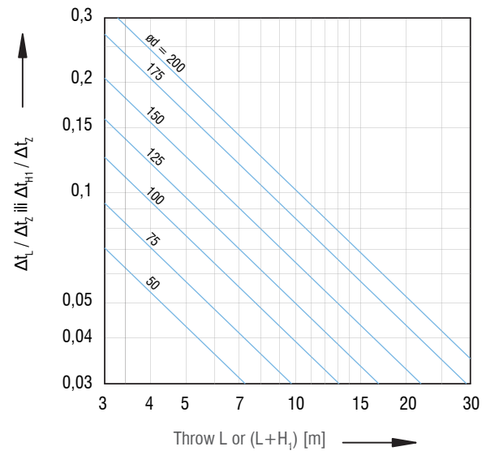
ød	Discharge angle	
	α = 0°	α = 30°
50	-6	-5
75	-3	-2
100	-2	0
125	1	2
150	3	4
175	4	6
200	5	7

Design changes reserved

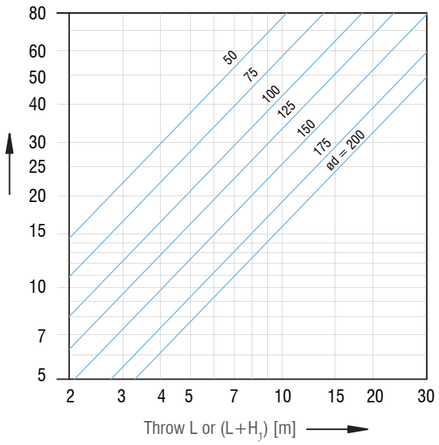
Core velocity



Temperature ratio



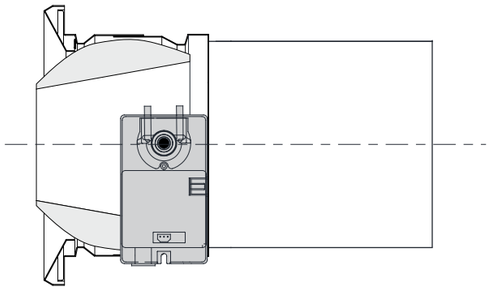
Induction



Design changes reserved

MOTOR DRIVE

Standard motor drive version



Ordering key

Jet nozzle	**SAP - Z - 400 - M230 - 1 - LO - RAL..**
Z - adjustable **F -** fixed	
(SAP-F - outer diameter) (SAP-Z - inner diameter)	
***M230-OZ -** motor drive 230V, two positions ***M230-K -** motor drive 230V, continuous ***M24-OZ -** motor drive 24V, two positions ***M24-K -** motor drive 24V, continuous	
1 - standard motor drive version	
Damper type **LO**	

* Sizes 100 and 125 only with manual drive

NOTES:

3/S2
v 3.3 (en)

AIR VALVES
VENTILATION GRILLE

ZOV, ZOT

klimaoprema

TABLE OF CONTENTS

Definition of symbols:

Δp	[Pa]	- Pressure drop
L_{WA}	[dB(A)]	- Sound power level
V	[m³/h]	- Airflow rate
s	[mm]	- air valve gap setting
$L_{0,2}$	[m]	- air throw distance for v_L = 0,2 m/s

Design changes reserved

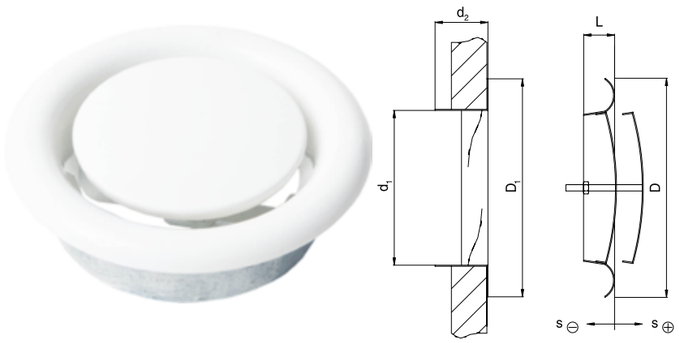
AIR VALVES, VENTILATION GRILLE

EXHAUST AIR VALVE - ZOV

- For air exhaust applications in sanitary areas.
- Made of steel sheet, standard powder coating in RAL 9010
- Adjustable airflow rate.

Options

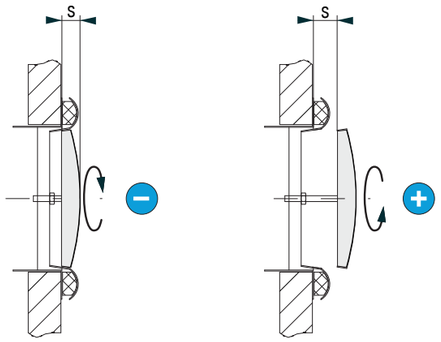
- RAL...



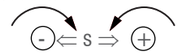
Dimensions ZOV

Air flow control

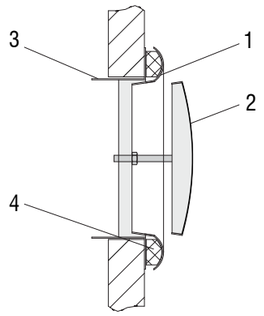
ZOV ZOT	øD [mm]	ød1 [mm]	d2 [mm]	L [mm]	øD1 [mm]
100	137	98	50	28	130
125	161	123	50	29	155
150	208	148	50	30	180
160	218	158	50	31	190
200	248	198	50	33	236



• Airflow adjustment is done by rotating the valve disc in positive or negative direction



ZOV air valve installation



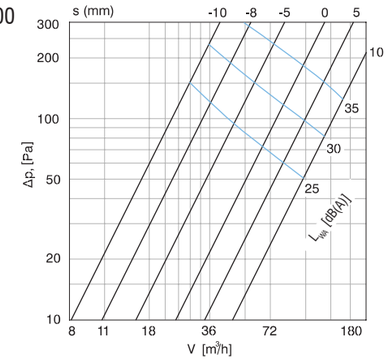
1. Air valve casing
2. Valve disc
3. Installation subframe
4. Foam seal

- Air valve casing “1” is placed in installation subframe “3” and turned right.
- Airflow adjustment is done by rotating the valve disc “2” left or right.

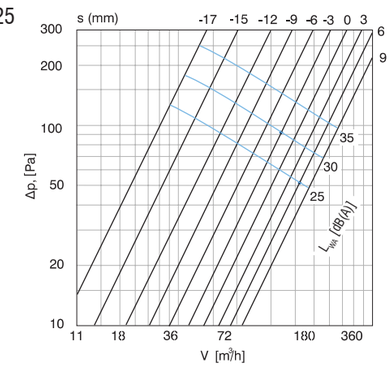
Design changes reserved

ZOV - airflow, pressure drop and sound power level diagrams

ZOV 100

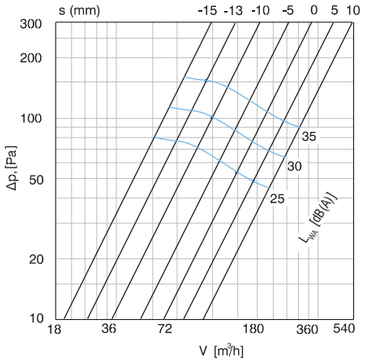


ZOV 125

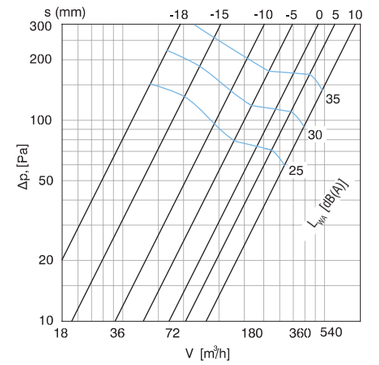


ZOV-150

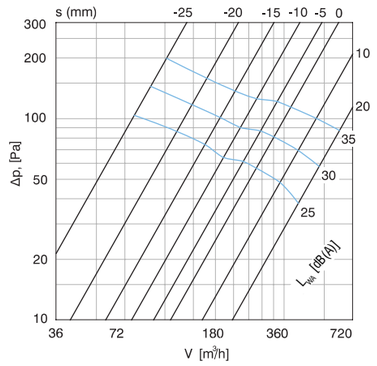
ZOV 150



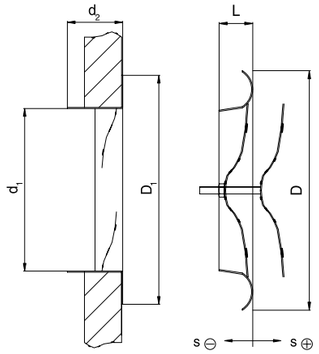
ZOV 160



ZOV 200

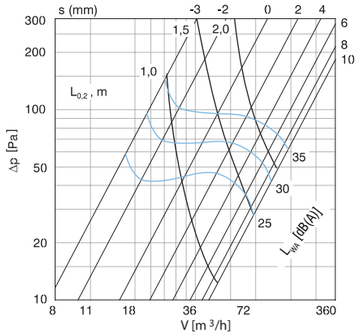


SUPPLY AIR VALVE - ZOT

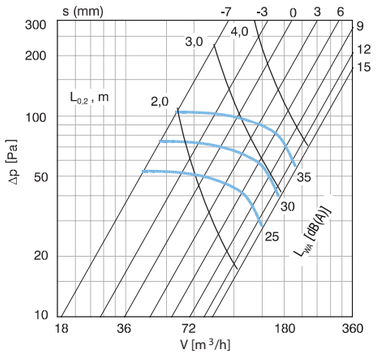


ZOT - airflow, pressure drop and sound power level diagrams

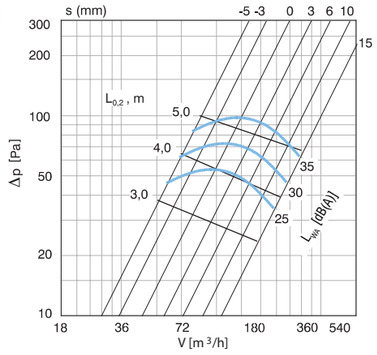
ZOT - 100



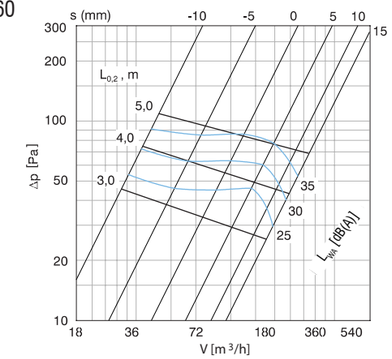
ZOT - 125



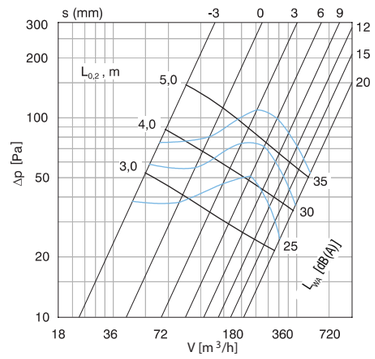
ZOT - 150



ZOT - 160



ZOT - 200



Ordering key

Air valve (ZOV, ZOT)	**ZOV - 100**
Size	

klimaoprema

3/S3
v 3.3 (en)

STAIRCASE SWIRL DIFFUSERS

IR, SDV, DSK

TABLE OF CONTENTS

Definition of symbols:

$\dot{V}$	[m³/h]	- Air flow rate
v_k	[m/s]	- Duct velocity
V_0	[m/s]	- Effective outled velocity
v_L	[m/s]	- Core velocity
L	[m]	- Throw distance
L_{WA}	[dB(A)]	- Sound power level
$\alpha = 6°$		- Dissipation angle
B	[m]	- Jet width
Δp_t	[Pa]	- Pressure drop
t_p	[°C]	- Room temperature
t_z	[°C]	- Supply air temperature
Δt_z	[°C]	- $(t_z - t_p)$

Design changes reserved

STAIRCASE SWIRL DIFFUSER - IR

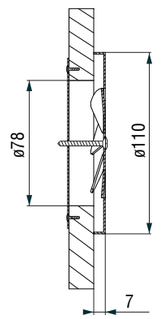
- Staircase diffuser, for ventilation in areas that require high air induction, as well as low air flow velocities and noise levels.
- Made out of steel sheet, standard powder coated RAL 9010.

Options

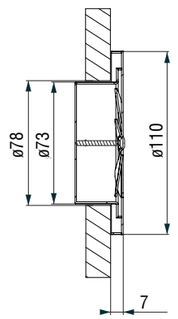
- RAL...

Instalation

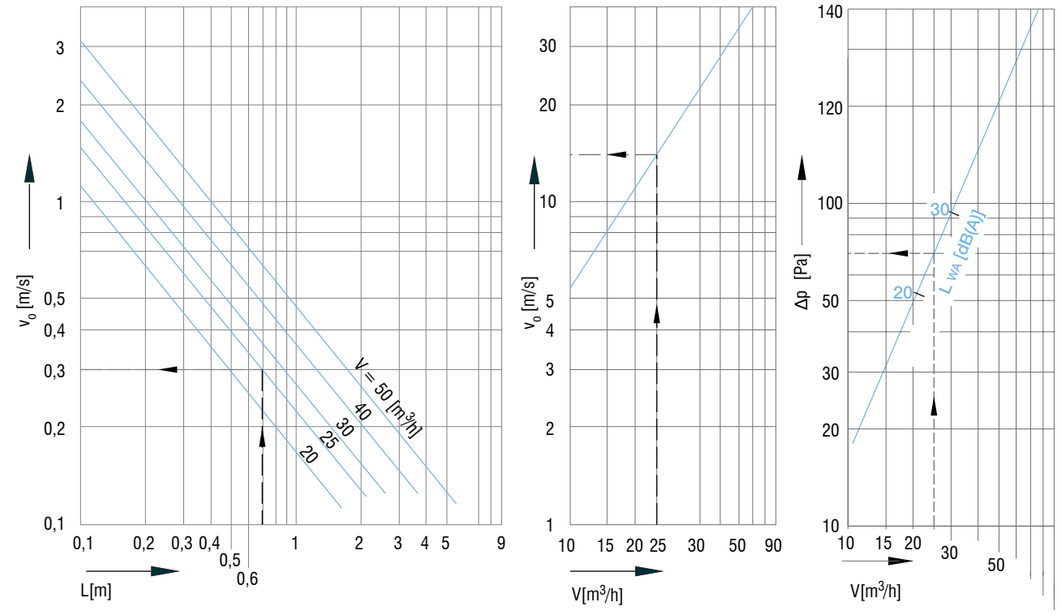
- with central screw and cross-member (standard)



- with plenum box



Selection diagram



Ordering key

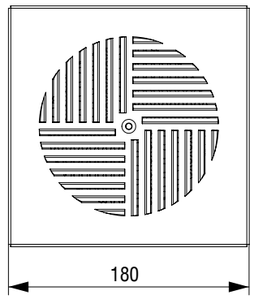
Staircase swirl diffuser	**IR - O - T - RAL...**
O - round **K** - square	
Connection : **K** - plenum box **T** - central screw and cross-member	

Design changes reserved

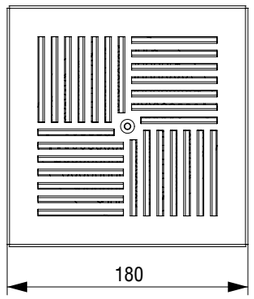
STAIRCASE SWIRL DIFFUSER - SDV

- Staircase diffuser, for ventilation in areas that require high air induction, as well as low air flow velocities and noise levels.
- Made out of steel sheet, standard powder coating RAL 9010.

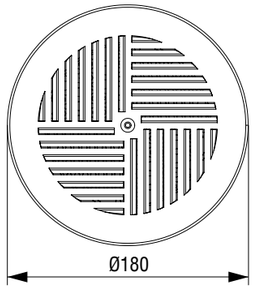
SDV-KO



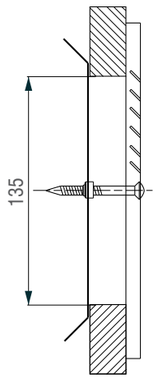
SDV-KK



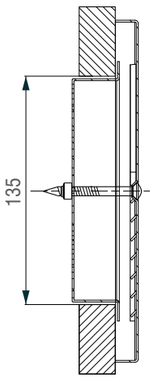
SDV-OO



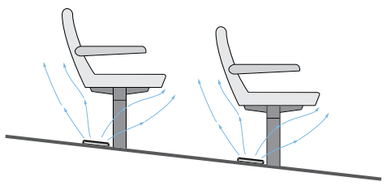
Installation with central screw and cross-member (standard)



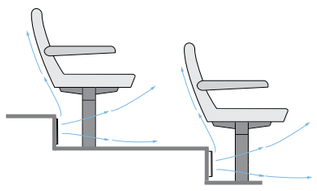
Installation with plenum box



Floor installation



Staircase installation



Design changes reserved

Ordering key

Staircase swirl diffuser **SDV - OO - K - 180- RAL...**

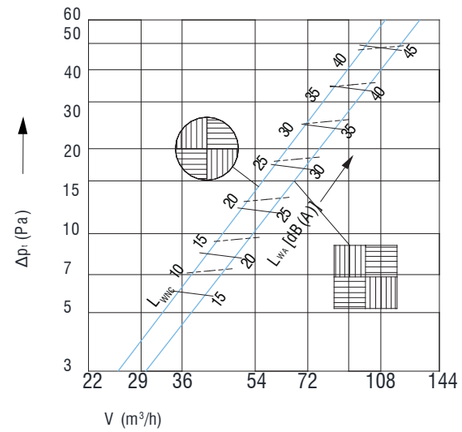
KK - square front plate and outlet area
OO - round front plate and outlet area
KO - square front plate / round outlet area

Connection to: **K** - plenum box
T - cross-member

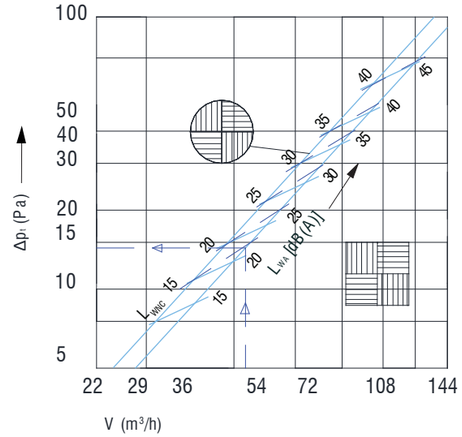
Size

Selection diagrams

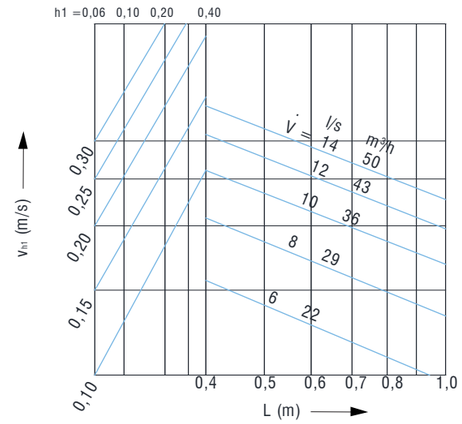
Pressure drop and sound power level SD-...-T



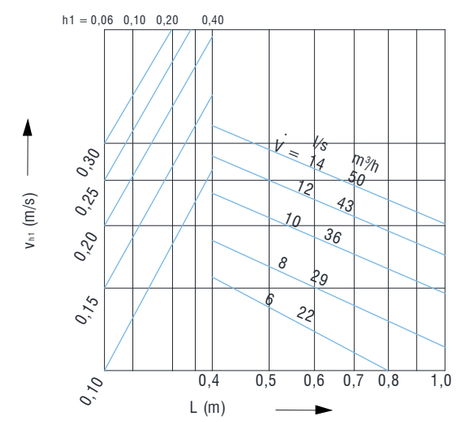
Pressure drop and sound power level SD-...-K



Core velocity, SD-...-KO-T staircase installation

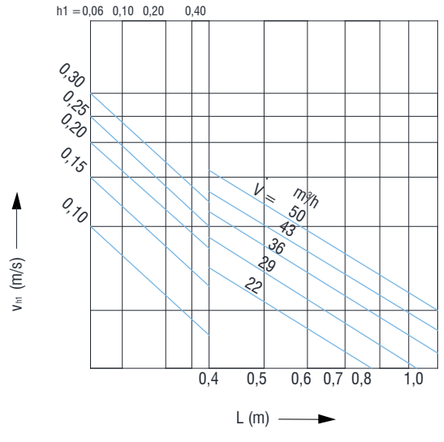


Core velocity, SD-...-KK-T staircase installation

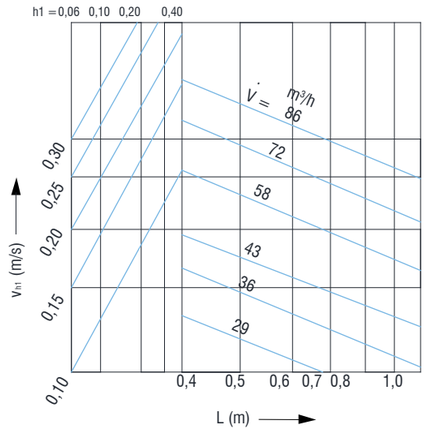


Design changes reserved

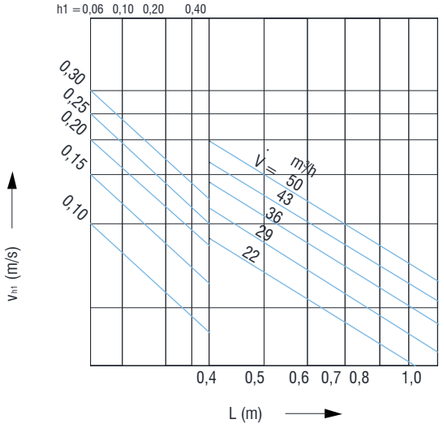
Core velocity, SD-...-KO-T floor installation



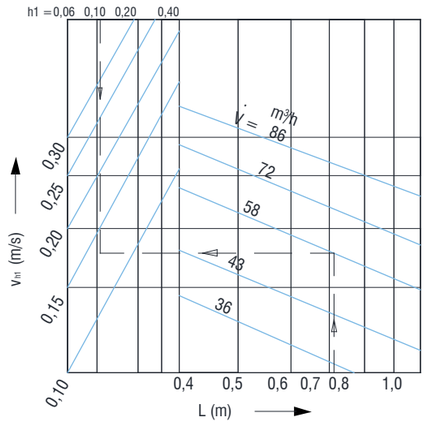
Core velocity, SD-...-OO-K floor installation



Core velocity, SD-...-KK-T floor installation

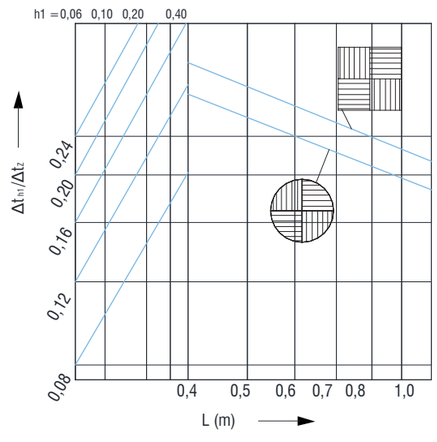


Core velocity, SD-...-KK-K staircase installation

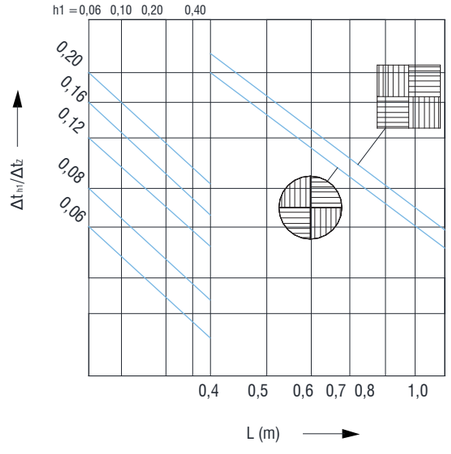


Design changes reserved

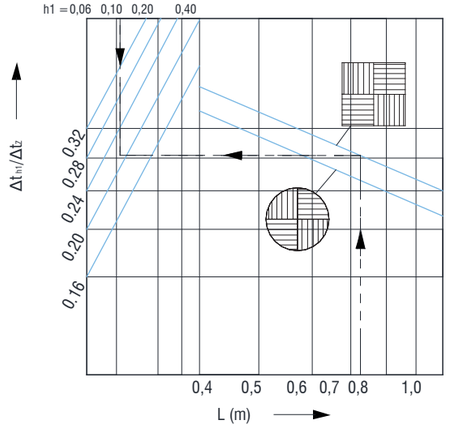
Temperature ratio, SD-...-T staircase installation



Temperature ratio, SD-...-T floor installation



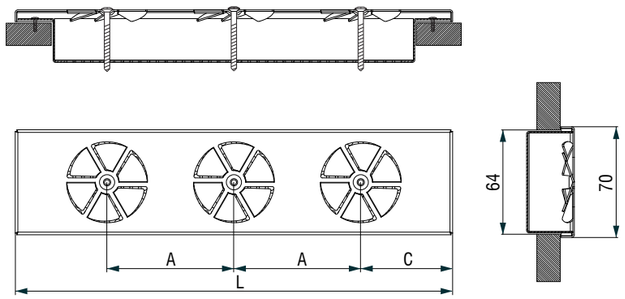
Temperature ratio, SD-...-K staircase installation



Design changes reserved

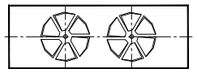
STAIRCASE SWIRL DIFFUSER - DSK

- Used for air supply, where large throw and low noise is required.
- Vertical installation in stairs (not a loading surface)
- Front plate made out of anodized aluminium. Casing made out of galvanized steel sheet.
- Fixing with screws

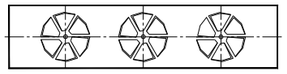


Dimension	L	C	A
DSK 2	200	63	74
DSK 3	300	63	87
DSK 4	400	71	86
DSK 5	500	66	92
DSK 6	500	65	74

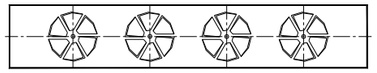
DSK-2



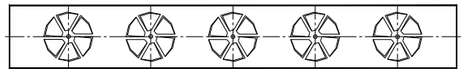
DSK-3



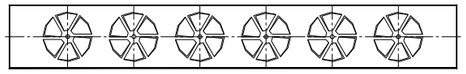
DSK-4



DSK-5



DSK-6



Effective outlet area	
No. of outlet elements	A_{ef} [10-6 m²]
1	631
2	1262
3	1893
4	2524
5	3155
6	3786

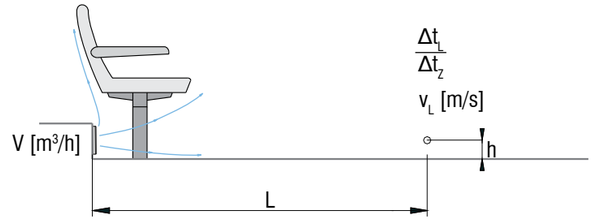
Ordering key:

Staircase swirl diffuser	**DSK -**	**2 -**	**PK -**	**RAL...**
Type of diffuser				
Plenum box				

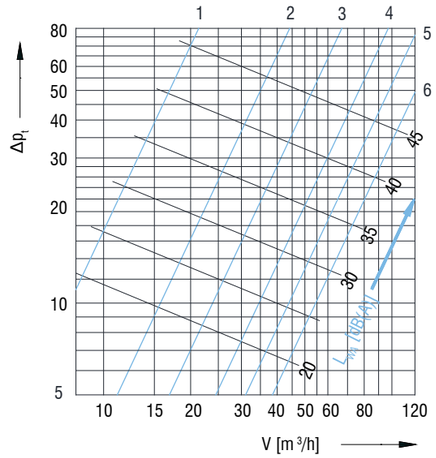
Design changes reserved

STAIRCASE SWIRL DIFFUSERS

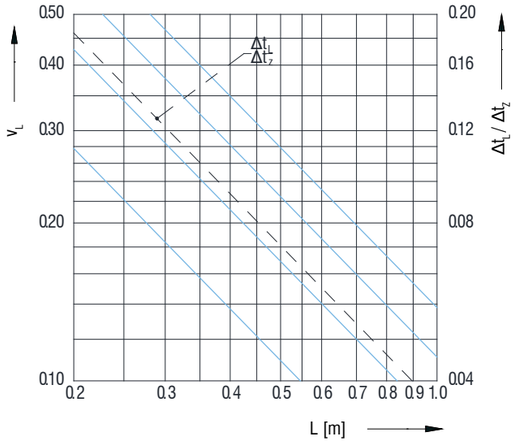
Air discharge for vertical installation



Pressure drop and sound power level



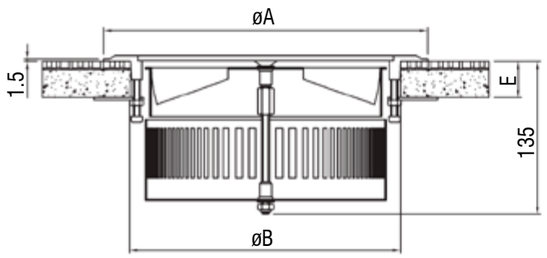
Core velocity / temperature ratio



Design changes reserved

STAIRCASE SWIRL DIFFUSER - DPV

- Circular swirl air diffusor for supply air.
- Floor mounting
- Front plate made out of anodized aluminium. Casing made out of galvanized steel sheet.



Size [mm]	øA [mm]	øB [mm]	E (min)	E (max)
150	190	150	14	50
200	240	200	19	50

Selection diagrams

Size [mm]	Lw [dB(A)]	Q [m3/h]	Δpst (Pa)
150	30	48	15
	35	60	24
	40	75	37
200	30	90	11
	35	110	17
	40	135	25

Ordering key:

Staircase swirl diffuser	**DPV -**	**150 -**	**RAL...**
Size			

NOTES:

3/S4
v 3.3 (en)

AIR DISPLACEMENT DIFFUSERS

SD

klimaoprema

TABLE OF CONTENTS

Definition of symbols:

V [m³/h]	- Air flow
x [m]	- Distance from the wall
A, B [m]	- Distance between diffusers
C, X [m]	- Distance between diffusers and walls
L [m]	- Throw distance L = x + h
v_L [m/s]	- Average core velocity at distance L (m) from a diffuser
h [m]	- Distance from the ceiling to the occupied zone
v_h [m/s]	- Average core velocity between two diffusers at distance h [m]
H [m]	- Room height
t_z [°C]	- Supply air temperature
t_p [°C]	- Air temperature in a room
t_m [°C]	- Core air temperature
Δt_z [K]	- (t_z - t_p)
Δt_L [K]	- (t_m-t_p)
Δp_t [Pa]	- Total pressure drop
L_{WA} [dB(A)]	- Sound power level

Design changes reserved

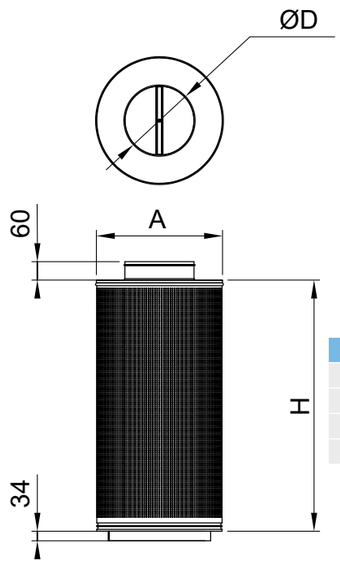
AIR DISPLACEMENT DIFFUSER, TYPE SD

- For cooling and fresh air supply in industrial and commercial spaces
- Low turbulence, low outlet velocity
- Increased air quality in residence areas
- For temperature differences up to 6K
- Made out of steel sheet, standard powder coating RAL 9010
- Standard heights: H = 750, 1000, 1250 and 1500

Options

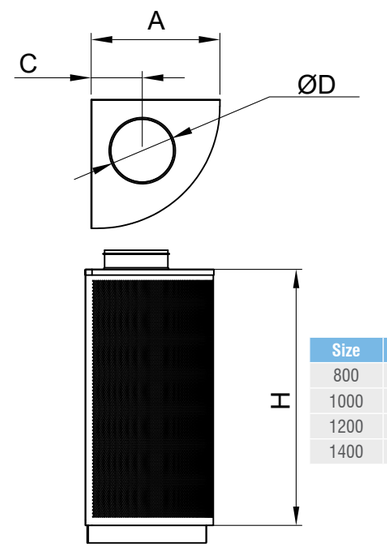
- Models: SD-K - corner diffuser
  SD-Z - wall diffuser
  SD-S -central diffuser
  SD-P - rectangular diffuser
- Damper
- Filter

SD-S



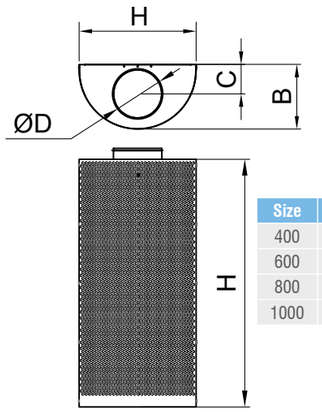
Size	A	øD
400	400	315
600	600	400
800	800	450
1000	1000	500

SD-K



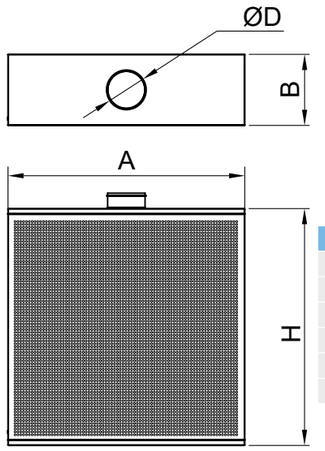
Size	A	C	øD
800	400	160	200
1000	500	200	250
1200	600	230	250
1400	700	290	315

SD-Z



Size	A	B	C	øD
400	400	250	120	200
600	600	330	150	250
800	800	400	200	315
1000	1000	500	250	355

SD-P

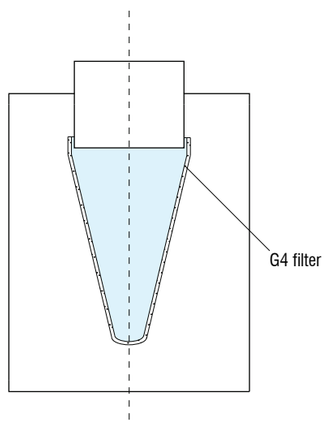


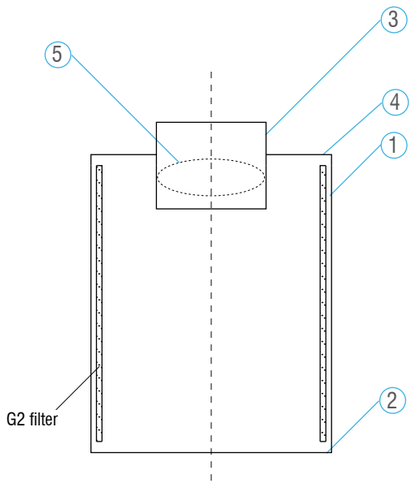
Size	A	B	øD
400	400	300	200
600	600	350	250
800	800	350	250
1000	1000	400	315
1500	1500	400	298
2000	2000	450	313

Design changes reserved

Filter

1 - Perforated sheet
2 - Bottom plate
3 - Round connection
4 - Cover plate
5 - Damper

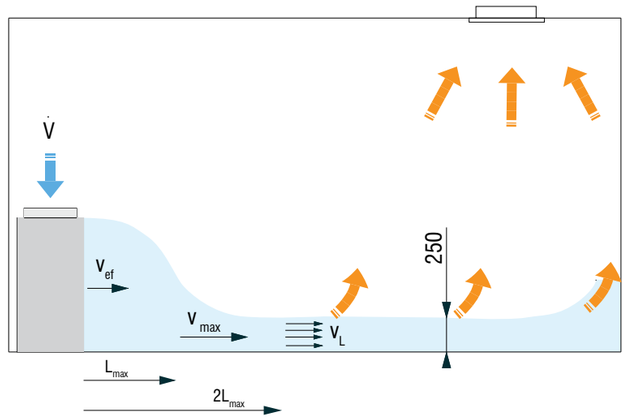




G4 - conical stabilization filter placed inside diffuser, made out of G4 class filtration material.

G2 - inner side of diffuser covered in black G2 class filtration material.

Discharge pattern



Ordering key

Air displacement diffuser **SD - S - øD - H - R - G2 - RAL...**

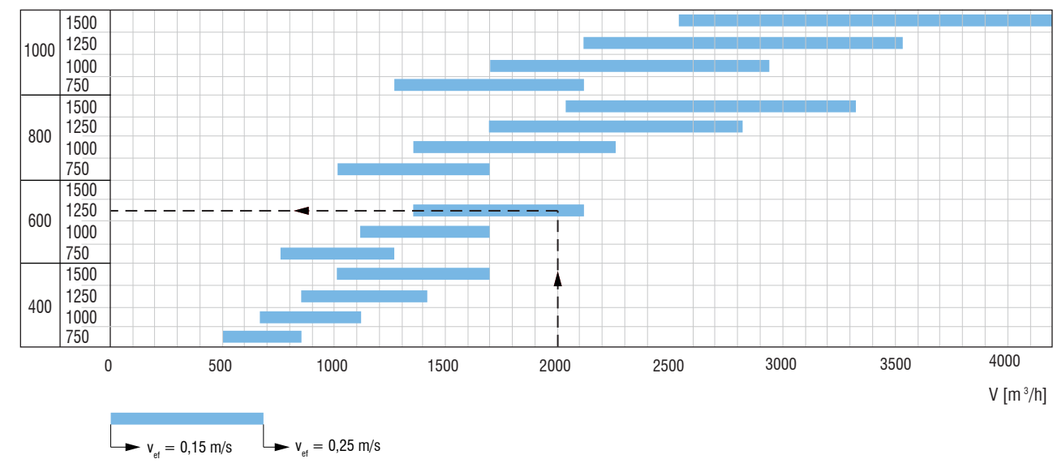
S - central
K - corner
Z - wall
P - rectangular

Connection diameter (**øD, BxH**)
Diffuser height
Damper
Filter **G2..G4**

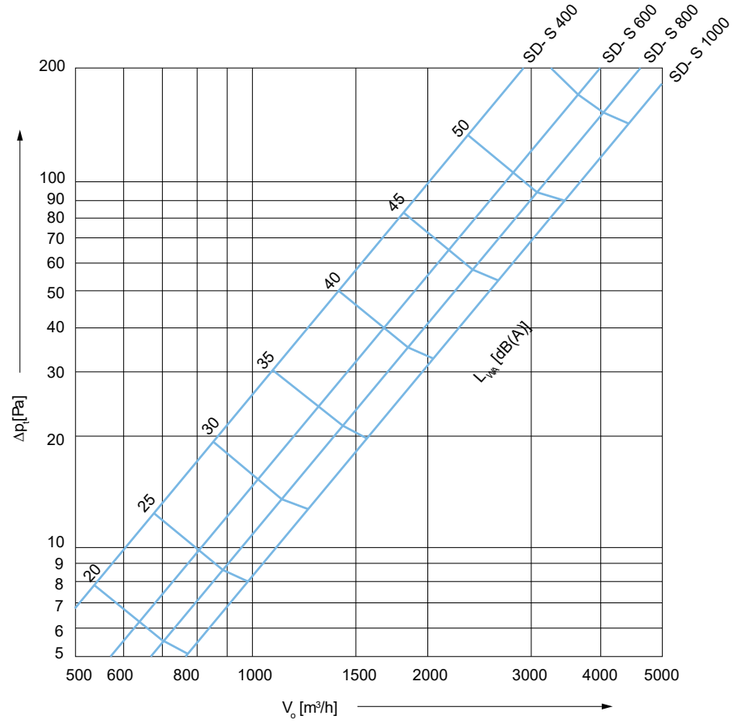
Design changes reserved

SELECTION DIAGRAMS

Fast selection diagram SD-S



Pressure drop and sound power level

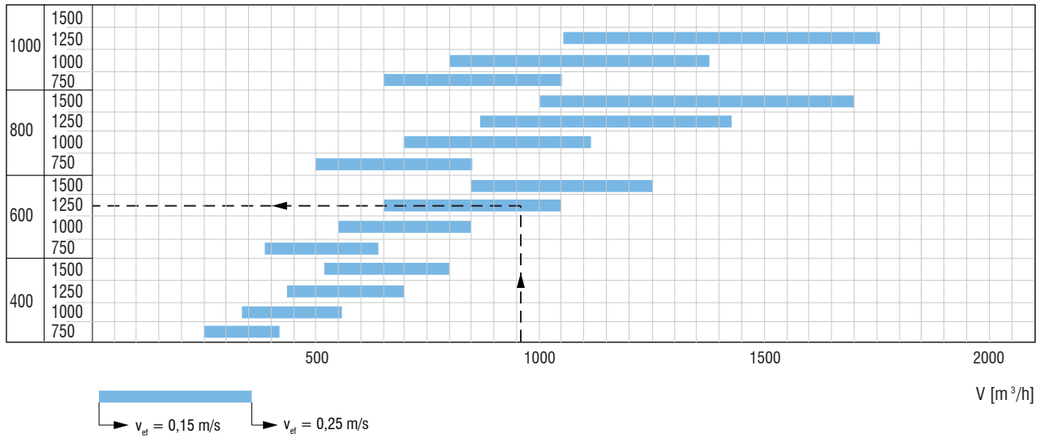


Correction values

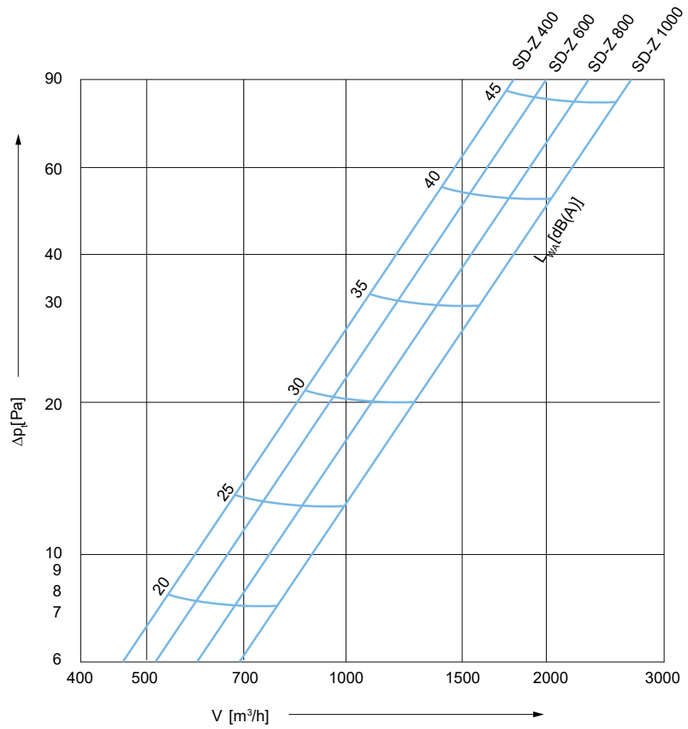
H [mm]	750	1000	1250	1500
Δp_t [Pa]	x 1,25	x 1,00	x 0,80	x 0,65
L_{WA} [dB(A)]	+3	± 0	-3	-6

Design changes reserved

Fast selection diagram SD-Z



Pressure drop and sound power level

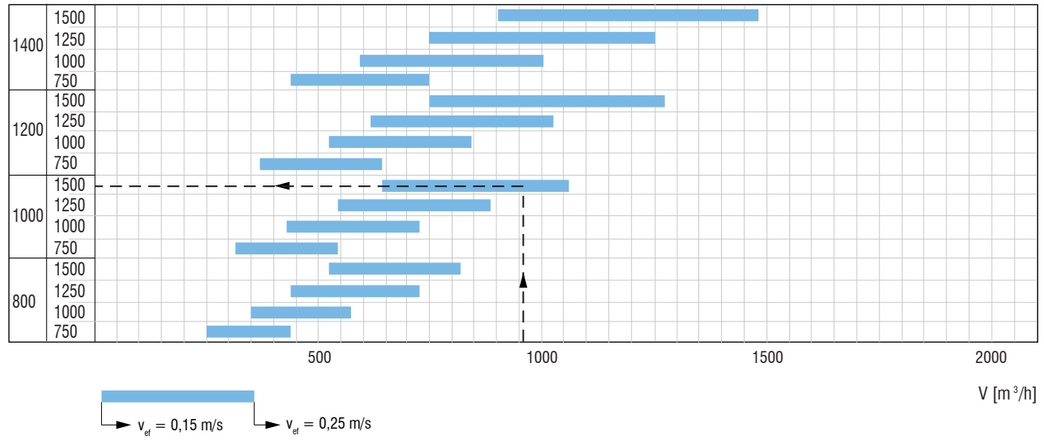


Correction values

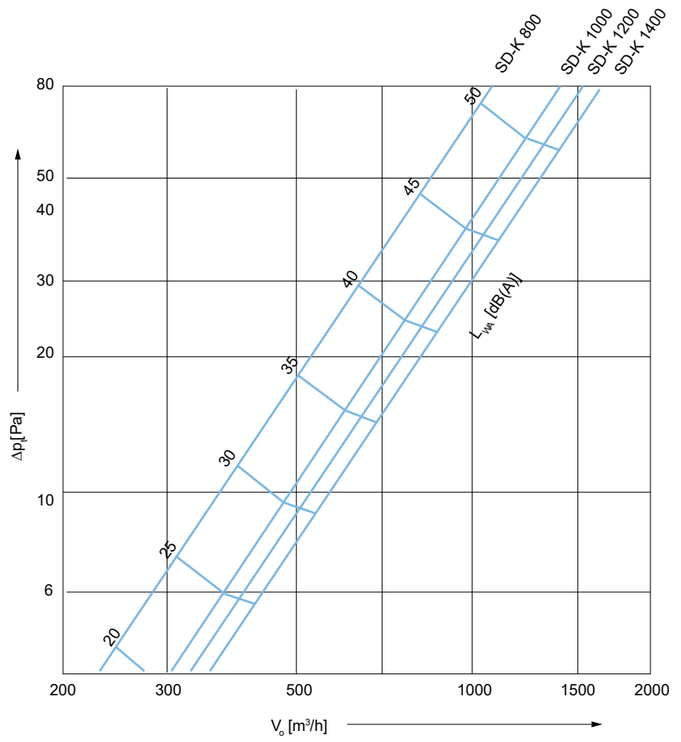
H [mm]	750	1000	1250	1500
Δp_t [Pa]	x 1,25	x 1,00	x 0,80	x 0,65
L_{WA} [dB(A)]	+3	± 0	-3	-6

Design changes reserved

Fast selection diagram SD-K



Pressure drop and sound power level

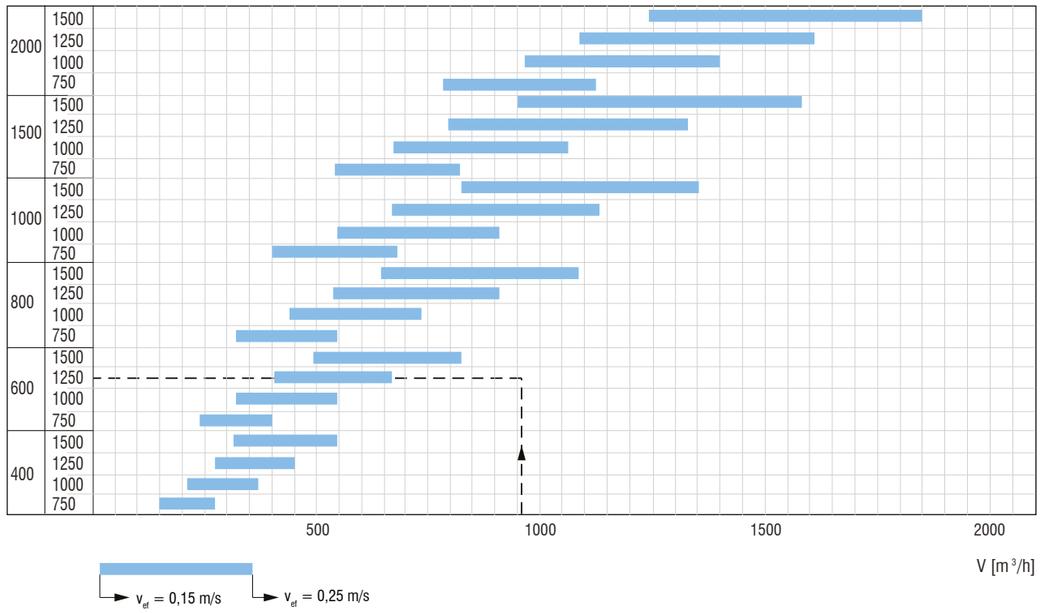


Correction values

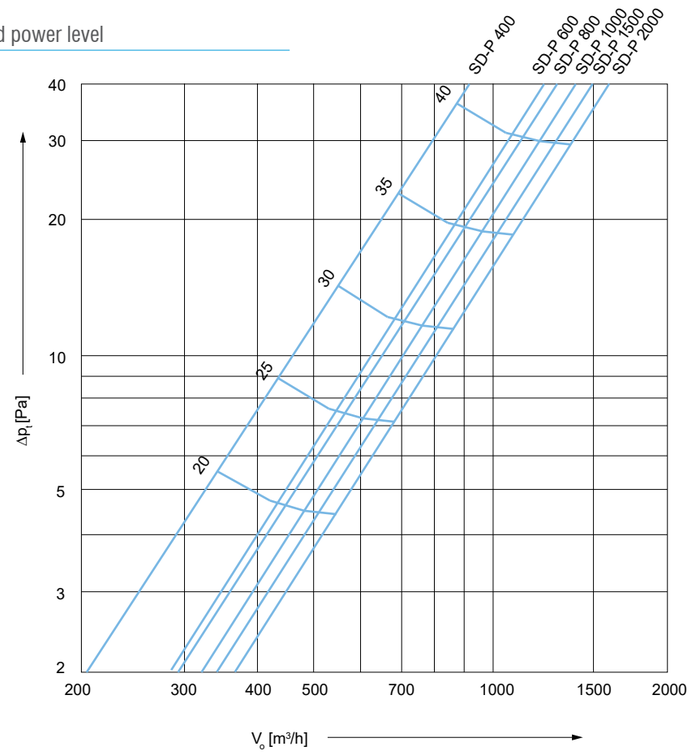
H [mm]	750	1000	1250	1500
Δp_t [Pa]	x 1,25	x 1,00	x 0,80	x 0,65
L_{WA} [dB(A)]	+3	± 0	-3	-6

Design changes reserved

Fast selection diagram SD-P



Pressure drop and sound power level



Correction values

H [mm]	750	1000	1250	1500
Δp_t [Pa]	x 1,25	x 1,00	x 0,80	x 0,65
L_{WA} [dB(A)]	+3	± 0	-3	-6

Design changes reserved

AIR DISPLACEMENT DIFFUSERS

NOTES:

Design changes reserved

3/S5
v 3.3 (en)

FLOOR DIFFUSER

PDI

klimaoprema

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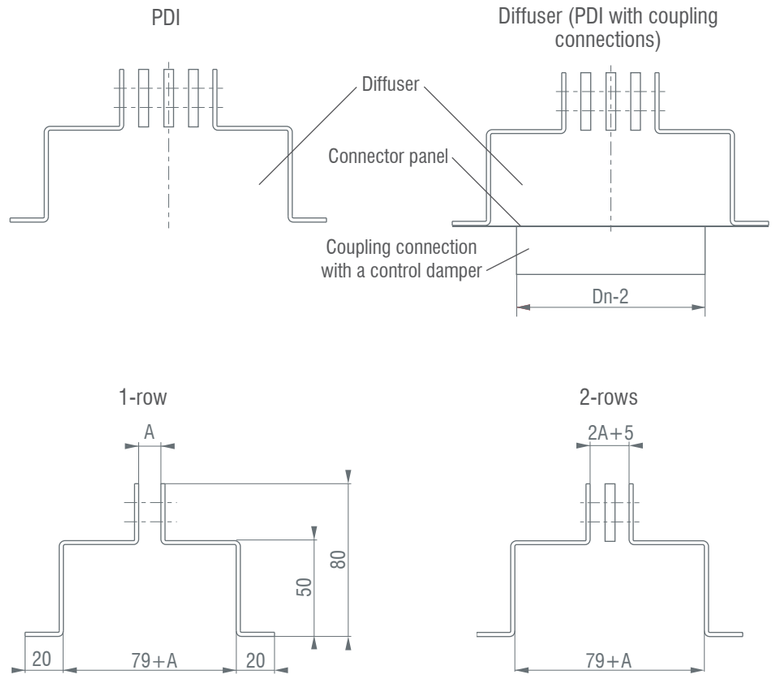
Definition of symbols:

V [m³/h]	-	Airflow rate
y [m]	-	Jet deflection
A [m]	-	Horizontal difference between nozzle and point of jet collision
B [m]	-	Distance between two nozzles in row
L [m]	-	Isohermal jet throw
L_{max}[m/s]	-	Total air throw of isothermal vertical jet
H_1 [m]	-	Distance from occupied zone to collision point of two cold jet
H_2	-	Distance from occupied zone to collision point of two warm jet
H_{uk} [m]	-	Installation height
α [°]	-	Angle of deflection
v_L [m/s]	-	Medium air velocity at a point of jet collision
v_{H1} [m/s]	-	Average air velocity at occupied zone
Δt_{H1} [K]	-	Temperature difference between supply air at throw distance and room temperature
Δt_L [K]	-	Difference between core and room temperature

Design changes reserved

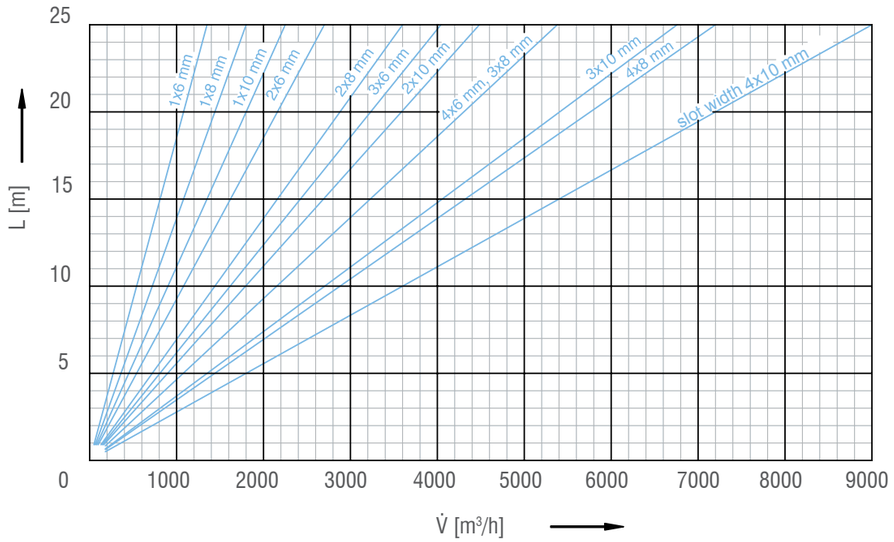
FLOOR DIFFUSER - PDI

- Floor diffuser is used for air supply to large glass surfaces.
- Made of aluminium sheet, discharge elements made of extruded aluminium profiles, connecting elements made of stainless steel.
- Possible version with or without end connections at bottom plate from aluminium sheet.



Design changes reserved

SELECTION DIAGRAM



Diffuser characteristics

		Slot width														
		6 mm			8 mm			10 mm			12 mm			15 mm		
		V_{min} [m³/h]	V_{max} [m³/h]	n x D_n	V_{min} [m³/h]	V_{max} [m³/h]	n x D_n	V_{min} [m³/h]	V_{max} [m³/h]	n x D_n	V_{min} [m³/h]	V_{max} [m³/h]	n x D_n	V_{min} [m³/h]	V_{max} [m³/h]	n x D_n
No. of slots	1	45	90	2xø80	55	110	2xø80	70	145	3xø80	90	180	3xø80	105	215	4xø80
	2	90	180	2xø80	110	220	4xø80	140	290	5xø80	180	360	4xø100	210	430	5xø100
	3	135	270	3xø100	165	330	4xø100	210	435	5xø100	270	540	6xø100	315	650	4xø125
	4	180	360	4xø100	220	440	5xø100	280	560	6xø100	360	720	5xø125	420	860	6xø125

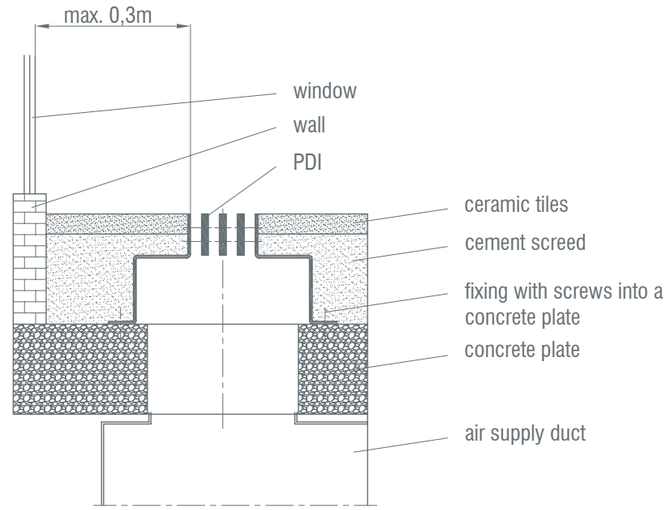
* Flow data given for diffuser length of 1m.

Ordering key:

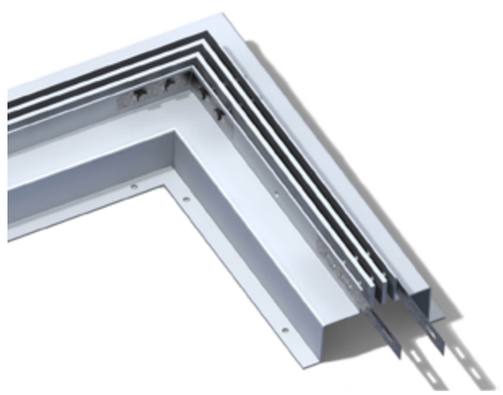
Floor diffuser	**PDI -**	**4 -**	**10 -**	**1600 -**	**K -**	**P**
No. of slots 1,2,3 or 4						
Slot width - standard (6, 8, 10) - on request (12, 15)						
Length						
End plate						
Coupling connections						

Design changes reserved

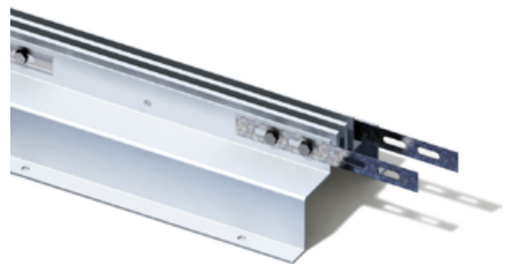
INSTALLATION



Corner connection

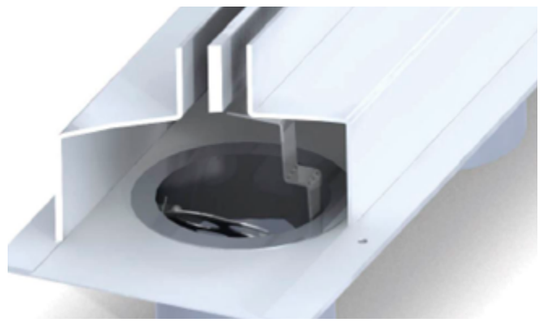


Line connection



End plate

Control damper



Design changes reserved

4/S1
v 3.3 (en)

VENTILATION LOUVRES

FZ, AFZV, AFZM, RZ, ARZ, PZ, ZP

klimaoprema

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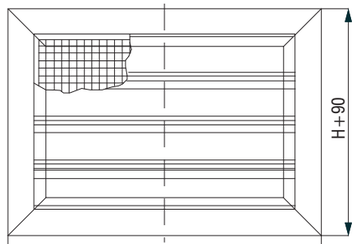
Definition of symbols:

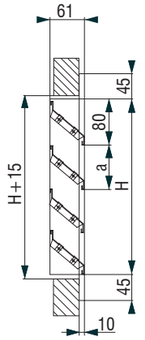
V [m³/h]	- Air flow
V_n [m³/h]	- Nominal air flow
V_{uk} [m³/h]	- Total air volume in motion
h [m]	- Distance from the ceiling to the occupied zone
H [m]	- Room height
A,B [m]	- Distance between diffusers
x [m]	- Distance from wall
L [m]	- Throw distance (x+h)
A_{ef} [m²]	- Effective discharge area
v_{ef} [m/s]	- Effective jet velocity
v_L [m/s]	- Average core velocity at distance L (m) from a diffuser
v_{Lmax} [m/s]	- Maximum core velocity at distance L (m) from a diffuser
v_h [m/s]	- Average core velocity at distance h (m) from a diffuser
Δp [Pa]	- Total pressure drop
t_p [°C]	- Air temperature in a room
t_z [°C]	- Supply air temperature
t_m [°C]	- Core air temperature
$Δt_z$ [°C]	- $(t_z - t_p)$
$Δt_L$ [C°]	- $(t_m - t_p)$
i	- Induction V_{uk}/V
L_{WA} [dB(A)]	- Sound power level

Design changes reserved

FZ

AFZV





FZ I AFZV

- FZ - made out of galvanized steel sheet
- AFZV - made out of anodized aluminium sheet
- Galvanized steel mesh on the back side
- Fixing with screws

Options:

- Installation subframe
- RAL...

* Holes for screws are not drilled

Standard dimensions FZ, AFZV*	
B	385 - 1885 mm, in increments 200mm
H	300 - 1800 mm, in increments 150mm

*all combinations B x H are possible

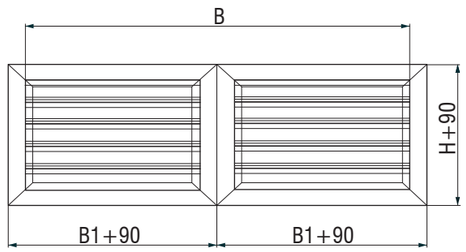
Free cross-section approx. 60 % of B x H

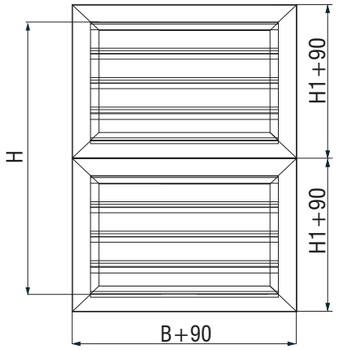
Dimension B > 1885 mm or H > 1800 mm

B=2B1 + 90; H=2H1 + 90

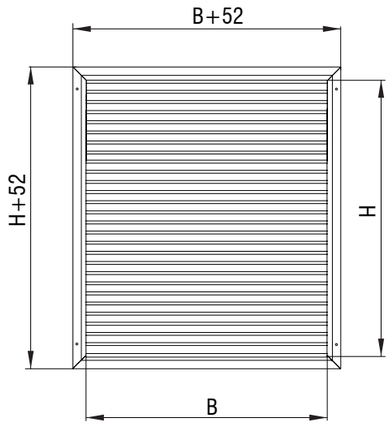
Example :
B = 1785 mm
H = 3400 mm

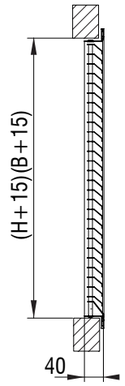
H = 2 H1 + 90
H 1 = (H - 90)/2 = (3400 - 90)/2 = 1655





Design changes reserved





AFZM

- Made out of anodized aluminium profiles
- Galvanized steel mesh on the back side
- Fixing with screws

Options:

- Installation subframe (UR)
- RAL...

Standard dimensions AFZM*	
B	297 - 1197 mm, in increments 100mm
H	197 - 697 mm, in increments 100mm

*all combinations B x H are possible

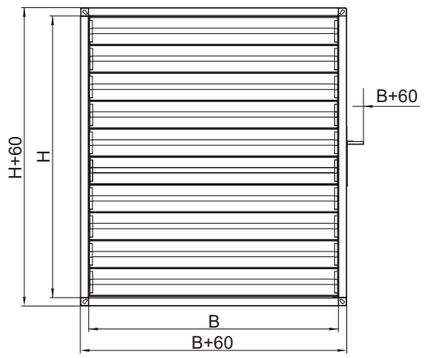
Free cross-section approx. 50 % of B x H

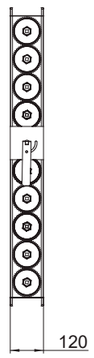
ZRZ12 / RZ12

-
- RZ - made out of galvanized steel sheet, gears and bearings made of ABS.
- Opposed damper blade operation
- Δp_{max} = 1000 Pa; t_{max} = 70°C

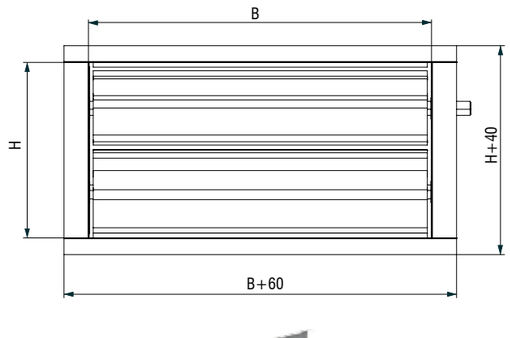
Standard dimensions RZ*	
B	200 - 1400 mm, in increments 100mm
H	215 - 1015 mm, in increments 100mm

*all combinations B x H are possible





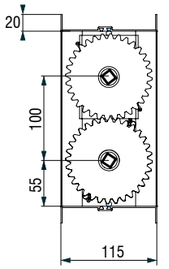
Design changes reserved



ARZ

- Made out of anodized aluminium profiles, gears and bearings made of ABS.
- Opposed damper blade operation
- Blade tip seals, made of specially profiled rubber provides excellent sealing characteristics
- Δp_{max} = 600 Pa; t_{max} = 70°C

Standard dimensions ARZ*	
B	400 - 2400 mm, in increments 200mm
H	210 - 1510 mm, in increments 100mm

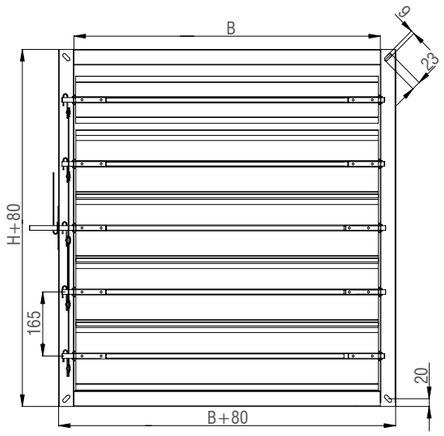


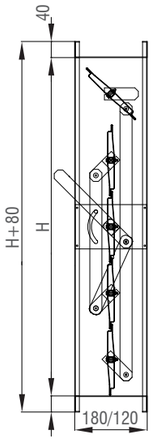
RZO

- Reinforced regulation louvre
- Made out of steel sheet profiles, reinforced damper blades out of steel profiles, brass bearings
- Frame width RZO12 - 120 mm
  RZO18 - 180 mm
- Counter-rotating damper blades

Standard dimensions RZ*	
B	400 - 2000 mm, in increments 200mm
H	345 - 1995 mm, in increments 195mm

*all combinations B x H are possible





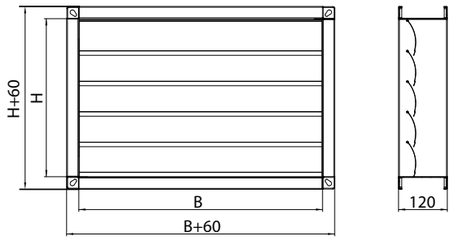
Design changes reserved

PZ

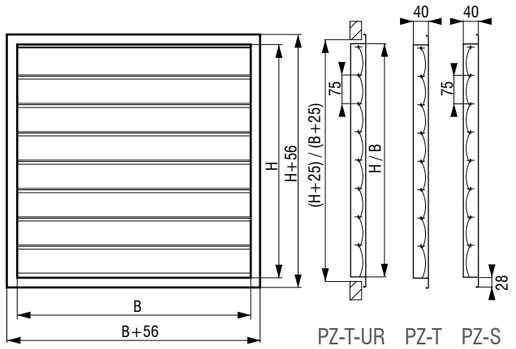
- Frame made of anodized aluminium profiles, blades made from anodized aluminium sheet.
- Duct version - frame made of galvanized steel sheet
- Wall or duct installation with screws

Options

- Overpressure (Supply)
- Underpressure (Exhaust)
- Duct type
- Discharge with square-to-cylindrical transition section
- Installation subframe



PZ-K



PZ-T-UR PZ-T PZ-S

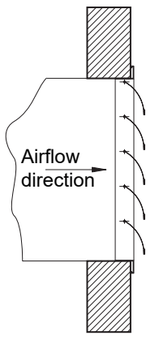
Standard dimensions PZ-T, PZ-S, PZ-K*	
B	200 - 1600 mm, in increments 200mm
H	240 - 1590 mm, in increments 75mm

*all combinations B x H are possible

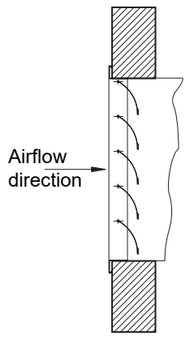
Standard dimensions PZ-T/O*	
B	330 - 730 mm, in increments 50mm
øD	300 - 700 mm, in increments 50mm

*all combinations B x H are possible

OVERPRESSURE



UNDERPRESSURE



Design changes reserved

ZP

- Made of galvanized steel sheet
- Installed directly into the wall opening by anchor springs at the installation frame

Application

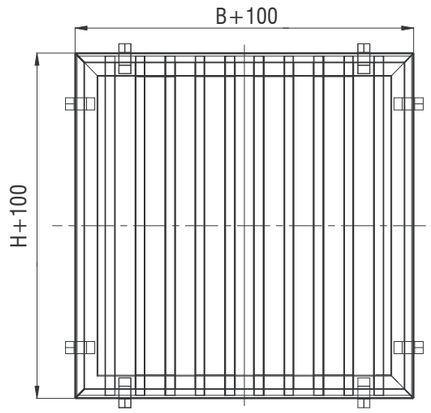
- Separation of sand from air stream
- Correct mounting position of the sand-trap louvre is important
- Average efficiencies obtained by tests 80% particles 20 - 50 μm, or 50% particles 1 - 70 μm.
-

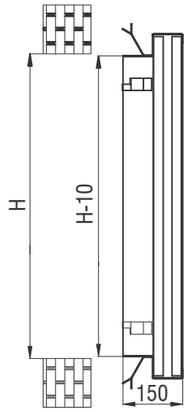
Options

- RAL...

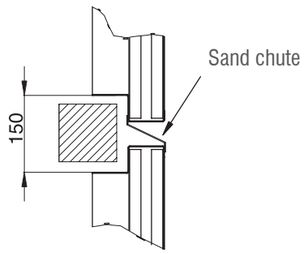
Standard dimensions ZP*	
B	300 - 2250 mm, in increments 150mm
H	300 - 2250 mm, in increments 150mm

*all combinations B x H are possible





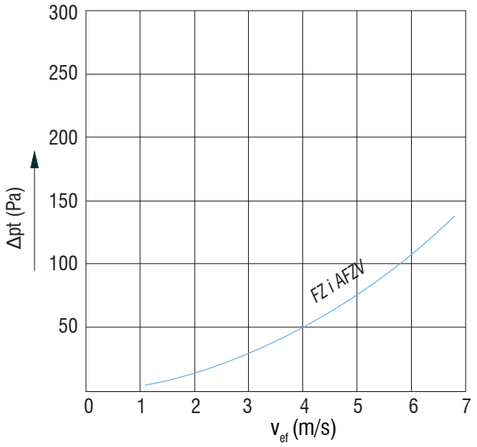
Vertical connection of two sand trap louvres



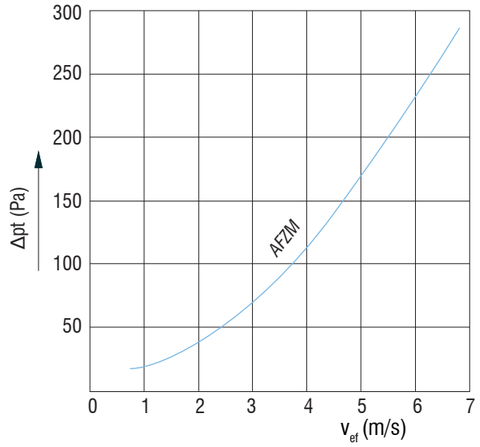
Design changes reserved

SELECTION DIAGRAMS

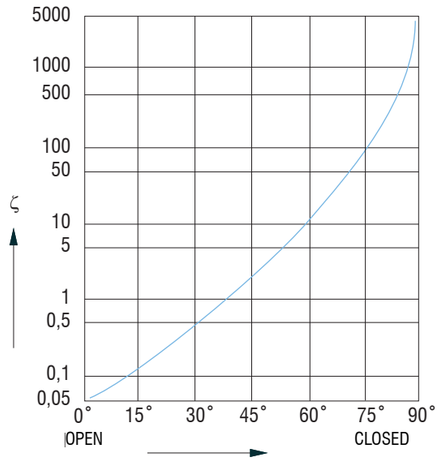
Pressure drop diagram - FZ



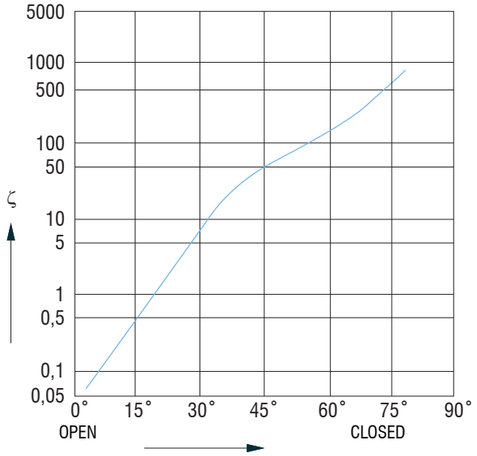
Pressure drop diagram - AFZM, AFZV



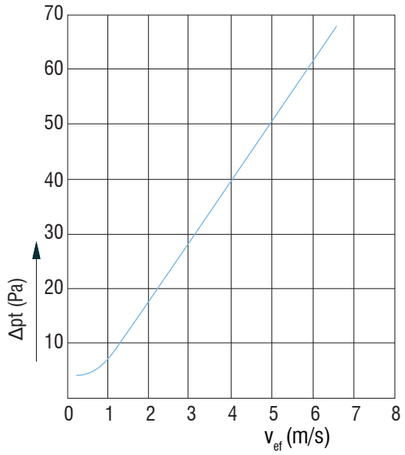
Flow resistance diagram - FZ



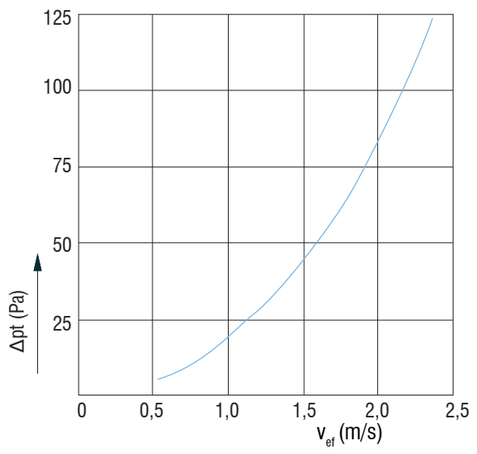
Flow resistance diagram - ARZ



Pressure drop diagram - PZ



Flow resistance diagram - ZP



Design changes reserved

ORDERING KEY

Louvre type	**AFZM**	**- 1785X1500**	**- UR**	**- M230**	**- OZ**
FZ, AFZV,AFZM, RZ12, RZO, ARZ, PZ-T, PZ-S, PZ-K, PZ-T/O, ZP					
Dimensions					
Installation subframe (UR, IS)					
Drive (RZ, ARZ) **- R**, manual **- M 24**, motor actuator 24 V **- M 230**, motor actuator 230 V					
Regulation (RZ, ARZ) **- OZ** (two positions) **- K** (continuous) **- F** (return spring)					

* Screws are not delivered

Design changes reserved

4/S2
v 3.3 (en)

DAMPERS

RZ-C, RZ-P, ZTZ-C, ZPC

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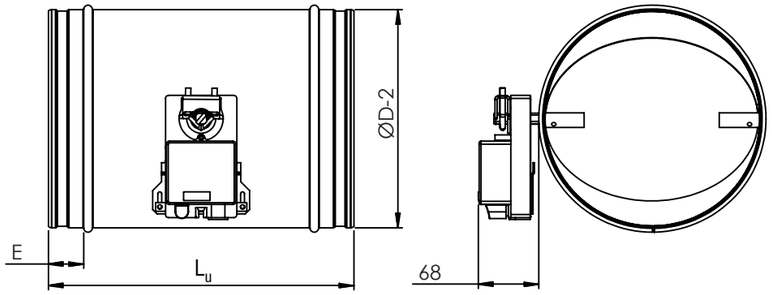
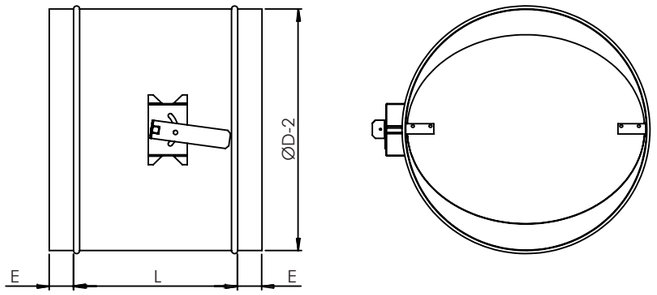
RZ - C

- Manual regulation / control of airflow in round ventilation ducts
- Made of galvanized steel sheet
- Self-locking control mechanism made of plastic is installed in dampers of diameter ≤ 250 mm and for operating temperatures up to 70°C
- For larger diameters, D≥250 mm, a metal control mechanism is installed

Round airtight damper with motor drive RZ-C-M



Round airtight damper with manual drive RZ-C-R

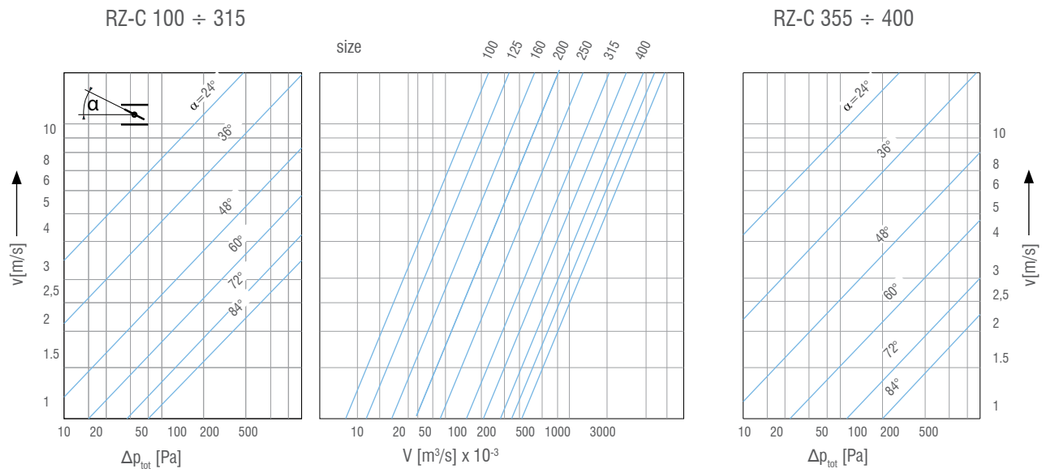


Design changes reserved

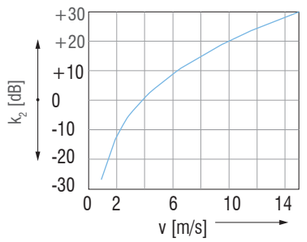
Dimensions

ØD	100	125	160	200	250	315	355	400
E	40	40	40	40	40	50	50	60
L	140	140	140	140	270	230	230	210
L_u	220	220	220	220	350	350	350	350

Selection diagram



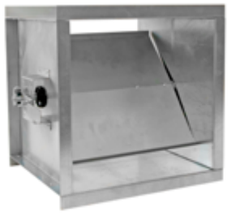
ØD	100	125	160	200	250	315	355	400
k_1 [dB]	-2	-1	0	+1	+2	+3	+3	+4

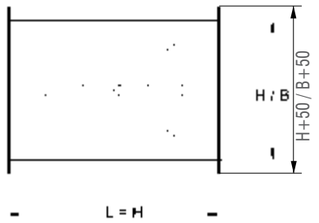


Total sound power level :

$L_w = L_{wnom} + k_1 + k_2$

Design changes reserved





RZ - P

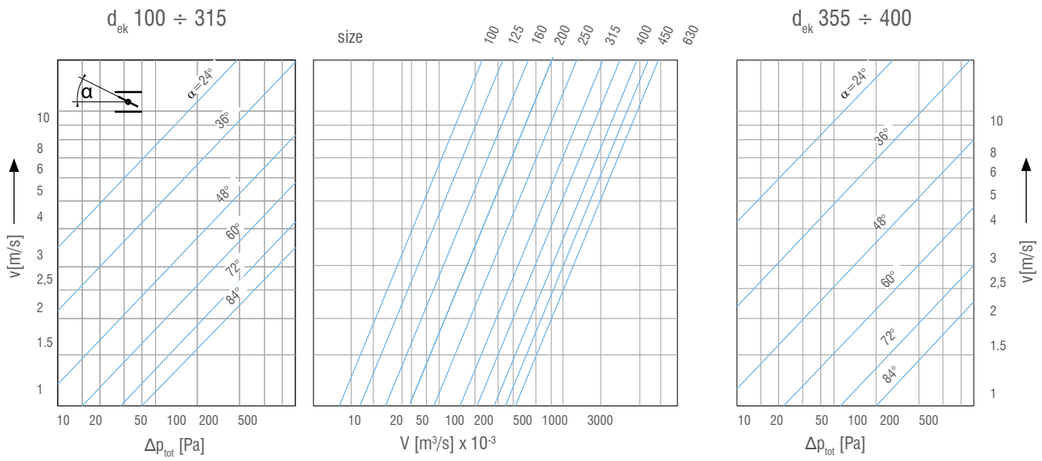
- Manual regulation / control of airflow in rectangular ventilation ducts
- Made of galvanized steel sheet
- Self-locking control mechanism made of plastic is installed in dampers up to H ≤ 300 mm and for operating temperatures up to 70°C
- For H≥300 mm a metal control mechanism is installed

B [mm]	100	150	200	250	300	350	400
H [mm]	100	150	200	250	300	350	400
d_{ek}[mm]	100	150	200	250	300	350	400
k_1 [dB]	-2	0	+1	+2	+3	+3	+4

d_{ek} = eqivalent diemeter

* All B x H combinations are possible. In that case d_{ek} is calculated : $d_{ek} = 2B \cdot H/(B+H)$

Selection diagram



Ordering key

Volume control damper **RZ - C - ØDn (BxH) M230 - OZ**

Type
C - round
P - rectangular

Diameter (Dimensions)

Drive
R - manual
M - preparation for a motor drive
M24 - motor drive 24V
M230 - motor drive 230V

Regulation
OZ - two positions
K - continuous
F - returning spring

Design changes reserved

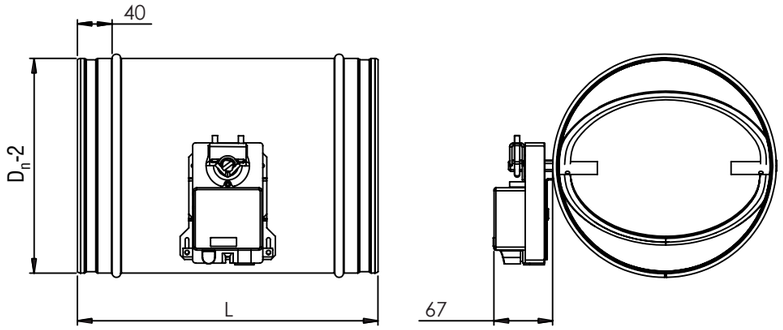
ZTZ-C

- For shuting off airflow in round ducts.
- Produced according to DIN 1946 (part 4).
- Casing and damper blade made of galvanized steel sheet. Rubber seal on blade for better sealing characteristics.

Options

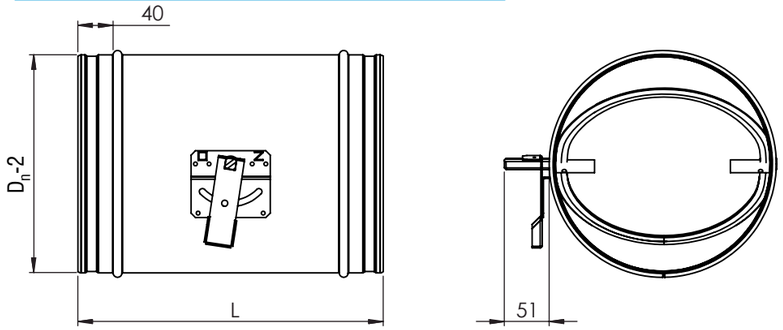
- Motor drive

Round airtight damper with motor drive ZTZ-C-M



øD [mm]	L [mm]
100	220
125	220
160	220
200	220
250	350
315	350
400	350

Round airtight damper with manual drive ZTZ-C-R



Ordering key

Airtight damper **ZTZ - C - ØDn M230 - OZ**

C - round

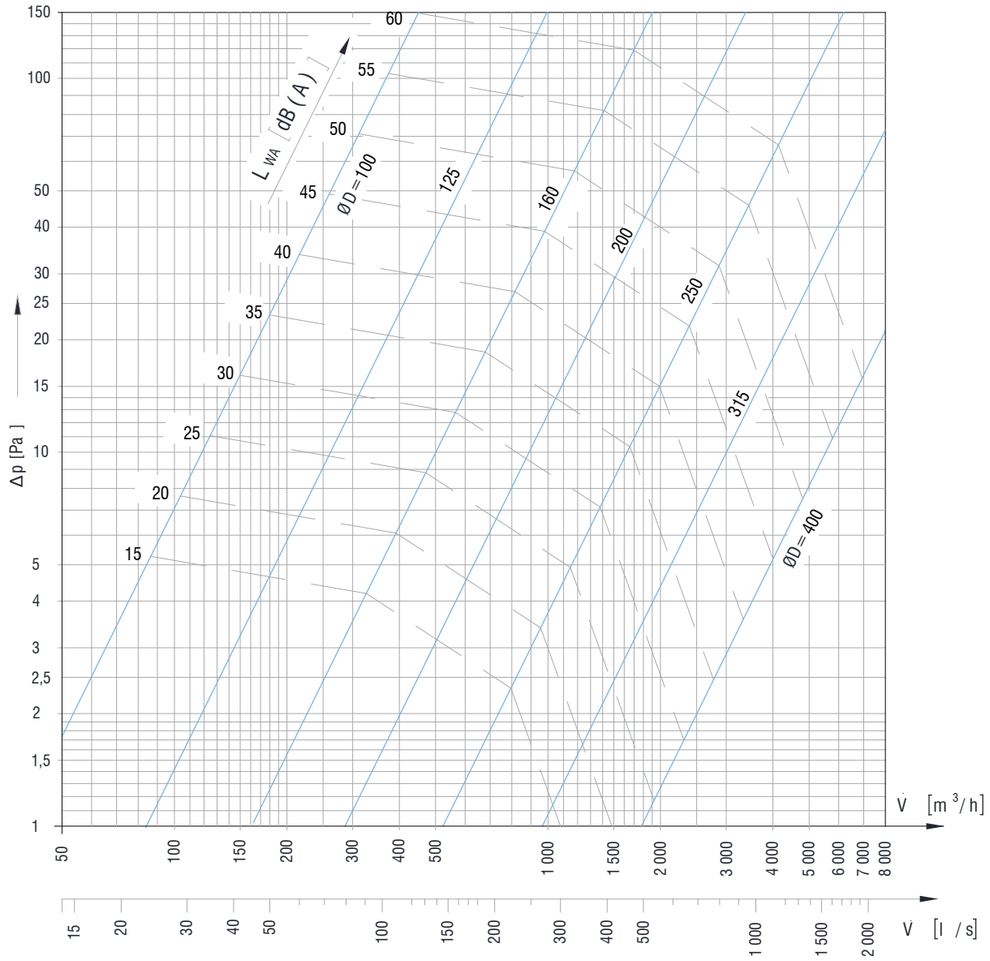
Diameter

Drive
R - manual
M - preparation for a motor drive
M24 - motor drive 24V
M230 - motor drive 230V

Regulation
OZ - two positions
K - continuous
F - returning spring

Design changes reserved

Pressure drop and sound power level diagram



Example:

Given:

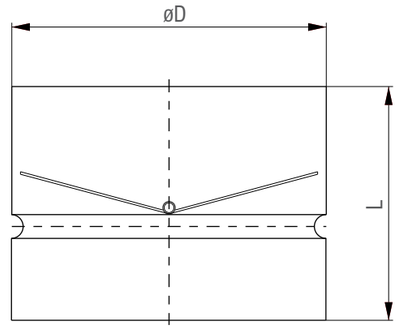
V=850 m³/h
v=5 m/s
Duct pressure = 2000 Pa

Dg.1: D=250mm
Δp = 2,7 Pa, L_w= 17dB(A)

Design changes reserved

ZPC

- Prevents unwanted airflow
- In case of horizontal installation, damper axis must be in vetrical position
- Casing made out of galvanized steel sheet, damper blade made out of anodized aluminium



Pay attention to airflow direction markings on the casing of a volume flow rate control damper

Dimensions

Size	ZPC 100	ZPC 125	ZPC 140	ZPC 150	ZPC 160	ZPC 180	ZPC 200	ZPC 250	ZPC 280	ZPC 300	ZPC 315	ZPC 355	ZPC 400	ZPC 450	ZPC 500
Connection diameter øD [mm]	ø98	ø123	ø138	ø148	ø158	ø178	ø198	ø248	ø278	ø298	ø313	ø353	ø398	ø448	ø498
Damper length L [mm]	80	80	80	80	80	80	80	80	80	80	80	100	100	100	100
Damper mass m [kg]	0,11	0,15	0,17	0,18	0,20	0,22	0,25	0,35	0,40	0,45	0,50	0,65	0,75	0,85	0,95

Ordering key

Round backdraft damper	**ZPC**	**- ØDn**
Diameter		

Design changes reserved

4/S3

v 3.3 (en)

VARIABLE AIR VOLUME CONTROL DAMPER
PRESSURE DAMPER

RVP-C, RVP-P, RVK
RVP-C-T, RVP-P-T

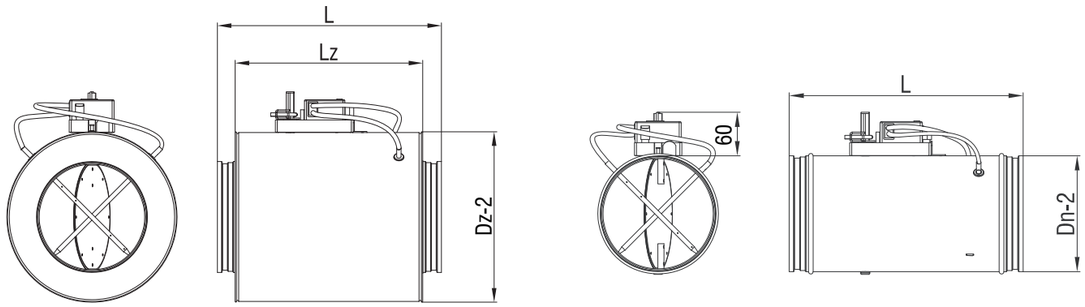
www.klimaoprema.hr

RVP-C

- Volume flow control regulation by a given set-point
- Factory parametrization in accordance with clients request
- High regulation precision
- No maintainance required

Options

- Constant
- Master-slave
- Insulated casing (50mm)
- MP-Bus (standard), LONWORKS, ModBus (Belimo/Siemens), KNX (Belimo/Siemens), MF (no Bus, Belimo), SGB (no Bus, Siemens), Bacnet (Siemens)



Specifications

$øD_n$ [mm]	L [mm]	$øD_z$	L_z [mm]	V_{min} [m³]	V_{max}
100	400	198	330	37	343
125	400	223	330	54	540
160	400	258	330	90	900
200	400	298	330	145	1459
250	500	348	430	217	2215
315	600	413	530	380	3680
355	600	453	530	482	4275
400	600	498	530	615	6047
500	800	598	740	973	9484
630	850	728	810	1435	12482

* Maximum volume flow at velocity v_{max} = 12 m/s
** Size 630 comes with reinforcement ring

Actuators overview

Type	ød 100 - 500	ød 630
MF	Belimo LMV-D3-MF	Belimo NMV-D3-MF
SGB	Siemens GDB181.1E/3	Siemens GLB181.1E/3
MP	Belimo LMV-D3-MP	Belimo NMV-D3-MP
MOD-S	Siemens GDB181.1E/MO	Siemens GLB181.1E/MO
MOD-B	Belimo LMV-D3-MOD	Belimo NMV-D3-MOD
KNX-S	Siemens GDB181.1E/KN	Siemens GLB181.1E/KN
KNX-B	Belimo LMV-D3-KNX	Belimo NMV-D3-KNX
BAC	Siemens GDB181.1E/BA	Siemens GLB181.1E/BA
LON	Belimo LMV-D3-LON	Belimo NMV-D3-LON
PP	Gruner 227VM-024-05	Gruner 227VM-024-10

Definition of symbols:

Δp [Pa]	- Total pressure drop	$Δp_S$ [Pa]	- Static pressure differential
v_{ef} [m/s]	- Effective outlet velocity	V_{max} [m³/h]	- Maximal airflow rate
V[m³/h]	- Airflow rate	$øD_n$ [mm]	- Damper diameter
f [Hz]	- Sound frequency	L [mm]	- Damper length
L_W [dB/okt]	- Sound power level per octave	$øD_z$ [mm]	- Insulation diameter
L_{WA} [dB(A)]	- Sound power level	L_z [mm]	- Insulation length
V_{min} [m³/h]	- Minimal airflow rate	B x H [mm]	- Dimensions

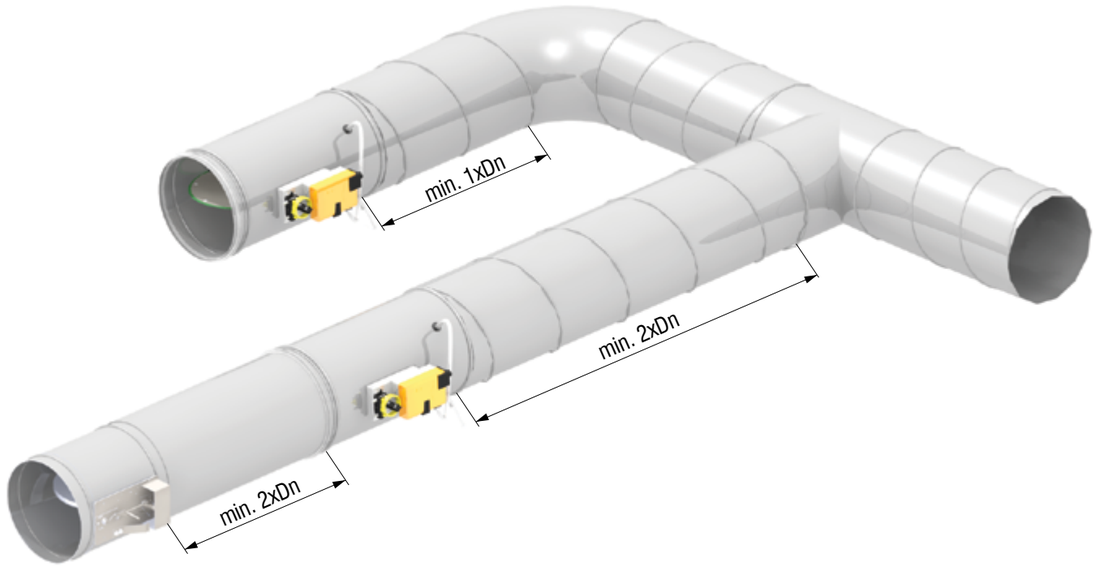
Design changes reserved

Compact VAV solutions - Belimo

	Belimo L(N)MV-D3-MF	Belimo L(N)MV-D3-MP	Belimo L(N)MV-D3-MOD	Belimo L(N)MV-D3-LON	Belimo L(N)MV-D3-KNX	Siemens GL(D)B181.1E/3	Siemens GL(D)B181.1E/MO	Siemens GL(D)B181.1E/KN	Siemens GL(D)B181.1E/BA	Gruner 227VM-024-05(10)
Applications										
VAV/CAV control	•	•	•	•	•	•	•	•	•	•
Actuators										
Torque	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm	5(10) Nm
Running time	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable
Control										
0/2..10V	•	•				•				•
Via contacts (CAV)	•	•								•
MP-Bus		•								
Modbus RTU			•				•			
LonWorks				•						
KNX					•			•		
Bacnet									•	
PP Bus										•
Pressure sensor										
	0..450Pa	0..450Pa	0..450Pa	0..450Pa	0..450Pa	0..300Pa	0..300Pa	0..300Pa	0..300Pa	0..250Pa
Accessories										
KOER Codis C35-VAV	•	•				•			•	•
Room temperature controler / CR24..	•	•								
Fan optimiser / COU24-A-MP	•	•								
MP gateways / UK24xxx	•	•								
PC Tool / MFT-P	•	•	•	•	•					
Service tool / ZTH-GEN	•	•	•	•	•					
Siemens software ASC941						•	•	•	•	
AST20						•	•	•	•	
Supply / Inputs										
AC/DC 24V	•	•	•	•	•	•	•	•	•	•
Feedback signal	Airflow / Damper position / Δp	Airflow / Damper position / Δp	Modbus / Not relevant	LonWorks /Not relevant	KNX /Not relevant	Airflow	Modbus / Not relevant	KNX /Not relevant	Bacnet /Not relevant	Airflow

Design changes reserved

RVP-C INSTALLATION



*Wiring diagrams are on the page 282.

Ordering key

Variable air volume damper	**RVP**	**- C**	**- ØDn**	**- MP**	**- Z**	**- V**	**- P**
C - round							
Diameter							
MP-Bus (standard) **LONWORKS** **ModBus** (Belimo/Siemens) **KNX** (Belimo/Siemens) **MF** (no Bus, Belimo) **SGB** (no Bus, Siemens) **Bacnet** (Siemens)							
Insulation							
Volume flow V*min/max [m³/h]							
Mode **P -** single **M -** master **S -** slave **K -** constant flow							

* if not otherwise specified, regulator is set to standard factory values V_{max} and V_{min}.

Design changes reserved

SOUND POWER LEVELS

Sound power levels Lw [dB/Okt]:
RVP-C Ø100 - Ø200

Size				ø100				ø125				ø160				ø200			
v [m/s]				3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
V [m³/h]				85	170	257	344	130	263	396	530	216	434	652	871	337	680	1027	1370
p_s = 125 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	34	41	46	50	40	48	52	58	43	51	55	61	49	57	61	67
			125	40	53	55	55	42	56	57	58	44	58	59	60	46	60	61	62
			250	37	49	50	54	38	51	53	57	41	53	55	59	43	55	57	61
			500	35	44	46	50	37	48	47	53	39	49	49	55	41	51	51	57
			1000	34	40	41	46	35	42	42	47	38	44	44	49	40	46	46	51
			2000	33	37	37	40	35	38	39	42	37	40	41	44	39	42	43	46
			4000	32	35	25	36	34	37	37	39	36	39	39	41	38	41	41	43
			8000	33	34	34	35	35	37	38	38	37	38	39	39	37	39	40	40
	L_{WA} [dB/(A)]			39	46	48	51	40	47	52	55	45	48	52	55	44	52	56	58
p_s = 250 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	38	44	49	58	45	52	56	65	49	55	59	69	55	61	66	76
			125	43	56	62	66	46	59	64	68	48	62	66	71	50	64	70	74
			250	42	53	58	62	45	57	60	64	47	57	62	67	49	60	65	70
			500	41	50	56	58	43	52	58	60	45	54	61	62	47	56	54	64
			1000	39	47	51	52	42	49	53	54	44	51	56	56	44	53	55	58
			2000	38	44	48	48	40	46	50	51	42	48	52	53	43	51	54	54
			4000	36	42	45	46	39	44	49	49	40	46	49	52	41	49	53	51
			8000	32	37	40	43	38	43	47	55	38	42	44	48	42	48	52	53
	L_{WA} [dB/(A)]			47	53	56	58	47	54	59	60	51	56	59	62	53	60	63	65
p_s = 500 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	42	46	54	57	50	54	62	65	56	60	68	71	61	65	73	76
			125	47	62	70	72	51	64	72	74	53	66	74	76	55	68	76	77
			250	46	59	67	68	50	61	69	70	50	63	71	72	54	65	72	72
			500	45	56	61	63	48	59	64	65	49	60	65	66	52	61	67	68
			1000	44	62	56	58	46	55	59	60	48	56	60	61	50	48	62	64
			2000	43	51	53	55	45	53	55	57	47	55	57	59	49	47	59	61
			4000	41	46	50	52	42	49	52	55	45	50	54	57	46	42	56	59
			8000	40	45	49	51	41	46	50	52	45	50	54	56	46	41	55	58
	L_{WA} [dB/(A)]			51	57	61	64	53	60	63	66	55	61	65	68	57	63	67	70
p_s = 1000 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	59	63	70	74	61	65	72	76	63	67	74	78	65	69	75	80
			125	56	62	70	71	58	63	72	75	60	66	74	77	62	68	76	79
			250	52	61	68	70	54	62	71	74	57	65	73	76	59	67	75	78
			500	51	59	64	69	53	62	68	73	56	63	70	75	58	65	71	76
			1000	52	58	63	67	54	60	67	71	58	62	69	72	58	64	70	74
			2000	51	57	62	66	53	59	66	69	57	61	68	71	57	63	69	72
			4000	49	55	59	63	51	58	62	66	55	59	64	67	56	61	65	68
			8000	49	56	58	62	50	57	61	65	54	59	63	67	56	61	65	67
	L_{WA} [dB/(A)]			56	63	69	75	58	65	73	79	62	69	75	81	63	70	77	83

Design changes reserved

Sound power levels Lw [dB/Okt]:
RVP-C Ø250 - Ø355

Size				ø250				ø315				ø355			
v [m/s]				3	6	9	12	3	6	9	12	3	6	9	12
V [m³/h]				529	1065	1604	2144	843	1692	2543	3394	1073	2160	3252	4347
p_s=125 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	52	62	65	71	55	64	68	73	57	65	69	74
			125	47	63	54	64	51	65	66	67	52	66	67	68
			250	45	58	60	63	48	60	62	65	49	61	63	67
			500	44	54	53	59	45	55	56	62	46	56	56	62
			1000	43	48	49	53	43	49	50	56	45	50	51	55
			2000	41	44	44	48	42	46	46	50	43	46	46	50
			4000	39	42	42	54	42	44	44	46	42	45	45	47
			8000	38	40	40	51	40	40	41	41	40	40	42	42
	L_{WA} [dB/(A)]			46	54	58	61	50	54	48	63	49	56	59	62
p_s=250 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	54	60	64	72	56	64	69	79	62	58	73	83
			125	49	62	54	65	48	61	66	72	56	59	75	79
			250	46	58	60	63	42	54	63	63	55	55	71	75
			500	43	53	52	58	45	53	60	60	51	51	67	69
			1000	41	49	47	52	46	53	57	57	49	56	61	63
			2000	40	44	44	47	46	53	55	55	48	54	59	60
			4000	39	42	43	53	41	47	54	54	47	53	58	58
			8000	38	39	40	50	44	51	52	55	48	52	56	58
	L_{WA} [dB/(A)]			46	52	57	61	55	64	65	69	58	63	66	70
p_s=500 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	64	68	76	79	67	71	79	82	68	72	80	83
			125	57	70	78	80	59	72	80	82	60	73	81	83
			250	56	67	75	76	57	69	76	78	59	70	78	78
			500	55	64	69	71	55	66	70	73	57	68	72	74
			1000	53	60	64	66	54	62	66	68	56	64	67	69
			2000	51	59	61	63	53	60	63	65	54	62	64	66
			4000	48	54	58	61	51	56	60	63	51	59	61	64
			8000	48	53	57	59	50	55	59	61	51	58	60	62
	L_{WA} [dB/(A)]			59	65	69	72	61	67	71	74	62	69	72	77
p_s=1000 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	67	71	78	82	69	73	79	83	69	74	81	85
			125	64	70	78	81	66	72	79	82	66	73	80	84
			250	61	69	77	80	63	71	77	79	62	72	78	83
			500	60	68	73	78	62	69	75	78	61	70	75	80
			1000	60	66	72	76	62	68	73	76	62	69	75	78
			2000	59	65	71	74	61	67	72	75	61	68	74	77
			4000	57	63	66	71	59	66	67	72	59	67	69	74
			8000	56	63	65	68	58	65	66	72	58	66	68	74
	L_{WA} [dB/(A)]			66	73	79	84	68	75	80	86	68	76	82	88

Design changes reserved

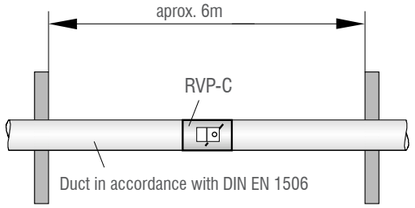
Sound power levels Lw [dB/Okt]:
RVP-C Ø400 - Ø630

Size				ø400				ø500				ø630			
v [m/s]				3	6	9	12	3	6	9	12	3	6	9	12
V [m³/h]				1364	2736	4111	5488	2111	4255	6412	8577	3365	6804	10273	13759
p_s=125 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	58	66	70	76	60	68	72	77	62	70	74	80
			125	53	67	67	69	55	70	70	71	57	72	71	73
			250	50	62	64	67	51	63	65	68	54	66	67	70
			500	47	56	58	63	49	58	58	65	51	62	62	66
			1000	45	51	53	56	47	53	53	60	50	57	55	60
			2000	44	47	49	51	46	49	50	54	48	52	52	56
			4000	43	46	46	48	45	47	48	50	47	50	49	52
			8000	42	42	43	43	42	42	44	44	45	45	45	46
	L_{WA} [dB/(A)]			51	56	62	65	54	60	62	65	56	62	64	68
p_s=250 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	65	71	76	86	65	71	76	86	67	73	78	88
			125	56	69	77	80	59	73	78	82	60	74	80	84
			250	55	67	72	76	58	69	74	78	59	71	76	80
			500	52	63	69	71	54	64	70	72	56	66	72	74
			1000	50	58	62	64	52	59	64	66	54	61	66	69
			2000	49	55	59	60	51	57	61	62	53	59	62	64
			4000	49	54	57	58	50	56	59	60	52	58	61	62
			8000	49	54	56	59	49	55	58	60	51	56	60	63
	L_{WA} [dB/(A)]			59	66	68	72	60	66	71	74	63	68	72	76
p_s=500 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	60	74	82	85	71	75	83	86	73	77	85	88
			125	61	74	82	84	63	76	84	86	65	78	86	88
			250	60	70	79	80	62	73	81	82	63	74	82	83
			500	58	67	73	75	60	70	75	77	61	72	77	78
			1000	57	64	68	70	58	66	70	72	60	68	72	74
			2000	55	63	65	67	57	65	67	69	59	67	69	71
			4000	52	59	62	65	55	60	64	67	57	62	66	69
			8000	52	57	61	63	54	59	63	65	56	61	65	67
	L_{WA} [dB/(A)]			63	69	73	77	65	71	75	78	67	73	77	81
p_s=1000 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	71	75	82	86	73	77	84	88	75	79	86	90
			125	68	74	81	85	68	76	83	87	72	78	86	89
			250	65	73	79	84	65	75	81	85	69	77	84	88
			500	64	71	76	82	65	73	78	83	68	75	80	86
			1000	64	70	75	79	66	73	77	81	68	74	79	83
			2000	63	69	75	78	65	71	76	80	67	73	79	82
			4000	61	59	72	75	63	69	73	77	65	72	74	78
			8000	60	59	71	75	63	69	73	76	64	71	73	77
	L_{WA} [dB/(A)]			70	77	83	89	72	79	85	91	74	81	87	93

Design changes reserved

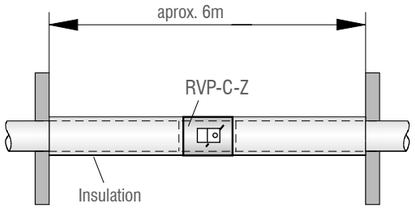
Correction values for case radiated noise in dB

$L_{w2} = L_W - \Delta L_w$



ΔL_w [dB], in relation to f_m [Hz]	Size 100	125	160	200	250	315	400
63	31	30	30	29	25	22	20
125	30	29	29	28	24	22	19
250	27	25	24	23	20	19	18
500	21	21	21	22	18	17	17
1000	19	18	19	21	16	15	15
2000	11	12	16	18	14	13	12
4000	11	12	14	16	12	11	10
8000	9	10	12	13	11	10	10

$L_{w3} = L_W - \Delta L_{w1}$



ΔL_{w1} [dB], in relation to f_m [Hz]	Size 100	125	160	200	250	315	400
63	33	32	32	31	27	24	22
125	28	29	32	31	27	25	23
250	26	24	24	26	23	23	22
500	26	27	28	33	29	29	29
1000	34	33	34	39	35	34	35
2000	33	33	38	44	42	41	39
4000	37	37	40	43	36	35	33
8000	31	32	34	35	31	29	29

Sound pressure level calculation

Given:

RVP 200
v = 6 m/s
Δp_s = 250 Pa

Required sound pressure level in room is 35 dB(A)

f_m	63	125	250	500	1000	2000	4000	8000
L_w (str. 5)	61	64	60	56	53	51	49	48
ΔL_w	29	28	23	22	21	18	16	13
L_{w2}	32	26	37	34	32	33	33	35
Ceiling reduction	4	4	4	4	4	4	4	4
Room attenuation	6	6	5	5	4	4	4	4
A-weighting	-26	-16	-9	-3	0	1	1	-1
Correction value	-4	0	19	22	24	26	26	26

- $L_{pA2} \approx$ 32 dB(A), requirement is met

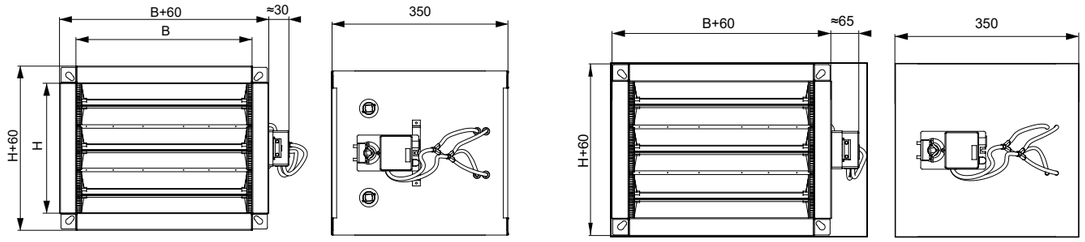
Design changes reserved

RVP-P

- Volume flow control regulation by a given set-point
- Factory parametrization in accordance with clients request
- High regulation precision
- No maintainance required

Options

- Constant mod
- Master-slave mod
- Insulated casing (30mm)
- MP-Bus (standard), LONWORKS, ModBus (Belimo/Siemens), KNX (Belimo/Siemens), MF (no Bus, Belimo), SGB (no Bus, Siemens), Bacnet (Siemens)



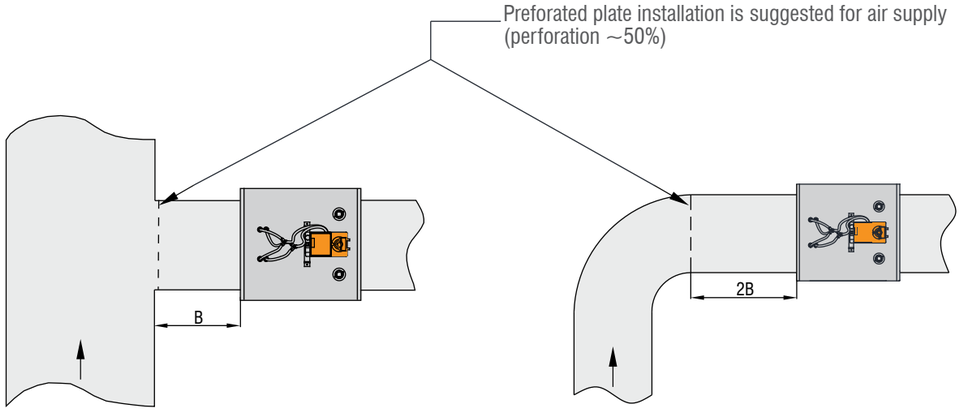
Specifications

B [mm]	H [mm]	A_{ef} [mm²]	Vmin [m³/h]	Vmax [m³/h]
200	100	0,0170	130	720
300		0,0255	190	1080
400		0,0340	255	1440
200	200	0,0340	255	1440
300		0,0510	380	2160
400		0,0680	505	2880
500		0,0850	630	3600
600		0,1020	755	4320
300	300	0,0765	570	3240
400		0,1020	755	4320
500		0,1275	940	5400
600		0,1530	1130	6480
700		0,1785	1320	7560
800		0,2040	1505	8640
900		0,2295	1695	9720
1000		0,2550	1880	10800
400	400	0,1360	1005	5760
500		0,1700	1255	7200
600		0,2040	1505	8640
700		0,2380	1755	10080
800		0,2720	2005	11520
900		0,3060	2260	12960

B [mm]	H [mm]	A_{ef} [mm²]	Vmin [m³/h]	Vmax [m³/h]
1000	400	0,3401	2510	14400
500	500	0,2125	1570	9000
600		0,2550	1880	10800
700		0,2975	2195	12600
800		0,3400	2510	14400
900		0,3825	2820	16200
1000		0,4250	3135	18000
600	600	0,3060	2260	12960
700		0,3570	2635	15120
800		0,4080	3010	17280
900		0,4590	3385	19440
1000		0,5100	3760	21600
700	700	0,4165	3070	17640
800		0,4760	3510	20160
900		0,5355	3950	22680
1000		0,5950	4385	25200
800	800	0,5440	4010	23040
900		0,6120	4515	25920
1000		0,6800	5015	28800
900	900	0,6885	5075	29160
1000		0,7650	5640	32400
1000	1000	0,8500	6265	36000

Design changes reserved

RVP-P INSTALLATION



*Wiring diagrams are on the page 282.

Ordering key

Variable air volume control damper	**RVP**	**- P**	**- BxH**	**- MP**	**- Z**	**- V**	**- P**	**- PZX**

P - rectangular

Dimensions

Communication type
MP-Bus (standard)
LONWORKS
ModBus (Belimo/Siemens)
KNX (Belimo/Siemens)
MF (no Bus, Belimo)
SGB (no Bus, Siemens)
Bacnet (Siemens)

Insulation

Volume flow V*min/max [m³/h]

Mode
P - single
M - master
S - slave
K - constant flow

Additional silencer

* if not otherwise specified, regulator is set to standard factory values V_{max} and V_{min}.

RVP-P SOUND POWER LEVELS

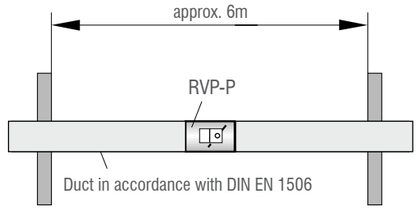
Correction values for other case widths																											
in relation to	B [mm]	Δp_s = 125Pa								Δp_s = 250Pa								Δp_s = 500Pa							
		63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
B=600 [mm]	200	-8	-4	-6	-2	-2	-5	-4	-6	-5	-6	-6	-3	-3	-4	-3	-4	-6	-5	-10	-5	-3	-4	-3	-3
	300	-5	-3	-4	-1	-1	-3	-3	-4	-3	-4	-4	-2	-2	-3	-2	-3	-4	-3	-6	-3	-2	-3	-2	-2
	400	-3	-2	-2	-1	-1	-2	-2	-2	-2	-2	-2	-1	-1	-2	-1	-1	-2	-2	-4	-2	-1	-2	-1	-1
	500	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	-1	-2	-1	0	-1	0	-1
	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	700	1	1	1	0	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	0	0
	800	2	1	2	0	1	1	1	2	1	1	2	1	1	1	1	1	2	1	3	1	1	1	1	1
	900	3	2	2	1	1	2	2	2	2	2	2	1	1	2	1	1	2	2	4	2	1	2	1	1
	1000	4	2	3	1	1	2	2	3	3	3	1	1	2	2	2	3	2	4	2	1	2	1	2	2
B=1000 [mm]	800	-2	-1	0	-1	-1	-1	-1	-0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1	-1	-1	-1
	900	-1	-1	0	-1	0	0	-1	-1	-1	-1	-1	0	0	0	0	0	-1	-1	0	-1	0	0	0	0
	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Size B x H [mm]			600																			
			100				200				300				400				500			
v [m/s]			3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
p_s=125 Pa	L_W [dB/Okt]	f_{sr} [Hz]																				
		63	45	55	63	68	51	60	68	73	53	63	71	76	56	65	73	78	59	68	76	81
		125	46	56	63	68	49	58	66	71	51	60	68	73	52	61	69	74	53	63	71	75
		250	42	49	54	57	46	53	58	61	48	55	60	63	50	56	62	64	52	59	64	67
		500	44	47	50	52	45	48	51	53	45	49	51	53	46	49	52	53	46	50	52	54
		1000	46	49	51	53	48	50	53	54	48	51	53	55	49	52	54	55	50	52	55	56
		2000	46	49	51	53	49	52	54	56	51	54	56	58	52	55	57	59	54	57	59	60
		4000	39	43	47	49	41	46	50	52	43	47	51	53	44	49	52	55	45	50	54	56
		8000	32	37	41	43	36	41	45	47	38	43	47	50	40	45	49	51	42	47	51	54
p_s=250 Pa	L_W [dB/Okt]	f_{sr} [Hz]																				
		63	52	61	68	72	56	64	71	75	58	66	73	77	59	68	75	79	61	70	77	81
		125	49	58	65	70	53	61	69	73	55	64	71	75	56	65	72	77	58	67	74	79
		250	46	53	58	62	49	56	62	66	51	58	64	68	53	60	66	69	55	62	68	72
		500	48	52	56	58	50	54	58	60	51	55	59	61	51	56	59	62	52	57	61	63
		1000	51	54	57	59	52	56	59	61	53	57	60	61	54	57	60	62	55	58	61	63
		2000	53	56	58	59	56	58	61	62	57	60	62	64	58	61	63	65	60	63	65	66
		4000	49	52	55	57	51	54	57	59	52	56	59	60	53	56	59	61	54	58	61	63
		8000	45	49	52	54	47	51	54	56	49	53	56	58	50	64	57	59	51	55	58	60
p_s=500 Pa	L_W [dB/Okt]	f_{sr} [Hz]																				
		63	57	65	72	76	60	69	76	80	63	71	78	82	64	73	80	84	67	75	82	86
		125	53	63	71	77	56	66	74	80	58	68	76	81	59	69	77	83	61	71	79	84
		250	49	58	66	70	55	64	72	76	59	68	75	80	61	70	78	82	54	74	81	86
		500	53	59	63	66	56	62	66	69	58	63	68	71	59	65	69	72	61	66	71	73
		1000	59	62	64	66	61	64	66	67	62	64	67	68	62	65	68	69	63	66	69	70
		2000	64	65	66	66	66	67	68	69	68	69	70	70	69	70	71	71	70	71	72	73
		4000	63	64	65	66	65	66	67	68	66	67	68	69	67	68	69	69	68	69	70	70
		8000	59	61	63	64	61	63	65	66	62	65	66	68	63	65	67	69	64	67	69	70

Size B x H [mm]				600				1000															
				600				700				800				900				1000			
v [m/s]				3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
p_s = 125 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	59	68	76	81	62	71	79	84	64	74	82	87	65	75	83	88	66	76	83	88
			125	53	63	71	75	55	65	73	77	57	66	74	79	57	67	75	80	57	67	75	80
			250	52	59	64	67	54	61	66	69	56	63	68	71	57	64	69	72	58	64	69	73
			500	46	50	52	54	47	51	53	55	47	51	53	55	48	51	54	55	48	51	54	55
			1000	50	52	55	56	51	53	56	57	51	54	56	57	51	54	56	58	51	54	56	58
			2000	54	57	59	60	56	59	61	62	57	60	62	64	58	61	63	65	58	61	63	65
			4000	45	50	54	56	47	52	56	58	49	53	57	59	49	54	58	60	49	54	58	60
			8000	42	47	51	54	45	50	54	56	47	52	56	58	48	53	57	59	48	53	57	59
p_s = 250 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	61	70	77	81	63	72	79	83	65	74	80	85	66	75	81	86	66	75	82	86
			125	58	67	74	79	60	69	77	81	62	71	79	83	63	72	80	84	64	72	80	84
			250	55	62	68	72	57	65	70	74	59	67	72	76	60	68	73	77	61	68	73	77
			500	52	57	61	63	54	58	62	64	55	59	63	65	55	60	63	66	55	60	63	66
			1000	55	58	61	63	56	59	62	64	57	60	63	65	57	61	64	65	57	61	64	65
			2000	60	63	65	66	62	65	67	68	63	66	68	69	64	67	69	70	64	67	69	70
			4000	54	58	61	63	56	59	62	64	57	60	63	65	57	61	64	66	57	61	64	66
			8000	51	55	58	60	53	57	60	62	54	58	61	63	55	59	62	64	55	59	62	64
p_s = 500 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	67	75	82	86	69	78	85	89	71	80	87	91	72	81	88	92	72	81	88	92
			125	61	71	79	84	63	73	81	86	64	74	83	88	65	75	84	89	65	75	84	89
			250	65	74	81	86	69	78	85	90	72	81	88	93	73	82	89	94	74	83	90	95
			500	61	66	71	73	63	68	73	75	64	70	74	77	65	71	75	78	65	71	75	78
			1000	63	66	69	70	64	67	70	71	65	68	70	72	66	69	71	72	66	69	71	72
			2000	70	71	72	73	72	73	74	75	73	75	75	76	74	75	76	77	74	75	76	77
			4000	68	69	70	70	69	70	71	72	70	71	72	73	70	72	73	73	70	72	73	73
			8000	64	67	69	70	66	68	70	71	67	69	71	72	68	70	72	73	68	70	72	73

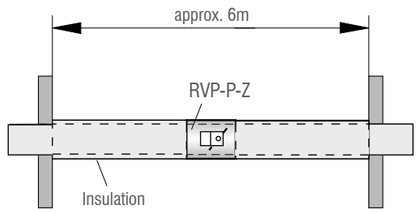
Design changes reserved

$L_{w2} = L_W - \Delta L_w$



$\Delta L_w/\Delta L_{w1}$	$\Delta L_w/\Delta L_{w1}$ u dB, in relation to f_m u Hz							
	63	125	250	500	1000	2000	4000	8000
ΔLw [dB(A)]	3	3	6	9	12	14	15	14

$L_{w3} = L_W - \Delta L_{w1}$



$\Delta L_w/\Delta L_{w1}$	$\Delta L_w/\Delta L_{w1}$ u dB, in relation to f_m u Hz							
	63	125	250	500	1000	2000	4000	8000
ΔLw1 [dB(A)]	7	7	14	21	25	28	28	25

Sound pressure level calculation

Given:

RVP-P-Z 500x300
v = 6 m/s
Δp_s = 500 Pa

Required sound pressure level in room is 42 dB(A)

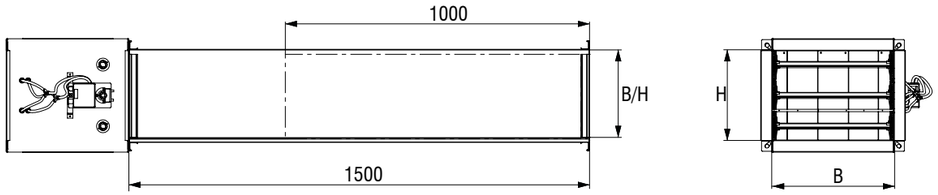
f_m [Hz]	63	125	250	500	1000	2000	4000	8000
L_w (str. 11)	71	68	68	63	64	69	67	65
Correction B=500	-1	-1	-2	-1	0	-1	0	-1
$\Delta L_w/\Delta L_{w1}$	7	7	14	21	25	28	28	25
L_{w3}	63	60	52	41	39	40	39	39
Ceiling reduction	4	4	4	4	4	4	4	4
Room attenuation	6	6	5	5	4	4	4	4
A-weighting	-26	-16	-9	-3	0	1	1	-1
Correction value	27	34	34	29	31	33	32	30

- $Lp_{A3} \approx$ 40 dB(A), requirement is met

Design changes reserved

RECTANGULAR VAV DAMPER ATTENUATOR - PZX

Rectangular variable air volume control damper (RVP) with attenuator (PZX):



Dimensions

B [mm]	200	300	400	500	600	700	800	900	1000
H [mm]	100 200	100 200 300	100 200 300 400	100 200 300 400	100 200 300 400 500 600	200 300 400 500 600 700	200 300 400 500 600 700	300 400 500 600 700 800 900	300 400 500 600 700 800 900 1000

L = 1500mm attenuator length
L_1 = 1000mm attenuator splitter length

Sound power level with PZX attenuator

B x H mm		v m/s	Δ p_s = 125 Pa								Δ p_s = 250 Pa								Δ p_s = 500 Pa							
			L_{W1} [dB]								L_{W1} [dB]								L_{W1} [dB]							
			f_m [Hz]								f_m [Hz]								f_m [Hz]							
			63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000	63	125	250	500	1000	2000	4000	8000
600	100	2	44	42	34	17	5	0	0	9	48	44	36	21	9	7	10	23	54	48	41	27	16	17	26	39
		4	53	50	40	29	24	20	16	19	57	53	43	33	26	24	24	30	62	58	50	37	30	29	34	42
		7	59	57	45	39	40	35	31	26	64	60	49	42	40	37	35	35	69	66	57	44	41	38	40	45
		10	64	62	48	45	50	45	40	31	68	64	53	48	49	46	43	39	73	71	61	49	48	45	44	46
	200	2	48	43	37	19	8	4	2	11	52	47	40	24	12	10	13	23	59	52	46	30	19	20	28	39
		4	56	52	43	31	27	23	20	20	60	56	47	36	30	27	27	31	67	62	55	40	33	32	35	42
		7	63	59	47	41	43	39	34	28	68	63	52	45	44	41	38	36	73	70	62	48	44	42	41	44
		10	68	63	50	47	53	49	43	33	72	67	56	51	52	49	45	40	78	75	66	53	51	48	45	46
	300	2	50	44	38	20	9	6	4	12	54	49	42	26	14	12	14	24	61	55	49	32	21	22	29	38
		4	59	53	44	32	29	25	22	22	63	58	49	37	31	29	28	31	69	65	58	42	35	34	36	41
		7	65	60	49	42	44	41	36	29	70	64	54	46	45	43	39	37	76	73	65	50	46	44	42	44
		10	70	64	52	48	54	51	45	34	74	69	58	52	54	51	46	40	80	78	69	55	53	50	46	45
	400	2	52	45	39	21	11	8	5	13	56	50	43	27	15	14	15	24	63	56	51	34	23	23	29	38
		4	60	54	45	33	30	27	23	22	64	59	50	38	33	31	29	31	71	66	60	44	36	36	37	41
		7	67	61	50	43	45	43	37	30	71	66	56	48	47	44	40	37	78	74	67	51	48	45	43	44
		10	71	65	53	49	55	53	46	35	76	70	59	53	56	53	47	41	82	79	72	56	55	51	47	45
	500	2	53	46	40	22	11	9	7	14	57	51	44	28	16	15	16	25	65	58	53	35	24	25	30	38
		4	61	54	46	34	31	28	24	23	65	60	51	39	34	32	30	32	73	68	61	45	38	37	38	41
		7	68	61	51	44	46	44	38	30	73	67	57	48	48	45	41	38	79	76	69	53	49	46	44	44
		10	73	66	54	50	56	54	48	35	77	71	60	54	57	54	48	41	84	81	73	58	56	53	47	45
	600	2	54	46	41	22	12	10	7	14	58	52	45	28	17	16	16	25	66	59	54	36	25	26	30	38
		4	62	55	47	34	32	29	25	23	66	61	52	40	35	32	30	32	74	69	63	46	38	38	38	41
		7	69	62	51	44	47	45	39	31	74	68	57	49	49	46	42	38	81	77	70	53	50	47	44	43
		10	74	66	54	50	57	55	48	36	78	72	61	55	57	54	49	41	85	82	75	58	57	53	48	45
1000	800	2	58	48	44	24	16	14	11	16	62	56	48	31	21	20	19	26	71	63	60	40	28	29	32	37
		4	67	57	50	37	35	33	29	26	71	64	56	43	38	36	33	33	79	73	69	50	42	42	40	40
		7	74	64	54	46	51	49	43	33	78	71	61	52	52	50	44	39	86	81	76	58	53	51	46	43
		10	78	68	57	53	60	59	52	38	82	75	65	58	61	58	51	42	90	87	80	63	60	57	50	44
	1000	2	60	49	45	25	17	15	12	17	63	57	50	32	22	21	20	26	73	65	61	41	29	31	33	37
		4	68	57	50	37	36	34	30	26	72	65	57	44	39	38	34	33	81	75	70	51	43	43	40	40
		7	75	64	55	47	51	50	44	34	79	72	62	53	53	51	45	39	88	83	77	59	54	52	47	43
		10	79	69	58	53	61	60	53	39	84	76	66	59	62	60	52	43	92	88	82	64	62	59	50	44

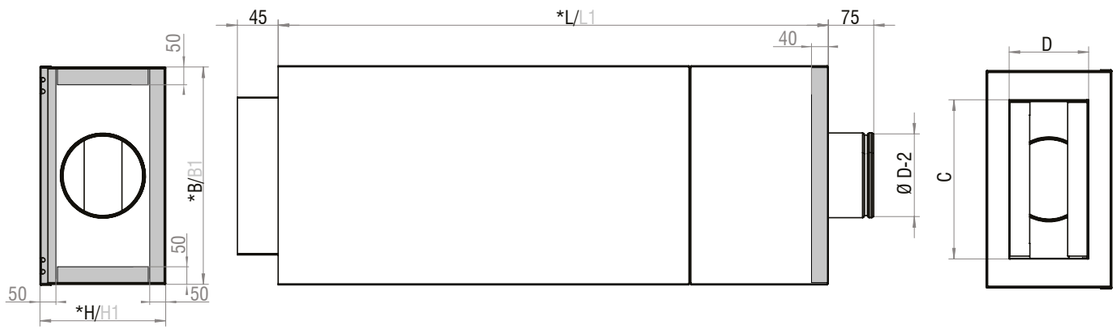
Design changes reserved

AIR TERMINAL UNIT - RVK

- Volume flow control regulation by a given set-point
- Factory parametrization in accordance with clients request
- High regulation precision
- RVK-A - supply air
- RVK-B - exhaust air
- Sound insulated case
- For high acoustic demand application

Options

- Constant
- Master-slave
- Insulated casing (50mm)
- MP-Bus (standard), LONWORKS, ModBus (Belimo/ Siemens), KNX (Belimo/Siemens), MF (no Bus, Belimo), SGB (no Bus, Siemens), Bacnet (Siemens) (Siemens)



Dimensions:

RVK	ØD-2 [mm]	B [mm]	*B1 [mm]	H [mm]	*H1 [mm]	L [mm]	*L1 [mm]	C [mm]	D [mm]	V_{min} [m³ /h]	V_{max} [m³/h]
125	123	300	400	236	336	1035	1075	200	150	54	540
160	158	410	510	236	336	1035	1075	300	150	90	900
200	198	560	660	281	381	1320	1360	460	200	145	1459
250	248	700	800	311	411	1440	1480	600	200	217	2215
315	313	900	1000	442	552	1440	1480	800	250	380	3680
400	398	1000	1100	525	625	1820	1860	900	350	615	6047

* B1, H1, L1 - dimensions of additionally insulated attenuator

Design changes reserved

Ordering key

RVK - A - ØDn - MP - Z - V - P - PZS

Variable air volume control damper

A - Supply air
B - Exhaust air

Diameter

Communication type
MP-Bus (standard)
LONWORKS
ModBus (Belimo/Siemens)
KNX (Belimo/Siemens)
MF (no Bus, Belimo)
SGB (no Bus, Siemens)
Bacnet (Siemens)

Insulation

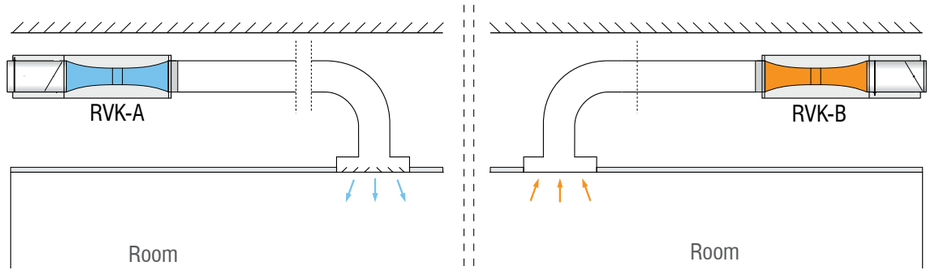
Volume flow V*min/max [m³/h]

Mode
P - single
M - master
S - slave
K - constant flow

Additional silencer

* if not otherwise specified, regulator is set to standard factory values V_{max} and V_{min}.

Air supply and exhaust



Design changes reserved

Sound power level RVK-A / RVK-A-Z

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t = 125 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	50	49	47	54	56	50	51	52	55	63	33	39	46	51	59	36	41	47	52	60	35	43	49	57	65	35	43	51	66	72
			125	26	33	44	50	51	33	42	52	54	59	29	38	43	45	54	34	38	42	45	52	36	41	46	47	54	35	42	48	53	63
			250	18	26	35	41	49	24	31	39	49	51	23	28	33	37	46	20	24	28	36	44	28	33	37	38	49	28	31	34	43	45
			500	15	17	18	25	36	15	18	21	30	38	15	15	16	27	38	15	16	17	33	40	15	16	16	25	37	15	19	22	36	42
			1000	15	15	15	16	23	15	15	15	23	33	15	15	15	21	33	15	15	15	28	36	15	15	15	21	34	15	17	19	35	39
			2000	15	15	15	15	15	15	18	21	15	27	15	15	15	15	28	15	15	15	24	33	15	15	15	15	31	15	16	18	30	39
			4000	15	15	15	15	15	15	15	16	15	17	15	15	15	21	15	15	18	21	32	15	15	19	23	29	15	15	17	19	30	37
			8000	16	15	15	15	15	15	15	16	15	16	17	16	15	15	15	15	15	15	25	33	15	20	25	34	34	15	19	23	35	41
	Lw [dB(A)]			26	27	31	37	42	27	30	38	43	47	23	26	30	34	43	24	26	29	38	44	25	30	34	38	45	25	29	34	44	51
p_t = 250 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	55	57	51	57	59	53	52	55	58	65	51	47	50	55	64	42	48	50	56	63	41	53	53	60	67	41	51	54	67	78
			125	32	43	47	51	54	45	48	53	56	61	32	41	45	48	56	36	39	45	50	56	37	47	49	52	58	38	48	51	56	65
			250	25	35	37	43	51	29	40	41	52	53	26	34	36	40	49	25	30	33	41	48	31	40	41	43	53	32	37	39	47	50
			500	16	18	22	28	42	17	23	25	33	40	15	20	21	31	40	15	18	22	36	43	15	22	22	30	41	15	21	27	39	45
			1000	15	15	15	19	37	15	15	15	25	35	15	15	15	23	35	15	15	15	31	39	15	15	15	26	37	15	18	24	37	42
			2000	15	15	15	15	33	15	15	15	17	29	15	15	15	17	30	15	15	15	27	36	15	15	15	20	34	15	18	23	33	41
			4000	15	15	15	15	19	15	15	19	17	21	15	15	15	15	24	15	15	15	24	34	15	15	15	27	34	15	20	26	34	41
			8000	19	21	22	19	20	19	20	21	20	22	20	15	15	19	22	18	15	18	28	36	15	25	29	37	38	15	24	30	39	45
	Lw [dB(A)]			30	34	34	39	46	32	36	39	45	49	28	30	32	37	46	26	28	32	40	47	27	35	37	42	49	27	35	38	47	55
p_t = 500 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	56	60	53	58	62	55	54	56	60	66	42	55	58	58	64	46	49	55	59	66	49	52	61	65	72	41	55	58	69	78
			125	31	41	46	58	60	37	49	54	60	66	33	44	49	53	57	40	44	50	57	60	38	51	58	60	65	43	53	56	61	67
			250	25	36	41	47	55	29	41	45	52	56	29	37	41	47	50	28	37	41	46	52	35	45	49	51	54	37	49	50	52	57
			500	16	23	26	32	38	20	28	34	37	44	19	28	30	34	44	15	26	29	37	46	23	27	33	39	47	24	29	34	40	50
			1000	15	15	15	20	28	15	16	26	28	38	16	15	15	25	39	15	15	22	32	42	17	25	31	37	45	16	26	31	38	49
			2000	15	15	15	15	20	15	15	23	20	33	15	15	15	18	34	15	15	20	28	39	15	22	29	35	42	15	26	30	36	46
			4000	15	15	15	18	18	15	15	21	18	25	15	15	15	15	27	15	15	21	27	36	15	27	30	35	41	20	31	34	39	46
			8000	22	23	22	28	29	19	23	23	27	31	23	22	25	28	31	20	18	26	31	39	22	34	37	42	45	25	35	38	44	50
	Lw [dB(A)]			31	36	36	44	49	31	37	41	47	53	27	34	38	42	48	28	33	38	44	51	31	40	46	49	54	33	43	46	51	58

Design changes reserved

Sound power level - RVK-B / RVK-B-Z

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t = 125 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	50	50	49	51	-	43	42	42	43	-	42	45	49	53	-	42	47	51	47	-	43	50	56	57	-	43	48	52	68	-
			125	35	42	47	48	-	29	40	51	50	-	24	35	46	43	-	24	35	45	42	-	35	45	54	51	-	35	39	44	47	-
			250	26	29	33	38	-	24	30	38	41	-	18	24	29	35	-	20	24	29	30	-	25	32	38	41	-	22	26	30	36	-
			500	15	15	15	21	-	15	18	21	22	-	15	17	19	23	-	15	18	21	27	-	15	20	24	31	-	15	18	21	30	-
			1000	15	15	15	15	-	15	15	15	15	-	15	15	15	22	-	15	15	16	26	-	15	17	20	33	-	15	17	20	30	-
			2000	15	15	15	15	-	15	15	15	15	-	15	15	15	21	-	15	15	16	22	-	15	16	17	22	-	15	17	20	29	-
			4000	15	15	15	15	-	15	15	15	15	-	15	15	15	19	-	15	16	16	18	-	15	18	20	24	-	15	18	22	27	-
			8000	17	16	15	16	-	15	15	15	17	-	15	16	17	28	-	17	18	19	21	-	15	23	31	30	-	17	22	27	32	-
	Lw [dB(A)]			27	30	33	35	-	24	28	36	37	-	23	26	32	34	-	24	26	32	32	-	25	32	40	40	-	25	29	33	43	-
p_t = 250 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	51	43	56	57	59	42	47	43	45	46	48	51	51	55	53	47	46	53	51	55	45	49	59	61	65	45	53	55	70	80
			125	39	45	48	51	49	30	49	53	54	49	29	38	46	46	44	29	41	47	47	45	37	50	55	55	49	37	43	48	52	62
			250	30	32	35	41	39	28	36	41	45	41	23	29	32	38	38	24	30	33	36	44	26	37	41	45	42	25	31	35	41	47
			500	17	16	18	25	28	17	23	26	28	31	20	20	23	27	35	19	22	25	31	38	15	22	29	36	43	18	21	26	35	44
			1000	15	15	15	16	25	15	15	15	17	26	15	15	19	25	35	15	17	20	28	34	15	20	25	31	40	16	20	24	34	41
			2000	15	15	15	15	18	15	15	15	15	19	15	15	18	23	32	15	16	20	25	35	15	15	21	26	36	15	19	24	33	42
			4000	15	15	15	15	15	15	15	15	17	16	15	15	18	23	28	15	17	20	23	31	15	17	25	30	36	16	23	27	34	43
			8000	20	19	15	20	22	18	18	18	23	21	17	18	23	31	32	21	22	24	27	33	17	20	33	35	38	22	26	32	38	47
	Lw [dB(A)]			29	31	35	38	38	25	35	38	40	37	26	29	33	37	40	26	30	34	36	43	26	36	42	44	47	27	33	37	46	56
p_t = 500 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	54	53	54	56	60	57	44	45	49	56	46	50	56	60	64	46	49	56	61	62	49	66	65	71	72	47	56	61	70	80
			125	39	46	50	58	59	38	50	57	61	65	33	40	47	53	53	31	43	51	56	56	39	51	58	61	61	38	49	54	58	63
			250	27	36	39	48	49	26	41	47	51	51	26	31	36	44	46	28	35	40	45	47	28	39	45	50	52	30	39	42	47	50
			500	15	20	25	31	36	15	29	33	37	42	22	24	29	32	39	23	27	31	37	41	15	31	36	41	47	23	28	31	37	45
			1000	15	15	17	21	26	15	15	18	24	30	19	19	24	28	37	19	21	24	32	36	15	25	29	35	42	20	25	29	35	42
			2000	15	15	15	16	21	15	15	15	18	24	17	17	23	27	34	18	21	24	29	37	15	20	25	29	37	19	24	28	34	42
			4000	15	15	15	16	20	16	15	15	22	26	18	18	25	27	32	19	21	25	31	35	15	24	32	40	45	21	29	36	43	47
			8000	19	19	21	25	30	18	18	22	32	37	24	24	35	37	38	24	25	29	35	38	15	24	33	39	44	26	32	38	44	49
	Lw [dB(A)]			30	33	37	44	46	32	37	43	47	50	28	31	38	42	45	29	33	39	44	47	28	42	45	50	53	31	39	44	50	57

Case radiated noise - RVK-A

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t = 125 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	15	25	35	41	45	22	29	36	46	48	30	36	42	48	53	25	38	50	50	55	34	42	49	55	61	37	45	52	62	76
			125	28	34	40	45	46	28	34	40	42	46	32	37	41	44	50	31	37	42	47	50	36	39	42	47	51	38	40	42	45	60
			250	26	30	33	39	43	23	29	35	40	46	29	33	37	43	51	29	32	35	37	47	27	32	36	42	49	32	35	37	39	52
			500	26	26	26	31	37	25	26	27	31	38	28	28	27	30	43	26	26	26	29	41	25	26	27	37	39	28	32	36	29	44
			1000	26	24	21	25	29	21	21	21	23	31	20	21	22	25	33	23	22	20	21	28	22	22	21	26	30	25	25	24	26	32
			2000	17	17	17	22	27	15	17	19	23	27	18	20	21	25	32	15	17	19	23	32	15	18	20	28	35	20	23	25	31	38
			4000	15	15	15	16	18	15	15	15	16	22	15	20	25	26	30	15	15	15	19	26	15	15	15	21	29	15	17	18	23	32
			8000	15	17	18	16	19	15	16	16	22	28	15	20	24	25	34	15	15	15	19	28	15	15	15	24	28	15	20	25	23	32
	Lw [dB(A)]			29	29	30	35	39	26	28	31	35	41	28	31	33	37	46	28	29	32	35	43	28	30	32	39	44	31	33	36	39	52
p_t = 250 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	27	34	38	42	47	25	34	39	48	51	31	40	46	51	56	28	46	52	54	58	35	49	52	58	64	40	52	56	67	77
			125	31	40	42	46	49	28	38	42	45	49	32	42	44	47	53	33	42	46	51	54	36	44	46	51	55	40	45	47	52	62
			250	27	32	35	40	45	25	34	37	42	48	30	38	41	46	53	32	39	40	44	51	31	38	42	47	53	36	43	43	47	55
			500	26	30	30	33	40	26	30	31	35	42	29	32	33	36	46	30	32	33	37	45	29	33	34	42	44	33	35	35	39	48
			1000	27	27	27	29	34	24	26	27	29	35	25	28	29	31	38	27	28	29	31	35	26	29	29	33	36	30	30	32	34	37
			2000	20	21	23	26	31	18	22	25	28	32	21	24	27	30	36	21	24	26	30	36	20	24	27	33	39	26	28	32	37	41
			4000	15	15	16	21	25	15	15	19	23	28	18	21	27	28	35	15	17	21	27	32	15	20	24	29	35	19	23	27	32	37
			8000	15	16	20	21	25	16	22	22	27	32	22	25	29	30	38	15	19	23	28	34	15	15	20	30	34	15	15	30	30	36
	Lw [dB(A)]			30	32	33	37	42	28	32	35	38	44	31	35	38	41	49	32	35	37	41	47	31	36	38	44	49	35	39	41	46	54
p_t = 500 Pa	L_W [dB/Okt]	f_{sr} [Hz]	63	20	29	38	46	51	21	35	44	49	55	27	45	49	55	60	36	47	53	58	62	40	50	56	61	68	44	57	59	67	79
			125	35	41	46	50	54	33	41	46	50	54	34	43	48	52	56	36	46	51	56	59	38	49	53	58	62	42	53	56	59	63
			250	28	36	40	43	46	28	37	41	46	51	34	41	46	50	54	35	44	47	51	55	38	46	50	55	57	42	52	55	55	58
			500	27	34	37	40	43	28	35	38	42	47	36	40	42	44	51	34	41	42	44	50	37	42	45	48	51	39	46	47	48	51
			1000	28	32	34	36	38	29	33	35	37	40	33	36	37	39	43	33	36	37	39	42	34	38	40	42	43	37	39	41	42	42
			2000	25	29	31	33	34	28	31	32	35	36	30	32	34	37	40	31	33	35	38	40	32	35	38	41	42	36	39	40	42	44
			4000	24	26	27	29	32	24	27	28	32	35	26	29	32	35	40	26	29	32	36	40	28	33	36	40	43	32	38	40	43	46
			8000	22	23	25	27	29	24	27	29	32	35	26	30	33	37	42	23	27	32	37	41	22	29	33	37	39	22	30	31	31	36
	Lw [dB(A)]			33	37	40	43	45	34	39	41	44	48	38	42	44	47	52	38	43	45	48	52	40	45	48	52	54	43	49	51	52	57

Case radiated noise - RVK-B

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t=125 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	15	22	29	37	-	17	29	40	45	-	26	36	46	45	-	23	36	48	46	-	27	40	52	58	-	29	38	47	60	-
			125	22	31	40	43	-	24	33	42	45	-	31	38	45	44	-	32	40	47	45	-	31	37	42	48	-	28	33	37	46	-
			250	15	25	34	39	-	16	24	31	35	-	22	26	30	36	-	15	22	29	29	-	16	23	29	37	-	15	22	29	42	-
			500	16	22	27	32	-	15	20	25	30	-	15	19	23	28	-	15	18	21	25	-	15	20	24	31	-	15	21	26	34	-
			1000	15	19	22	26	-	15	18	20	25	-	15	18	21	25	-	15	15	15	26	-	15	20	24	31	-	15	22	28	33	-
			2000	15	20	24	28	-	15	19	23	27	-	15	20	24	29	-	15	21	26	32	-	16	23	29	34	-	15	25	34	37	-
			4000	15	19	23	27	-	15	18	21	25	-	15	18	21	26	-	15	17	19	24	-	15	19	23	30	-	15	23	31	36	-
			8000	15	21	26	28	-	15	19	22	29	-	15	17	19	29	-	15	21	26	26	-	16	22	27	33	-	15	22	29	38	-
	Lw [dB(A)]			22	27	33	37	-	22	26	31	36	-	23	28	33	36	-	23	28	34	36	-	23	29	35	41	-	22	30	38	44	-
p_t=250 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	15	24	34	40	45	23	36	42	47	48	32	42	47	48	48	25	43	50	50	50	28	47	54	60	64	32	45	50	63	52
			125	26	36	41	45	48	29	39	43	47	50	34	41	46	48	46	32	45	48	48	45	31	40	44	50	54	30	37	42	50	48
			250	18	29	35	40	43	20	29	34	38	42	24	30	34	39	42	15	29	33	38	47	15	29	34	42	48	20	32	36	47	71
			500	15	22	30	35	40	15	24	28	33	38	18	24	28	32	39	15	21	27	33	40	16	25	30	36	43	20	28	33	40	58
			1000	15	21	26	29	32	15	21	24	28	32	17	22	26	29	32	15	15	16	31	32	15	25	29	35	38	22	28	33	38	50
			2000	19	22	28	32	34	15	22	27	31	33	19	22	28	32	33	15	24	30	34	32	15	28	33	38	40	22	32	38	41	47
			4000	15	22	27	31	31	15	20	25	29	32	16	21	26	31	31	15	17	25	29	26	15	23	28	34	37	19	30	36	41	44
			8000	20	26	30	32	33	19	24	27	32	34	20	23	26	33	32	15	20	30	31	29	15	26	31	37	39	18	28	34	42	42
	Lw [dB(A)]			25	31	36	40	42	23	30	35	39	42	26	31	36	40	42	23	32	37	40	42	23	34	39	44	48	28	37	43	48	64
p_t=500 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	27	38	42	45	48	24	36	42	49	55	22	42	51	55	61	32	47	56	59	59	39	50	55	60	62	44	51	56	64	45
			125	24	38	45	50	53	28	39	45	51	56	31	43	48	52	53	33	45	52	55	56	34	44	48	53	55	35	43	49	52	41
			250	24	32	37	42	46	22	32	37	42	47	25	34	39	45	48	15	33	39	45	50	19	37	43	48	52	30	42	46	49	72
			500	23	29	32	35	41	20	27	31	37	42	22	29	33	37	44	15	29	34	41	44	18	32	38	42	46	26	36	39	44	58
			1000	23	27	29	32	35	20	26	29	33	36	20	26	30	34	38	18	27	31	37	41	24	31	35	40	43	28	34	37	43	53
			2000	23	29	33	36	38	22	28	32	36	39	21	26	32	36	39	18	29	34	38	41	25	34	38	42	44	32	38	40	45	48
			4000	22	28	30	33	38	20	26	30	34	39	19	26	32	38	44	15	26	33	39	43	20	33	38	44	45	29	40	43	49	46
			8000	25	30	32	34	37	24	28	31	36	40	23	28	34	38	43	15	24	33	37	40	20	31	37	42	44	28	39	40	47	47
	Lw [dB(A)]			30	36	39	42	46	29	35	39	43	48	28	35	40	45	50	25	36	42	47	50	30	40	45	50	52	37	45	48	54	65

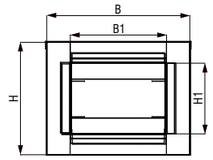
Case radiated noise - RVK-A-Z

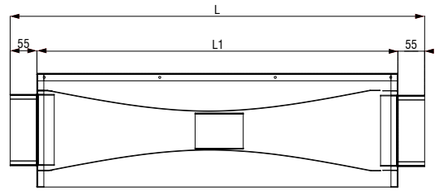
Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t=125 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	16	25	33	39	43	15	25	34	44	46	23	32	40	46	51	23	36	48	48	53	31	39	46	52	58	36	43	50	58	70
			125	19	25	31	36	37	20	27	34	36	40	28	33	38	41	47	26	32	37	42	45	30	33	36	41	45	32	34	36	39	54
			250	19	23	26	32	36	17	23	29	34	40	21	26	30	36	44	21	24	27	29	39	18	23	27	33	40	22	25	27	29	42
			500	16	16	16	21	27	16	17	18	22	29	17	17	16	19	32	18	17	16	19	31	15	16	16	26	28	16	16	15	17	32
			1000	15	15	15	15	17	15	15	15	15	18	15	15	15	15	19	15	15	15	15	16	15	15	15	15	19	16	16	15	17	23
			2000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	19	15	15	15	15	20	15	15	15	17	24	15	16	16	22	29
			4000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	16	15	15	15	15	15	15	15	15	15	19	15	15	15	15	24
			8000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	20	15	15	15	15	16	16	16	15	15	18	15	16	17	16	15
	Lw [dB(A)]			22	23	24	27	30	22	23	25	29	34	23	24	27	31	38	23	24	27	29	35	23	24	26	31	37	24	25	28	33	45
p_t=250 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	25	32	36	40	45	23	32	37	46	49	29	38	44	49	54	26	44	50	52	56	32	14	49	55	61	38	49	53	64	74
			125	22	31	33	37	40	22	32	36	39	43	29	39	41	44	50	28	37	41	46	49	30	38	40	45	49	34	39	41	46	56
			250	20	25	28	33	38	19	28	31	36	42	23	31	34	39	46	24	31	32	36	43	22	29	33	38	44	26	33	33	37	45
			500	16	20	20	23	15	17	21	22	26	33	19	21	22	25	35	21	22	23	27	35	18	22	23	31	33	21	23	23	27	36
			1000	15	15	15	17	22	15	15	15	16	22	15	15	15	17	24	16	16	17	19	23	15	18	18	22	25	21	21	23	25	28
			2000	15	15	15	15	18	15	15	15	16	20	15	15	15	17	23	15	15	15	18	24	15	15	16	22	28	17	19	23	28	32
			4000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	20	15	15	15	15	19	15	15	15	19	15	15	15	19	24	29
			8000	15	15	15	15	15	15	15	15	15	18	15	15	15	16	24	15	15	15	16	22	15	15	15	20	25	15	15	22	22	28
	Lw [dB(A)]			22	24	25	28	32	22	25	27	31	36	24	28	30	34	40	24	28	30	34	39	23	27	30	36	40	27	30	33	40	49
p_t=500 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	18	27	36	44	49	19	33	42	47	53	25	43	47	53	58	34	45	51	56	60	37	47	53	58	65	41	54	56	64	76
			125	26	32	37	41	45	27	35	40	44	48	31	40	45	49	53	31	41	46	51	54	32	43	47	52	56	36	47	50	53	57
			250	21	29	33	36	39	22	31	35	40	45	27	34	39	43	47	27	36	39	43	47	29	37	41	46	48	32	42	45	45	48
			500	17	24	27	30	33	19	26	29	33	38	25	29	31	33	40	24	31	32	34	40	26	31	34	37	40	27	34	35	36	39
			1000	16	20	22	24	26	16	20	22	24	27	19	22	23	25	29	21	24	25	27	30	23	27	29	31	32	15	30	32	33	33
			2000	15	16	18	20	21	16	19	20	23	24	17	19	21	24	27	19	21	23	26	28	21	24	27	30	31	15	30	31	33	35
			4000	15	15	15	15	17	15	15	15	17	20	15	15	17	20	25	15	16	19	23	27	18	23	26	30	33	24	30	32	35	38
			8000	15	15	15	15	15	15	15	15	18	21	15	16	19	23	28	15	15	20	25	29	15	19	23	27	29	15	22	27	23	28
	Lw [dB(A)]			23	27	30	33	36	24	29	32	36	40	27	31	35	38	43	27	33	36	40	44	29	35	38	42	46	30	40	42	44	51

Case radiated noise - RVK-B-Z

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t=125 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	15	23	31	38	-	21	31	40	45	-	30	38	45	46	-	22	35	48	48	-	28	41	53	59	-	31	40	48	61	-
			125	19	27	35	40	-	23	30	37	41	-	29	35	41	43	-	26	35	43	44	-	27	34	40	46	-	26	32	37	45	-
			250	15	22	29	35	-	15	22	29	33	-	20	25	29	35	-	15	22	28	32	-	15	23	30	38	-	16	24	31	42	-
			500	15	19	23	29	-	15	19	22	27	-	15	19	22	27	-	15	18	21	26	-	15	20	25	31	-	15	21	27	32	-
			1000	15	19	22	26	-	15	18	20	24	-	15	18	21	25	-	15	15	15	27	-	15	20	25	31	-	18	24	29	33	-
			2000	15	19	23	27	-	15	19	22	26	-	15	19	22	27	-	15	20	24	30	-	15	21	27	32	-	15	23	31	34	-
			4000	15	19	22	26	-	15	18	20	24	-	15	18	20	26	-	15	17	19	25	-	15	19	22	28	-	15	23	30	35	-
			8000	15	20	25	27	-	15	19	22	27	-	15	18	20	28	-	15	20	25	27	-	15	21	26	32	-	15	22	28	36	-
	Lw [dB(A)]			22	26	31	35	-	22	26	29	34	-	23	27	30	35	-	22	26	32	36	-	22	28	34	40	-	23	30	37	43	-
p_t=250 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	15	21	31	37	42	21	34	40	45	46	30	40	45	46	46	23	41	48	48	48	27	46	53	59	63	31	44	49	62	70
			125	20	30	35	39	42	23	33	37	41	44	29	36	41	43	41	27	40	43	43	40	27	36	40	46	50	26	33	38	46	54
			250	15	23	29	34	37	15	24	29	33	37	20	29	30	35	38	15	25	29	34	43	15	25	30	38	44	16	28	32	43	46
			500	15	15	23	28	33	15	18	22	27	32	15	19	23	27	34	15	16	22	28	35	15	20	25	31	38	15	23	28	35	42
			1000	15	17	22	25	28	15	17	20	24	28	15	18	22	25	28	15	15	15	27	28	15	21	25	31	34	18	24	29	34	40
			2000	15	17	23	27	29	15	17	22	26	15	15	17	23	27	28	15	19	25	29	27	15	22	27	32	34	15	25	31	34	35
			4000	15	17	22	26	26	15	15	20	24	27	15	16	21	26	26	15	15	20	24	21	15	17	22	28	31	15	24	30	35	37
			8000	15	21	25	27	28	15	19	22	27	29	15	18	21	28	27	15	15	25	26	24	15	21	26	32	34	15	23	29	37	41
	Lw [dB(A)]			22	25	31	34	37	22	25	29	34	36	23	27	31	35	37	22	27	32	35	38	22	29	34	40	44	23	32	37	44	49
p_t=500 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	24	35	39	42	45	22	34	40	47	53	20	40	49	53	59	38	45	54	57	57	38	49	54	59	61	43	50	55	63	71
			125	18	32	39	44	47	22	33	39	45	50	26	38	43	47	48	28	40	47	50	51	30	40	44	49	51	31	39	45	48	54
			250	18	26	31	36	40	17	27	32	37	42	21	30	35	41	44	15	29	35	41	46	15	33	39	44	48	26	38	42	45	49
			500	16	22	25	28	34	15	21	25	31	36	17	24	28	32	39	15	24	29	36	39	15	27	33	37	41	21	31	34	39	43
			1000	19	23	25	28	31	16	22	25	29	32	16	22	26	30	34	15	23	27	33	37	20	27	31	36	39	24	30	33	39	42
			2000	18	24	28	31	33	17	23	27	31	34	16	21	27	31	34	15	24	29	33	36	19	28	32	36	38	25	31	33	38	40
			4000	17	23	25	28	33	15	21	25	29	34	15	21	27	33	39	15	21	28	34	38	15	28	32	38	39	23	34	37	43	45
			8000	20	25	27	29	32	19	23	26	31	35	18	23	29	33	38	15	19	28	32	35	15	27	32	37	39	23	34	35	42	45
	Lw [dB(A)]			25	31	34	37	41	24	30	34	38	42	24	30	36	40	45	23	31	37	42	45	25	35	40	45	47	31	40	43	48	52

ADDITIONAL ATTENUATOR PZS





Size	L	L1	H	H1	B	B1
ø125	862	750	236	150	300	200
ø160	862	750	236	150	410	300
ø200	1012	900	281	200	560	460
ø250	1012	900	311	200	700	600
ø315	1112	1000	361	250	900	800
ø400	1362	1250	446	350	1000	900

Sound power levels with additional attenuator

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t=125 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	49	47	45	51	52	48	49	50	52	60	34	39	44	49	58	34	40	45	50	58	33	40	47	55	63	32	41	49	64	73
			125	22	31	40	45	48	27	38	48	50	55	25	32	39	41	50	30	34	38	41	48	32	37	42	43	50	31	38	44	49	59
			250	15	23	30	36	44	17	25	32	43	44	15	20	25	29	39	15	17	18	26	34	19	24	28	29	40	19	22	25	34	36
			500	15	15	15	15	26	15	15	15	17	23	15	15	15	18	27	15	15	15	20	27	15	15	15	15	24	15	15	15	27	32
			1000	15	15	15	15	21	15	15	15	15	18	15	15	15	15	17	15	15	15	15	23	15	15	15	15	21	15	15	15	25	29
			2000	15	15	15	15	17	15	15	15	15	15	15	15	15	15	15	15	15	15	15	18	15	15	15	16	19	15	15	15	20	29
			4000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	18	15	15	15	15	19	15	15	15	23	30
			8000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	17	25	15	17	19	28	28	15	17	19	31	37
	Lw [dB(A)]			25	25	28	33	38	25	27	33	38	41	22	24	27	29	37	23	24	26	29	36	23	25	29	33	40	23	26	30	40	49
p_t=250 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	53	55	49	54	57	51	50	53	55	63	49	45	48	53	61	40	46	48	54	61	39	51	51	58	65	39	49	52	65	76
			125	29	39	43	47	50	41	44	49	52	57	28	37	41	44	52	32	35	41	46	52	33	43	45	48	54	34	44	47	52	61
			250	21	30	32	38	46	22	33	34	45	46	18	26	28	32	41	16	21	23	31	38	22	31	32	34	44	23	28	30	38	41
			500	15	15	16	16	27	15	15	15	19	25	15	15	15	21	29	15	15	15	22	28	15	15	15	18	28	15	15	18	29	35
			1000	15	15	15	15	22	15	15	15	15	20	15	15	15	15	21	15	15	15	17	24	15	15	15	15	25	15	15	15	27	32
			2000	15	15	15	15	19	15	15	15	15	16	15	15	15	15	15	15	15	15	15	21	15	15	15	15	22	15	15	15	23	31
			4000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	20	15	15	15	15	23	15	15	20	15	15
			8000	15	15	15	15	15	15	15	16	15	17	15	15	15	15	15	15	15	15	15	20	28	15	20	23	31	32	15	20	26	35	41
	Lw [dB(A)]			28	31	30	35	40	29	31	35	40	44	26	26	28	32	40	23	25	28	33	40	24	31	32	37	43	24	30	34	42	52
p_t=500 Pa	L_w [dB/Okt]	f_{sr} [Hz]	63	54	58	51	55	58	53	52	54	58	64	40	53	56	56	62	44	47	53	57	64	47	50	59	63	70	39	53	56	67	76
			125	28	37	42	54	55	33	45	50	56	62	29	40	45	49	53	36	40	46	53	56	34	47	54	56	61	39	49	52	57	63
			250	21	31	36	42	49	22	34	38	45	49	21	29	33	39	43	18	27	31	37	44	26	36	40	42	46	28	40	41	43	48
			500	15	15	16	19	28	15	15	20	23	30	15	18	20	24	35	15	15	16	28	37	15	15	20	29	39	15	19	24	31	41
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			8000	15	16	15	20	21	15	18	18	21	25	15	15	15	15	18	15	15	19	23	31	16	28	31	36	39	21	31	34	40	46
	Lw [dB(A)]			29	33	31	40	43	28	32	36	42	48	23	30	33	36	42	25	28	33	39	44	26	34	40	43	49	27	37	42	46	53

Case radiated noise with additional attenuator RVK-B/RVK-B-Z + PZS

Size				ø125					ø160					ø200					ø250					ø315					ø400				
V [m³/h]				54	126	216	342	540	90	234	360	612	900	144	393	648	1008	1458	216	612	1008	1692	2214	378	954	1512	2592	3690	612	1602	2556	4500	6048
p_t=125 Pa	L_W [dB/Okt]	f_{tr} [Hz]	63	46	48	50	48	–	32	36	40	41	–	40	44	47	51	–	38	44	49	45	–	41	48	54	55	–	41	46	50	65	–
			125	32	38	43	44	–	26	37	47	46	–	21	31	41	39	–	20	31	42	38	–	31	41	50	47	–	31	36	40	43	–
			250	22	25	28	33	–	18	25	31	34	–	15	19	22	30	–	15	19	22	32	–	17	24	30	36	–	15	20	24	34	–
			500	15	15	15	19	–	15	15	15	18	–	15	15	15	25	–	15	16	16	28	–	15	16	17	31	–	15	16	17	30	–
			1000	15	15	15	15	–	15	15	15	15	–	15	15	15	17	–	15	15	15	22	–	15	15	15	29	–	15	15	15	27	–
			2000	15	15	15	15	–	15	15	15	15	–	15	15	15	15	–	15	15	15	19	–	15	15	15	22	–	15	15	15	16	–
			4000	15	15	15	15	–	15	15	15	15	–	15	15	15	15	–	15	15	15	15	–	15	15	15	15	–	15	15	15	20	–
			8000	15	15	15	15	–	15	15	15	15	–	15	15	15	16	–	15	15	15	15	–	15	20	25	24	–	15	19	23	28	–
	Lw [dB(A)]			25	22	30	31	–	22	22	32	32	–	23	22	28	30	–	22	22	29	30	–	23	23	36	36	–	23	23	29	40	–
p_t=250 Pa	L_W [dB/Okt]	f_{tr} [Hz]	63	49	52	54	55	57	40	41	41	43	44	46	48	49	53	51	45	48	51	49	53	43	50	57	59	63	43	48	53	68	78
			125	35	40	44	47	45	27	38	49	50	45	26	34	42	42	42	25	34	43	43	44	33	42	51	51	47	33	39	44	48	58
			250	25	28	30	36	36	22	28	34	38	36	17	21	25	32	38	16	21	25	35	43	18	26	33	39	45	17	23	28	38	45
			500	15	16	16	22	32	15	15	15	21	31	15	15	15	26	38	15	17	18	33	42	15	18	21	35	44	15	18	20	34	43
			1000	15	15	15	17	29	15	15	15	15	26	15	15	15	20	33	15	15	15	28	38	15	16	16	30	41	15	15	15	29	39
			2000	15	15	15	15	22	15	15	15	15	19	15	15	15	15	27	15	15	15	21	32	15	15	15	23	36	15	15	15	25	35
			4000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	18	15	15	15	15	24	15	15	15	20	29	15	18	20	27	36
			8000	15	15	15	15	15	15	15	15	18	16	15	15	15	18	19	15	16	17	20	25	15	21	27	29	32	19	24	28	34	43
	Lw [dB(A)]			27	23	32	34	36	23	23	34	36	34	24	22	29	32	39	24	22	30	35	43	24	24	37	40	46	25	25	33	44	53
p_t=500 Pa	L_W [dB/Okt]	f_{tr} [Hz]	63	52	52	52	54	58	55	49	43	47	54	44	49	54	58	62	44	49	54	59	60	47	55	63	69	70	45	52	59	68	78
			125	35	41	46	54	55	34	44	53	57	61	29	36	43	49	49	27	37	47	52	52	35	45	54	57	57	34	42	50	54	59
			250	23	29	34	43	44	20	30	40	44	44	19	24	28	37	41	19	25	30	38	43	20	28	36	42	47	21	27	33	40	46
			500	15	16	16	22	32	15	17	19	24	32	15	17	19	27	38	15	18	20	33	42	15	20	25	35	45	15	19	23	34	43
			1000	15	15	15	17	29	15	15	15	15	27	15	15	15	20	34	15	15	15	28	38	15	17	18	31	41	15	18	20	30	39
			2000	15	15	15	15	22	15	15	15	15	20	15	15	15	15	27	15	15	15	21	32	15	15	15	24	36	15	17	19	25	35
			4000	15	15	15	15	15	15	15	15	15	15	15	15	15	15	18	15	15	15	17	25	15	18	21	29	35	15	22	29	36	40
			8000	15	15	15	18	22	15	16	17	26	31	15	18	21	23	24	17	19	21	27	30	15	21	27	33	38	22	28	34	40	45
	Lw [dB(A)]			28	23	33	40	42	30	23	38	42	46	24	23	32	37	41	24	23	33	39	44	26	25	41	46	49	26	29	39	46	54

VOLUME FLOW CALCULATION RELATED TO CONTROL SIGNAL

In mode W1: 0...10VDC control signal Y corresponds to following volumes:

$$\dot{V}_{act} = \dot{V}_{min} + \frac{Y}{10VDC} \cdot (\dot{V}_{max} - \dot{V}_{min})$$

and volumes correspond Y = 0VDC for $\dot{V}_{min}$ and Y = 10VDC for $\dot{V}_{max}$ according to:

$$Y = 10VDC \cdot \frac{\dot{V}_{act} - \dot{V}_{min}}{\dot{V}_{max} - \dot{V}_{min}}$$

Notice: Y = 0VDC corresponds $\dot{V}_{min}$ and 10VDC corresponds $\dot{V}_{max}$

In mode W2: 2...10VDC control signal Y corresponds to following volumes:

$$\dot{V}_{act} = \dot{V}_{min} + \frac{Y\text{-}2VDC}{8VDC} \cdot (\dot{V}_{max} - \dot{V}_{min})$$

and volumes correspond Y = 2VDC for $\dot{V}_{min}$ and Y = 10VDC for $\dot{V}_{max}$ according to:

$$Y = 2VDC + 8VDC \cdot \frac{\dot{V}_{act} - \dot{V}_{min}}{\dot{V}_{max} - \dot{V}_{min}}$$

with shutdown function for Y = 0VDC

Notice: Y = 2VDC corresponds $\dot{V}_{min}$ and 10VDC corresponds $\dot{V}_{max}$

In mode W1 (0...10VDC) output signal U corresponds to following volumes:

$$U = 10VDC \cdot \frac{\dot{V}_{act}}{\dot{V}_{nom}}$$

for actual volume calculation $\dot{V}_{act}$ form analog output signal U in mode W1:

$$\dot{V}_{act} = \dot{V}_{nom} \cdot \frac{U}{10VDC}$$

In mode W (2...10VDC) output signal U corresponds to following volumes:

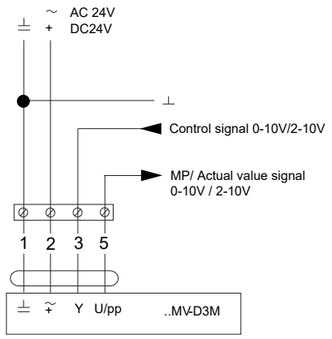
$$U = 2VDC + 8VDC \cdot \frac{\dot{V}_{act}}{\dot{V}_{nom}}$$

for actual volume calculation $\dot{V}_{act}$ form analog output signal U in mode W (2...10VDC):

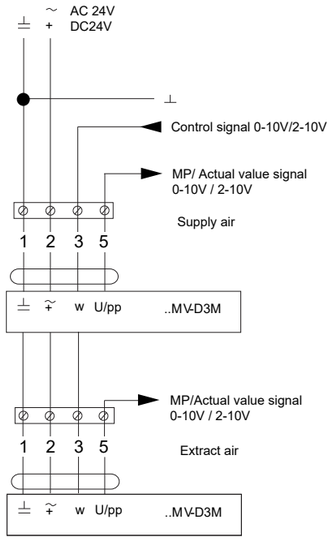
$$\dot{V}_{act} = \dot{V}_{nom} \cdot \frac{U\text{-}2VDC}{8VDC}$$

WIRING DIAGRAM

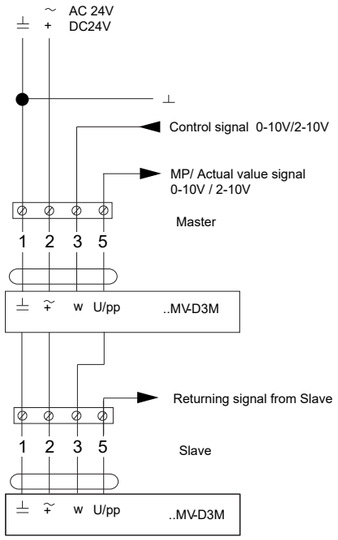
Analog control signal



Analog control signal
supply/extract in paralel mode



Analog control signal
master / slave mode



Mode	-	0...10V	0...10V	0...10V	0...10V
	2...10V	2...10V	2...10V	2...10V	2...10V
Signal	±	0...10V 2...10V	~	~ +	~
Function	3	3	3	3	3
Damper CLOSED	a) CLOSED		c) CLOSED*		
V_{min}...V_{max}		b) VAV			
CAV-V_{min}	All open - V_{min} active**				
Damper OPEN					e) OPEN*
CAV- V_{max}				d)V_{max}	

Contact closed, function active

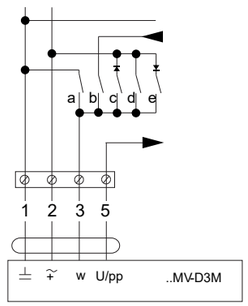
Contact open

Contact closed, function active, only in 2..10V mode

* Not available in DC 24V version

**Damper is shut-off at 0,5V

Constant mode:
- Standard 0,1V closing



Design changes reserved

MOTOR DRIVE

- motor drives : Belimo (MP, LON, MOD, MF), Siemens (KNX)
- power supply - AC 24V, 50/60 Hz
  - DC 24V
- diagnostic socket for service and PC-Tool software

Version

Type	Torque	Energy consumption	Dimensioning	Weight
LMV-D3-MP	5Nm	2W	4VA (max- 8A @ 5ms)	≈ 500g
NMW-D3-MP	10Nm	3W	5VA (max- 8A @ 5ms)	≈ 700g

Control variables	
V_{nom}	specific nominal volume flow, suitable for VAV units
Δp @ V_{nom}	50...450 Pa
V_{max}	20...100%
V_{min}	0...100%
V_{mid}	50% od V_{min} do V_{max}

Classic control		
VAV mod for referent variables Y (connection 3)	- DC 2...10V / (4...20mA with 500Ω impedance)	} input impedance min. 100 kOhm
	- DC 0...10V / (0...20mA with 500Ω impedance)	
	- Adjustable DC 0...10V	
Actual signal value mod U5 (connection 5)	- DC 2...10V - DC 0...10V - Adjustable : volume flow, damper position or differential pressure	} max. 0.5 mA
CAV mode (constant volume flow)	CLOSED / Vmin / Vmid / Vmax / OPEN* (*only with AC 24V supply)	

Actuator	
Connection	Cable, 4 x 0,75 mm^2
Protection	
Safety class	III Safety extra - low voltage
Level of protection	IP54
Electromagnetic compliance	CE according to 89/336/EEC
Mode	Type 1 (according to EN 60730-1)
Rated power	0,5kV (according to EN 60730-1)
Operating temperature	0...+50°C
Non operating temperature	-20...+80°C
Relative humidity	5...95% r.h., no condensation (according to EN 60730-1)
Maintainance	Not required

Design changes reserved

MOTOR DRIVE

- motor drives : Siemens (KNX, MOD, SGB)
- power supply - AC 24 V ±20% 50/60 Hz
- Power consumption at
  Actuator holds 1 VA/0.5 W
  Actuator rotates 3 VA/2.5W

Damper actuator	
Normal torque	5 Nm (GDB) / 10 Nm (GLB)
Maximum torque	<7 Nm (GDB) / <14 Nm (GLB)
Normal rotation angle / maximum rotation angle	90˚ / 95˚ ±2˚
Running time for normal rotation angle 90˚	150 s (50Hz) / 125 s (60Hz)
Direction of rotation (Adjustable with e.g. ACS941)	Clockwise / Counterclockwise

Signal inputs	
Input voltage	DC 0/2 ... 10 V
Max. perm input volume	DC 35 V
Contact Sensing	
Contact open	DC 30 V contact voltage
Contact closed	DC 0 V, 8 mA contact current

Signal outputs	
Output voltage	DC 0/2 ... 10 V limited to DC 12 V
Max. output current	DC ±1 mA
Time constant (actual value U)	0,05...5 s
Resolution 0.01 S / factory settin 1 s	

Configurartion and maintenance interface	
Series A - D	6-pin, grid 2.54 mm
Series E or later	7-pin, grid 2.00 mm

Connection cable	
Cable lenght	0.9 m
Number of cores and cross-sectional area	6 x 0.75 mm2

Design changes reserved

Degree of protection and safety class	
Degree of protection acc. to EN 60529 (cf. mounting instructions	IP54
Safety class acc. to EN 60730	6 x 0.75 mm2

Enviromental conditions	
Operation / transport	IEC 721-3-3 / IEC 721-3-2
Temperature	0 ... 50˚C / -25...70˚C
Humidity (non-condensing)	<95% r.h. / <95% r.h.

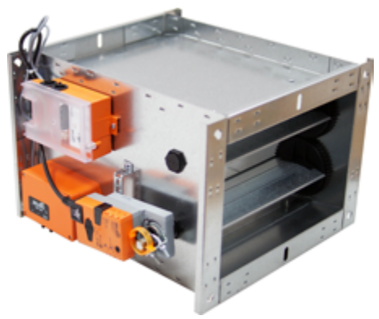
Standards and Regulations		
Product safety - Automatic electric controls for household and similar use	EN 60730-2-14 (mode of action type 1)	
Electromagnetic compatibility (application)	For residental, commercial and industrial enviroments	
EU conformity (CE)	GDB181.1E/3	GLB181.1E/3
	A5W00003842	A5W0000176
RCM Conformity	GDB181.1E/3	GLB181.1E/3
	A5W00003843	A5W0000177
Product enviromental declaration	CM2E4634E	

Air volume controller	
3-position controller with hysteresis	
V_{max}	20 ... 100%
V_{min}	-20 ... 100%
V_{mid}	0 ... 100%
V_n	1...3.16

Differential pressure sensor	
Connection tubes (inerior diameter)	3 ... 8 mm
Measuring range	0 ... 500 Pa
Operation range	0 ... 300 Pa
Precision at 23˚C, 966 mbar and optional mounting position	
Zero point	± 0.2 Pa
Amplitude	± 4.5 of the measured value
Drift	± 0.1 Pa / Year
Max. permissible operation pressure	3000 Pa
Max. permissible overload on one side	3000 Pa

Design changes reserved

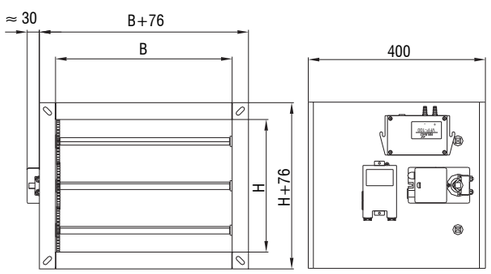
RVP-P-T

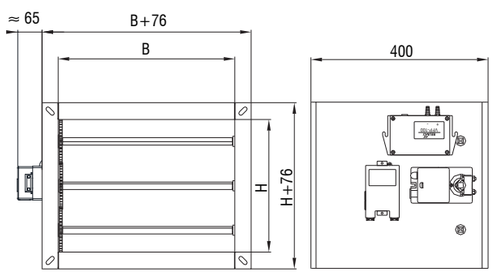


RVP-T

- Maintains constant overpressure or underpressure in duct or room
- Linear pressure regulation (not a function of volume flow)
- Adjusting set-point with potentiometer
- Regulation range 7,5 Pa - 600 Pa

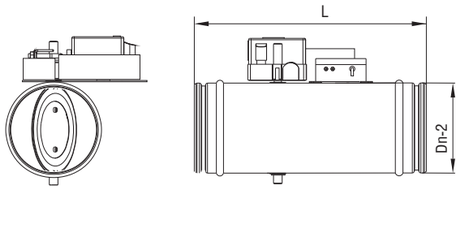
Standard dimensions RVP-P-T [mm]	
B	200 - 1000 mm, in increments 100 mm
H	100 - 1000 mm, in increments 100 mm

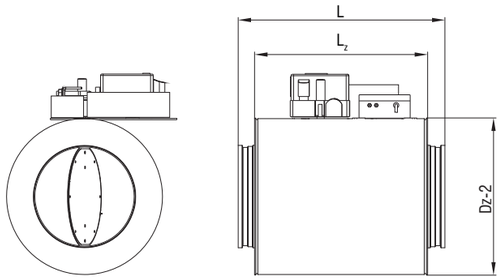




RVP-C-T

Standard dimensions RVP-C-T [mm]								
øDn	100	125	160	200	250	315	400	500
L	400	400	400	400	500	600	600	750
$øD_z$	198	223	258	298	348	413	498	598
L_z	330	330	330	330	430	530	530	680



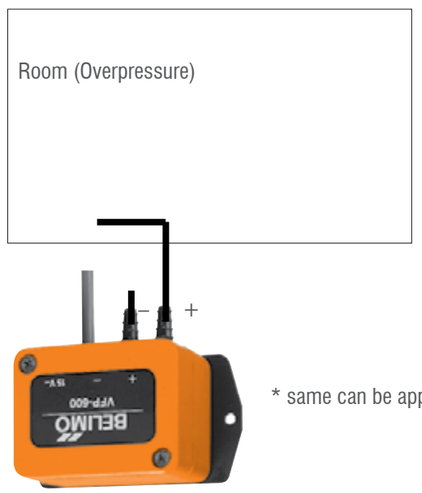


Design changes reserved

Operation principle

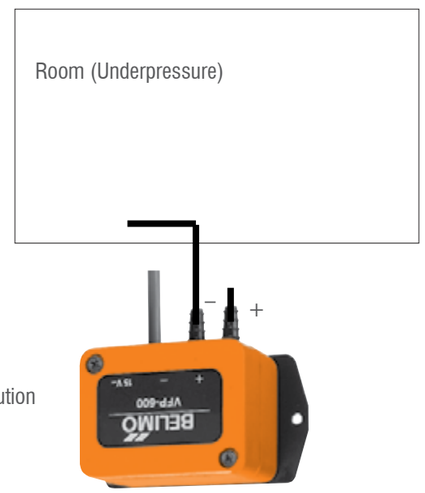
Example

If we want to maintain overpressure in room, + tube should be drawn from sensor to room, and - tube to referent area (hallway, ceiling etc.)



Example

If we want to maintain underpressure in room, - tube should be drawn from sensor to room, and + tube to referent area (hallway, ceiling etc.)



* same can be applied to duct distribution

Ordering key

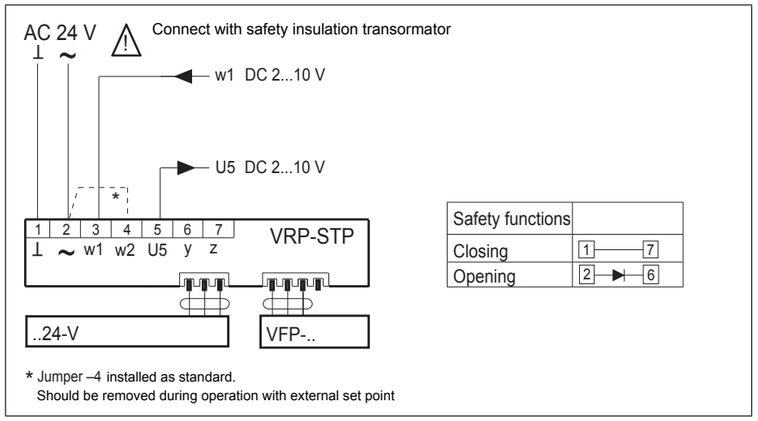
Variable air volume control damper	**RVP**	**- C**	**- T**	**- 100**	**- ØDn**	**- Z**

C - round version
P - rectangular version

Pressure controller

100 - 100 Pa
300 - 300 Pa
600 - 600 Pa
PP - Compact controller (0...300Pa)

Design changes reserved



Motor drive and pressure sensor are delivered connected to regulator VRP-STP. During commisioning it is only neccesary to bring power supply 24V AC to clamps 1 and 2 on regulator VRP-STP (under the transparent cover) and regulator is ready for operation. Connecting tubes are not delivered.

Technical specification:

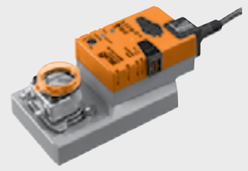
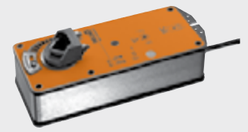
Rated voltage	AC 4 V 50/60 Hz
Voltage range	AC 19.…8.8 V
Power	1.3 W (incl. Sensor VFP-.., no damper drive ..–4-V)
Cable dimensioning	2,6 VA (incl. Sensor VFP-.., no damper drive ..–4-V)
Referent signal w1	DC …10 V @ input impedance 100 kΩ
Actual signal value U5	DC …10 V @ max. 0,5 mA (linear signal = 0…100% Δp)
Adjusting	
• Referent value	5…100% referent sensor signal (Factory setting =100%. in example VFP-300: 100% = 300 Pa)
• Setpoint	30…100% referent value (Δp)
Connection	clamps for 2×1.5mm
Protection class	III (safety extra-low voltage) IP4
Operating temperature	0…+50 °C
Storage temperature	–0…+80 °C
Humidity test	to EN 60335-1
EMC	CE according to 004/108/EC

Operation specification:

Rated voltage	DC 15 V (from regulator VRP…)
Voltage range	DC 13,5…16,5 V
Mesuring range	0…100 Pa 0…300 Pa 0…600 Pa
Mesuring principle	Inductive membrane differential presure mesurement
Output signal	DC 0…10 V (proportional pressure for VRP..)
Linearity	±1% from extreme value (FS)
Histeresis	0.1% typ.
Temperature influence	
• zero position	±0.1% / K ±0.05% / K ±0.05% / K
• Mesuring range	±0.1% / K
	t = +10…+40°C (referent temperature to = 5°C)
Installation position	Vertical
Position dependance	Max. ±4,5 Pa za 90° rotation from horizontal
Electric connection	Cable 1 m , with 4 pole connector
Protection class	III (safety extra-low voltage) IP4
Operating temperature	0…+50°C
Storage temperature	–0...+80°C
Humidity test	to EN 60335-1

Design changes reserved

MOTOR DRIVE - BELIMO

	Type	Drive	Characteristics
Standard drives 0..90°	LM24A-V		– Motor drive VAV-Universal – AC/DC 24 V, modulating, 5 Nm – Control DC 6.0 ±4 V from VRP controller – Operating cycle 110 ... 150 s – Deflection angle 90°
	NM24A-V		– Motor drive VAV-Universal – AC/DC 24 V, modulating, 10 Nm – Control DC 6.0 ±4 V from VRP controller – Operating cycle 120 s – Deflection angle 90°
	SM24A-V		– Motor drive VAV-Universal – AC/DC 24 V, modulating, 10 Nm – Control DC 6.0 ±4 V from VRP controller – Operating cycle 120 s – Deflection angle 90°
Drives with spring return 0 ... 90°	LF24-V		– Motor drive with return spring VAV-Universal – AC/DC 24 V, modulating, 4 Nm – Control DC 6.0 ±4 V from VRP controller – Operating cycle 10...300 s – Spring working cycle 20 s – Deflection angle 95°
	AF24-V		– Motor drive with return spring VAV-Universal – AC/DC 24 V, modulating, 15 Nm – Control DC 6.0 ±4 V from VRP controller – Operating cycle 10...300 s – Spring working cycle 16 s – Deflection angle 95°

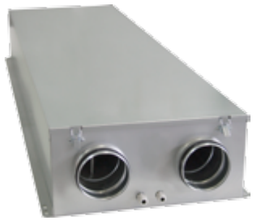
Design changes reserved

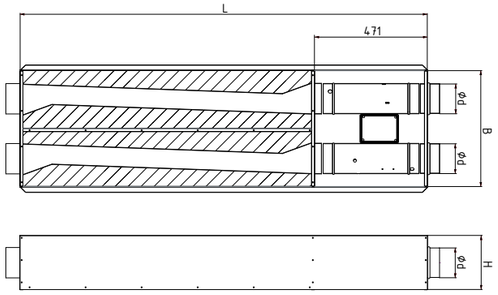
klimaoprema
klimaoprema

4/S4
v 3.3 (en)

COMPACT APARTMENT VAV UNIT

CAVU



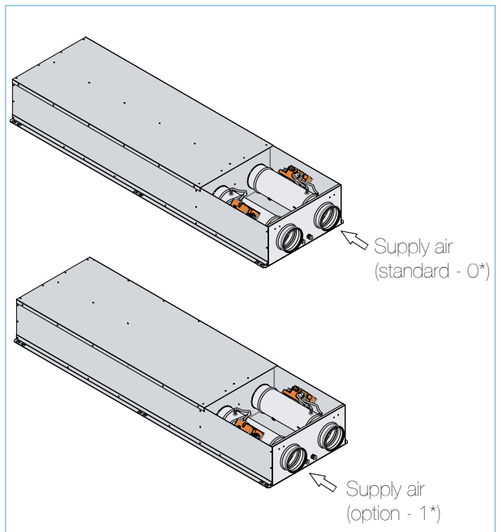


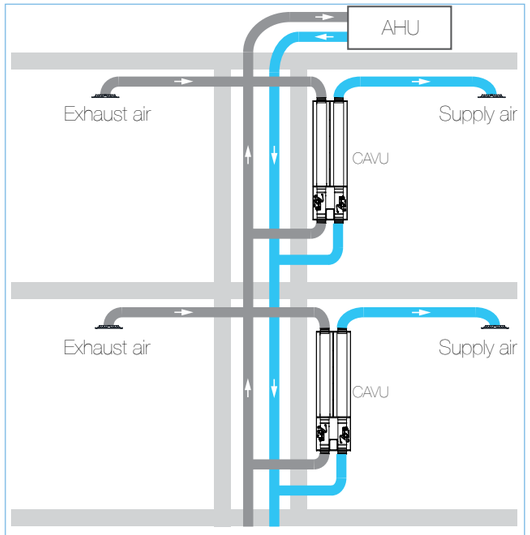
CAVU

- Main purpose of CAVU is to control air volumes, reduce airborne sound and casing brakeout according to user needs.
- It is mainly used in residential or office buildings with central air preparation.
- CAVU consists of two VAV units (supply and extract) with integrated silencers.

CAVU offers you:

- Compact (all in one) casing
- Minimal installation cost
- Adjustable air volume
- Maintenance free
- Low sound power levels
- Energy saving (demand controlled)
- Indoor air quality improvement
- Simple and easy to use
- Wide variety of control modes
- Protocols: MPBUS, LONBUS, MODBUS, BACNET, KNX





CAVU - Dimensions

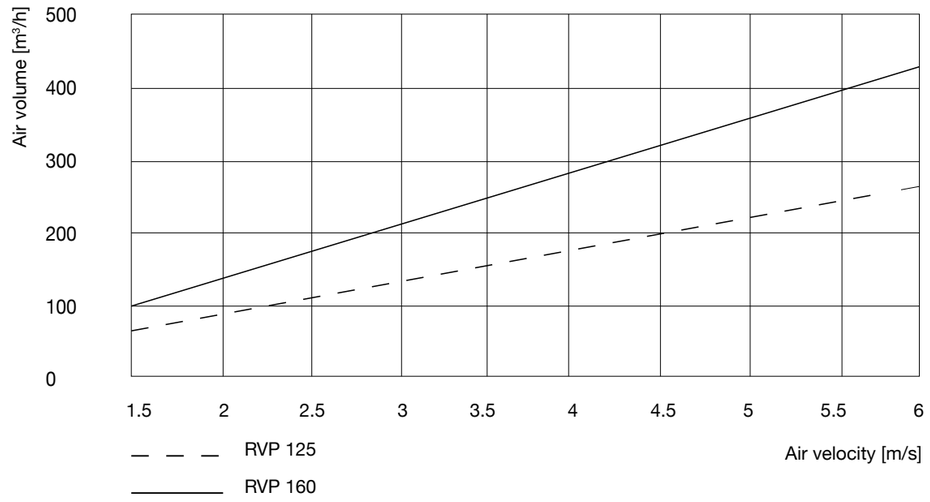
VAV ød [mm]	B [mm]	H [mm]	L [mm]
125	490	230	1700
160	535	260	1700

Ordering key

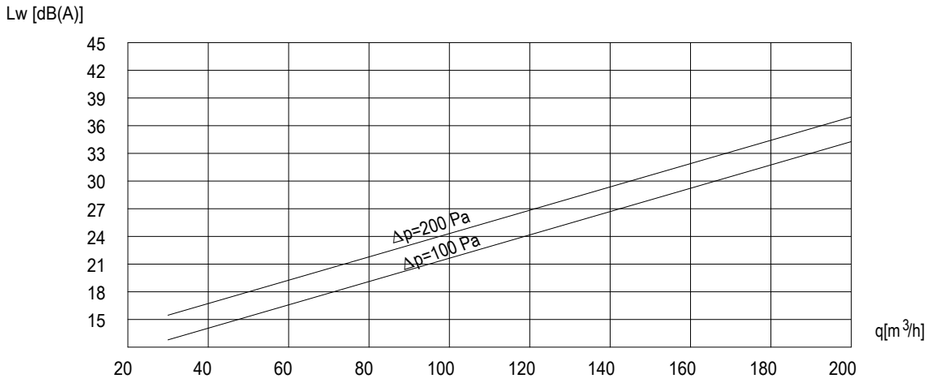
Damper type	CAVU	- ød	- MP	-0
Diameter				
Communication type **MP** - MP-Bus (standard) **LON** - LONWORKS **MOD** - Modbus **KNX** - KNX protocol (Siemens) **BAC** - BACNET **MF** - no bus				
Supply air side **0** - Supply air right / Extract air left **1** - Supply air left / Extract air right When viewing service access cover with supply air from below				

Design changes reserved

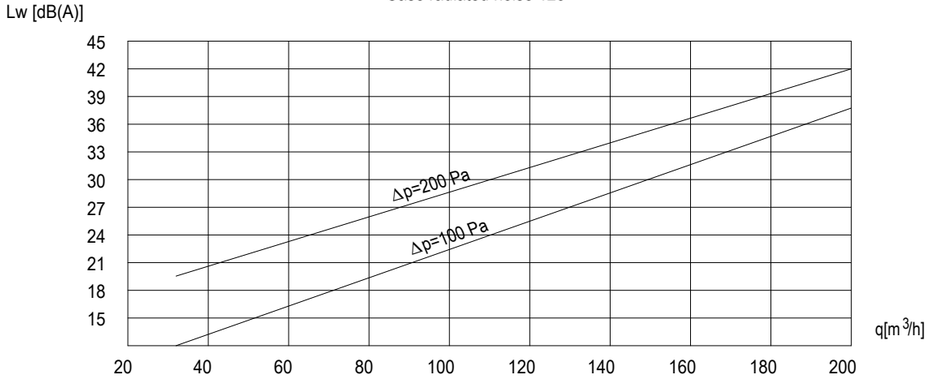
TECHNICAL DATA



Air-regenerated noise 125



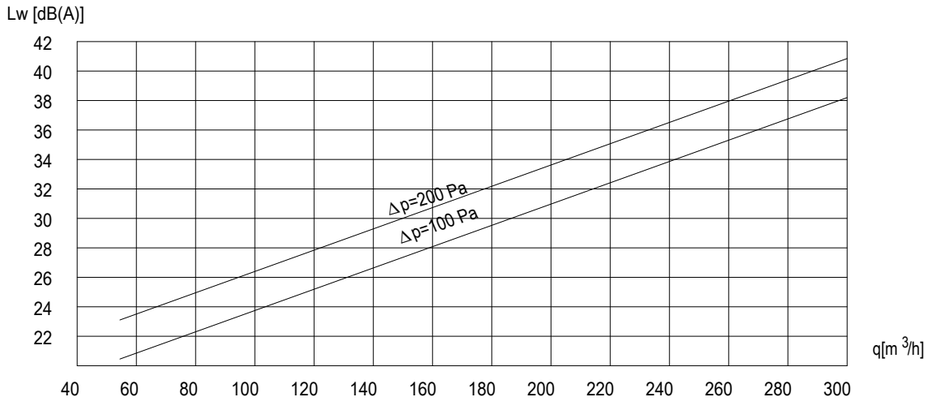
Case radiated noise 125



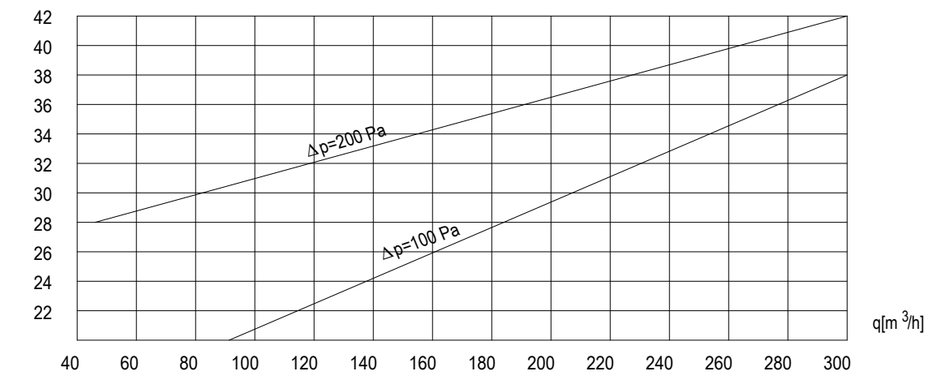
Design changes reserved

TECHNICAL DATA

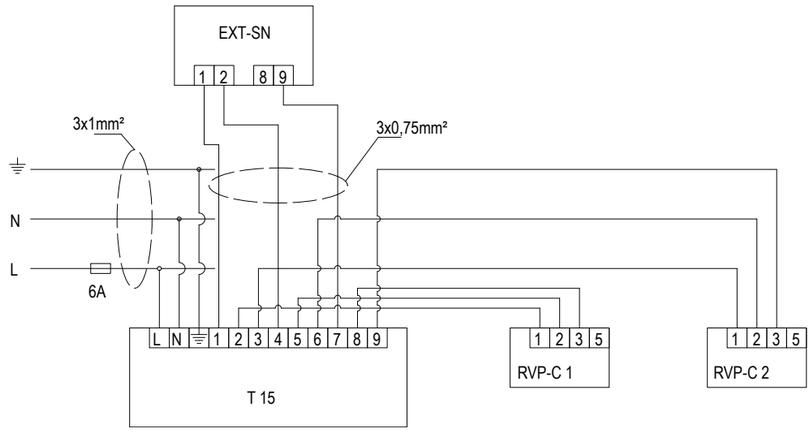
Air-regenerated noise 160



Case radiated noise 160



WIRING DIAGRAM



Design changes reserved

ACCESSORIES

EXT-SN - With this 4 step switch you can choose between 4 pre-defined modes

1) CONTROL 2...10V = CLOSED; Vmin - Vmax (default)
   a) **0** = CLOSED
   b) **I** = Vmin
   c) **II** = Vmid(50%)
   d) **III** = Vmax
2) CONTROL 0...10V = Vmin - Vmax
   a) **0** = Vmin
   b) **I** = Vmid(20%)
   c) **II** = Vmid (60%)
   d) **III** = Vmax

* For more technical information visit www.belimo.eu

BELIMO CRA-B3 BELIMO CRA-B3P

BELIMO CRA-B3 - Room controller specially adapted for the requirements of a controlled apartment ventillation. The system combines individual room comfort and minimum energy consumption in an economically optimised solution.

MODES:
COMF - setpoint according to external signal
MIN - the air volume is maintained at a minimum value set on the VAV controller
MAX - the air volume is regulated at a maximum value set on the VAV controller

* For more technical information visit www.belimo.eu

CODIS 35 VAV - Offers a wide selection of options for measuring temperature, humidity and air quality within single device. It is designed for demand controlled ventilation and room temperature applications.

FEATURES:
- Touch screen LCD display
- Temperature measurement
- Indoor air quality measurement
- Humidity measurement
- Timers and working modes
- Communication protocols
- Mobile applications
- Wi-Fi connectivity
- Inputs and outputs
- Quick and easy installation

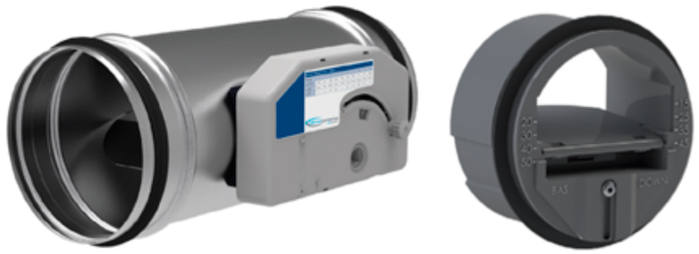
* For more technical information visit www.koer.com

Design changes reserved

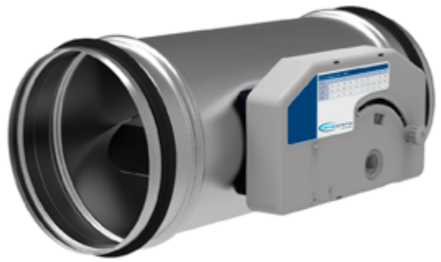
4/S5
v 3.3 (en)

CONSTANT VOLUME DAMPERS

RKP-C-N, RKP-P-N, KVR-R



klimaoprema

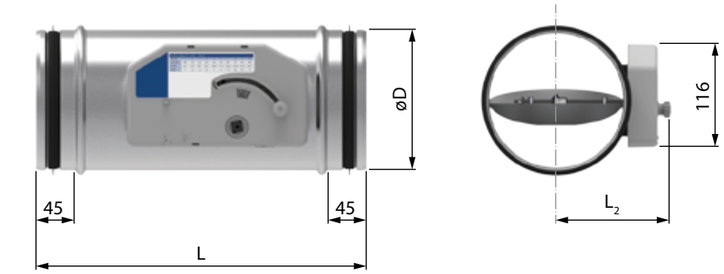


RKP-C-N

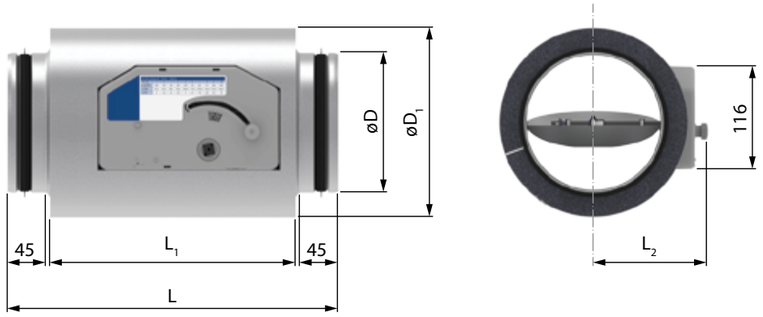
- For maintaining constant air volume in ventilation systems, without additonal power supply
- Made of galvanized steel sheet, damper blade made of anodized aluminium sheet
- Recommended aiflow velocity from 3 to 8 m/s, at pressure difference Δp >50 Pa
- Adjusting required constant amount is done by turning of working screw on the right side of the cover

Working temperature :	-20...80°C
Relative humidity:	5...80% rh
Constant flow:	±10% set value
Casing airtightness:	Class C

Dimensions RKP-C-N



Dimensions RKP-C-Z-N

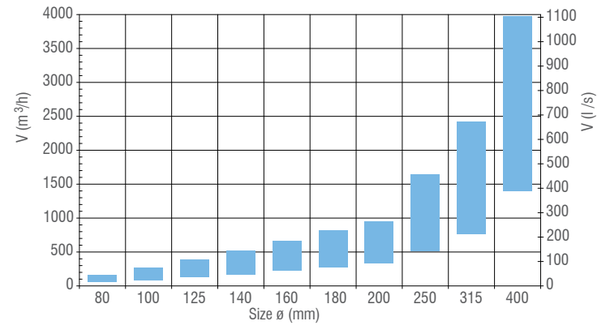


Dimensions

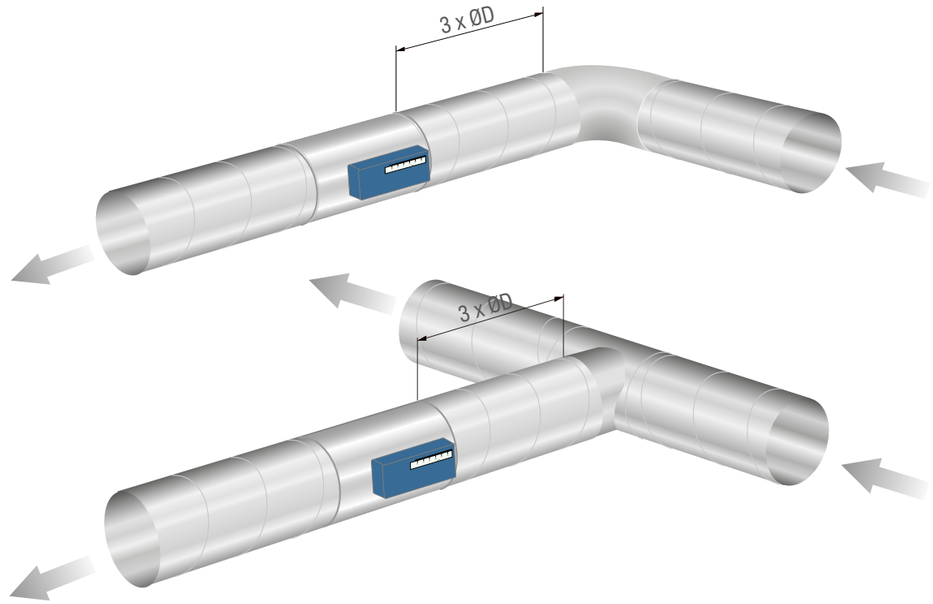
Dn [mm]	V_{min} [m³/h]	V_{max} [m³/h]	øD [mm]	$øD_1$ [mm]	L [mm]	L1 [mm]	L2 [mm]	m [kg]	m(z) [kg]
100	100	200	98	155	350	251	93	1,2	2,0
125	125	300	123	180	360	261	106	1,4	2,4
160	300	620	158	215	380	281	123	1,8	3,2
200	350	800	198	255	400	301	143	2,3	4,2
250	650	1300	248	305	425	326	165	3,6	6,1
315	850	1650	313	370	485	386	201	5,0	8,7
400	650	1300	398	455	530	431	243	6,9	12,2

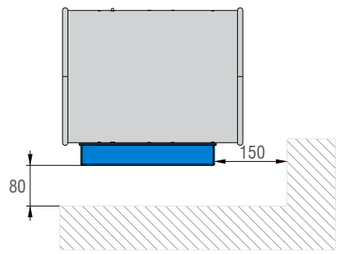
Design changes reserved

Fast selection diagram

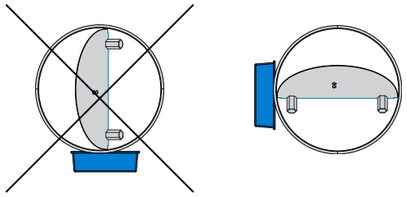


Installation





- Required length of straight section before regulator is L >3d . If L<3d, a 10% error in regulation occurs so that kind of installation is not advisable
- Pay attention to airflow direction marking on the regulator. If not correctly installed, regulator will not work
- Maintenace is not required

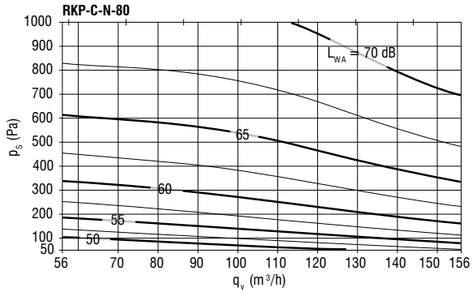


Installation in horizontal, angled or vertical duct so that rotation axis is always in horizontal position.

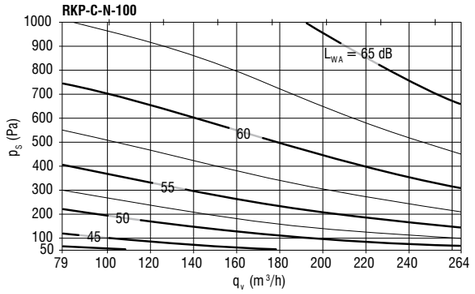
Design changes reserved

Sound power level diagrams

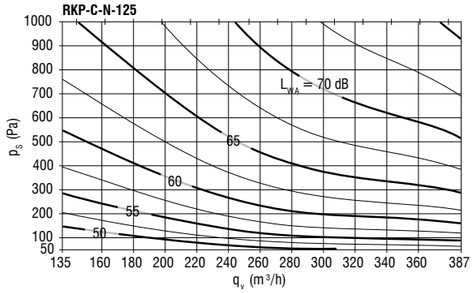
RKP-C-N-80



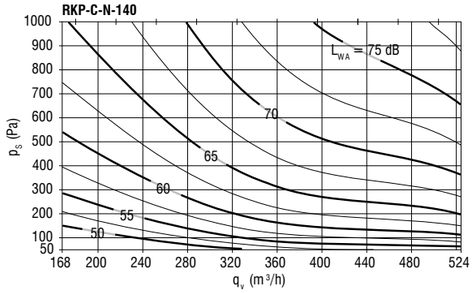
RKP-C-N-100



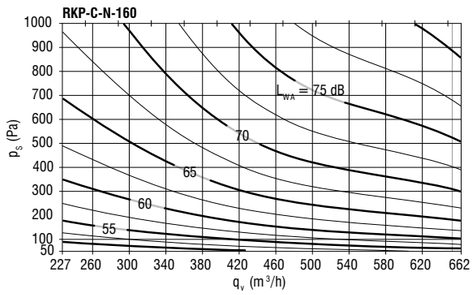
RKP-C-N-125



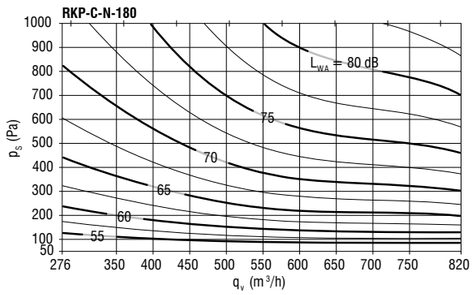
RKP-C-N-140



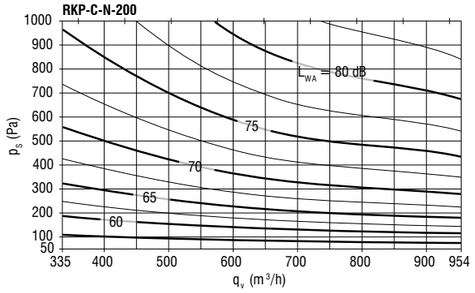
RKP-C-N-160



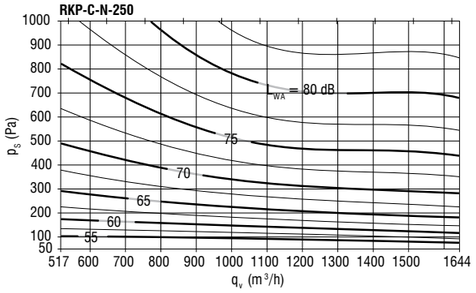
RKP-C-N-180



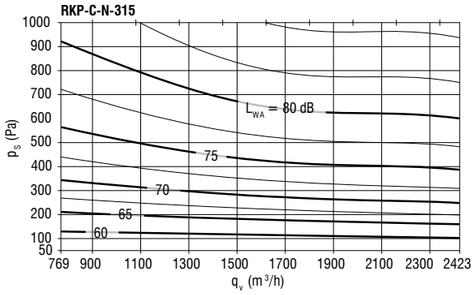
RKP-C-N-200



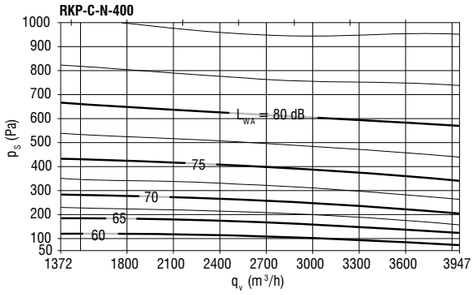
RKP-C-N-250



RKP-C-N-315



RKP-C-N-400



Design changes reserved

Ordering key:

Constant volume damper	**RKP-C-N - ØDn - R - V - Z**
Dimensions	
R - manual drive	
Air volume flow V [m³/h]	
Insulation	

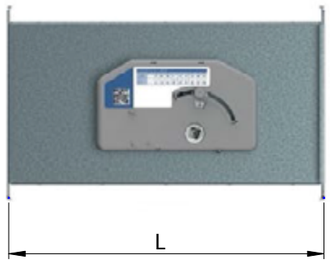
Design changes reserved

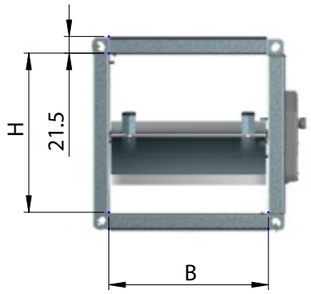
RKP-P-N

- For maintaining constant air volume in ventilation systems, without additonal power supply
- Made of galvanized steel sheet, damper blade made of anodized aluminium sheet
- Recommended aiflow velocity from 3 to 8 m/s, at pressure difference Δp >50 Pa
- Adjusting required constant amount is done by turning of working screw on the right side of the cover

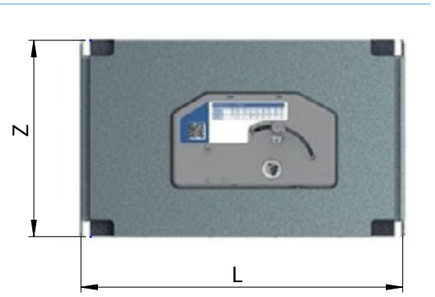
Working temperature :	-20...80°C
Relative humidity:	5...80% rh
Constant flow:	±10% set value
Casing airtightness:	Class C

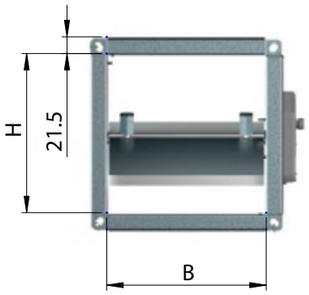
Dimensions RKP-P-N





Dimensions RKP-P-Z-N



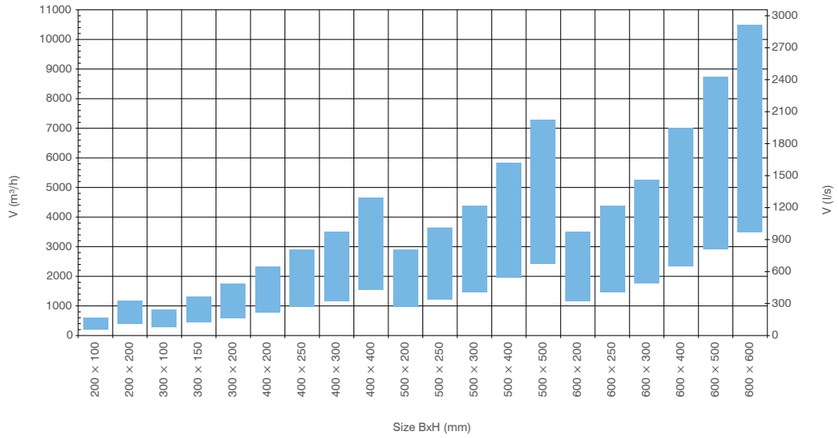


Dimensions

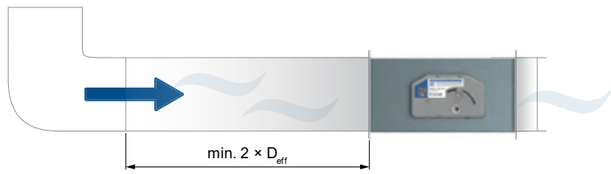
Size B×H (mm)		200×100	200×200	300×100	300×150	300×200	400×200	400×250	400×300	400×400	500×200	500×250	500×300	500×400	500×500	600×200	600×250	600×300	600×400	600×500	600×600
L	(mm)	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Pressure drop	(Pa)	732.8	956,2	694,3	794,5	758,5	825,3	833	766,5	833	933,1	797	863,8	876,6	871,2	542,9	663,5	835,6	640,4	650,7	712,3
V_{max}	(m^3/h)	500	1161	702	1295	1705	2194	2804	3404	4598	2868	3586	4353	5795	7243	3482	4346	5215	6987	8692	10329
mass RKP-P	m(kg)	-	5,3	5,4	5,9	6,4	7,5	8,0	8,7	12,7	8,7	9,2	9,8	14,4	15,4	9,7	10,4	11	16,2	17,4	22,5
mass RKP-P-N	m(kg)	5,8	7,3	7,4	8,1	8,8	10,5	11,2	12	16,4	12	12,8	13,6	18,6	19,9	13,6	14,4	15,3	20,8	21,9	27

Design changes reserved

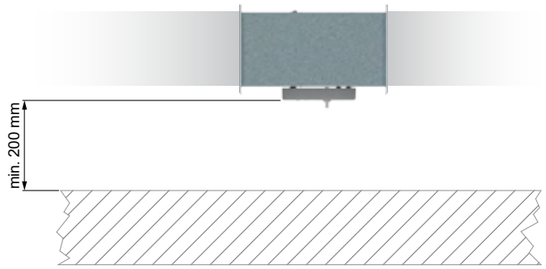
Fast selection diagram

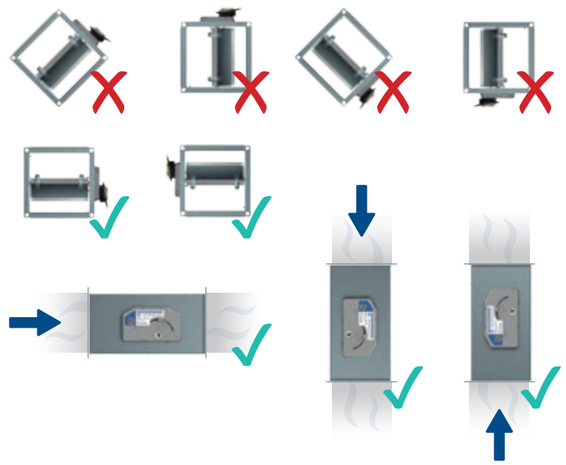


Installation



$$D_{eff} = \frac{2 \times W \times H}{W + H}$$





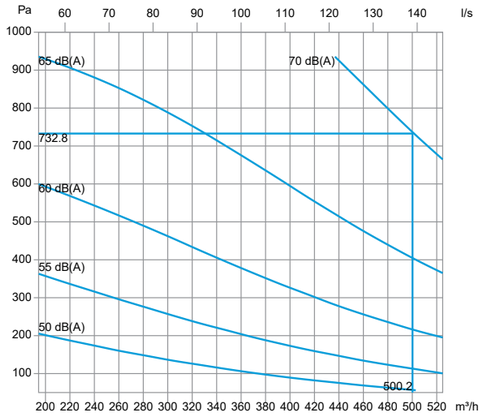
- Required length of straight section before regulator is L >3d . If L<3d, a 10% error in regulation occurs so that kind of installation is not advisable
- Pay attention to airflow direction marking on the regulator. If not correctly installed, regulator will not work
- Maintenace is not required

Installation in horizontal, angled or vertical duct so that rotation axis is always in horizontal position.

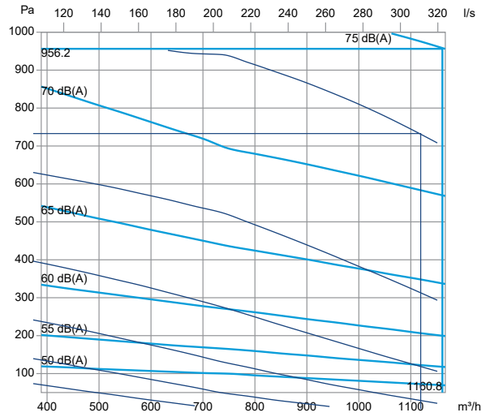
Design changes reserved

Sound power level diagrams

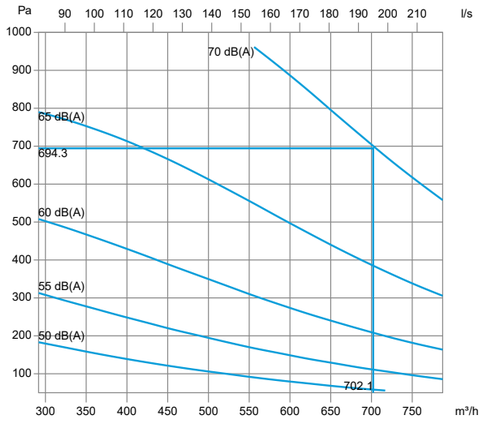
RPK-P-Z-N 200x100



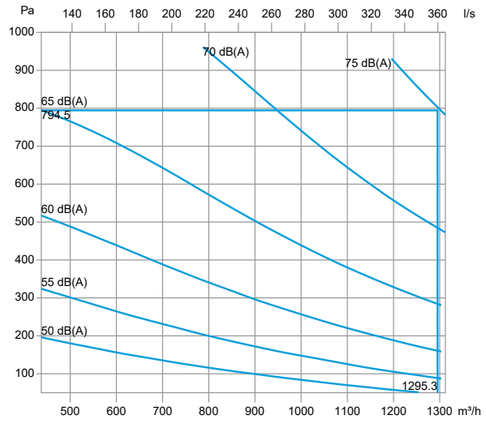
RPK-P-Z-N 200x200



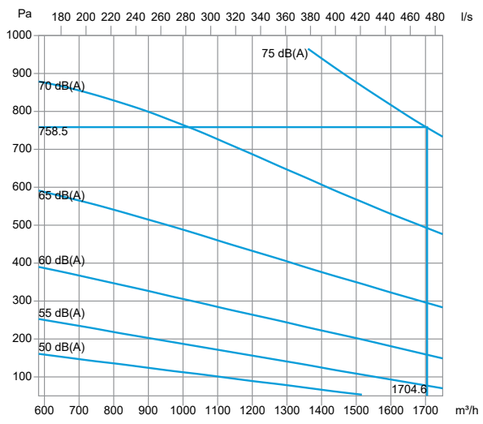
RPK-P-Z-N 300x100



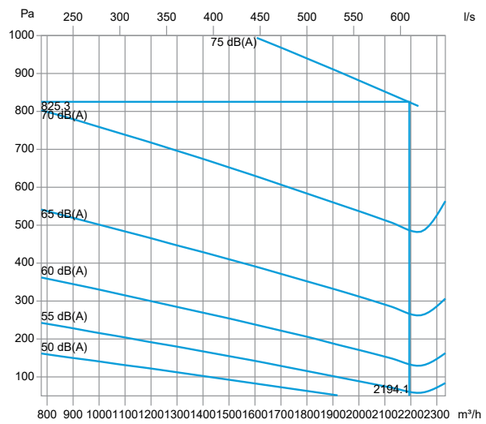
RPK-P-Z-N 300x150



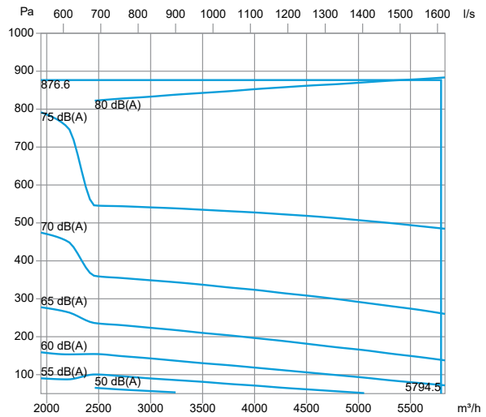
RPK-P-Z-N 300x200



RPK-P-Z-N 400x200



RPK-P-Z-N 500x400



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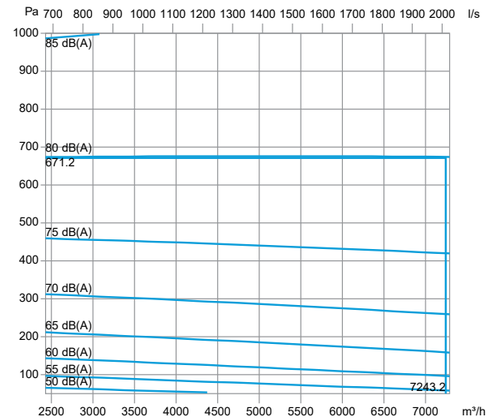

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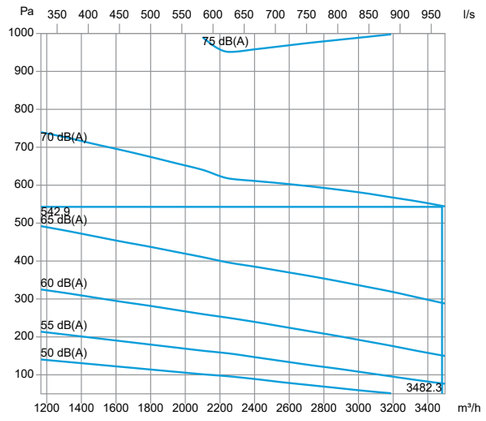
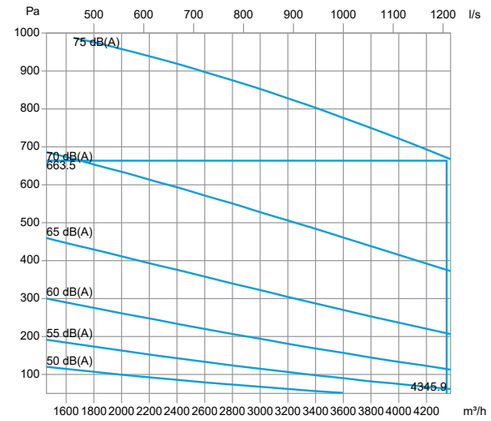
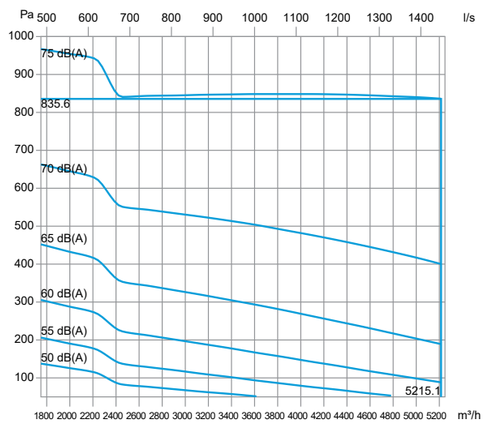


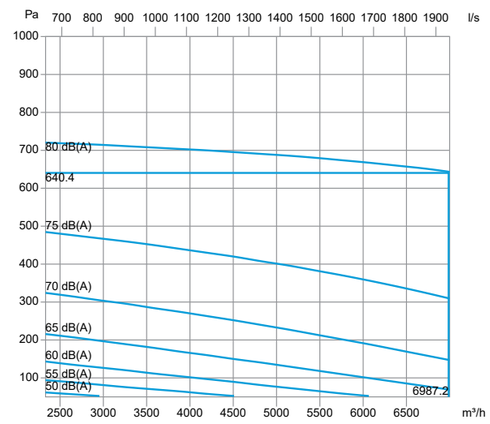
RPK-P-Z-N 600x250



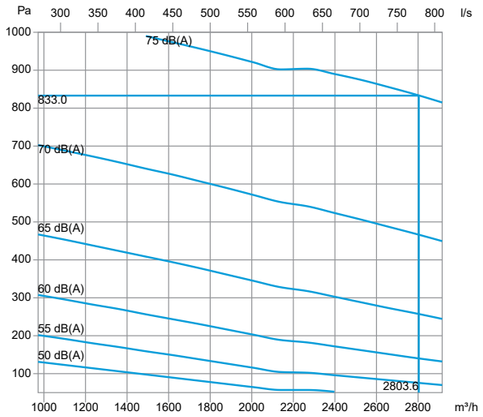
RPK-P-Z-N 600x300



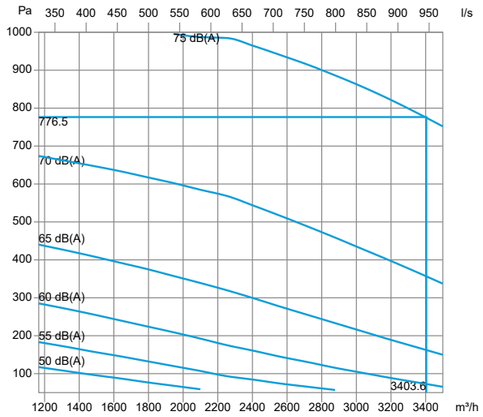
RPK-P-Z-N 600x400



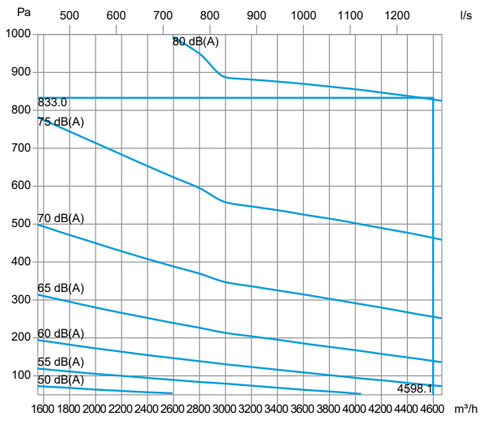
RPK-P-Z-N 400x250-M0



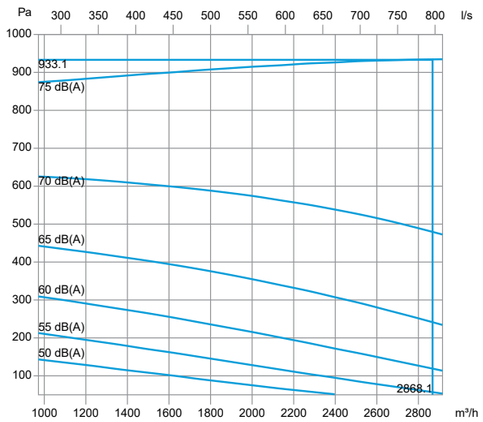
RPK-P-Z-N 400x300



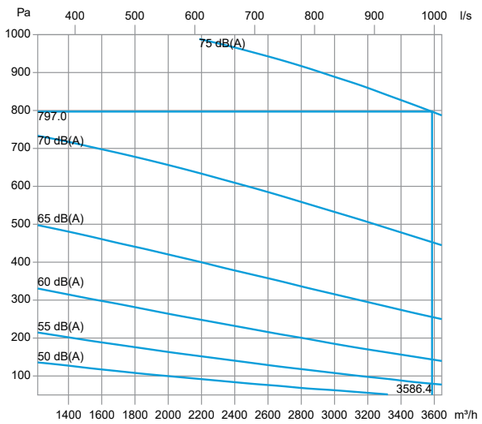
RPK-P-Z-N 400x400



RPK-P-Z-N 500x200



RPK-P-Z-N 500x250



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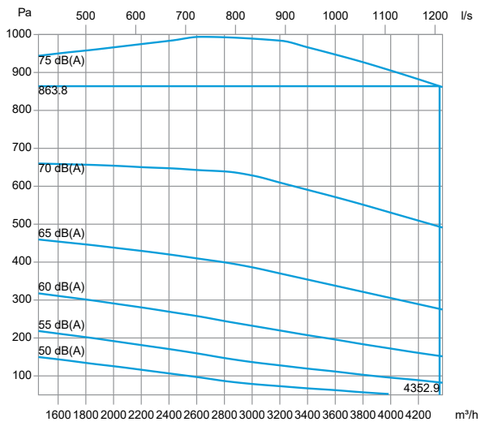
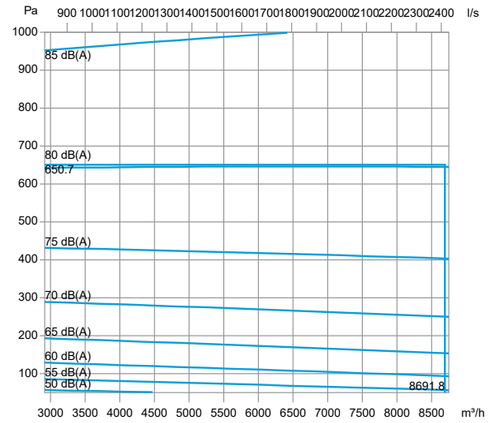
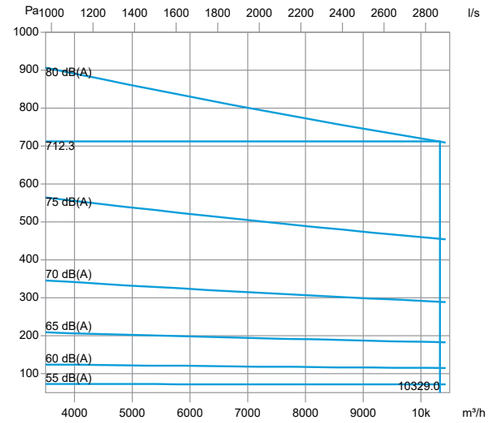


Design changes reserved

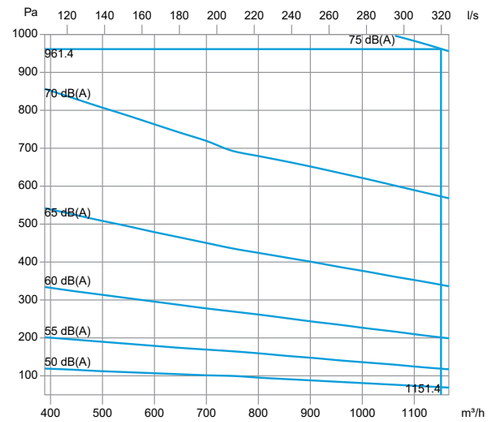
RPK-P-Z-N 600x500



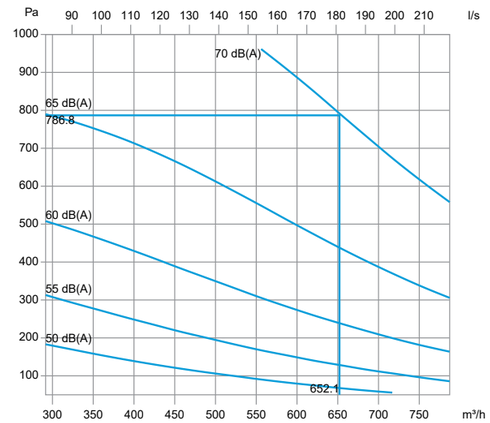
RPK-P-Z-N 600x600



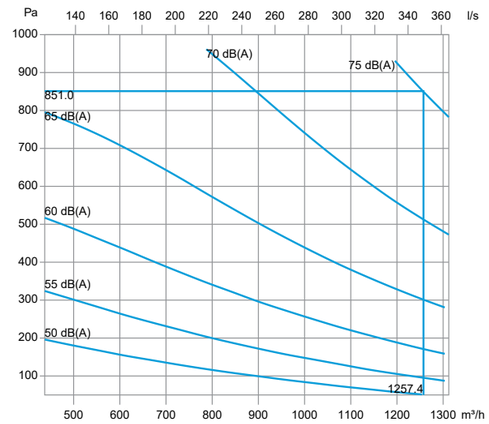
RPK-P-N 200x200



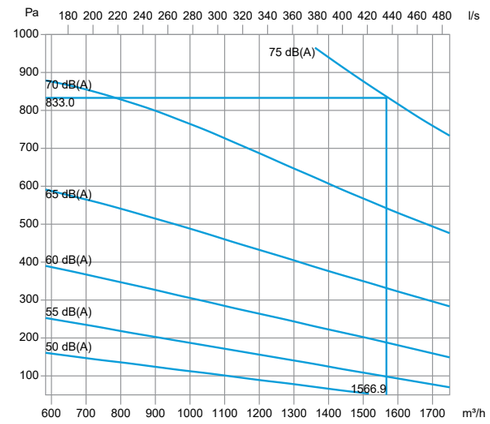
RPK-P-N 300x100



RPK-P-N 300x150

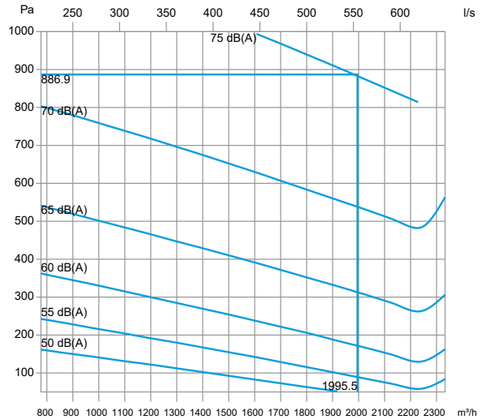


RPK-P-N 300x200



Design changes reserved

RPK-P-N 400x200



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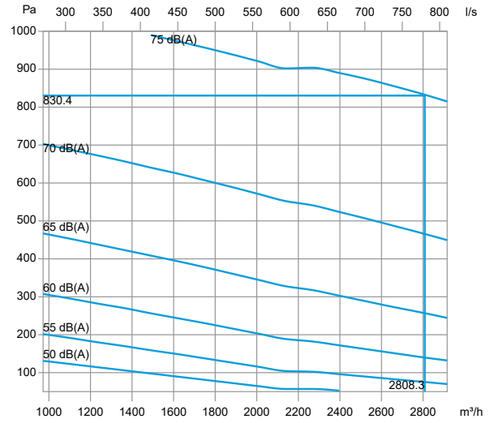


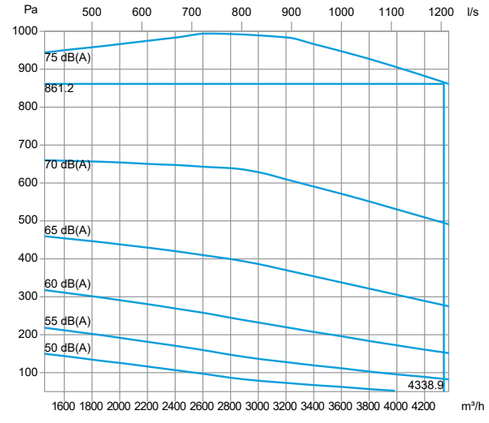
RPK-P-N 400x300

RPK-P-N 400x400

RPK-P-N 500x200

RPK-P-N 500x250

RPK-P-N 500x300



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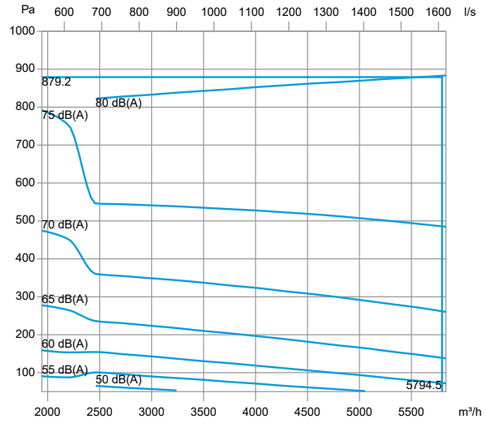


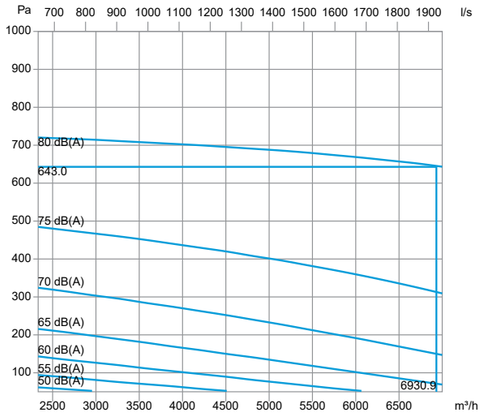
RPK-P-N 500x500

RPK-P-N 600x200

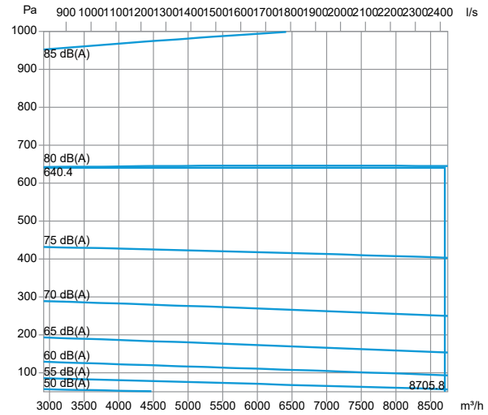
RPK-P-N 600x250

RPK-P-N 600x300

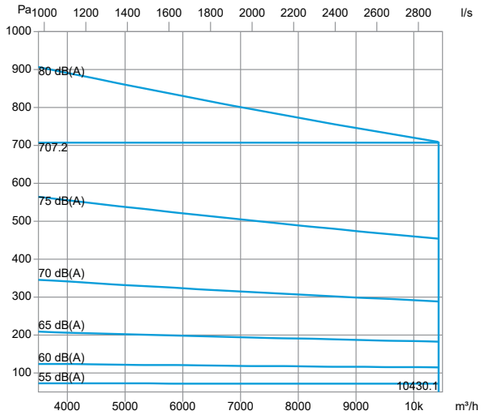
RPK-P-N 600x400



RPK-P-N 600x500



RPK-P-N 600x600



Ordering key:

Constant volume damper	**RKP-P-N**	**- B x H**	**- R**	**- V**	**- Z**	
Dimensions						
R - manual drive						
Air volume flow V [m³/h]						
Insulation						

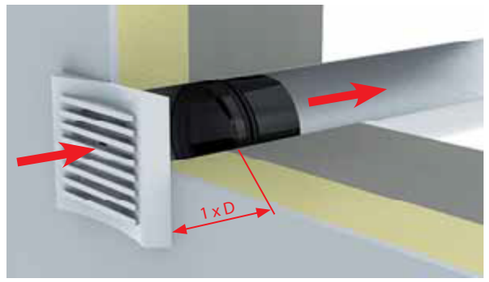
Design changes reserved

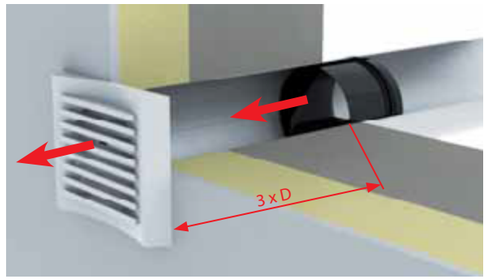
KVR-R

- For maintaining constant air volume in ventilation systems, without additonal power supply
- Made of fire retardant plastics
- Covers an air flow range between 15 up to 700 m³/h within a pressure range from 50 up to 200 Pa
- Air flow can easily be adjusted within the airflow range of each damper
- Maximum working temperature 60°C

Material

- Fire retardant plastics classified M1
- Body, valve and piston made out of fire retardant plastics M1
- Stainless steel calibrated spring
- Rubber air-tight sealing





Installation

- To be inserted inside round ducts
- For horizontal of vertical mounting
- When horizontally mounted the marking “BAS” must be horizontal
- To be placed according the marked airflow direction
- To be placed in air supply at a minimum distance of 3x the duct diameter from air supply grilles and at the same distance close to areas with high turbulance like duct connections, bends,...
- To be placed in air exhaust at a minimum distance of 1x the duct diameter from air exhaust grilles and at the same distance close to areas with high turbulance like duct connections, bends,...
- The flow regulator must be accessible to allow maintenance.

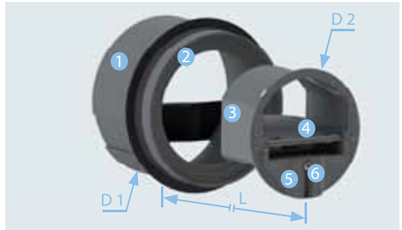
Dimensions

Ø	D1 [mm]	D2[mm]	L[mm]
80	76	73	55
100	96	93	70
125	120	117	89
150	146	148	91
160	146	148	91
200	190	195	91
250	245	236	127

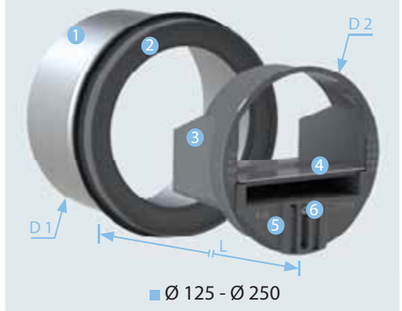
Design changes reserved

Construction

1. Cuff with seal
2. Spacer (according air volume)
3. Corps
4. Regulator element
5. Flow control module
6. Blocking screw adjustment module



■ Ø 80 - Ø 100



■ Ø 125 - Ø 250

■ **Ø 80 i 100 mm**

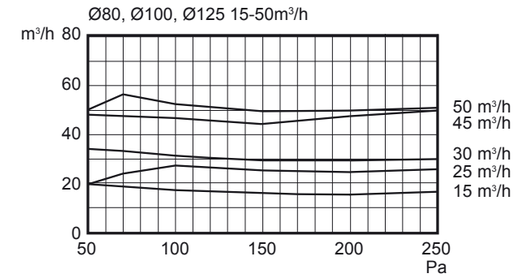
■ **od Ø 125 do 250 mm**

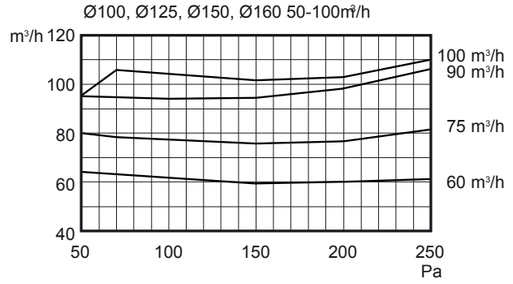
Pressure drop and sound power levels

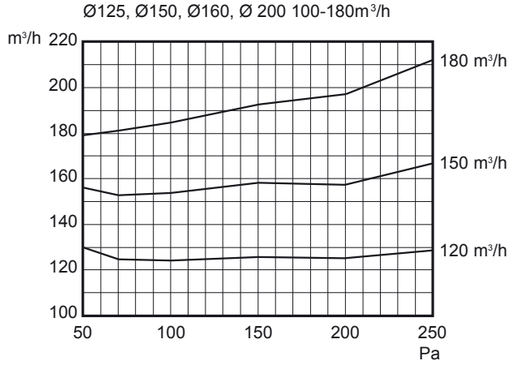
Qv	Lw			
	50 Pa	100 Pa	150 Pa	200 Pa
15	25	29	32	35
25	26	30	33	36
30	26	31	35	38
45	27	33	36	39
50	29	35	37	41
60	32	37	39	42
75	32	37	40	42
90	32	38	41	44
100	33	39	42	45
120	30	34	39	42
150	33	37	41	45
180	34	40	44	47
210	34	40	42	44
240	35	41	44	47
270	37	43	45	49
300	33	37	42	45
350	35	40	44	47
400	37	42	45	50
450	38	44	46	51
500	39	46	48	53

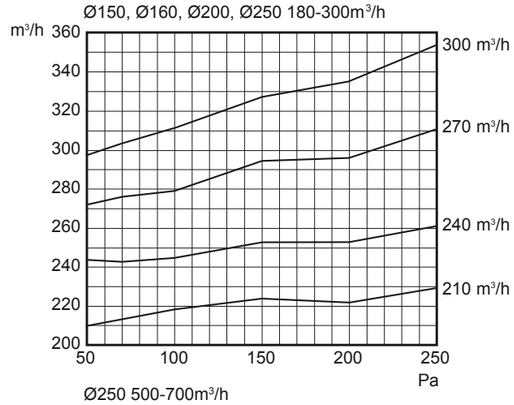
Design changes reserved

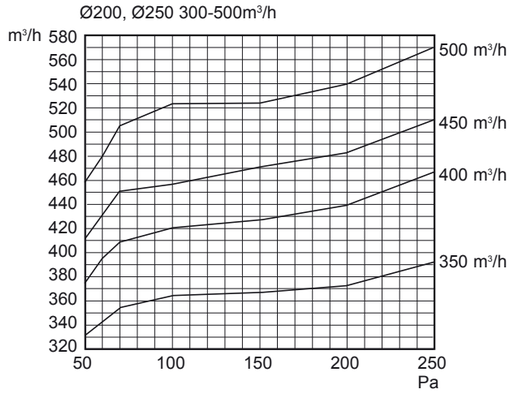
SELECTION DIAGRAMS

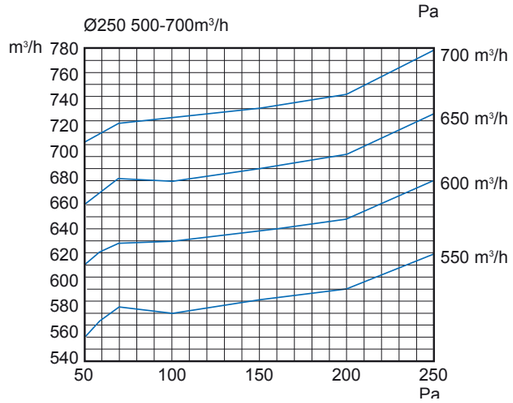












ORDERING KEY

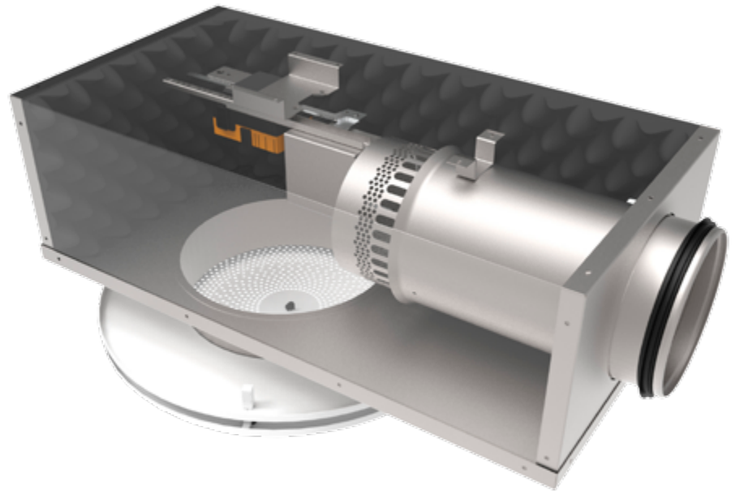
Constant flow regulator	**KVR - Ø**
Dimension	

Design changes reserved

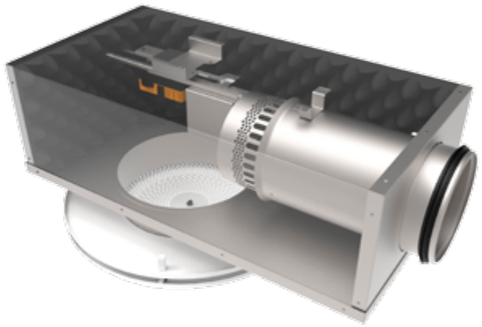
4/S6
v 3.3 (en)

KLIMAOPREMA VAV SYSTEM

SmartVAV



klimaoprema



Application

Smart VAV box is designed for easy commisioning and integration with other systems. It consists of diffuser, plenum box and VAV damper. Klimaoprema's Smart VAV system features a wide variety of available diffuser types and sizes. In a combination with KOER Codis controller it becomes a powerful tool for modern, precise and energy efficient ventilation.

Features

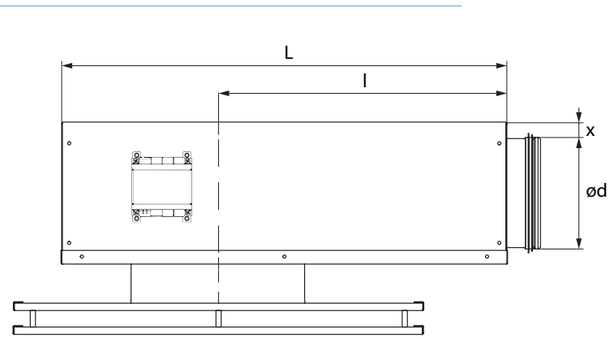
Every Smart VAV box is available with highly efficient acoustic foam insulation.

Available connection diameters: 125, 160, 200, 250mm

Compatible with diffuser plate types:
KDP/ODP, DEV/DEV/DEU, DVF/DVS

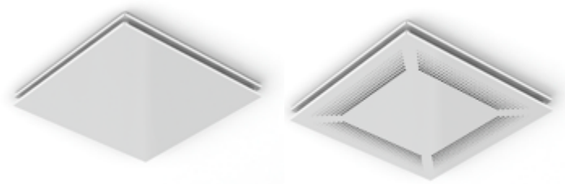
Accurate and reliable measurement of airflow. Removable filter for extended life and simpified maintenance.

Dimensions



Model	D	d	L	l	B	H	h	x
125-160	160	123	643	420	312	175	70	25
160-200	200	158	643	420	337	210	70	25
200-250	250	198	643	420	377	250	70	25
250-315	315	248	643	420	427	300	70	25

Design changes reserved

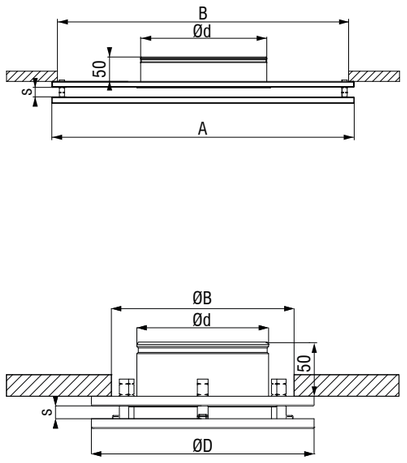


Diffusor plates

Smart VAV box is designed for standard use with KDP/ODP diffusers. However, a wide range of Klimaoprema diffuser plates can be installed with additional compact plenum box.

- Ceiling diffuser for room heights from 2,3-4m
- Made out of steel sheet, standard RAL 9010
- Suitable for horizontal supply of cooled air
- Easy face plate removal
- Easy slot width adjustment (10, 20, 30mm)

Dimensions



KDP	A [mm]	ød [mm]	øB [mm]
125	235	125	210
160	295	160	270
200	400	200	375
250	495	250	370
315	600	315	575

ODP	ØD	Ød	ØB
125	210	125	190
160	250	160	227
200	350	200	327
250	450	250	427
315	550	315	527

Ordering key

Air terminal unit **SmartVAV** **- MP** **- øD - ød** **- Z** **- V**

Communication
MP - MP Bus

Outlet / Inlet diameter

Insulation

V* **-** volume flow, min/max [m³/h]

Ceiling diffuser **KDP/ODP** **- A** **-250**

A - round perforation
E - without perforation
PP - square perforation
PPA - square perforation around perimiter
PE - full square perforation

Size (eqvivalent to ød)

Design changes reserved

Codis C35 VAV

Codis 35 VAV was designed to control Variable Air Volume dampers. Its hardware platform is the same as Codis 35 FC with the addition of a CO2 sensor. Like the FC, it enables higher energy efficiency thanks to a powerful weekly scheduler, “Occupied” operating mode and a digital input for presence sensor connection or passive electromechanical switch (open window) connection.

LCD with touchscreen

Touchscreen and intuitive graphical user interface enable quick and easy adjustment of operating functions and device settings.

Temperature, humidity and CO2 measurement

Built-in sensors guarantee a cost effective solution by eliminating the need for additional installation of multiple external sensing devices.

Comunication

Support for BACNet MSTP communication protocol over RS485 enables easier system integration.

Inputs and outputs

Depending on the application, the Codis 35 can have:

- 3 x 0 - 10V outputs
- 1 x 0 - 10V input (Co2)
- 1 x resistance input for PT1000
- 1 digital input for window contact
- 1 x relay 3A
- RS485 MSTP

Timers and working modes

HVAC systems play a particularly significant role in obtaining energy efficiency in buildings. Thus, Codis’ easy week timer setup and different working modes (Comfort, Pre-comfort, Economy, Frost protection) are primarily designed to optimize the building energy consumption.

Indoor air quality

A common problem caused by poor indoor air quality control is under-ventilating or over-ventilating the user space which leads to poor indoor air quality or unnecessary increased operating costs. With a built-in VOC sensor and input for CO2 sensor, Codis 35 helps control ventilation more efficiently by demanding just the right amount of fresh air needed for optimal indoor conditions.

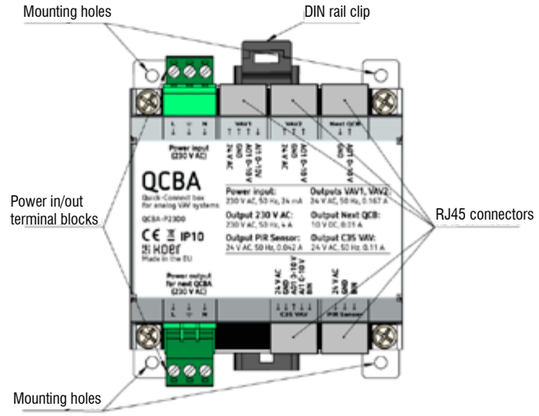
Ordering key

Damper type	C35 - VAV	- H	-B	-RS
Built in sensor **C** - CO2 sensor **H** - Humidity sensor				
Protocol **B** - BACNet **M** - MODBUS*				
Network interface **RS** - RS485 **W** - Wi-Fi*				

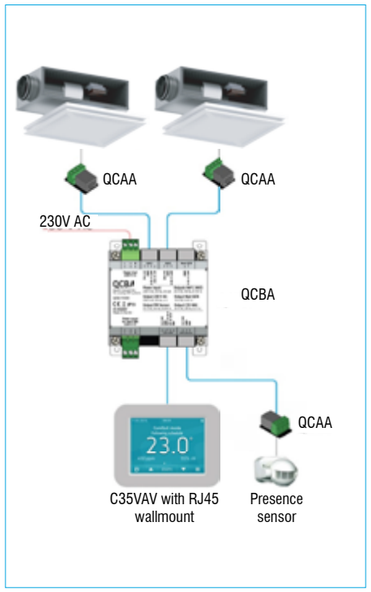
Design changes reserved

Quick Connect Box (QCB)

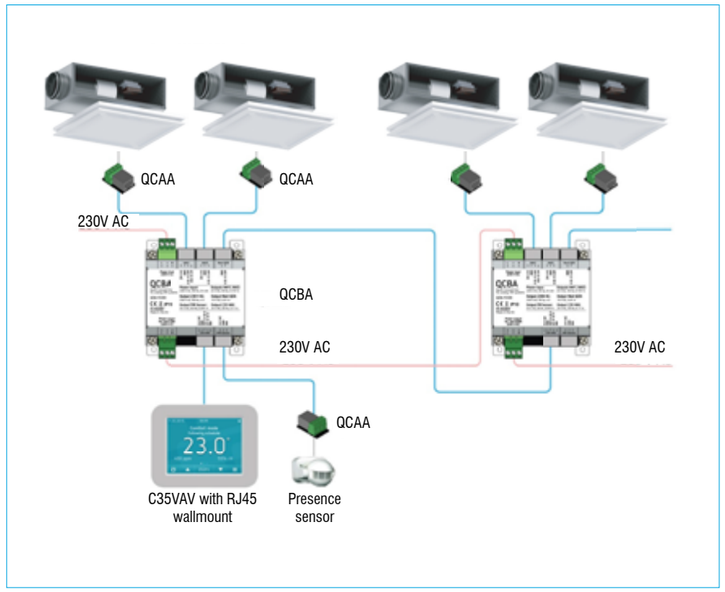
QCBA is an electronic device which dramatically reduces wiring and installation time of SmartVAV’s and the Codis C35 room controller. It supplies 24V AC power for up to two SmartVAV actuators, one C35 room controller and one PIR sensor. it enables the installer to connect to VAV actuators, C35 and PIR sensor together using standard straight CAT5 Ethernet cables instead of screw type terminal blocks. C35 communicates with VAV actuators using the analog 0-10V signal. The A01 and AI1 markings on the device casing identify the connectors over which this analog communication is taking place.



Wiring example with Quick Connect Box (QCB)



QCBA wiring example

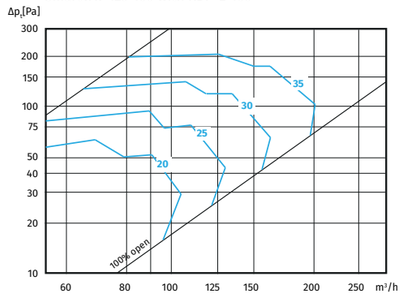


QCBA wiring example - cascading QCBAs in one zone

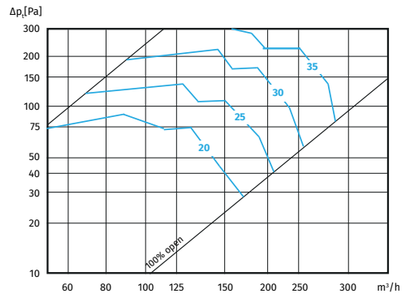
Design changes reserved

Pressure drop

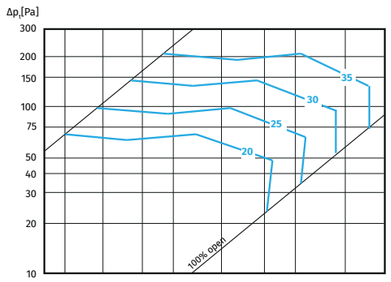
SmartVAV-125-160 with KDP-E-160



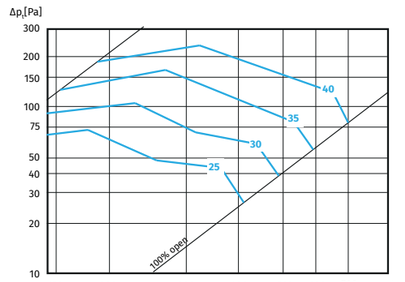
SmartVAV-160-200 with KDP-E-200



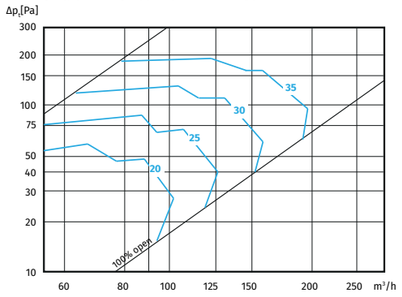
SmartVAV-200-250 with KDP-E-250



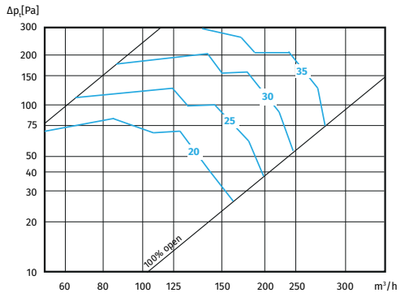
SmartVAV-250-315 with KDP-E-315



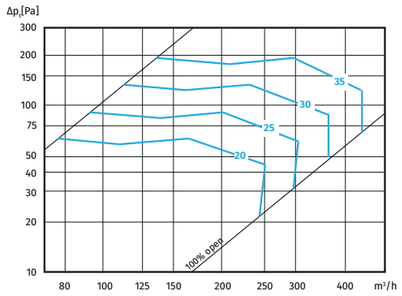
SmartVAV-125-160 with KDP-PE-160



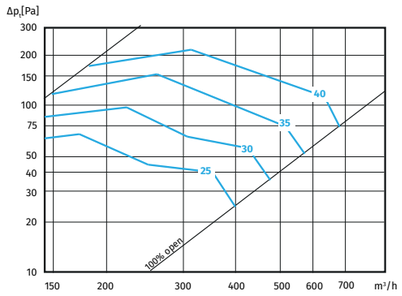
SmartVAV-160-200 with KDP-PE-200



SmartVAV-200-250 with KDP-PE-250



SmartVAV-250-315 with KDP-PE-315



NOTES:

5/S1
v 3.3 (en)

KITCHEN HOODS

NZK, NZR, NZP, NSK, NSR, NSP, NES, NEZ

klimaoprema

TABLE OF CONTENTS

Definition of symbols:

B [m]	- Kitchen hood width
H [m]	- Kitchen hood height
L [m]	- Kitchen hood length
d [m]	- Overlap
b [m]	- Appliance width
h [m]	- Installation height
FxO [m]	- Exhaust connection dimensions
ExS [m]	- Exhaust connection dimensions (eco-hoods)
V [m³/h]	- Airflow rate
v [m/s]	- Effective air velocity
Δp [Pa]	- Pressure drop
axbxc [m]	- Kitchen hood dimensions

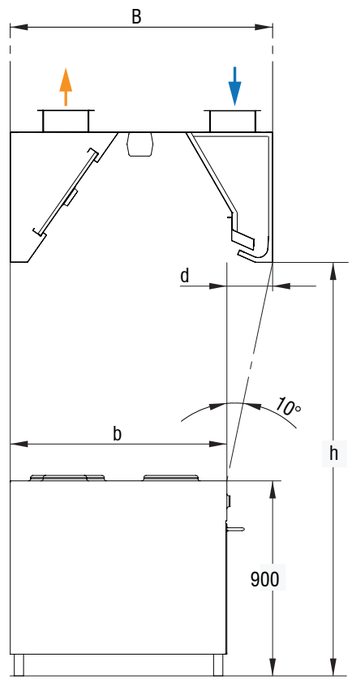
Design changes reserved

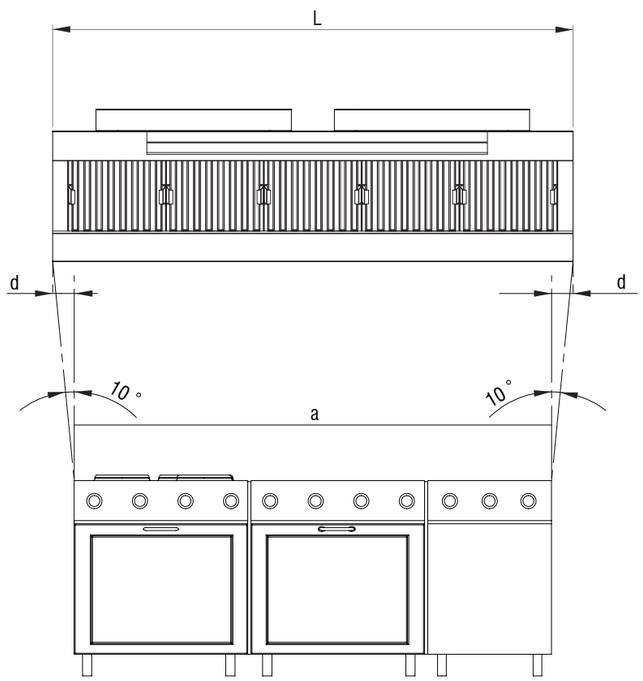
Construction

Hood is made of stainless steel AISI 430, according to DIN 59382. Unique construction enables all condensation, from inner surfaces and filter units, to be drained in one or more draining taps.
Grease traps and fire resistant grease traps can be installed without construction changes.
Air volume quantities are determened by VDI 2052.

Hood size

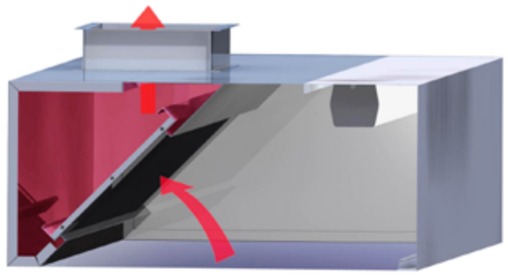
Hood size is determened by size of kitchen appliances from which air should be extracted.
For wall or ceiling hood with installation height h=2,1m , outer sides of hood should overhang ends of equipment by minimum of 100mm.
If installation height is h>2,1m , 10° angle between end of equipment and hood side should be achived (see picture below).
For economical hoods, width should be increased by the width of inactive edge (wall version - 200mm, ceiling version - 400mm).





Design changes reserved

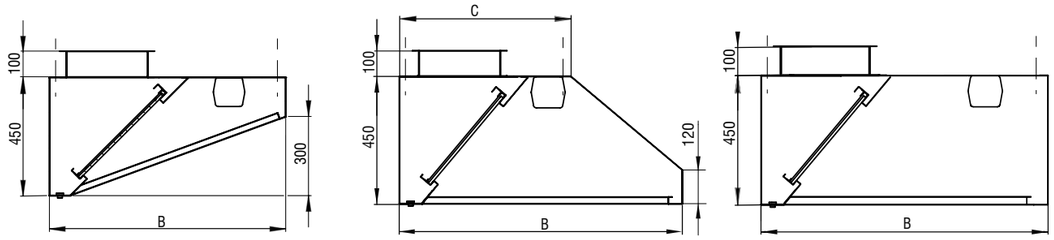
CONVENTIONAL WALL HOODS

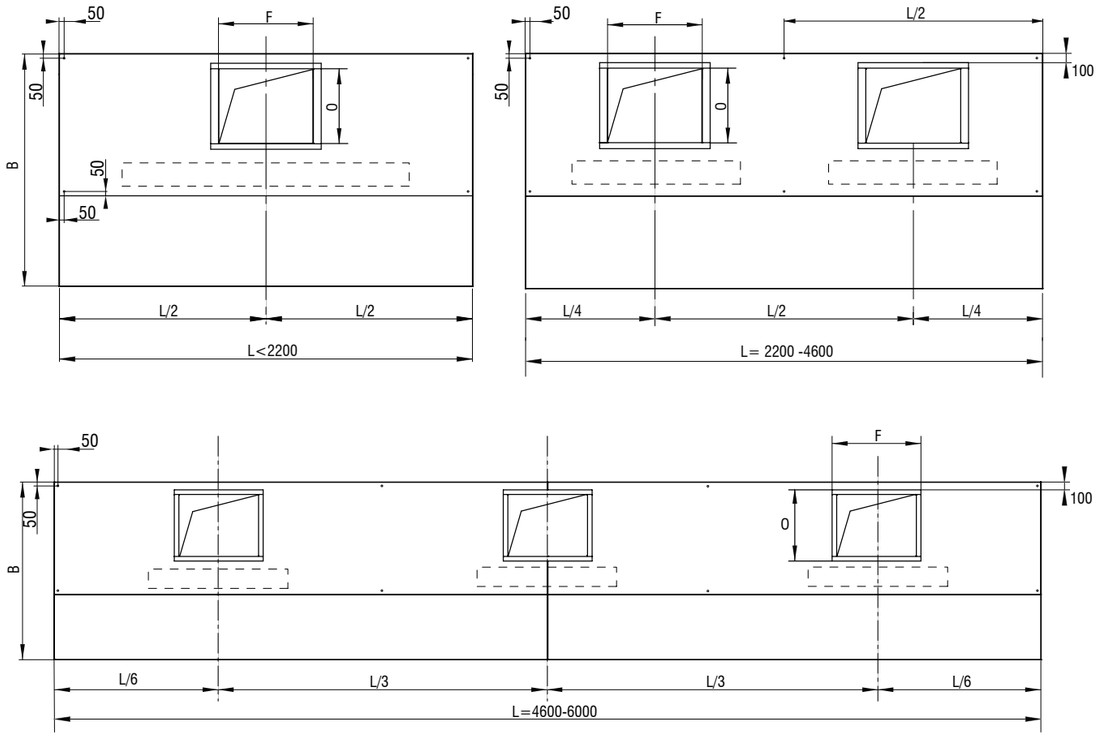


NZK
Inclined wall hood

NZR
Horizontal wall hood

NZP
Rectangular wall hood





* displays suspension for model NZR

Design changes reserved

Standard hood widths (B)

B	900	1000	1100	1200
C	670	725	770	870

Standard height H = 450

- Other sizes available on request
- Appropriate number of FM filters is delivered with hood
- Fire resistant filters PNF or combined filters KFM (combination of PNF and FM) are delivered on request
- Material: Stainless steel sheet

Ordering key:

- hood, wall, inclined, length 3000, width 1000 height 450;

NZK 3000 x 1000 x 450
Outter dimensions L x B x H

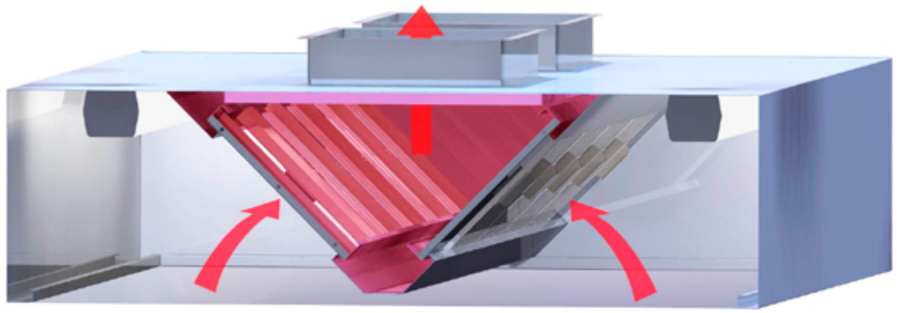
Room entering problems should be considered when ordering larger dimension hood. In such case, we can make multipart hood.

Width	900	1000	1100	1200

Standard length L	Draining taps No.	Filter units No.	Nominal extract air volume	Extract air connection F x O		Lightning characteristics			No. of suspensions M8
				No. of connections	Dimensions	No. of lamps	Lamp power	Lamp length	
mm	kom	kom	m³/h	kom	mm	kom	W	mm	kom
1000	1	2	1050	1	400 x 310	1	18	660	4
1200	1	2	1300	1	400 x 310	1	18	660	4
1400	1	3	1550	1	400 x 310	1	18	660	4
1600	1	3	1800	1	400 x 310	1	36	1270	4
1800	1	4	2000	1	400 x 310	1	36	1270	4
2000	1	4	2250	1	400 x 310	1	36	1270	6
2200	1	5	2500	2	400 x 310	1	58	1570	6
2400	1	5	2800	2	400 x 310	1	58	1570	6
2600	1	5	2950	2	400 x 310	2	18	660	6
2800	1	6	3200	2	400 x 310	2	18	660	6
3000	2	6	3450	2	400 x 310	2	36	1270	6
3200	2	6	3700	2	400 x 310	2	36	1270	6
3400	2	6	3900	2	400 x 310	2	36	1270	6
3600	2	6	4150	2	400 x 310	2	36	1270	6
3800	2	8	4400	2	400 x 310	2	36	1270	8
4000	2	8	4600	2	400 x 310	2	36	1270	8
4200	2	8	4900	2	400 x 310	2	58	1570	8
4400	2	8	5100	2	400 x 310	2	58	1570	8
4600	2	8	5350	2	400 x 310	2	58	1570	8
4800	2	10	5600	3	400 x 310	2	58	1570	8
5000	2	10	5800	3	400 x 310	2	58	1570	8
5200	2	10	6050	3	400 x 310	2	58	1570	8
5400	2	12	6300	3	400 x 310	2	58	1570	8
5600	2	12	6550	3	400 x 310	2	58	1570	8
5800	2	12	6750	3	400 x 310	3	58	1570	8
6000	3	12	7000	3	400 x 310	3	58	1570	8

Design changes reserved

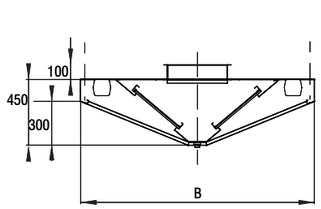
CONVENTIONAL CEILING HOODS

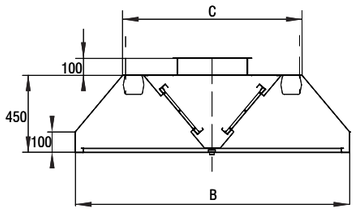


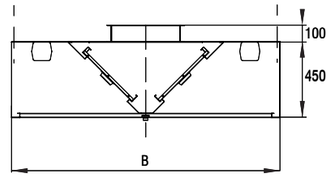
NSK
Inclined ceiling hood

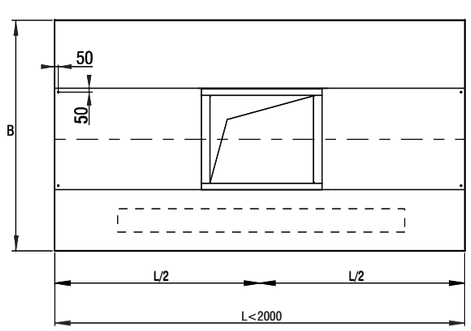
NSR
Horizontal ceiling hood

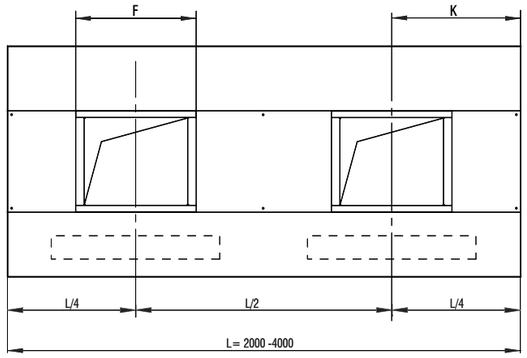
NSP
Rectangular ceiling hood

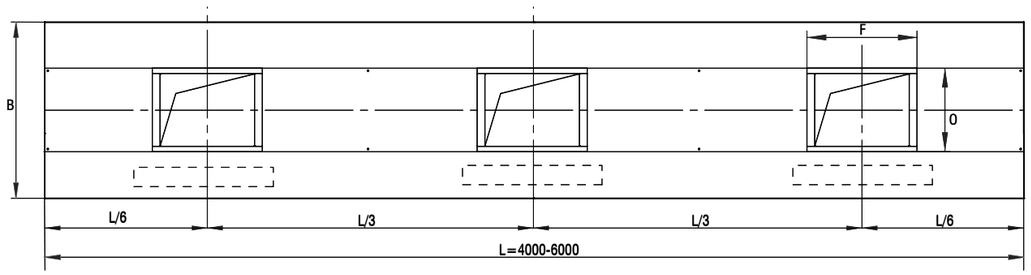












Design changes reserved

Standard hood widths (B)

B	1400	1600	1800	2000	2200	2400
C	1020	1140	1245	1340	1415	1615

Standard height H = 450

- Other sizes available on request
- Appropriate number of FM filters is delivered with hood
- Fire resistant filters PNF or combined filters KFM (combination of PNF and FM) are delivered on request
- Material: Stainless steel sheet

Ordering key:

- hood, ceiling, inclined, length 3800, width 1800 height 450;

NSK 3800 x 1800 x 450
Outter dimensions L x B x H

Room entering problems should be considered when ordering larger dimension hood. In such case, we can make multipart hood.

Width	1400	1600	1800	2000	2200

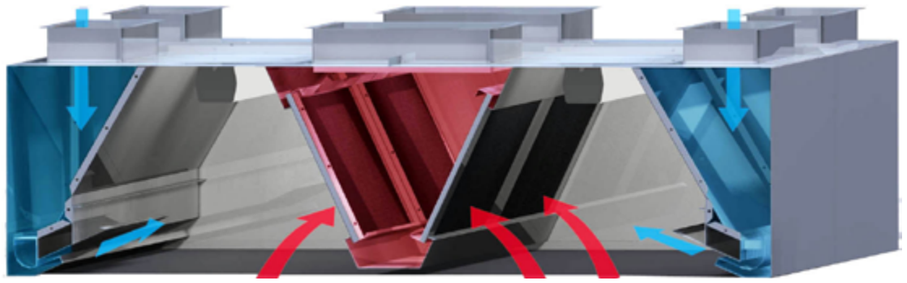
Standard length L	Draining taps No.	Filter units No.	Nominal extract air volume	Extract air connection F x O		Lightning characteristics			No. of suspensions
				No. of connections	Dimensions	No. of lamps	Lamp power	Lamp length	
mm	kom	kom	m³/h	kom	mm	kom	W	mm	kom
1000	1	4	2100	1	560 x 410	2	18	660	4
1200	1	4	2600	1	560 x 410	2	18	660	4
1400	1	4	3100	1	560 x 410	2	18	660	4
1600	1	6	3600	1	560 x 410	2	36	1270	4
1800	1	8	4000	1	560 x 410	2	36	1270	4
2000	1	8	4500	2	560 x 410	2	36	1270	4
2200	1	8	5000	2	560 x 410	2	58	1570	4
2400	1	10	5400	2	560 x 410	2	58	1570	4
2600	1	10	5900	2	560 x 410	2	58	1570	6
2800	1	12	6400	2	560 x 410	2	58	1570	6
3000	2	12	6900	2	560 x 410	4	36	1270	6
3200	2	12	7400	2	560 x 410	4	36	1270	6
3400	2	12	7800	2	560 x 410	4	36	1270	6
3600	2	16	8300	2	560 x 410	4	36	1270	6
3800	2	16	8800	2	560 x 410	4	36	1270	6
4000	2	16	9200	2	560 x 410	4	58	1570	6
4200	2	16	9800	3	560 x 410	4	58	1570	6
4400	2	16	10200	2	560 x 410	4	58	1570	8
4600	2	20	10700	3	560 x 410	4	58	1570	8
4800	2	20	11200	3	560 x 410	4	58	1570	8
5000	2	20	11600	3	560 x 410	4	58	1570	8
5200	2	24	12100	3	560 x 410	6	36	1270	8
5400	2	24	12600	3	560 x 410	6	36	1270	8
5600	2	24	13100	3	560 x 410	6	36	1270	8
5800	3	24	13500	3	560 x 410	6	58	1570	8
6000	3	24	14000	3	560 x 410	6	58	1570	8

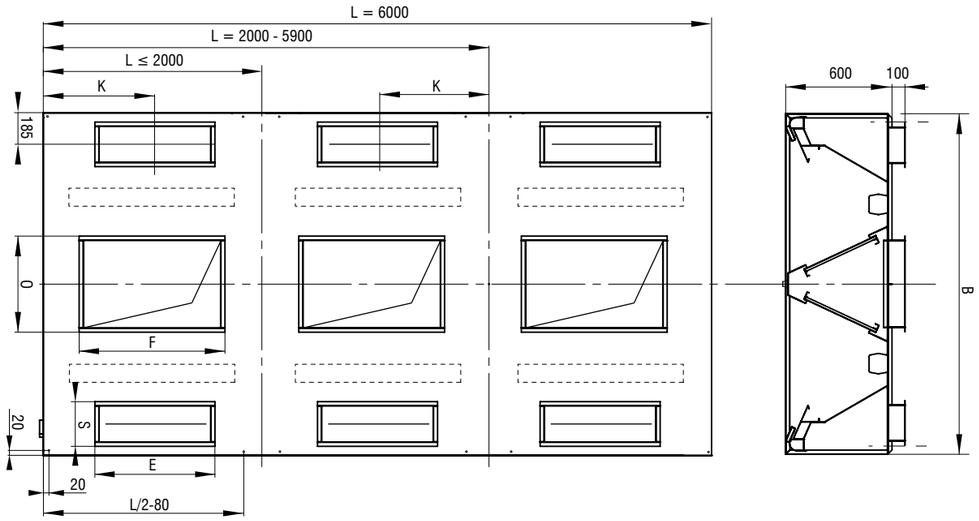
Design changes reserved

ENERGY-SAVING HOODS (ECO-HOODS)

- Energy saving hood operates with approximately 70% of external unheated air, supplyed trough a special duct and fan, and delivered trough a jet profiled slot to extraction filters.
- High lateral velocity of a cold air jet induces a low pressure zone beneath the hood and enables efficient ehxaust of of vapours, smoke, grease particles and odours.
- Cold air jet lowers the filter temperature below grease condensation temperature (40°C), thus fostering grease separation and condensation of vapours.
- External air ducts are heat insulated to prevent condensation.
- Energy saving hoods can easily satisfy minimal ventilation requrements of 35 m^3/h per m^2 according to VDI 2052.
- The result of that is less grase in exhaust system, easy cleaning and mantainance, lower risk of fire and preservation of building roof or facade.
- However, in order to achieve full efficiency of this hood type, some 30% of exhaust air in the kitchen have to be restored by fresh air that needs to be heated to 20°C in winter.

Energy saving ceiling hood (twosided), NES





Design changes reserved

Standard hood widths (B)

B	1600	1800	2000	2200	2400	2600
	2800	3000				

Standard height H = 600

- Other sizes available on request
- Appropriate number of FM filters is delivered with hood
- Fire resistant filters PNF or combined filters KFM (combination of PNF and FM) are delivered on request
- Material: Stainless steel sheet

Ordering key:

- hood, energy-saving, ceiling, length 3000, width 1600 and height 600;

NES 3000 x 1600 x 600
Outter dimensions L x B x H

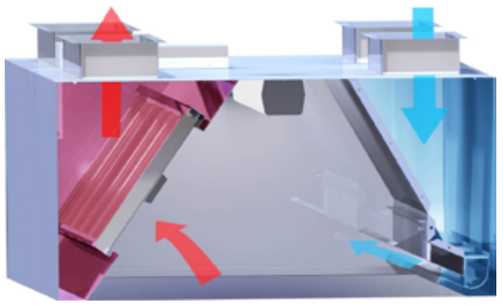
Room entering problems should be considered when ordering larger dimension hood. In such case, we can make multipart hood.

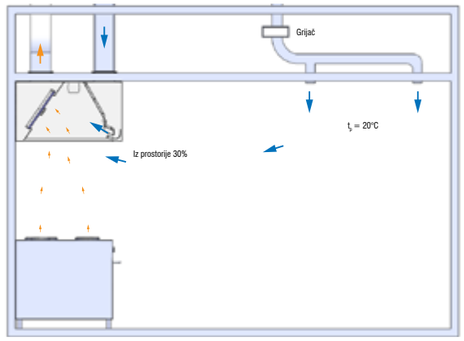
Width	1600	1800	2000	2200	2400	2600	2800	3000

Standard length L	Draining taps No.	Filter units No.	Nominal extract air volume	Supply air connection E x O		Extract air connection F x O		Lighting characteristics			No. of suspen-sions M8	Connection K
				No. of connections	Dimensions	Dimensions	No. of connections	No. of lamps	Lamp power	Lamp length		
mm	kom	kom	m^3/h	kom	mm	mm	kom	kom	W	mm	kom	mm
1600	1	6	2400	2	950 x 210	1000 x 510	1	2	36	1270	4	800
1800	1	8	2600	2	950 x 210	1000 x 510	1	2	36	1270	4	900
2000	1	8	3000	2	1200 x 210	1000 x 510	1	2	58	1570	4	1000
2200	1	8	3200	4	650 x 210	700 x 510	2	2	58	1570	4	550
2400	1	10	4200	4	650 x 210	700 x 510	2	2	58	1570	4	600
2600	1	12	4900	4	650 x 210	800 x 510	2	2	58	1570	4	650
2800	1	12	5600	4	650 x 210	800 x 510	2	4	36	1270	6	700
3000	2	12	6000	4	850 x 210	800 x 510	2	4	36	1270	6	750
3200	2	12	6500	4	850 x 210	800 x 510	2	4	36	1270	8	800
3400	2	12	7900	4	950 x 210	800 x 510	2	4	36	1270	8	850
3600	2	14	8300	4	950 x 210	800 x 510	2	4	36	1270	8	900
3800	2	16	8800	4	950 x 210	1000 x 510	2	4	58	1570	8	950
4000	2	16	9400	4	1200 x 210	1000 x 510	2	4	58	1570	8	1000
4200	2	16	9700	4	1200 x 210	1000 x 510	2	4	58	1570	8	1050
4400	2	16	10200	4	1200 x 210	1000 x 510	2	4	58	1570	8	1100
4600	2	18	10600	4	1200 x 210	1000 x 510	2	4	58	1570	8	1150
4800	2	18	11200	4	1200 x 210	1000 x 510	2	4	58	1570	8	1200
5000	2	20	11600	4	1200 x 210	1000 x 510	2	4	58	1570	8	1250
5200	2	20	12000	6	850 x 210	800 x 510	3	6	58	1570	10	865
5400	2	20	12500	6	850 x 210	800 x 510	3	6	58	1570	10	900
5600	2	20	13000	6	850 x 210	800 x 510	3	6	58	1570	10	935
5800	2	22	13500	6	950 x 210	1000 x 510	3	6	58	1570	10	965
6000	3	24	13900	6	950 x 210	1000 x 510	3	6	58	1570	12	1000

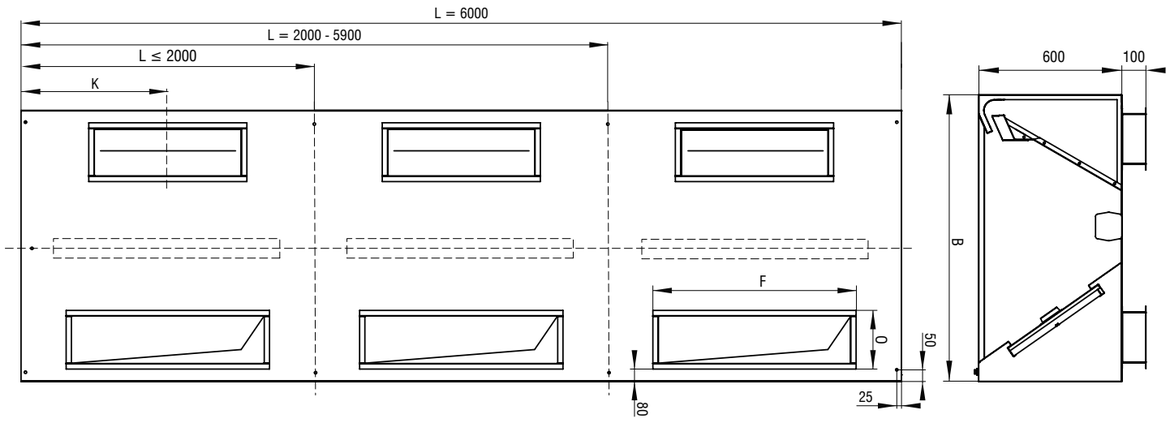
Design changes reserved

Energy saving ceiling hood (onesided), NEZ





Dimensions



Standard hood widths (B)

B	1000	1100	1200	1300	1400	1500
	1600					

Standard height H = 600

- Other sizes available on request
- Appropriate number of FM filters is delivered with hood
- Fire resistant filters PNF or combined filters KFM (combination of PNF and FM) are delivered on request
- Material: Stainless steel sheet

Ordering key:

- hood, energy saving, wall, length 3000, width 1600 and height 600;

NEZ 3000 x 1600 x 600

Outter dimensions L x B x H

Room entering problems should be considered when ordering larger dimension hood. In such case, we can make multipart hood.

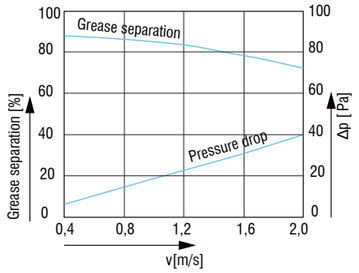
Design changes reserved

Width	1000	1100	1200	1300	1400	1500

Standard length L	Draining taps No.	No. of filter units	Nominal extract air volume	Supply air connection E x S		Extract air connection F x O		Lamp characteristics			No. of suspensions	Connection K
				No. of connections	Dimensions	Dimensions	No. of connections	No. of lamps	Lamp power	Lamp length		
mm	kom	kom	m^3/h	kom	mm	mm	kom	kom	W	mm	kom	mm
1000	1	2	1000	1	650 x 210	850 x 210	1	1	18	660	4	500
1200	1	2	1100	1	650 x 210	850 x 210	1	1	18	660	4	600
1400	1	2	1300	1	650 x 210	1200 x 210	1	1	18	660	4	700
1600	1	3	1800	1	950 x 210	1200 x 210	1	1	36	1270	4	800
1800	1	3	2100	1	950 x 210	1200 x 210	1	1	36	1270	4	900
2000	1	4	2310	1	1200 x 210	1200 x 210	1	1	58	1570	6	1000
2200	1	4	2550	2	650 x 210	850 x 210	2	1	58	1570	6	550
2400	1	5	2790	2	650 x 210	850 x 210	2	1	58	1570	6	600
2600	1	6	3000	2	650 x 210	850 x 210	2	1	58	1570	6	650
2800	1	6	3300	2	850 x 210	850 x 210	2	1	58	1570	6	700
3000	2	6	3450	2	850 x 210	950 x 210	2	2	36	1270	6	750
3200	2	6	3680	2	850 x 210	950 x 210	2	2	36	1270	6	800
3400	2	6	3950	2	950 x 210	950 x 210	2	2	36	1270	6	850
3600	2	6	4150	2	950 x 210	950 x 210	2	2	36	1270	6	900
3800	2	8	4400	2	950 x 210	1200 x 210	2	2	58	1570	8	950
4000	2	8	4700	2	1200 x 210	1200 x 210	2	2	58	1570	8	1000
4200	2	8	4900	2	1200 x 210	1200 x 210	2	2	58	1570	8	1050
4400	2	8	5100	2	1200 x 210	1200 x 210	2	2	58	1570	8	1100
4600	2	10	5300	2	1200 x 210	1200 x 210	2	2	58	1570	8	1150
4800	2	10	5600	2	1200 x 210	1200 x 210	2	2	58	1570	8	1200
5000	2	10	5800	2	1200 x 210	1200 x 210	2	2	58	1570	8	1250
5200	2	10	6000	3	850 x 210	950 x 210	3	3	58	1570	8	865
5400	2	12	6300	3	850 x 210	950 x 210	3	3	58	1570	8	900
5600	2	12	6500	3	850 x 210	950 x 210	3	3	58	1570	8	935
5800	2	12	6700	3	950 x 210	1200 x 210	3	3	58	1570	8	965
6000	3	12	6950	3	950 x 210	1200 x 210	3	3	58	1570	8	1000

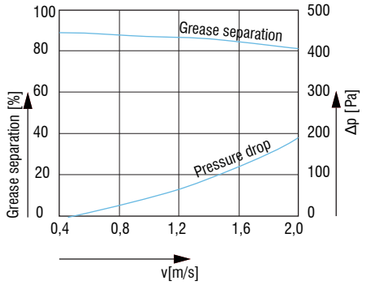
Design changes reserved

Accessories



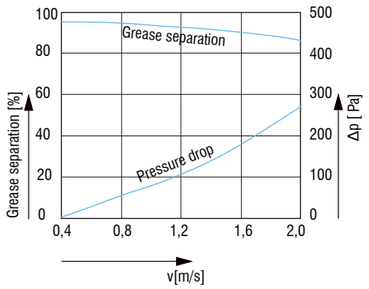
Grease trap filter, type FM

- Filter casing made of aluminium sheet, filter insert made of expanded aluminium sheet
- Filter inserts can be easily removed from casing for cleaning
- Advantages:
  - High efficiency of grease separation (up to 90%)
  - Relatively small air pressure drop
- Recommended air velocity at filter inlet: v=1.2 m/s.
- Typical filter surface treatment: anodised in natural colour of Al



Fire resistant grease trap filter, type PNF

- This type of grease filter is designed for kitchens where increased inflammability hazard exists
- Made of aluminium sheet. Smooth surfaces enable easy cleaning.
- Can be washed in a dishwasher. Sharp airstream bends between the blades prevent penetration of flames (that may occur on the working surface) to the exhaust hood
- Advantages:
  - High efficiency of grease separation (up to 90%)
  - Relatively small air pressure drop
- Recommended air velocity at filter inlet, v = 0.8 - 1.5 m/s. Inlet velocity higher than 1.5 m/s causes higher level of exhaust duct noise



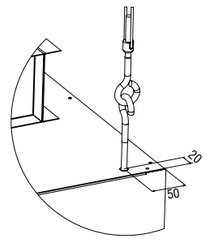
Combined grease filter, type KFM

- Advantages:
  - High efficiency of grease separation (more than 90%)
  - Prevention of flame penetration into the exhaust duct system
  - Easy cleaning and maintainance
  - Washing in a dishwasher
- Grease separation efficiency of energy-saving exhaust hoods is higher than of conventional hoods The main reason lies with intensive cooling of filters, causing higher condensation rate of moisture and grease droplets. These are also main parameters for assessing quality of exhaust air filtering in hotel and restaurant kitchens
- Recommended air velocity through the combined KFM filter is v = 0.8 - 1.5 m/s. Velocity higher than 1.5 m/s causes higher level of exhaust duct noise

Standard filter dimensions
400 x 400
400 x 450
450 x 400
450 x 450

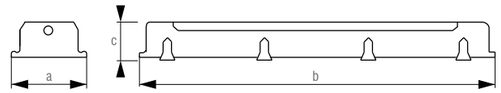
Design changes reserved

Power [W]	Light source	Dimensions a x b x c [mm]
18	T8 G 13	135x705x90
36	T8 G 13	135x1305x90
54	T8 G 13	135x1605x90



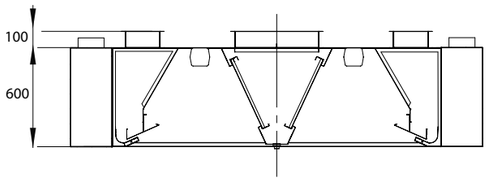
Inox lamp

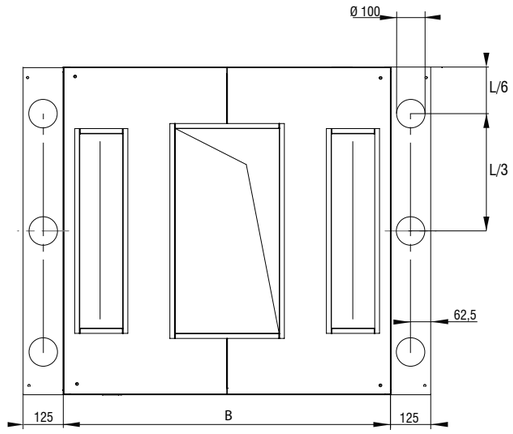
- fluorescent, watertight inox lamp
- casing made of stainless steel sheet
- difusor made of tempered glass
- all electric parts are placed on white metal board with aluminium shade



Suspension elements

- One suspension set consists of:
  - tensioner
  - hooks (3 pcs)
  - concrete anchor Ø12 mm
  - chain 1 m



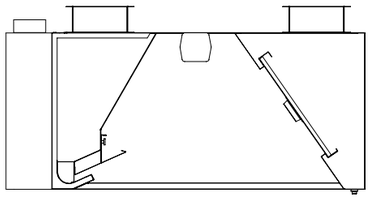


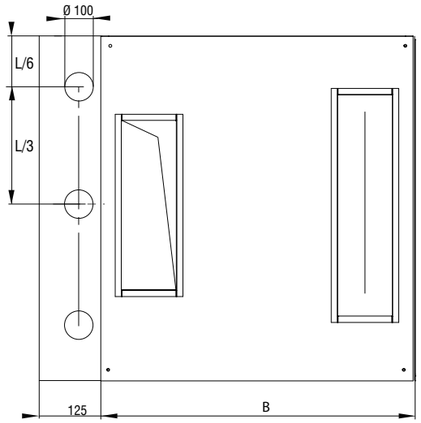
Fresh air supply (NES)

Standard length	Fresh air supply		
	No. of connections	Distance	Dimensions
mm	pcs	mm	mm
1600 - 2000	4	L/2	Ø 100
2200 - 2800	6	L/3	Ø 100
3000 - 4200	8	L/4	Ø 100
4400 - 6000	12	L/6	Ø 100

Design changes reserved

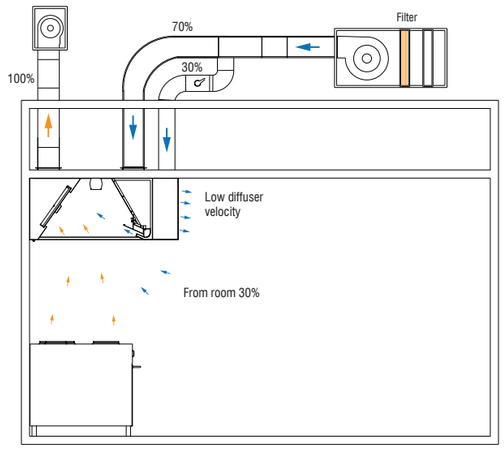
Accessories





Fresh air supply (NEZ)

Standard length	Fresh air supply connection		
	No. of connections	Distance	Dimensions
mm	pcs	mm	mm
1000 - 1400	1	L/2	Ø 100
1600 - 2000	2	L/2	Ø 100
2200 - 2800	3	L/3	Ø 100
3000 - 4200	4	L/4	Ø 100
4400 - 6000	6	L/6	Ø 100



Design changes reserved

Number of rows

L/B	1400	1600	1800	2000	2200	2400	2600	2800	3000
1000									
1200									
1400									
1600									
1800									
2000									
2200									
2400									
2600									
2800									
3000									
3200									
3400									
3600									
3800									
4000									
4200									
4400									
4600									
4800									
5000									
5200									
5400									
5600									
5800									
6000									

Color legend:

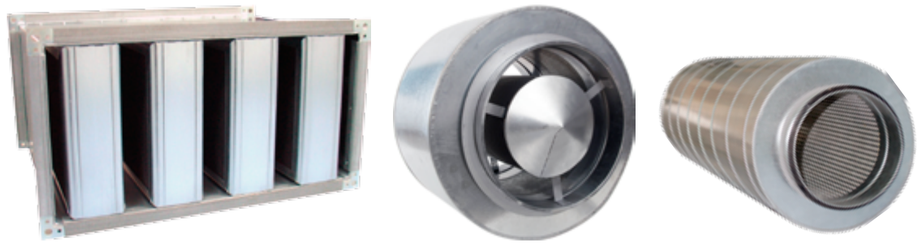
- 1-row kitchen hood
- 2-row kitchen hood
- 3-row kitchen hood
- 4-row kitchen hood
- 1 or 2-row option kitchen hood
- 2 or 3-row option kitchen hood

Design changes reserved

6/S1
v 3.3 (en)

SOUND ATTENUATORS

PZ, PZC, PZM, PK



klimaoprema

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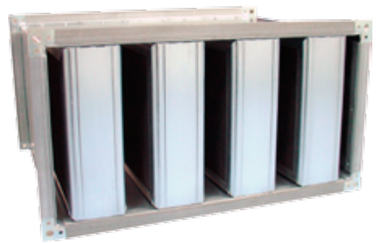
Definition of symbols:

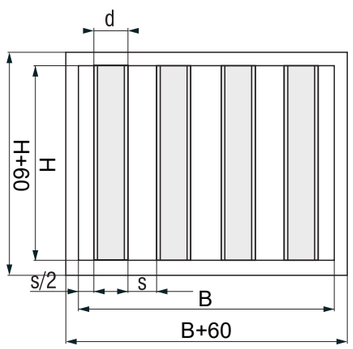
B [m]	- Attenuator width	f_m [Hz]	- Frequency
H [m]	- Attenuator height	L_W [dB]	- Sound power level
L [m]	- Attenuator length	L_{WA} [dB]	- Sound power level (A-weighting)
d [m]	- Splitter width	De [dB]	- Sound attenuation
s [m]	- Splitter gap	L_{pA} [dB(A)]	- Sound pressure level (A-weighting)
V [m³/h]	- Air flow rate		
v [m/s]	- Air velocity		
Δp [Pa]	- Pressure drop		

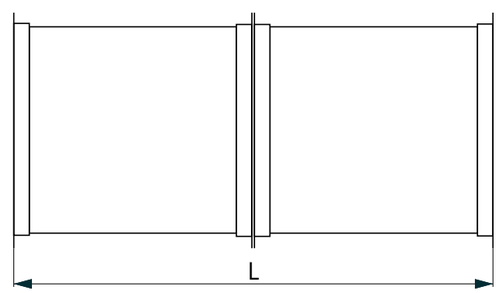
Design changes reserved



RECTANGULAR ATTENUATOR

- For sound attenuation in ventilation ducts and ventilated areas
- Aerodynamically shaped sound attenuation splitter reduces drag by 30% (energy savings)
- Sound attenuation splitters are made of flame retardant material, apsorption material
- Splitters are constructed in three standard thicknesses: d = 100 mm, d = 200 mm and d = 300 mm
- Rectangular sound attenuators are available in five standard cross-section dimensions: d/s = 100/50; 100/100; 200/100; 200/200 and 300/100
- Attenuator casing is made of galvanised steel, fitted with flanges meeting criteria given in the table on page 3
- Attenuators heavier than 300 kg are supplied in two or more sections, each single section lighter than 300 kg





SOUND ATTENUATION SPLITTER

- Absorption material rock-wool, non-flammable, according to Class A2, to DIN 4102, Part 1.
- Significant attenuation in frequency span form 63 to 8000Hz.
- Aerodynamic splitter shape.
- Splitter cover (lining):
  - **Glass fibre veil (V) -** Very thin protective cover on the splitter surface
  - **Reflective plates (R) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised tin plates
  - **Glass silk (S) -** At air velocities higher than 20m/s
  - **Reflective plates and glass silk (RS) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised tin plates with other surface covered in glass silk
  - **Reflective plates and glass fibre veil (RV) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised tin plates with other surface covered in glass fibre veil
  - **Perforated plate and glass silklass (PS) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised perforated tin plates with other surface covered in glass silk
  - **Reflective plates and glass fibre veil (PV) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised perforated tin plates with other surface covered in glass fibre veil

Meets standards VDI 6022, Part 1 and Part 3, DIN 1946, Part 2 and Part 4 and VDI 3803.

Design changes reserved

Standard attenuator dimensions and weights (no splitter lining)

H [mm]	L [mm]	Duct width B [mm]																			
		PZ 100/50 d/s = 100/50											PZ 100/100 d/s = 100/100							
		300	450	600	750	900	1050	1200	1350	1500	1650	1800	400	600	800	1000	1200	1400	1600	1800
300	500	12	16	20	24	28	32	36	41	45	49	53	13	18	23	27	32	37	41	46
	1000	20	27	34	41	48	55	62	69	76	83	90	22	30	38	46	54	62	70	78
	1500	29	39	49	58	68	78	88	98	108	118	128	32	43	54	66	77	88	100	111
	2000	37	50	63	76	88	101	114	127	140	153	165	41	55	70	85	99	114	129	143
600	500	18	24	29	34	40	45	50	56	61	66	72	19	25	31	37	43	49	55	61
	1000	31	40	49	58	67	76	85	94	103	112	121	33	43	53	63	73	83	93	103
	1500	43	56	68	81	94	106	119	132	144	157	170	46	60	74	88	102	116	130	145
	2000	55	71	88	104	121	137	153	170	186	202	219	59	77	95	113	132	150	168	186
900	500		31	38	44	51	58	64	71	77	84	91	26	33	40	47	55	62	69	76
	1000		52	63	74	85	96	107	118	129	140	151	43	55	67	79	91	103	115	127
	1500		72	88	103	119	134	150	165	181	196	212	60	77	94	111	127	144	161	178
	2000		93	113	133	153	173	193	212	232	252	272	77	99	120	142	164	186	207	229
1200	500			46	54	62	70	78	86	94	102	110		40	49	57	66	74	83	91
	1000			77	90	103	116	129	142	155	168	182		67	81	95	109	123	137	151
	1500			117	167	158	178	198	219	239	260	280		100	122	144	166	188	210	232
	2000			147	173	198	224	250	275	301	327	352		127	154	182	209	237	264	292
1500	500				78	90	102	114	126	138	150	162			69	81	94	106	119	132
	1000				120	138	156	174	192	210	228	245			106	125	144	163	182	201
	1500				162	186	210	234	258	281	305	329			144	169	195	220	245	270
	2000				204	234	264	293	323	353	383	412			182	213	245	277	308	340
1800	500					105	119	133	146	160	174	188				94	109	123	137	152
	1000					160	180	201	221	242	262	283				114	166	187	206	230
	1500					215	242	269	296	323	350	378				195	223	252	280	309
	2000					270	303	337	371	405	439	472				245	281	316	352	388

H [mm]	L [mm]	Duct width B [mm]																			
		PZ 200/100 d/s = 200/100								PZ 200/200 d/s = 200/200						PZ 300/100 d/s = 300/100					
		600	900	1200	1500	1800	2100	2400	2700	800	1200	1600	2000	2400	2800	800	1200	1600	2000	2400	2800
300	500	19	28	34	42	50	57	65	72	22	30	39	48	57	66	25	36	46	57	67	78
	1000	33	46	59	72	85	98	112	125	37	52	67	82	97	113	43	61	80	98	116	134
	1500	46	65	84	102	121	140	159	177	52	74	95	117	138	160	61	87	113	139	165	191
	2000	60	84	108	133	157	181	205	230	67	95	123	151	179	207	79	113	147	180	210	248
600	500	28	38	47	57	67	77	87	97	30	41	52	64	75	86	36	50	64	78	92	106
	1000	47	64	81	98	115	132	149	166	51	70	89	108	127	146	61	85	109	133	157	181
	1500	66	90	114	138	162	186	210	234	71	98	125	152	179	206	86	120	154	188	222	256
	2000	85	116	147	178	209	240	271	303	92	127	162	196	231	266	111	155	199	246	287	331
900	500	36	48	61	73	85	98	110	122	38	52	66	79	93	106	46	64	81	99	116	134
	1000	60	81	102	123	144	165	186	207	64	87	110	133	156	179	78	108	138	167	197	227
	1500	85	114	144	173	203	232	262	291	91	123	155	188	220	252	110	152	194	236	278	331
	2000	109	147	185	224	262	300	338	376	117	159	200	242	284	325	142	196	251	305	359	413
1200	500	44	59	74	89	103	118	133	148	47	63	79	95	111	127	57	78	99	120	141	162
	1000	74	99	124	149	173	198	223	248	78	105	132	159	186	212	96	131	167	202	238	273
	1500	112	150	189	228	266	305	344	382	118	159	201	242	283	325	145	201	256	311	367	422
	2000	142	190	239	288	336	385	434	482	149	202	254	306	359	411	184	254	324	394	463	533
1500	500	62	84	106	128	150	171	193	215	65	88	111	134	157	180	81	112	143	174	205	236
	1000	98	131	164	198	231	264	298	331	102	137	172	208	243	279	127	174	222	270	318	366
	1500	133	178	223	268	313	358	403	448	139	187	234	282	330	378	172	237	302	366	431	496
	2000	169	225	281	338	394	451	507	564	176	236	296	356	417	477	218	300	381	463	544	625
1800	500	72	98	123	148	173	198	223	249	75	110	128	154	180	207	94	130	166	202	238	274
	1000	113	152	190	228	266	304	343	381	117	158	198	238	278	319	147	202	257	312	366	421
	1500	154	206	257	308	359	411	462	513	160	214	268	322	377	431	200	274	348	422	495	569
	2000	195	260	324	388	452	517	581	645	203	271	339	407	475	534	253	345	438	531	624	717

Design changes reserved

Standard attenuator dimensions and weights (with splitter lining)

H [mm]	L [mm]	Duct width B [mm]																			
		PZ 100/50 d/s = 100/50											PZ 100/100 d/s = 100/100							
		300	450	600	750	900	1050	1200	1350	1500	1650	1800	400	600	800	1000	1200	1400	1600	1800
300	500	15	21	26	32	37	43	48	54	59	65	70	16	22	29	35	41	47	53	59
	1000	25	35	44	54	63	72	82	91	101	110	119	27	38	48	59	69	79	90	100
	1500	36	49	62	75	89	102	115	129	142	155	169	38	53	68	83	97	112	127	142
	2000	46	63	80	97	115	132	149	166	183	200	218	49	68	87	107	126	145	164	183
600	500	24	32	41	49	57	66	74	82	91	99	107	25	34	43	52	61	70	79	88
	1000	40	54	68	82	96	110	124	138	151	165	179	42	57	72	87	102	117	132	147
	1500	56	76	95	115	134	154	173	193	212	232	251	59	80	101	122	143	164	185	206
	2000	73	98	123	148	173	198	223	248	273	298	323	76	103	130	157	184	211	238	265
900	500		44	55	67	78	89	100	111	122	133	144	35	46	58	70	81	93	105	116
	1000		74	92	110	129	147	165	184	202	221	239	57	77	96	115	135	154	174	193
	1500		103	129	154	180	206	231	257	283	308	334	80	107	134	162	189	216	243	270
	2000		132	165	198	231	264	297	330	363	396	429	103	138	173	207	242	277	312	347
1200	500			70	84	98	112	125	139	153	167	181		58	73	87	101	116	130	145
	1000			116	139	162	184	207	230	253	276	299		96	120	144	168	192	215	239
	1500			171	205	239	273	307	341	375	410	444		141	177	212	248	283	319	354
	2000			217	260	303	436	389	432	475	518	562		179	224	269	314	359	404	449
1500	500				115	135	154	173	193	212	232	251			98	118	138	158	178	198
	1000				181	211	241	271	302	332	362	392			155	186	217	249	280	311
	1500				247	288	329	370	411	451	492	533			212	254	297	339	381	423
	2000				313	365	416	468	519	571	622	674			269	322	376	429	483	536
1800	500					158	181	204	226	249	272	294				139	162	185	208	232
	1000					248	283	318	353	388	423	458				218	254	290	326	362
	1500					337	385	432	480	527	575	622				297	346	395	444	493
	2000					426	486	546	606	666	726	786				376	438	499	561	623

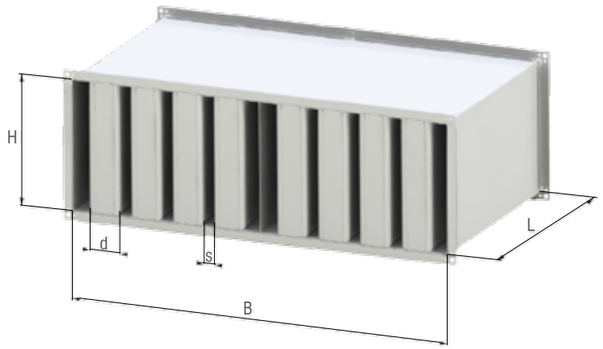
H [mm]	L [mm]	Duct width B [mm]																			
		PZ 200/100 d/s = 200/100								PZ 200/200 d/s = 200/200						PZ 300/100 d/s = 300/100					
		600	900	1200	1500	1800	2100	2400	2700	800	1200	1600	2000	2400	2800	800	1200	1600	2000	2400	2800
300	500	23	32	42	51	61	70	80	89	25	36	47	57	68	79	29	42	55	68	81	93
	1000	38	54	70	86	102	118	134	150	42	60	78	96	114	132	49	71	92	114	135	157
	1500	54	76	99	121	144	166	189	211	60	85	110	136	161	186	69	100	130	160	190	220
	2000	69	98	127	156	185	214	243	277	77	109	142	175	207	240	89	128	167	206	245	284
600	500	35	49	62	76	90	104	117	131	37	52	67	82	97	112	45	63	82	100	119	137
	1000	58	81	103	126	149	171	194	217	62	87	111	136	161	185	73	104	134	165	195	226
	1500	81	112	144	176	207	239	271	302	86	121	156	190	225	259	102	145	187	229	272	314
	2000	104	144	185	225	266	307	347	388	111	155	200	244	288	332	131	185	240	294	348	403
900	500	47	65	83	101	119	137	155	173	50	69	88	107	126	145	60	84	108	132	157	181
	1000	77	107	136	166	195	224	254	283	81	113	144	176	207	239	97	137	176	216	255	294
	1500	108	148	189	230	271	312	353	393	113	157	201	244	288	332	135	190	244	299	353	408
	2000	138	190	242	295	347	399	451	504	145	201	257	313	369	425	173	242	312	382	451	521
1200	500	59	81	104	126	148	170	192	215	62	85	108	132	155	179	75	105	135	165	195	225
	1000	97	133	169	205	241	277	313	349	101	139	177	215	253	292	121	170	218	266	315	363
	1500	142	196	250	303	357	411	465	518	148	204	261	318	374	431	179	251	323	395	467	539
	2000	180	247	315	383	450	518	586	653	187	258	330	401	472	544	255	316	406	496	587	677
1500	500	81	112	143	174	205	237	268	299	83	116	148	180	213	245	103	145	188	230	273	315
	1000	126	173	221	268	316	363	411	458	130	179	229	278	328	378	159	232	286	350	414	478
	1500	171	235	299	362	426	490	554	618	177	243	310	377	444	510	214	300	385	471	556	642
	2000	216	296	376	457	537	617	697	777	223	307	391	475	559	643	270	377	484	591	698	805
1800	500	95	131	167	204	240	277	313	349	97	135	172	210	247	285	121	170	220	269	319	368
	1000	147	202	258	313	368	423	478	533	151	208	266	323	380	437	185	259	334	408	482	556
	1500	200	274	348	422	496	570	644	717	205	282	359	436	513	590	250	349	448	574	645	744
	2000	252	345	438	530	623	716	809	902	259	356	452	549	645	742	314	438	561	685	809	933

Design changes reserved

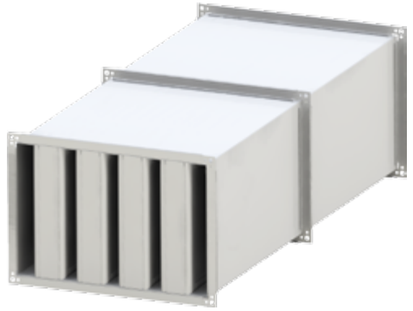
Connecting more attenuators

- Sections of the attenuator are connected with built-in flanges and bolts
- Contact flange surfaces can be additionally fixed by reinforcement holders
- Prior to attenuator delivery, sections of each attenuator are assembled and disassembled in the factory.

Connection along width

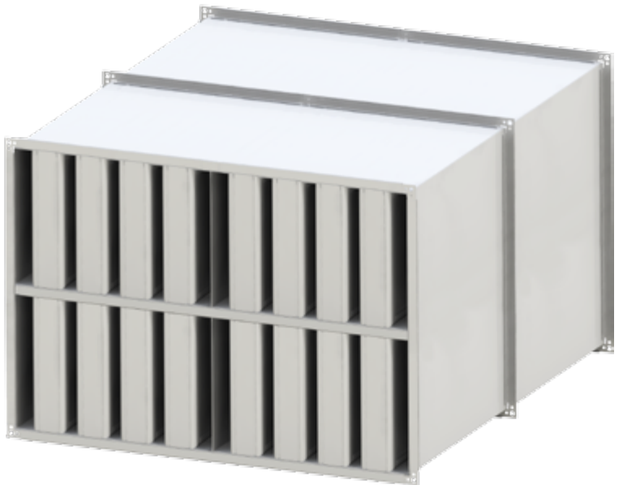


Connection along length



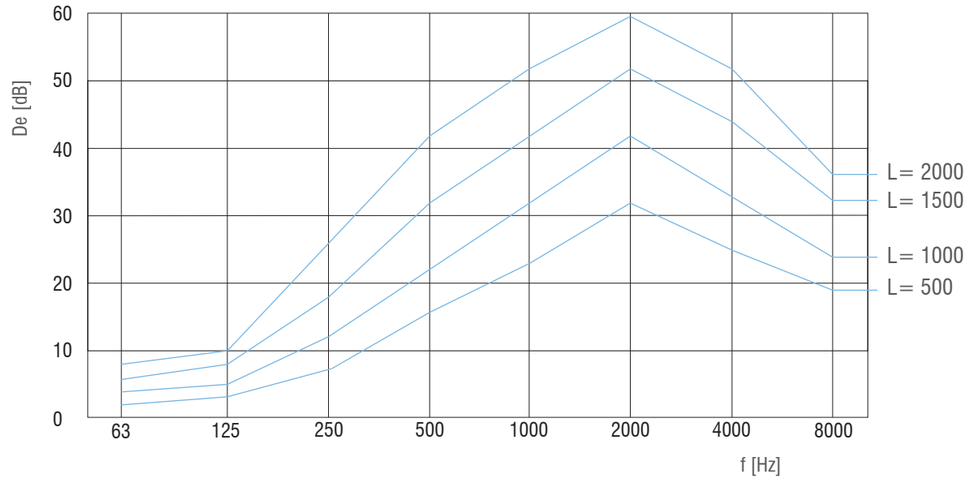
Connection along height

Four and eight sectional attenuator

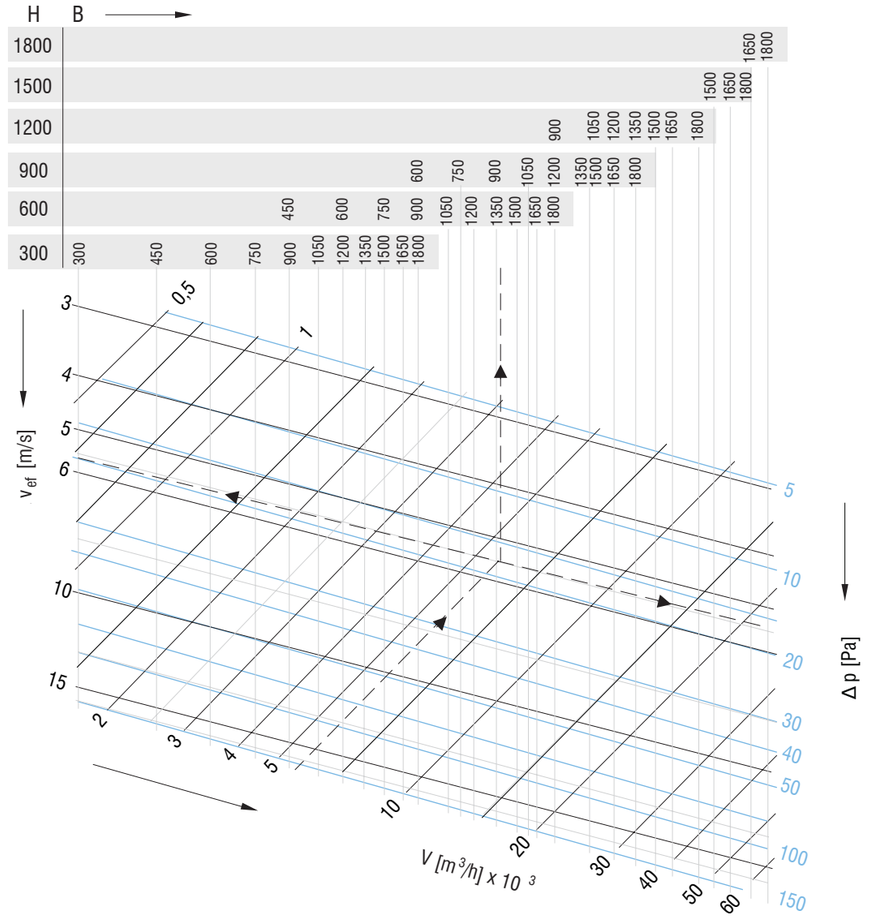


Design changes reserved

Attenuation diagram, type PZ 100/50



Selection diagram

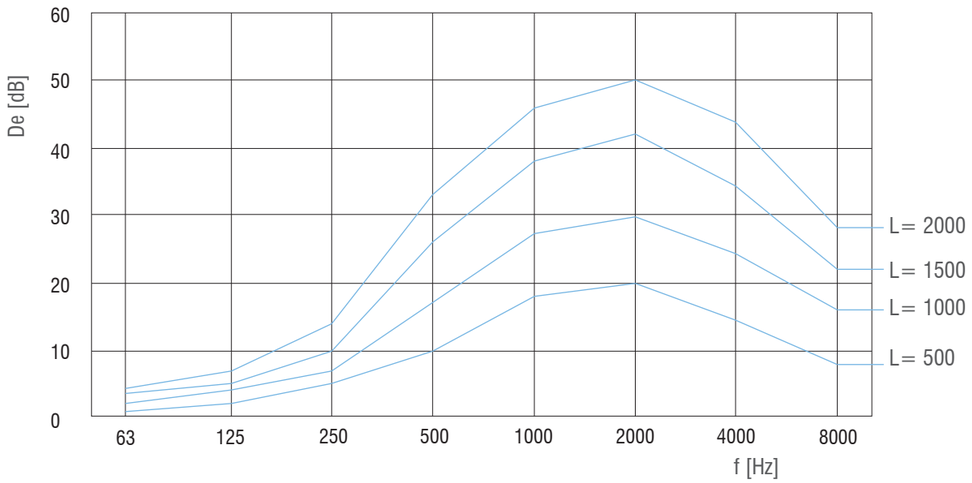


d/s = 100/50

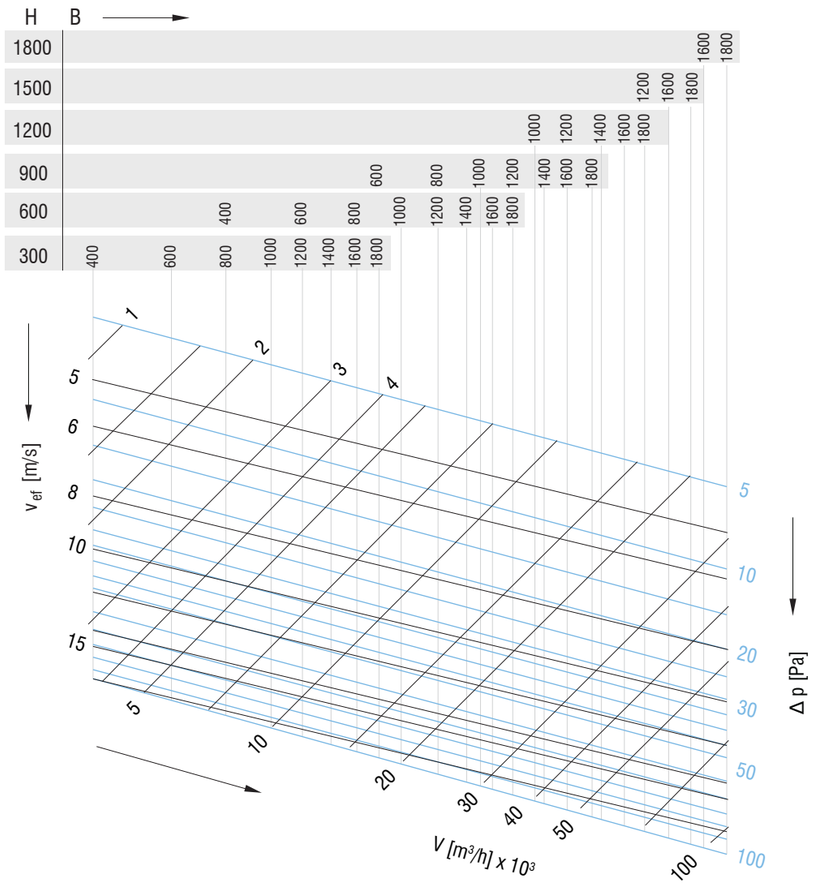
Width B [mm]	No. of splitters
300	2
450	3
600	4
750	5
900	6
1050	7
1200	8
1350	9
1500	10
1650	11
1800	12

Design changes reserved

Attenuation diagram, type PZ 100/100



Selection diagram



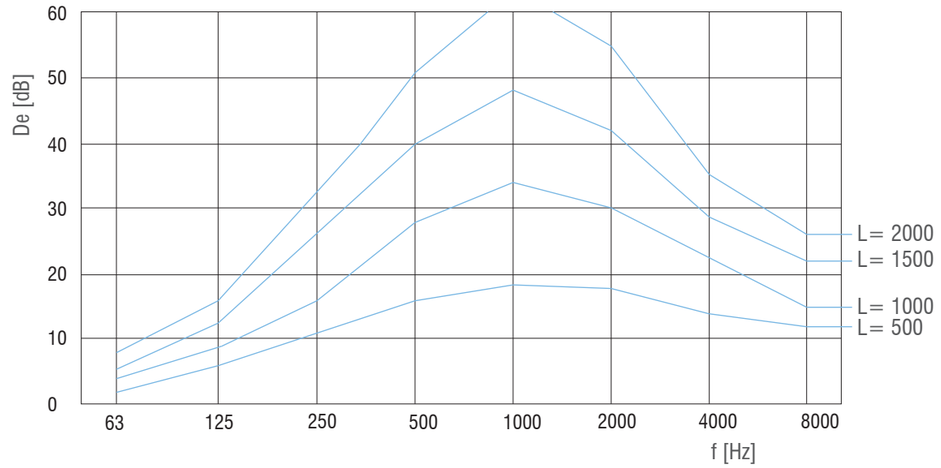
d/s = 100/100

Width B [mm]	No. of splitters
400	2
600	3
800	4
1000	5
1200	6
1400	7
1600	8
1800	9

Design changes reserved

SOUND ATTENUATORS

Attenuation diagram, type PZ-R 100/50



Example:

Given:
Airflow rate: V=5500 m³/h
Required attenuation: 24 dB (A) at 250 Hz

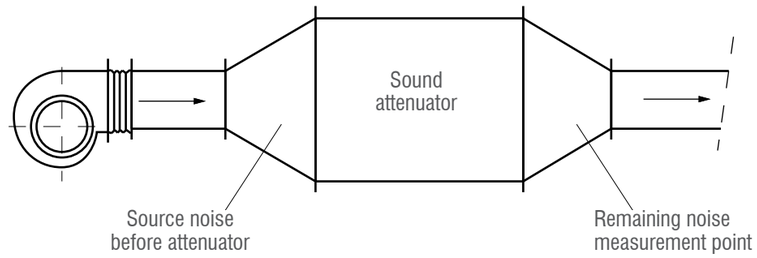
Solution:

Dg 1: PZ-R 100/50
Attenuator length: L = 1500 mm

Dg 2: Effective air velocity v_{ef} = 5,5 m/s
Pressure drop Δ P_{tot} = 17 Pa
Attenuator cross-section B x H = 1350 x 600 or 900 x 900

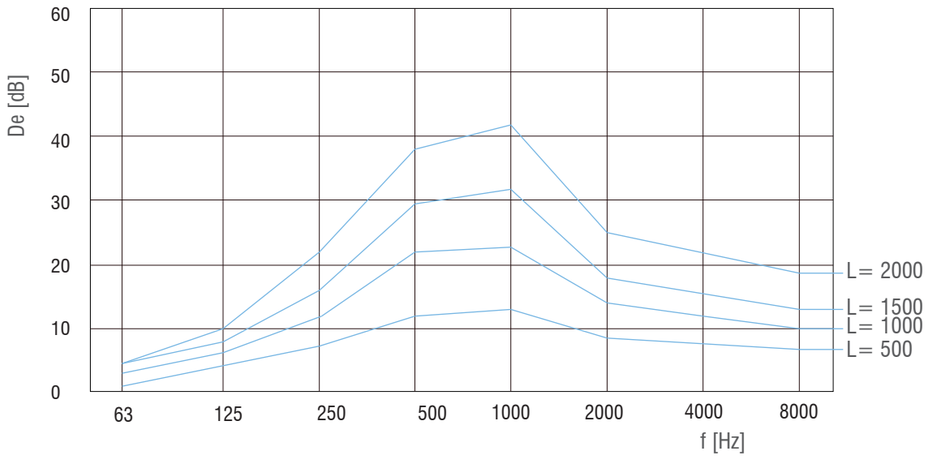
Dg. 7: Frequency Hz	125	250	500
Flow regenerated noise dB (A)	39	31	27
A_{tot} = B x H= 0,81 m2			
Tab. 9: correction dB (A)	-2	-2	-2
Total air flow regenerated noise dB(A)	37	29	25

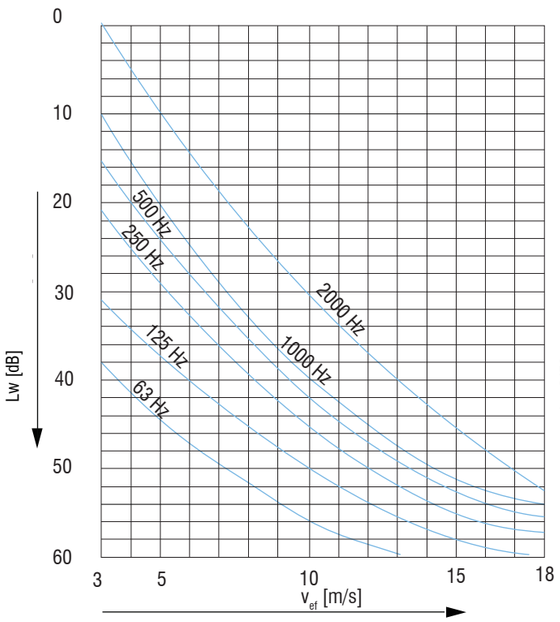
In each octave band noise values determined above have to be by 9 dB(A) lower than the attenuated source noise measured after the attenuator (see Figure).



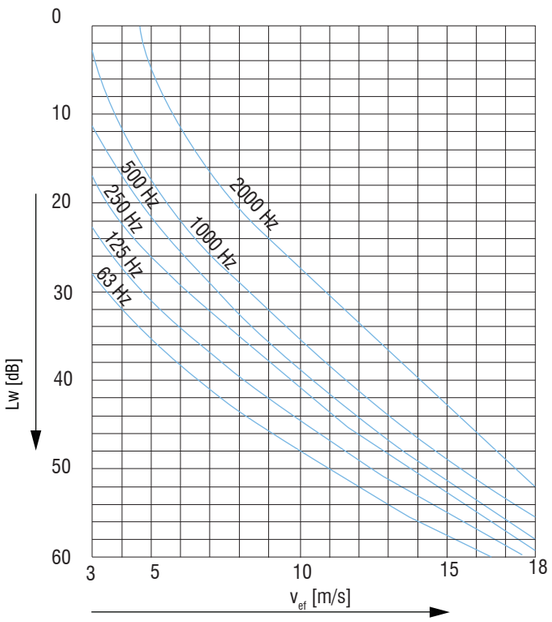
Design changes reserved

Attenuation diagram, type PZ-R 100/100





Airflow regenerated noise diagram for d/s = 100/50
(based on outlet size B x H = A_{tot} = 1m²)



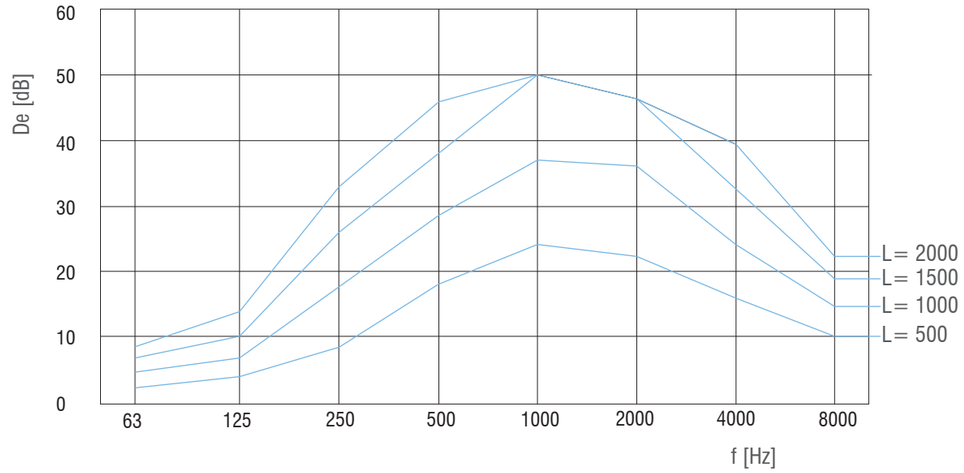
Airflow regenerated noise diagram for d/s = 100/100
(based on outlet size B x H = A_{tot} = 1m²)

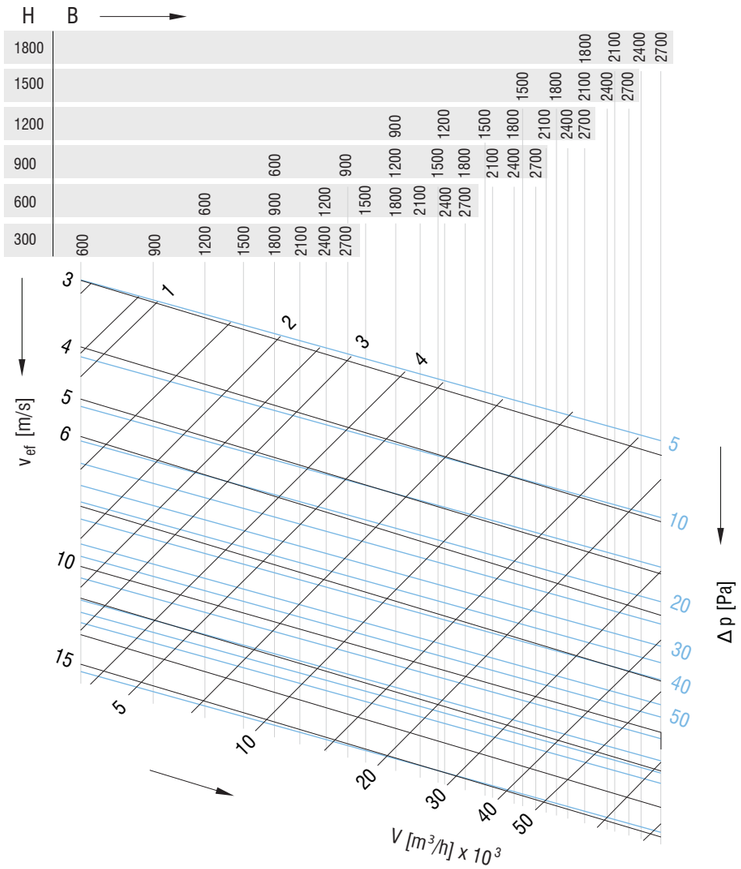
Correction table

A_{tot} [m²]	0,25	0,5	0,75	1	1,25	1,5	2
Correction dB (A)	-6	-3	-2	0	1	2	3

Design changes reserved

Attenuation diagram, type PZ 200/100



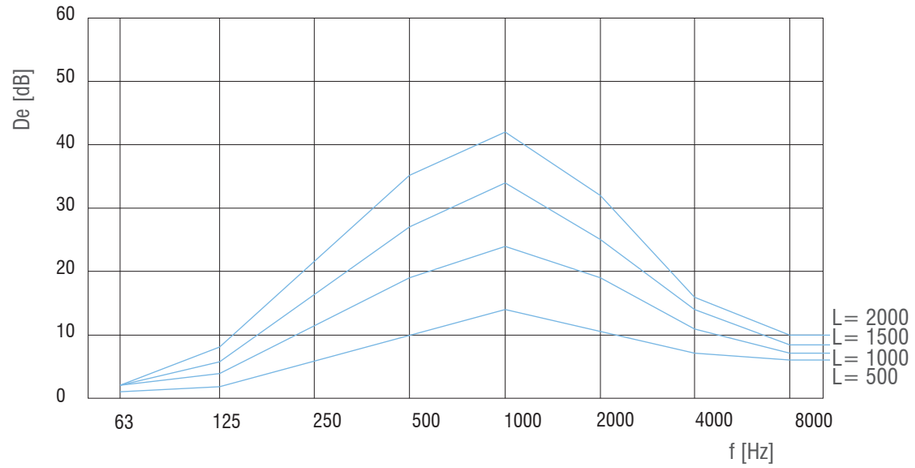


d/s = 200/100

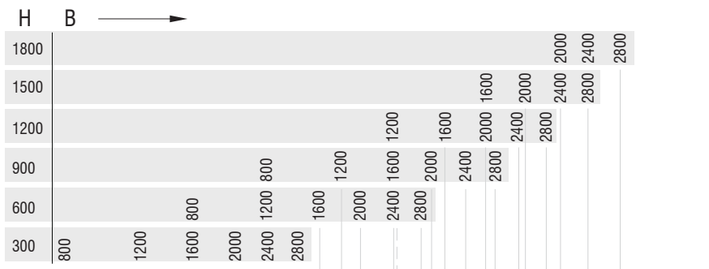
Width B [mm]	No. of splitters
600	2
950	3
1200	4
1500	5
1800	6
2100	7
2400	8
2700	9

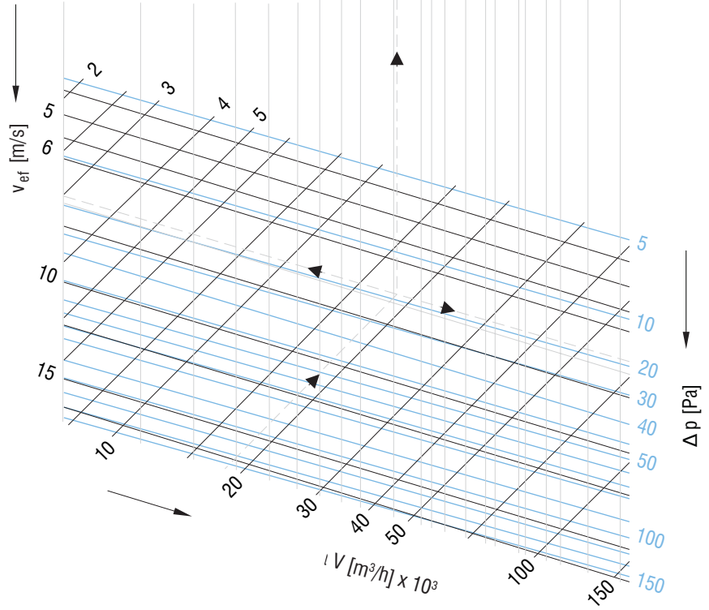
Design changes reserved

Attenuation diagram, type PZ 200/200



Selection diagram



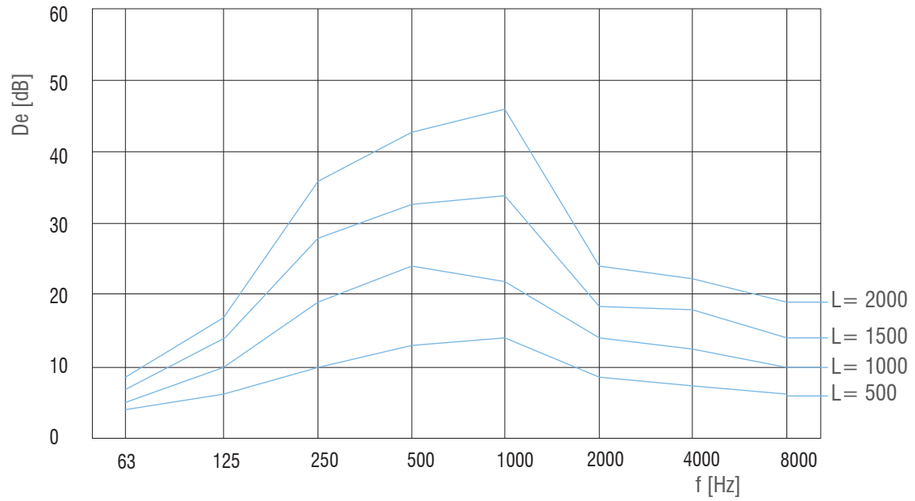


d/s = 200/200

Width B [mm]	No. of splitters
800	2
1300	3
1600	4
2000	5
2400	6
2800	7

Design changes reserved

Attenuation diagram, type PZ-R 200/100



Example:

Given:
Airflow rate: V=1800 m³/h
Required attenuation: 18 dB (A) at 250 Hz

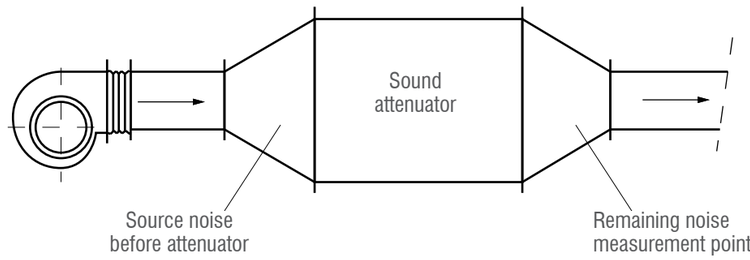
Solution:

Dg 1: PZ-R 200/100
Attenuator length: L = 1500 mm

Dg 2: Effective air velocity v_{ef} = 7 m/s
Pressure drop Δp_{tot} = 17 Pa
Attenuator cross-section B x H = 2400 x 600 or 1600 x 900

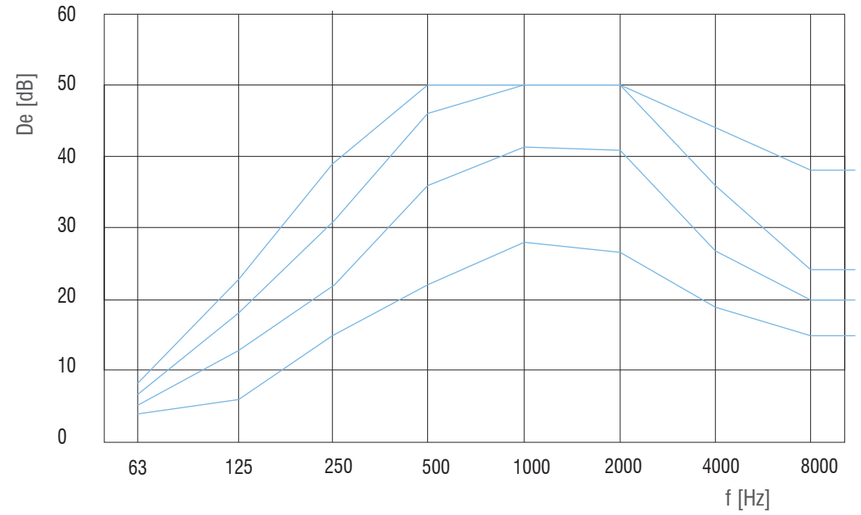
Dg. 7: Frequency Hz	125	250	500
Flow regenerated noise dB (A)	37	32	29
A_{tot} = B x H= 0,81 m²			
Tab. 9: correction dB (A)	2	2	2
Total air flow regenerated noise dB(A)	39	34	31

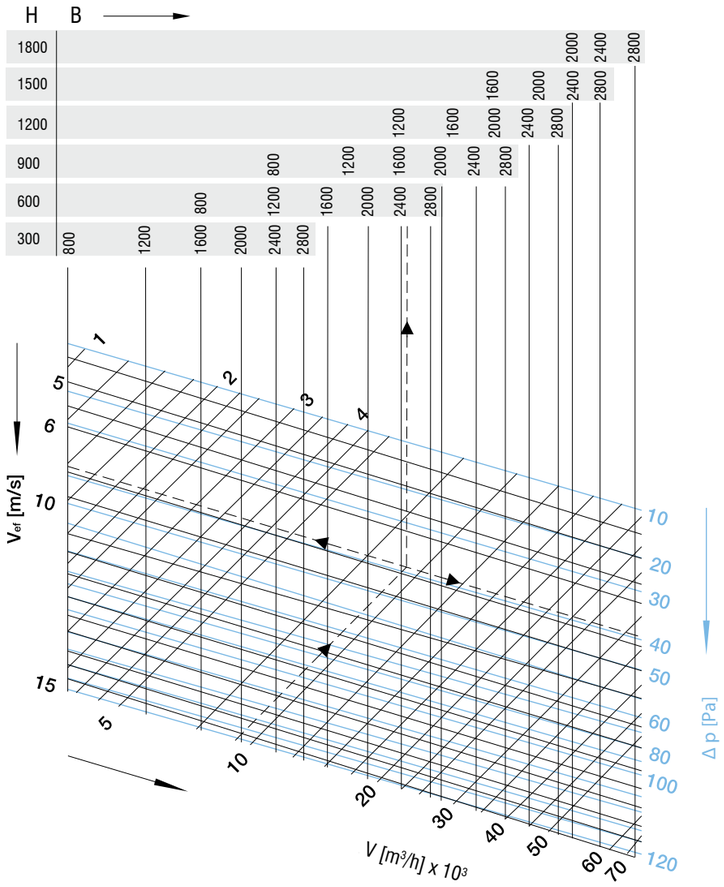
In each octave band noise values determined above have to be by 9 dB(A) lower than the attenuated source noise measured after the attenuator (see Figure).



Design changes reserved

Attenuation diagram, type PZ 300/100

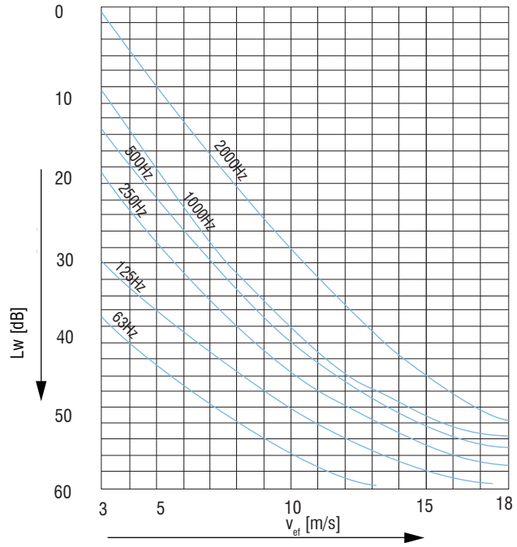




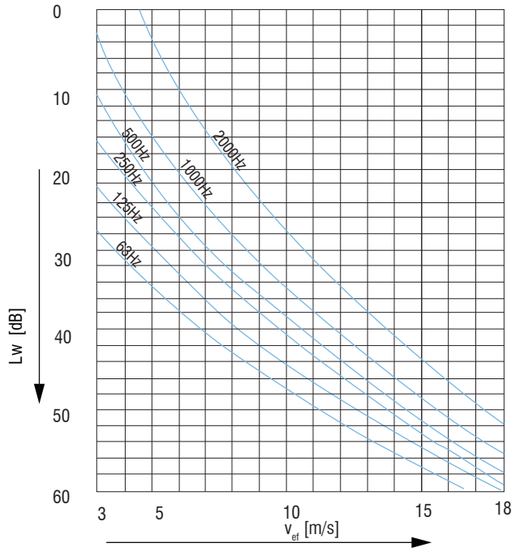
d/s = 300/100

Width B [mm]	No. of splitters
800	2
1300	3
1600	4
2000	5
2400	6
2800	7

Airflow regenerated noise diagram for d/s = 200/100;
(based on outlet size B x H = A_{tot} = 1m²)



Airflow regenerated noise diagram for d/s = 300/100
(based on outlet size B x H = A_{tot} = 1m²)

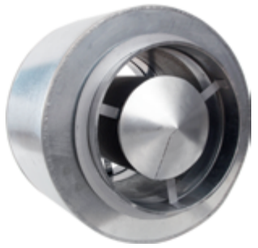


A_{tot} [m²]	0,25	0,5	0,75	1	1,25	1,5	2
Correction dB (A)	-6	-3	-2	0	1	2	3

Ordering key:

Sound attenuator	**PZ - d / s - B x H x L - V**
Splitter width / gap	
Dimensions	
Splitter coverings:	
V - Glass fibre veil	
RS - Reflective plate and glass silk	
PS - Perforated plate and glass silk	
S - Glass silk	
RV - Reflective plate and glass fibre veil	
PV - Perforated plate and glas fibre veil	

Splitter	**PK - d x H x L - V**
Dimensions	
Designations as for attenuator	



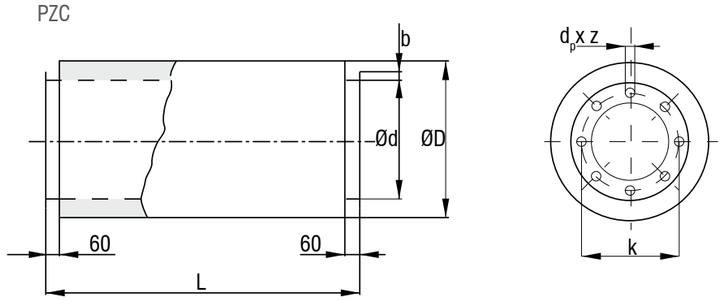
ROUND ATTENUATOR - PZC

- Outer casing is made of galvanised sheet steel, filled with sound absorbing material. Inner duct of the attenuator is made of perforated galvanised sheet steel

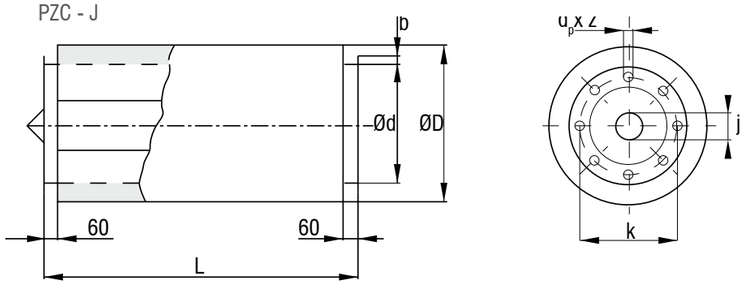
Options

Version with pod

PZC



PZC - J



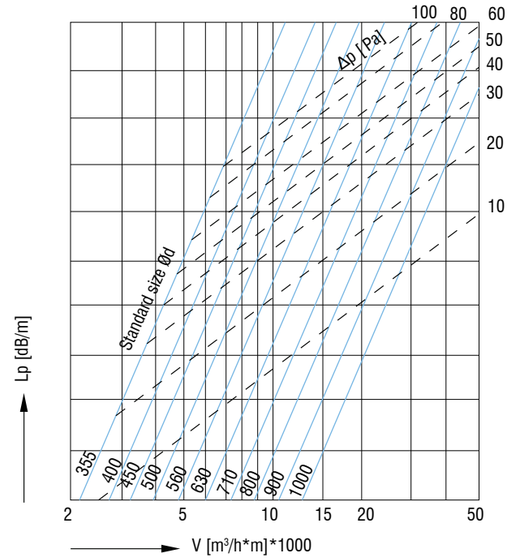
Standard diameter	Flow area [m²]	øD [mm]	ø j [mm]	Attenuator weight L=500 PZC	L=500 PZC-J	L=1000 PZC	L=1000 PZC-J	L=1500 PZC	L=1500 PZC-J	øk [mm]	b [mm]	s [mm]	ødpxz
355	0,100	555	224	23	28	40	48	57	68	392	30	4	9,5x8
400	0,126	600	250	25	31	44	53	62	76	438	30	4	9,5x8
450	0,158	650	280	28	35	48	59	68	84	488	30	4	9,5x8
500	0,198	700	315	30	39	52	66	74	93	538	30	4	9,5x8
560	0,251	760	355	33	43	57	73	81	104	600	35	4	9,5x12
630	0,316	830	399	37	49	63	83	89	117	670	35	4	9,5x12
710	0,397	910	450	41	55	70	94	98	132	750	35	4	9,5x12
800	0,499	1000	500	46	62	77	106	109	149	840	35	4	9,5x16
900	0,628	1100	560	51	71	86	120	120	169	940	35	4	9,5x16
1000	0,785	1200	630	56	80	94	136	132	191	1041	35	4	9,5x16

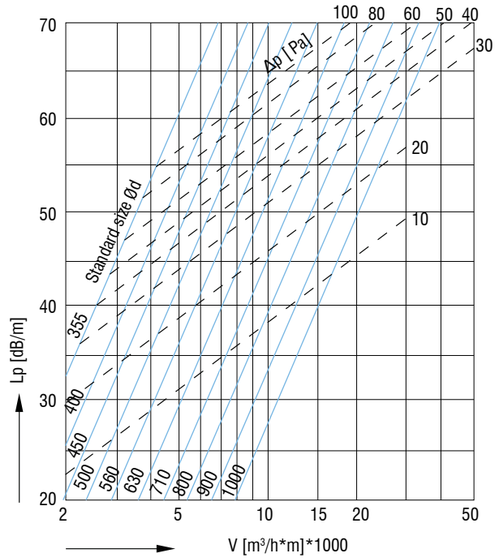
Ordering key

Round attenuator	**PZC**	**- J**	**- 560**	**- L**
J - attenuator with pod				
Standard size ød				
Attenuator length				

Attenuation D_e [dB]

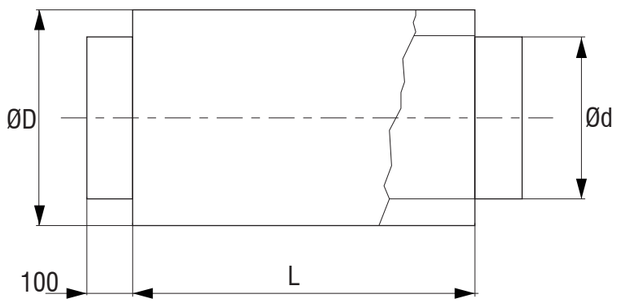
Frequency [Hz]	63		125		250		500		1000		2000		4000		8000	
Diameter	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J
Attenuator length: L=500																
355	2	2	3	4	6	7	11	12	10	20	6	23	3	20	3	15
400	2	2	3	3	5	6	10	12	8	19	5	21	3	17	2	13
Attenuator length: L=1000																
355	2	3	7	9	11	14	21	24	23	42	12	43	7	39	4	27
400	2	3	6	8	10	13	20	24	19	42	9	41	6	34	4	23
450	2	3	5	7	9	12	19	23	14	42	7	37	4	28	3	19
500	2	3	4	6	8	11	18	22	10	43	4	34	3	23	3	15
560		3		6		11		21		40		31		21		14
630		3		6		11		21		36		28		18		13
710		3		5		10		20		32		24		15		11
800		3		5		10		19		28		20		12		10
900		2		5		10		18		23		15		8		8
1000		2		4		9		17		18		10		5		7
Attenuator length: L=1500																
355	3	3	9	11	14	17	27	31	35	48	19	50	8	43	6	37
400	3	4	8	10	14	16	26	30	29	50	15	50	7	40	5	31
450	3	4	7	9	13	15	25	29	22	50	11	50	6	36	5	25
500	3	4	6	8	12	14	24	28	16	50	6	50	4	33	4	19
560	3	4	5	8	11	14	23	27	14	49	6	46	4	30	4	18
630	2	4	4	7	10	13	21	27	12	48	5	42	4	26	3	16
710	2	3	4	7	9	13	19	26	10	47	4	37	3	22	3	15
800	1	3	3	6	8	12	17	25	7	46	3	32	3	17	2	13
900		3		5		11		24		45		26		12		11
1000		2		5		11		23		43		20		6		9





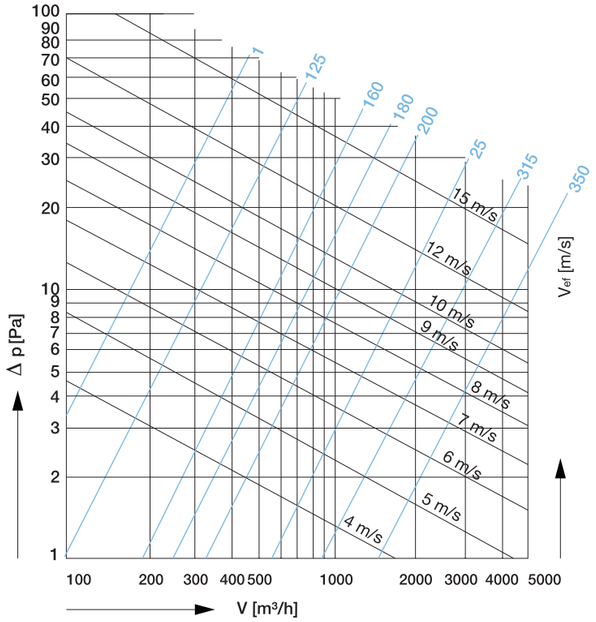
INTERSPACE ATTENUATOR - PZM

- PZM attenuators are made of galvanised sheet steel, containing sound-absorbing material infill.

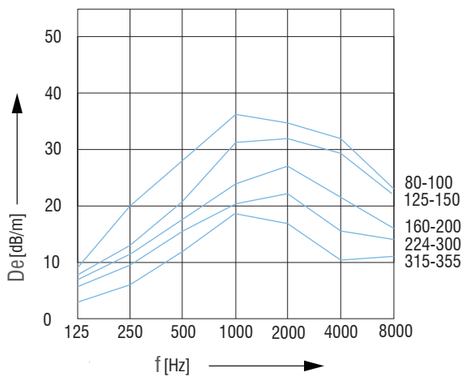


Dimensions of interspace sound attenuator			
Standard size ød [mm]	ød-2 [mm]	øD [mm]	Lenghts L[mm]
100	98	200	L=500,1000, 1500
125	123	225	
160	158	260	
200	198	300	
250	248	350	
300	298	400	
315	313	415	

Standard sizes



Insertion loss per meter length



Ordering key

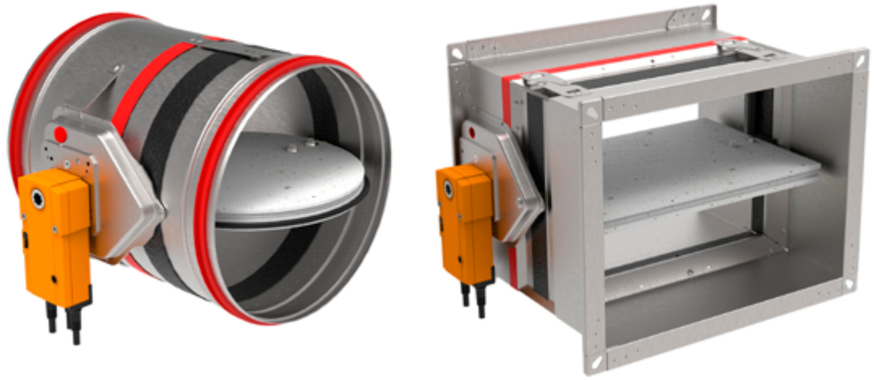
Interspace Sound Attenuator	**PZM**	**- 200**	**- 1000**
Diameter ød			
Attenuator length			

NOTES:

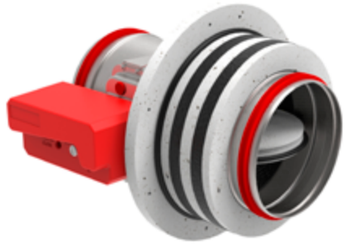
7/S1
v 3.3 (en)

FIRE DAMPER

FD25/40, FDC25/40



klimaoprema



FIRE DAMPER FDC25/40

- Used for the isolation of duct penetrations between fire compartments
- Fire dampers consist of housing, fire-resistant damper blade and release mechanism
- Casing made of galvanised sheet steel, damper blade made of special insulating material, damper blade shaft and push rod made of galvanized steel, bearings made of brass, seals made of polyurethane and elastomer
- Closed blade air leakage according to EN 1751, class 2
- Casing air leakage to EN 1751, class C
- Fire damper can be equipped with thermic fuse with 72°C or for warm air ventilation systems 95°C release temperature
- Fire damper casing is manufactured form galvanized steel, but on demand can be made from:
  - Galvanized steel and powder coated
  - Stainless steel
  - Stainless steel and powder coated
  - Fire damper for areas with potentially explosive atmospheres are also available (for additional information see FD-Ex catalog)

Dimensions

	FDC25							FDC40						
Ø$_n$[mm]	100	125	160	200	250	300	315	355	400	450	500	630	710	800
	Applique compatible dimensions													

FIRE CLASSIFICATION (according to EN 13501-3)

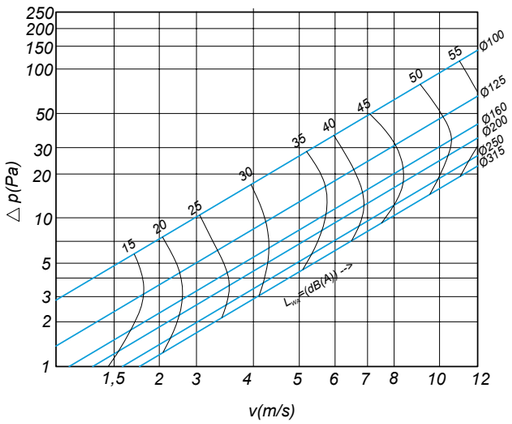
Fire resistance of fire damper depends on classification of walls or ceilings. It is allowed to install products to walls or ceilings only according to products Declaration of Performance. Walls or ceilings with greater fire resistance can also be used. Fire damper should be installed according installation manual which can be found within this document.

Please consult latest Declaration of Performance on our website: www.klimaoprema.hr

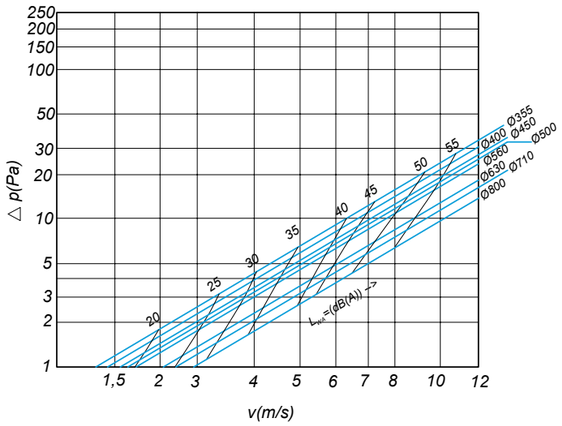
SELECTION DIAGRAM

Symbol:

v - air velocity in the duct [m/s]
Δp_t - total pressure loss [Pa]
L_{WA} - sound power level [dB(A)]



FDC25



FDC40

Design changes reserved

ORDERING KEY

Damper type: FDC25 FDC40	**FDC25**	**- Applique**	**- Ø250**	**- M230-S**
Applique				
Damper dimensions Ø [mm]				
Mechanism type:				

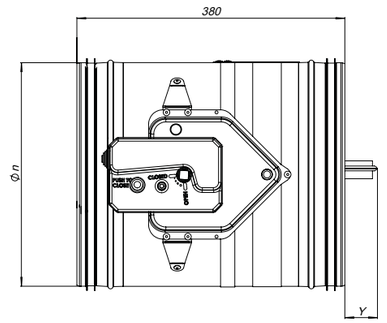
R	- manual drive
R-S	- manual drive with limit switches
M230-S	- electric actuator AC230V
M24-S	- electric actuator AC/DC 24V
M24-S-ST	- electric actuator AC/DC 24Vwith connection plug
EMS-S	- electromagnetic drive, permanent
EMP-S	- electromagnetic drive, interuptive

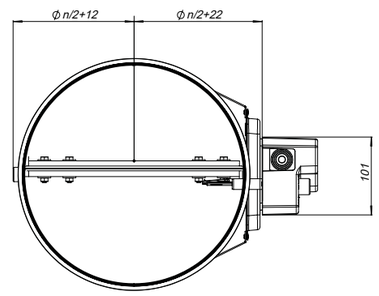
* Applique is compatible up to dimension Ø315 and damper size 25 mm

DAMPER MODELS

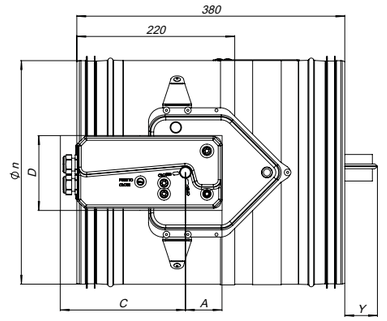
FDC25 / FDC40 -R (manual mechanism)

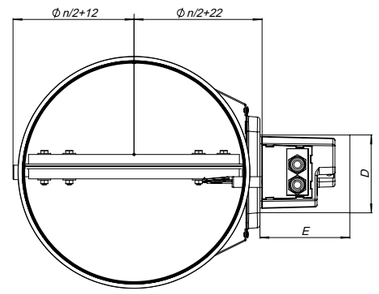
- automactic closure when the temperature in the duct exceed 72°C
- manual rearmation with handle
- manual unlocking possible for periodical test of fire damper





FDC25



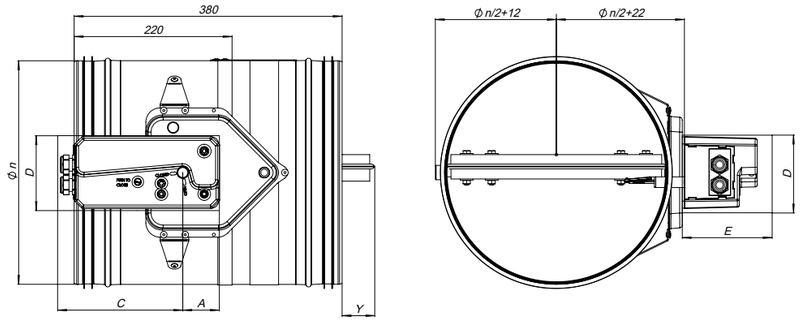


FDC40

Design changes reserved

FDC25 / FDC40 -EMS/EMP (solenoid actuator)

- spring return actuator with integrated limit switches and thermoelectric release mechanism (72°C)
- manual rearmation with handle
- possible closing with solenoid
- manual closing possible

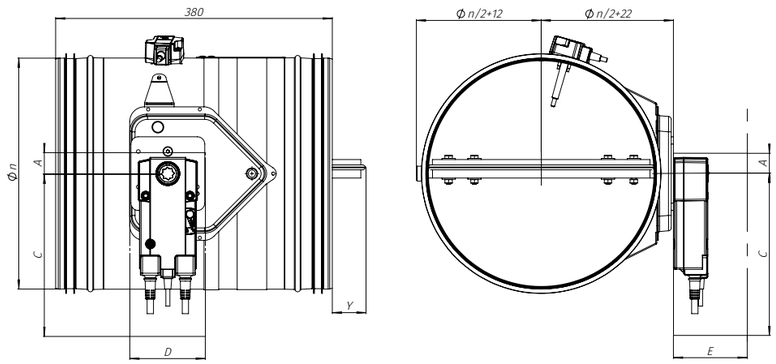


FDC25 / FDC40 -M (electric actuator)

- Thermoelectric activation (72°C) with electric actuator and return spring
- Integrated end switches
- Fully automatic operation

Options:

M230 – electric actuator AC 230V
M24 – electric actuator AC/DC 24V



Lenght of damper blade outside of casing (Y dimension on front side and X dimension on back side)

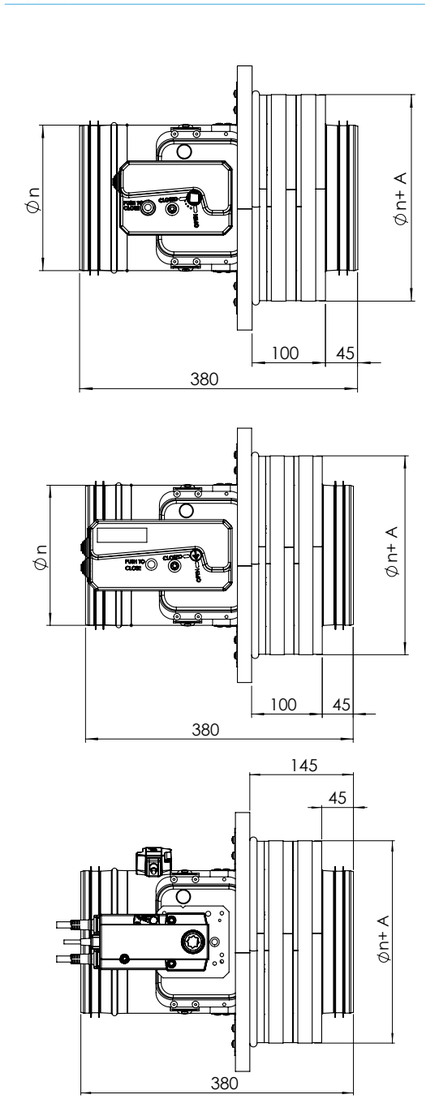
X=(Dn/2)-270 (mm)
Y=(Dn/2)-110 (mm)

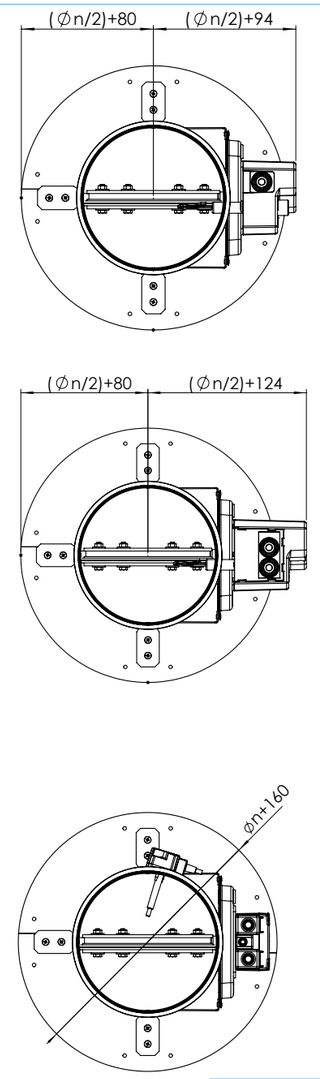
Design changes reserved

Product		A	C	D	E
Belimo	BFL (M)	25	200	90	120
	BFN (M)	25	225	100	120
	BF (M)*	50	250	100	120
Klimaoprema	-R (FD25 / FDC 25)	55	150	105	150
	-R (FD 40 & FDC 40)*	55	200	105	200
	-EMS/EMP (FD 25/40 & FDC 25/40)	55	200	105	200

* Not comaptible with Applique

Applique dimensions



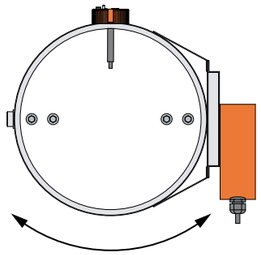


	A
Øn = 100	105
Øn = 125-180	95
Øn = 200-315	80

Design changes reserved

All installation opportunities are valid for:

- Installation onto duct in any shaft axis angle position



- Airflow and fire protection in both sides

INSTALLATION:

- Mounting is possible with the blade axis in horizontal or in vertical position
- The installation must comply with the tests that were performed during certification
- Avoid any obstruction of the moving blade by the connected ducts
- The class of air-tightness is maintained in case the installation of the damper is made in accordance with the technical manual
- Operating temperature: 50° C max
- For indoor use only

The FDC25 / FDC40 fire damper is always tested in standardized support frames (both in a concrete wall and in a flexible wall) in accordance with EN 1366-2: 1999 table 3/4/5. The results obtained are valid for all similar support frames which have a thickness and / or density and / or fire resistance similar or greater than the one of the test.

Examples of similar constructions:

Aerated concrete wall 100 mm + density 550 kg/m3 + fire resistance ≤ 120’	=	Wall made of hollow or solid bricks, reinforced concrete, cellular concrete, light concrete, ... + Fire resistance ≥ 120 ‘
Cellular concrete slab 100 mm + density 550 kg/m3 + fire resistance 90’	=	Concrete parts, pre-stressed concrete, reinforced concrete, cellular concrete ... + fire resistance ≥ 120 ‘

Minimum opening hole for fire damper installation

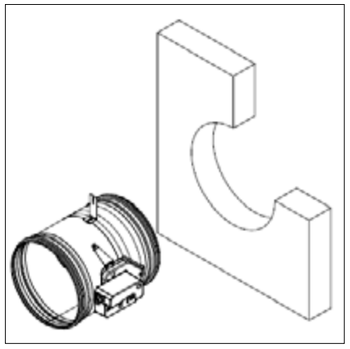
Damper size - Øn [mm]	Opening size - A (minimum)
Øn < 160	Øn + 85
180 < Øn < 315	Øn + 75
315 < Øn < 450	Øn + 65
Øn > 450	Øn + 55

Design changes reserved

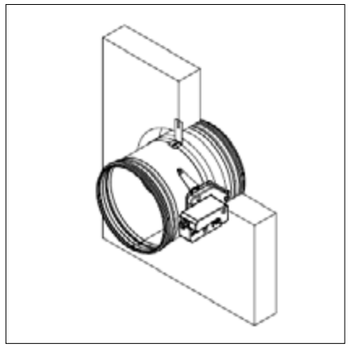
INSTALLATIONS AND SEALING:

Concrete wall and reinforced concrete wall installation

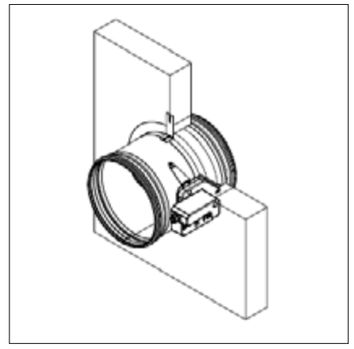
The wall is composed of concrete blocks (minimum density of 550 kg/m3) and with a minimum thickness of 100 mm.



Place the damper in an opening according to table (on pg. 366)



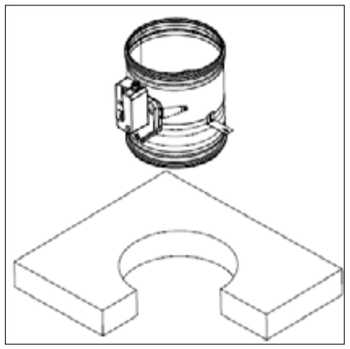
Fix the damper to the wall using screws



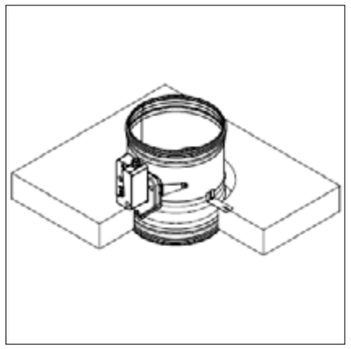
Fill the space between the damper and the wall with mortar

Aerated concrete ceiling installation and reinforced concrete ceiling installation

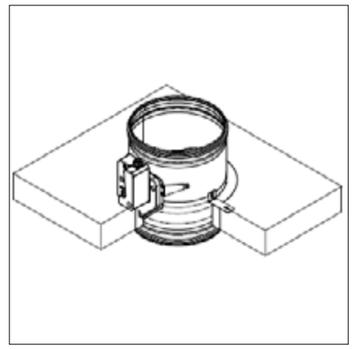
The ceiling is made of aerated concrete with a minimum density of 550 kg/m3 and a minimum thickness of 100 mm.



Place the damper in an opening according to table (on pg. 366)



Fix the damper to the slab using screws

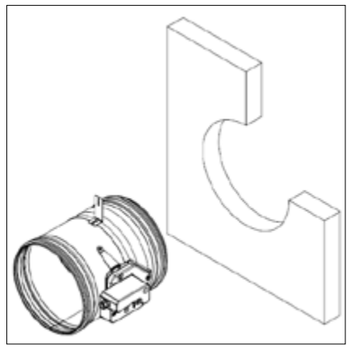


Fill the space between the damper and the slab with mortar

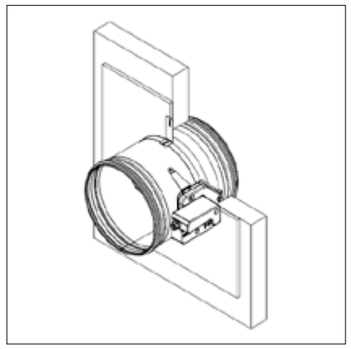
Design changes reserved

Gypsum blocks wall mounting 70mm

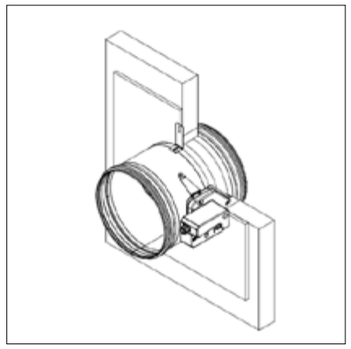
The wall is composed of gypsum blocks (minimum density of 995kg/m3), and with minimum thickness of 70mm.



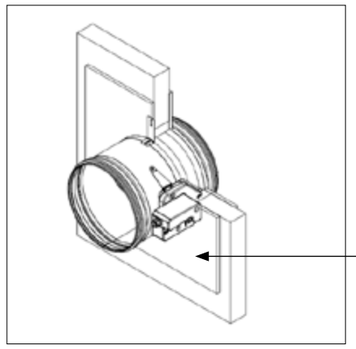
Place the damper in an opening according to table (on pg. 366)



Fix damper and GKF gypsum boards (12,5mm thick) to wall with screws



Fill the space between the damper and the wall with mortar



Cover the mortar with GKF gypsum boards (12,5 mm thick)

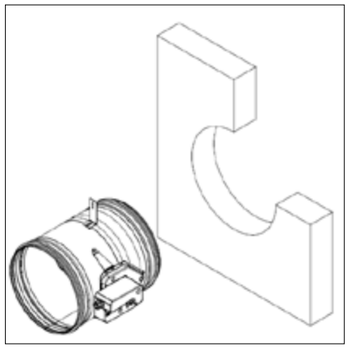
Diameter of the damper (mm)	Mounting kit
100	60061429
125	60061430
160	60061431
200	60061432
250	60061433
315	60061435
355	60061436
400	60061437
450	60061438
500	60061439
560	60061440
630	60061441
710	60061442
800	60061443

* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

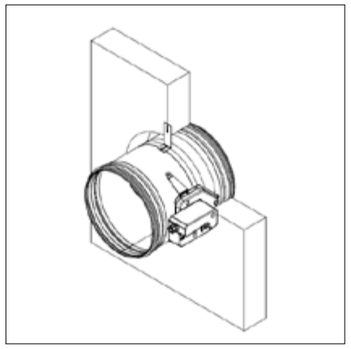
Design changes reserved

Gypsum blocks wall mounting 100mm

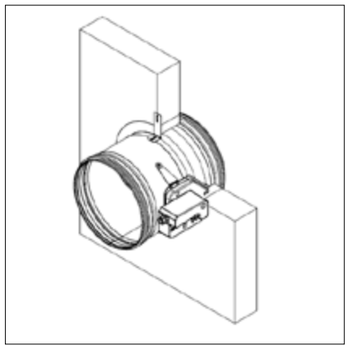
The wall is composed of gypsum blocks (minimum density of 995kg/m3), and with minimum thickness of 100mm.



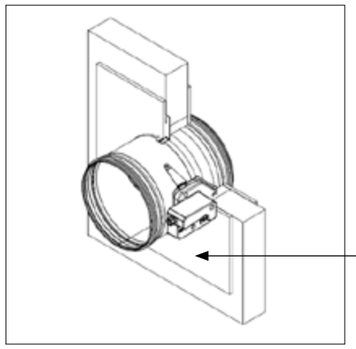
Place the damper in an opening according to table (on pg. 366)



Fix the damper to the wall using screws



Fill the space between the damper and the wall with mortar



Cover the mortar with GKF gypsum boards (12,5 mm thick)

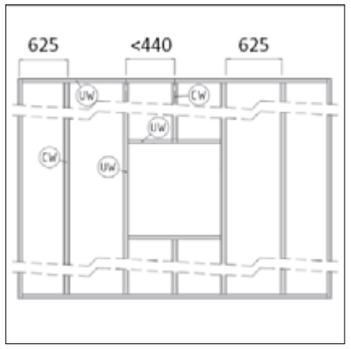
Diameter of the damper (mm)	Mounting kit
100	60061429
125	60061430
160	60061431
200	60061432
250	60061433
315	60061435
355	60061436
400	60061437
450	60061438
500	60061439
560	60061440
630	60061441
710	60061442
800	60061443

* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

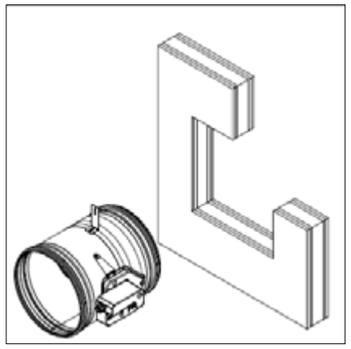
Design changes reserved

Flexible wall mounting

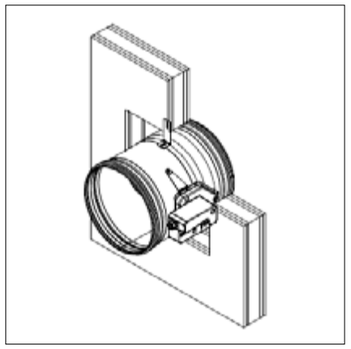
The wall is composed of 2x2 GKF plates, 12.5 mm thick, installed on a 48 mm wide steel construction. The interior of the wall is filled with mineral wool of 100 kg / m3 density.



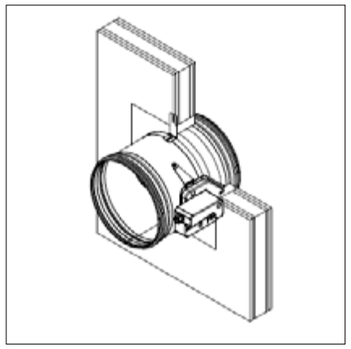
Realization of the steel construction



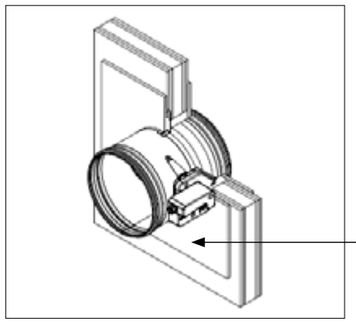
Place the damper in an opening according to table (on pg. 366)



Fix the damper to the wall using screws



Fill the space between the damper and the wall with mineral wool (100 kg/m3 of density)



Cover the mineral wool with GKF gypsum boards (12,5 mm thick)

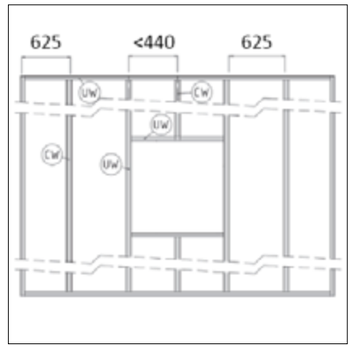
Diameter of the damper (mm)	Mounting kit
100	60061429
125	60061430
160	60061431
200	60061432
250	60061433
315	60061435
355	60061436
400	60061437
450	60061438
500	60061439
560	60061440
630	60061441
710	60061442
800	60061443

* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

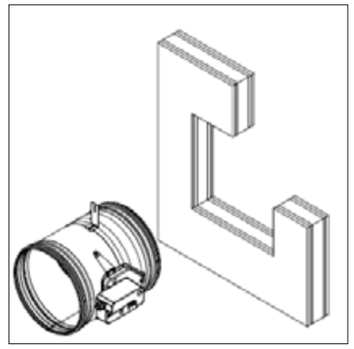
Design changes reserved

Flexible wall mounting

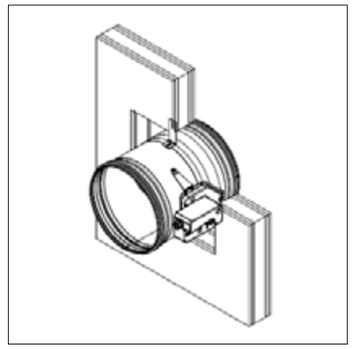
The wall is composed of 2x2 GKF plates (example PROMATECT 100, 12,5 mm thick), installed on a steel construction of 48 mm width.



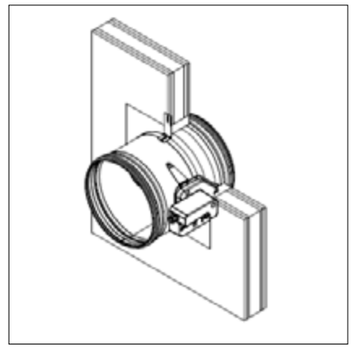
Realization of the steel construction



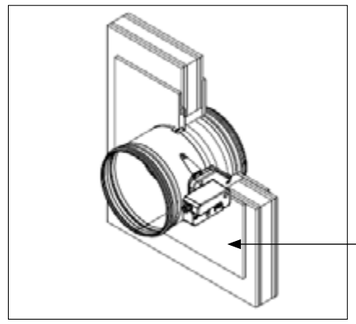
Place the damper in an opening according to table (on pg. 366)



Fix the damper to the wall using screws



Fill the space between the damper and the wall with mortar



Cover the mortar with GKF gypsum boards (12,5 mm thick)

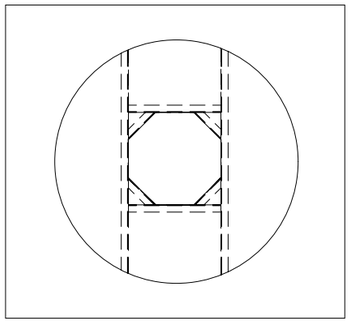
Diameter of the damper (mm)	Mounting kit
100	60061429
125	60061430
160	60061431
200	60061432
250	60061433
315	60061435
355	60061436
400	60061437
450	60061438
500	60061439
560	60061440
630	60061441
710	60061442
800	60061443

* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

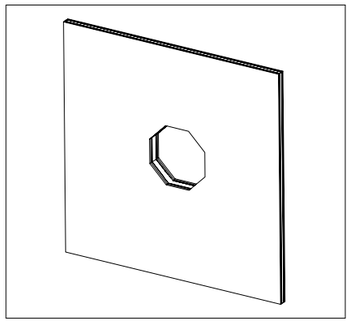
Design changes reserved

Installation remote from flexible/rigid wall

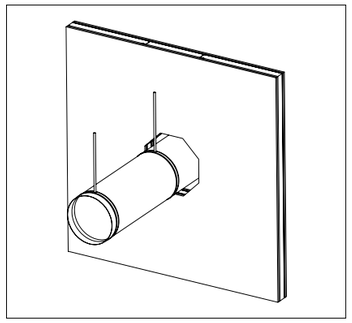
The wall is composed of 2x2 GFK plates, 12.5 mm thick, installed on a 48 mm wide steel construction. The interior of the wall is filled with mineral wool of 100 kg / m3 density.



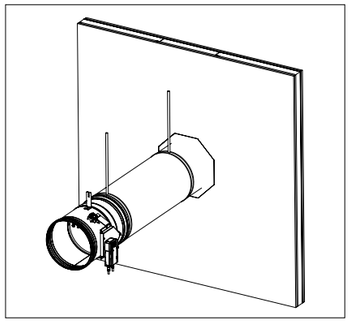
Arrangement of steel profiles.



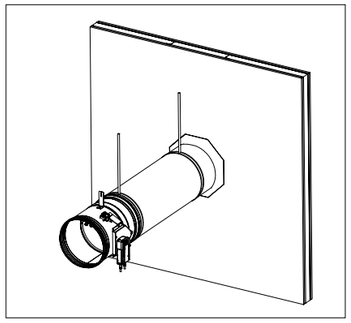
Place the damper in an opening according to table (on pg. 366) (wall cover with gypsium plates)



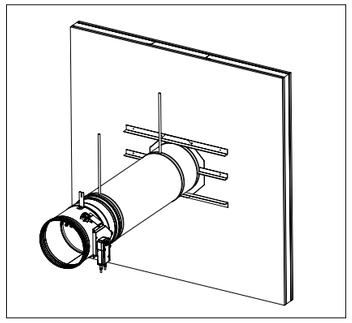
Place ventilation duct trough wall



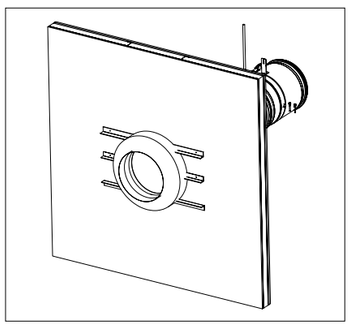
Install fire damper and secure it with self-tapping screws 4,3x10 to duct



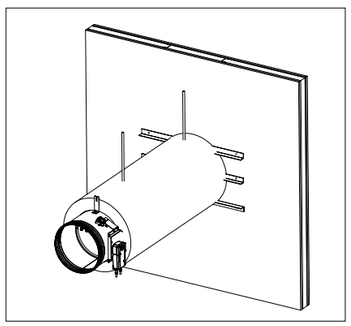
Fill space between duct and wall with mineral wool (Isover U protect). Additionally paint wool with Isover BSF in thickness of 1mm



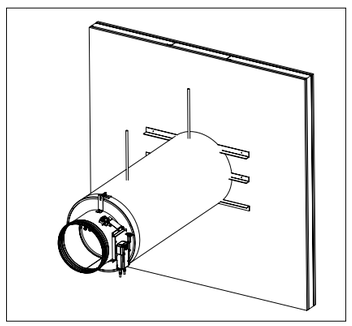
Close installation with L profiles 30x30x3mm. Additionally fix profiles to duct with self-tapping screws, and screw them to wall with 4,5x50 screws.



Repeat the same procedure on the other side. Place the wool on ventilation duct in lenght of 80m.



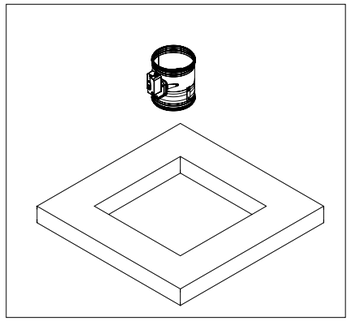
On connection wool-wall apply glue Isover BSK in thickness of 2mm.



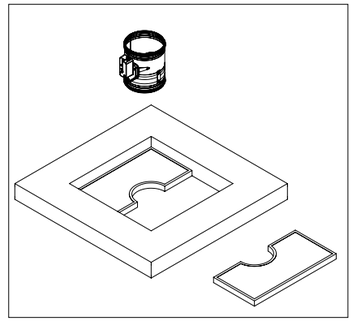
Additionally place steel protection on place where insulation on damper ends.

Installation in ceiling (Weichschott)

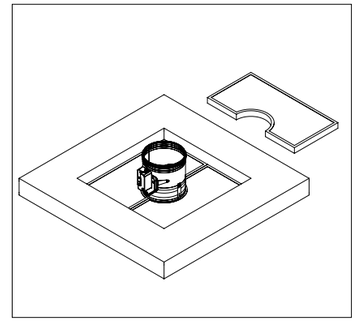
Installation material: Fire damper FDC, Mineral wool >140kg/m3, Fire protection coating, (HILTI weichschott system)



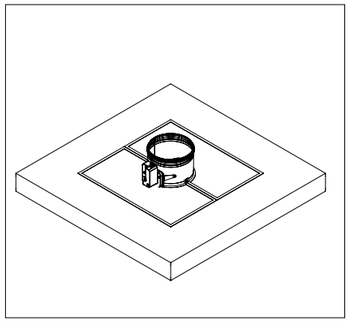
Recommended ceiling opening for fire damper installation is Ø+ 400mm, but openings from Ø + 80…600 mm can also be used



Insert fire damper into ceiling Damper blade must be closed during installation!



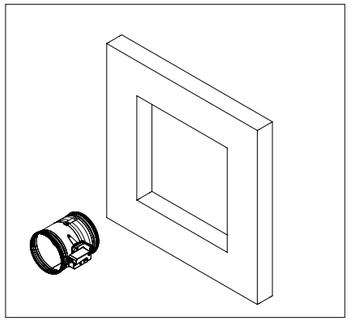
Space between casing and wall close with two layers of mineral wool (density 140 kg/m3 or more, coated on one side)



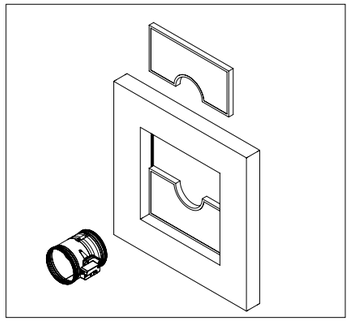
Connections of mineral wool should be sealed with intumescent fire resistant sealant. Mineral wool and damper casing must be coated with 2 mm thick fire protection coating

Installation in flexible wall (Weichschott)

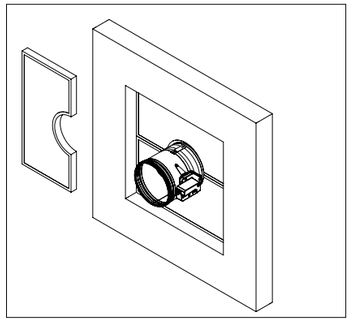
Installation material: Fire damper FDC, Mineral wool >140kg/m3, Fire protection coating, (HILTI weichschott system)



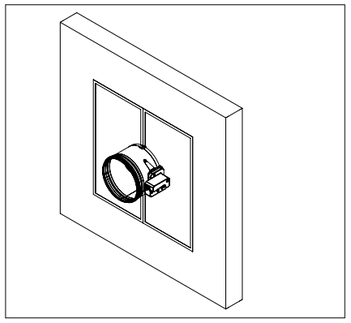
Recommended wall opening for fire damper installation is Ø + 400mm, but openings from Ø + 80…600 mm can also be used



Insert fire damper into wall Damper blade must be closed during installation!



Space between casing and wall close with two layers of mineral wool (density 140 kg/m3 or more, coated on one side)

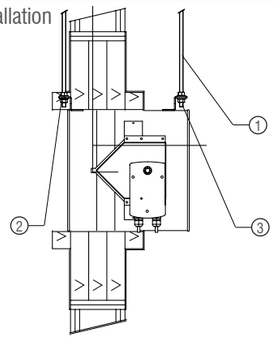


Connections of mineral wool seal with intumescent fire resistant sealant. Mineral wool and damper casing must be coated with 2 mm thick fire protection coating

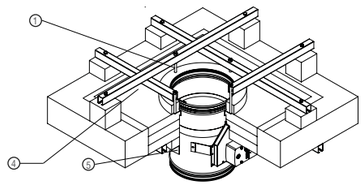
Suspension for mortarless installation

Suspension systems are required for the dry mortarless installation of the fire damper with mineral wool in solid walls, flexible walls and ceiling slabs. Fire dampers can be suspended from solid ceiling slabs using adequately sized threaded rods. Load the suspension system only with the weight of the fire damper. Ducts must be suspended separately. Suspension systems longer than 1.5 m require fire-resistant insulation.

Wall installation



Ceiling installation



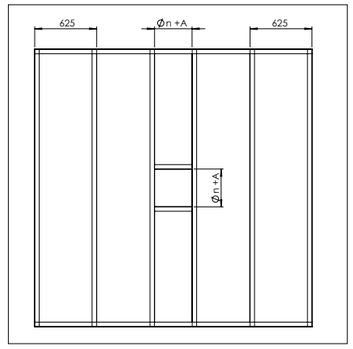
1. Threaded rod (M10), galvanized steel
2. Washer, galvanized steel
3. Nut, galvanized steel
4. Bracket, 45x30x1,5 mm, galvanized steel
5. L shaped profile (50x50x1) secured with self tapping screw to damper housing

Design changes reserved

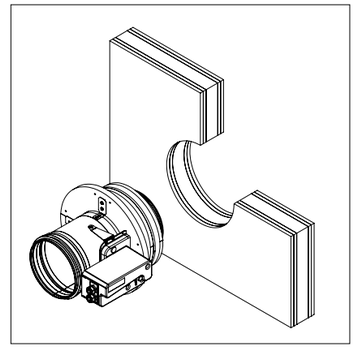
INSTALLATIONS AND SEALING FOR APPLIQUE:

Flexible wall installation

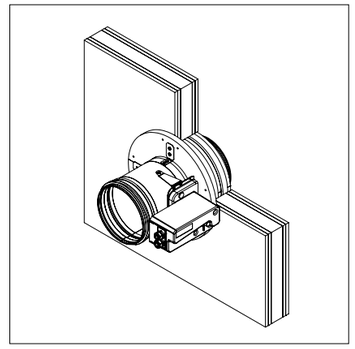
The wall is composed of 2x2 GKF plates, 12.5 mm thick, installed on a 48 mm wide steel construction. The interior of the wall is filled with mineral wool of 100 kg / m3 density.



Arrangement of steel profiles.



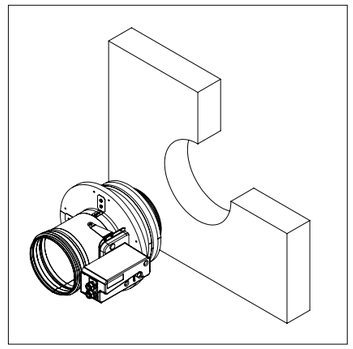
Installation hole is Øn + A + 10 mm



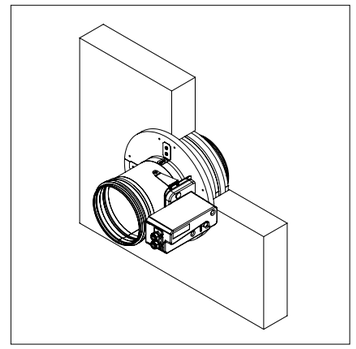
Insert fire damper into wall and fasten with screws (8 pcs, 4.8x60 mm)

Concrete wall and reinforced concrete wall installation

The wall is made of aerated concrete with a minimum density of 550 kg/m3 and a minimum thickness of 100 mm.

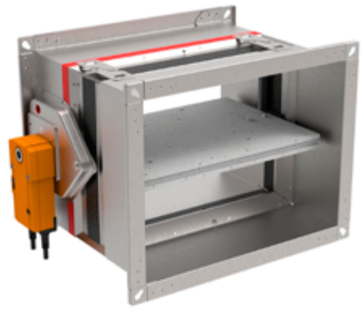


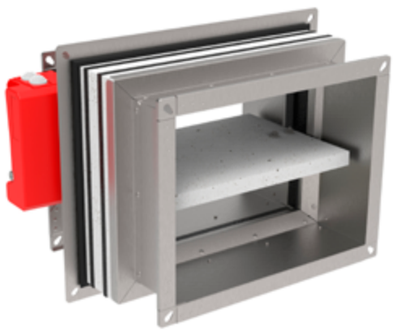
Installation hole is Øn + A + 10 mm (max)



Insert fire damper into wall and fasten with screws (8 pcs, 4.8x60 mm)

Design changes reserved





FIRE DAMPER FD25/FD40

- Used for the isolation of duct penetrations between fire compartments.
- Fire dampers consist of housing, fire-resistant damper blade and release mechanism.
- Casing made of galvanized sheet steel, damper blade made of special insulating material, damper blade shaft and push rod made of stainless steel, bearings made of brass, seals made of polyurethane and elastomer.
- Closed blade air leakage according to EN 1751, class 2
- Casing air leakage to EN 1751, class C
- Fire damper can be equipped with thermic fuse with 72°C or for warm air ventilation systems 95°C release temperature
- Fire damper casing is manufactured form galvanized steel, but on demand can be made from:
  - Galvanized steel and powder coated
  - Stainless steel
  - Stainless steel and powder coated
  - Fire damper for areas with potentially explosive atmo spheres
  - are also available (for additional information see FD-Ex catalog)

Dimensions

FD25 dimensions B(W) x H [mm]	FD40 dimensions B(W) x H [mm]
100x200 - 800x600	800x600 - 1500x800
Applique compatible dimensions	

*All possible combinations of width and height are available.
**Standard dimensions are avaliable with increments of 50mm.

FIRE CLASSIFICATION (according to EN 13501-3)

Fire resistance of fire damper depends on classification of walls or ceilings. It is allowed to install products to walls or ceilings only according to products Declaration of Performance. Walls or ceilings with greater fire resistance can also be used. Fire damper should be installed according to installation manual which can be found within this document

Please consult latest Declaration of Performance on our website: www.klimaoprema.hr

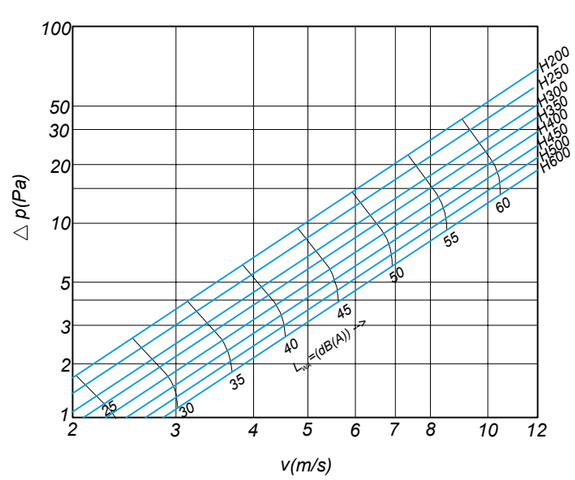
Design changes reserved

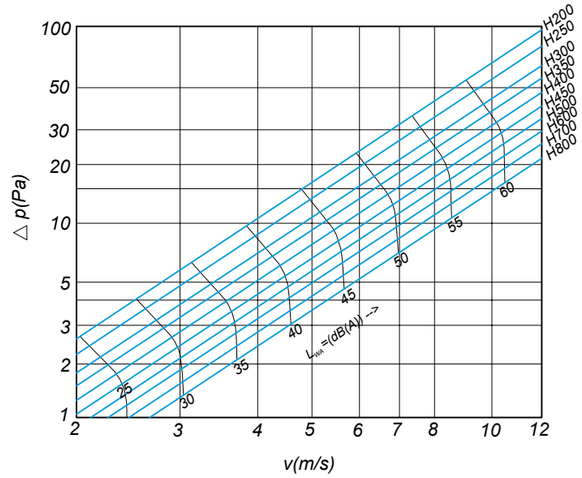
SELECTION DIAGRAM

Symbol:

v - air velocity in the duct [m/s]
Δp_t - total pressure loss [Pa]
L_{WA} - sound power level [dB(A)]

Total pressure loss and sound power level:





The values of total pressure loss for other sizes are obtained in a manner that read value from the graph is multiplied with the correction value from the table. Value of sound power are obtained in a manner that read value is added the correction value from the table.

B [mm]	100	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000 - 1200	1200 - 1500
Δp_t x	1,30	1,22	1,14	1,07	1,0	0,94	0,88	0,83	0,77	0,73	0,68	0,64	0,6	0,58	0,56	0,55	0,54	0,5	0,4
L_{wa} +	-1	-1	-1	0	0	0	0	0	0	0	0	1	1	2	2	2	3	3	4

ORDERING KEY

Damper type:	**FD25**	**- Applique**	**- 400x300**	**- M230-S**
FD25				
FD40				
Applique				
Damper dimensions				
B(W) x H [mm]				

Mechanism type:

R	- manual drive
R-S	- manual drive with limit switches
M230-S	- electric actuator AC230V
M24-S	- electric actuator AC/DC 24V
M24-S-ST	- electric actuator AC/DC 24Vwith connection plug
EMS-S	- electromagnetic drive, permanent
EMP-S	-electromagnetic drive, interuptive

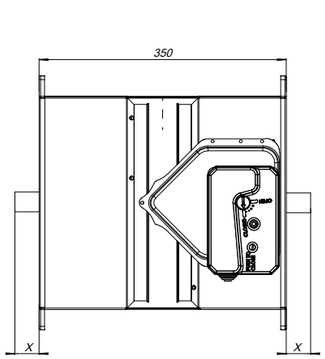
* Applique is compatible up to dimension Ø315 and damper size 25 mm

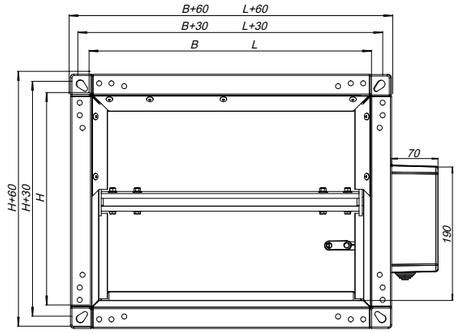
Design changes reserved

DAMPER MODELS

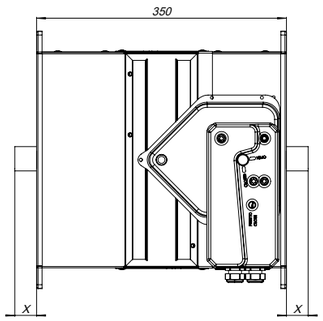
FD25 / FD40 -R (manual actuator)

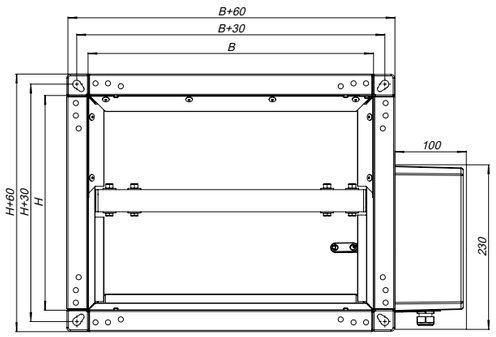
- automatic closure when the temperature in the duct exceeds 72°C
- manual rearmation with handle
- manual unlocking possible for periodical test of fire damper





FDC25

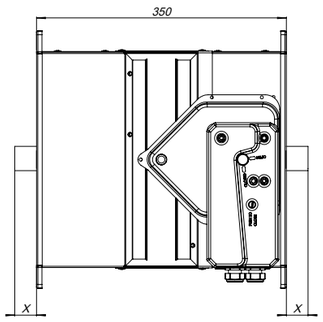


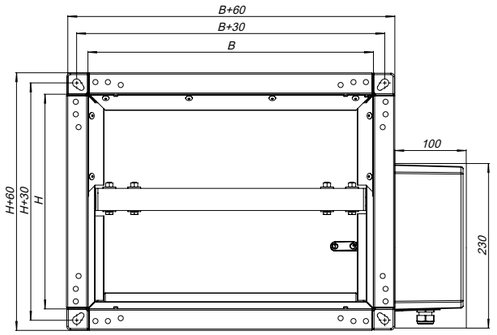


FDC40

FD25 / FD40 -EMS/EMP (solenoid actuator)

- spring return actuator with integrated limit switches and thermoelectric release mechanism (72°C)
- manual rearmation with handle
- possible closing with solenoid
- manual closing possible





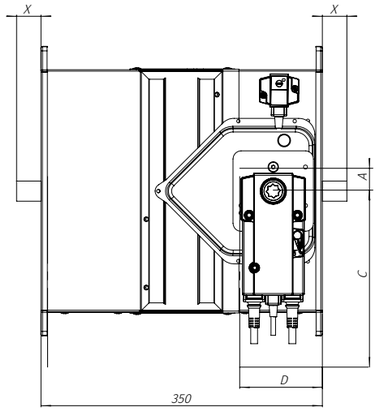
Design changes reserved

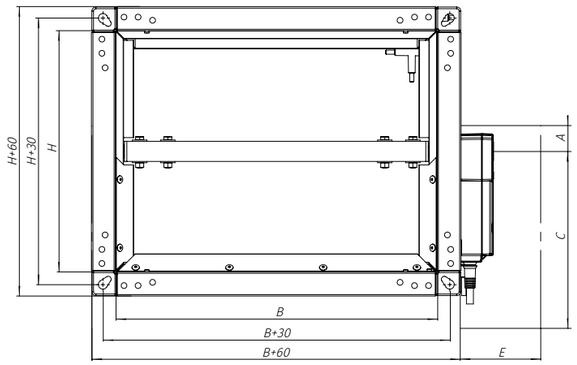
FD25 / FD40 -M (electric actuator)

- Thermoelectric activation (72°C) with electric actuator and return spring
- Integrated end switches
- Fully automatic operation

Options:

M230 – electric actuator AC 230V
M24 – electric actuator AC/DC 24V





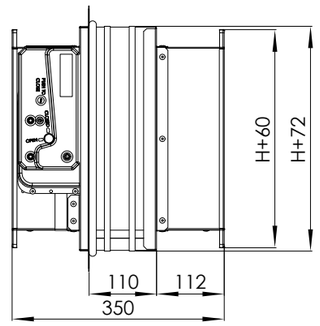
Lenght of damper blade outside of casing:

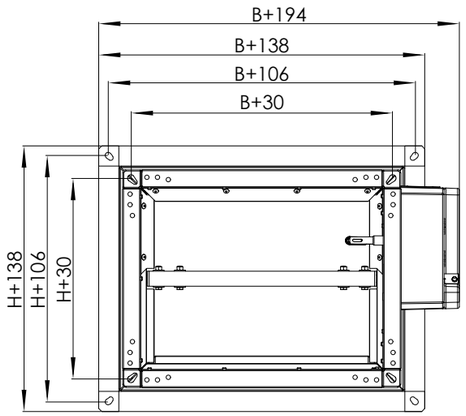
X=(H/2)-175 (mm)

Product		A	C	D	E
Belimo	BFL (M)	25	200	90	120
	BFN (M)	25	225	100	120
	BF (M)*	50	250	100	120
Klimaoprema	-R (FD25 / FDC 25)	55	150	105	150
	-R (FD 40 & FDC 40)*	55	200	105	200
	-EMS/EMP (FD 25/40 & FDC 25/40)	55	200	105	200

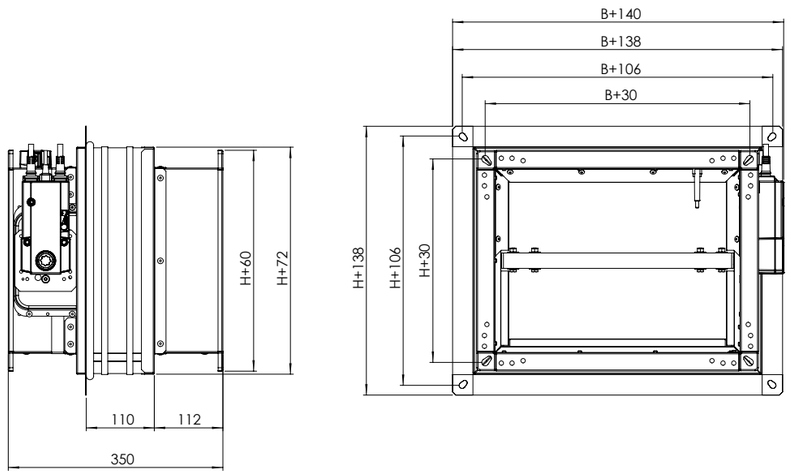
* Not comaptible with Applique

Applique dimensions



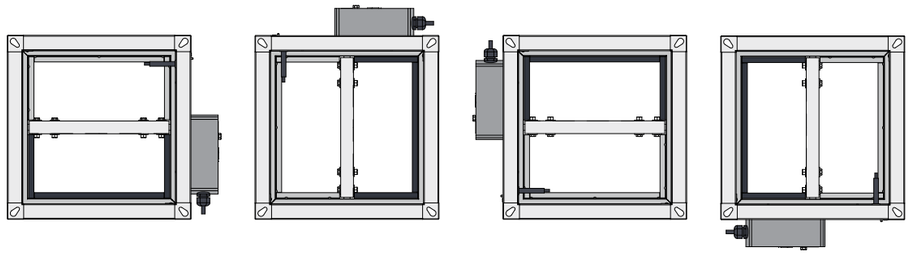


Design changes reserved



All installation opportunities are valid for:

Installation onto duct in positions mentioned on picture below:



- Airflow and fire protection in both sides

INSTALLATION AND IMPLEMENTATION

- Mounting is possible with the blade axis in horizontal or in vertical position
- The installation must comply with the tests that were performed during certification, s explained in 8.2.
- Avoid any obstruction of the moving blade by the connected ducts
- The class of air-tightness is maintained in case the installation of the damper is made in accordance with the technical manual
- Operating temperature: 50° C max
- For indoor use only

The FD25 / FD40 fire damper is always tested in standardized support frames (both in a concrete wall and in a flexible wall) in accordance with EN 1366-2: 1999 table 3/4/5. The results obtained are valid for all similar support frames which have a thickness and / or density and / or fire resistance similar or greater than the one of the test.

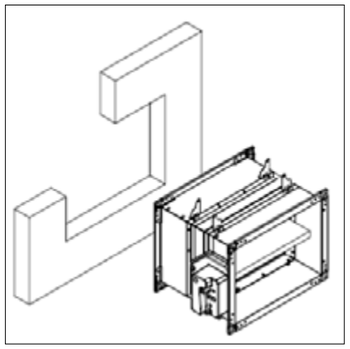
Examples of similar constructions:

Aerated concrete wall 100 mm + density 550 kg/m3 + fire resistance ≤ 120’	=	Wall made of hollow or solid bricks, reinforced concrete, cellular concrete, light concrete, ... + Fire resistance ≥ 120 ‘
Cellular concrete slab 100 mm + density 550 kg/m3 + fire resistance 90’	=	Concrete parts, pre-stressed concrete, reinforced concrete, cellular concrete ... + fire resistance ≥ 120 ‘

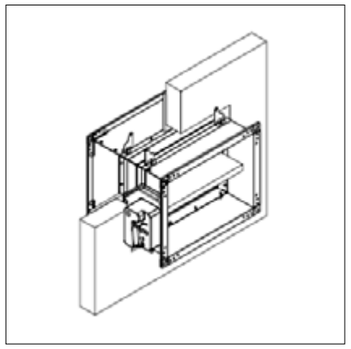
INSTALLATIONS AND SEALING:

Gypsum blocks wall mounting 70mm

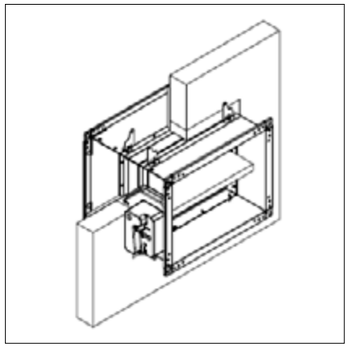
The wall is composed of gypsum blocks (minimum density of 995kg/m3), and with minimum thickness of 70mm.



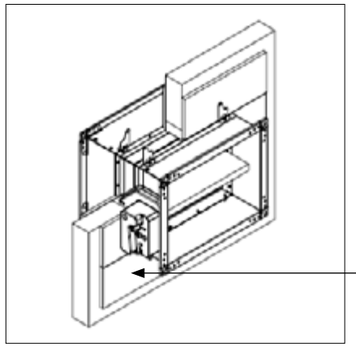
Place the damper in an opening of H + 80 mm and B + 80 mm or more



Fix damper and GKF gypsum boards (12,5mm thick) to wall with screws



Fill the space between the damper and the wall with mortar



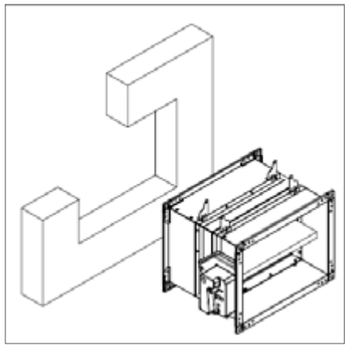
Cover the mortar with GKF gypsum boards (12,5 mm thick)

Dimensions (mm)	Mounting kit
All dimensions *	60061444

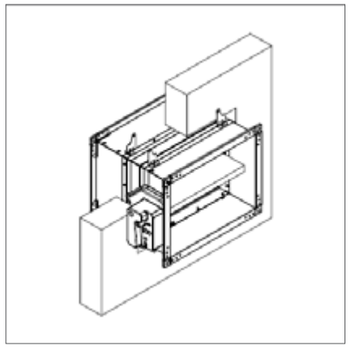
* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

Gypsum blocks wall mounting 100mm

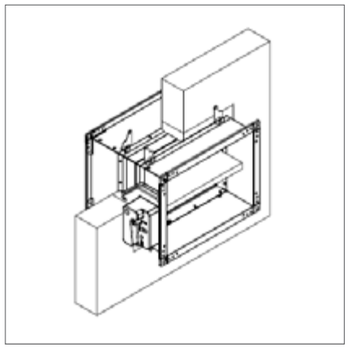
The wall is composed of gypsum blocks (minimum density of 995kg/m3), and with minimum thickness of 100mm.



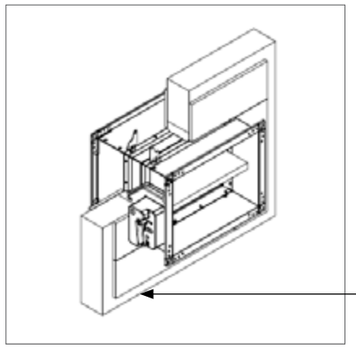
Place the damper in an opening of H + 80 mm and B + 80 mm or more



Fix the damper to the wall using screws



Fill the space between the damper and the wall with mortar



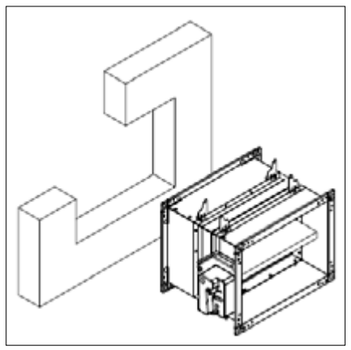
Cover the mortar with GKF gypsum boards (12,5 mm thick)

Dimensions (mm)	Mounting kit
All dimensions *	60061444

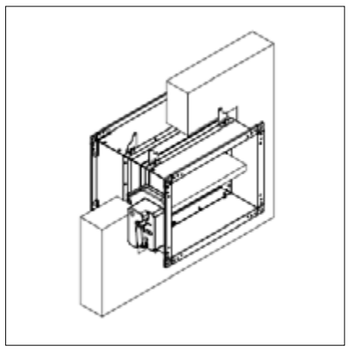
* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

Concrete wall and reinforced concrete wall installation

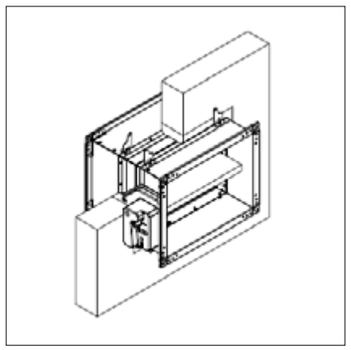
The wall is composed of concrete blocks (minimum density of 550 kg/m3) and with a minimum thickness of 100 mm.



Place the damper in an opening of H + 80 mm and B + 80 mm or more



Fix the damper to the wall using screws

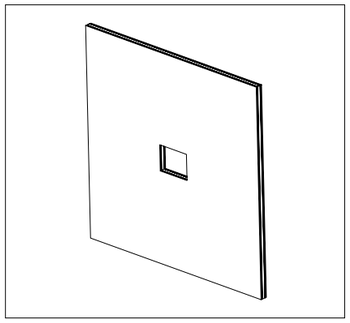


Fill the space between the damper and the wall with mortar

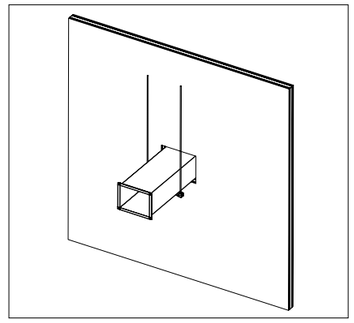
Design changes reserved

Installation remote from flexible/rigid wall

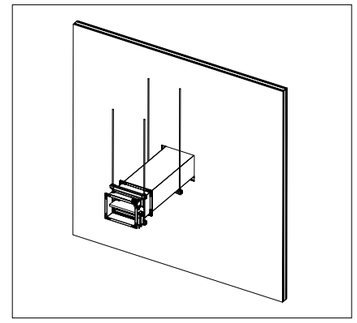
The wall is composed of 2x2 GKF plates, 12.5 mm thick, installed on a 48 mm wide steel construction. The interior of the wall is filled with mineral wool of 100 kg / m3 density.



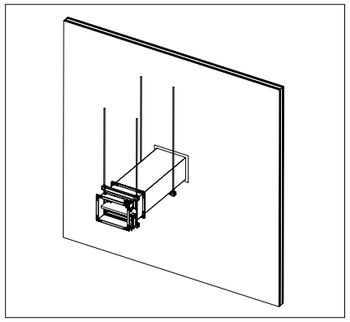
Recommended wall opening is B,H+70 mm



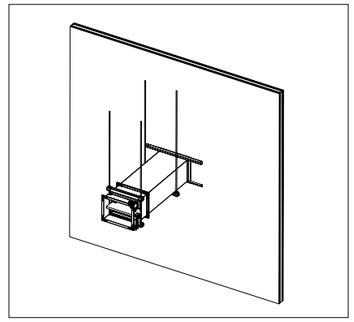
Place ventilation duct trough wall



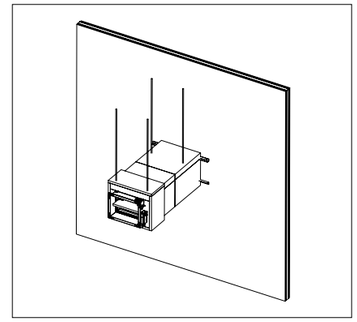
Install fire damper and secure it to ventilation duct



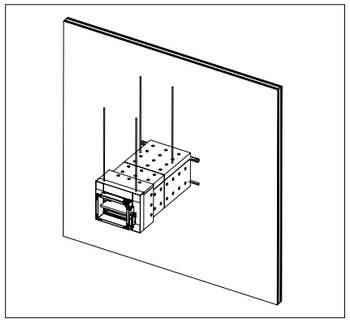
Fill space between duct and wall with mineral wool (Isover U protect). Additionally paint wool with Isover BSF in thickness of 1mm.



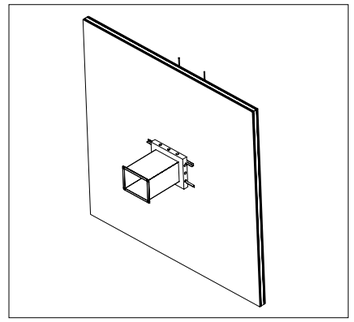
Close installation with L profiles 30x30x3mm. Additionally fix profiles to duct with self-tapping screws, and screw them to wall with 4,5x50 screws. Repeat the same procedure on the other side.



Install wool (Isover U protect). Wool should be glued to the wall with Isover BSK glue. Glue is applied in thickness 2mm. For details please see Isover U-protect brochure page 28.



Secure the wool with welding nails. Nails are placed 60mm from the end of the plate and 150mm between each other. In the corner are aditionaly used IsoveFireProtectScrew screws on every 150mm. Additionally place steel protection on place where insulation on damper ends.

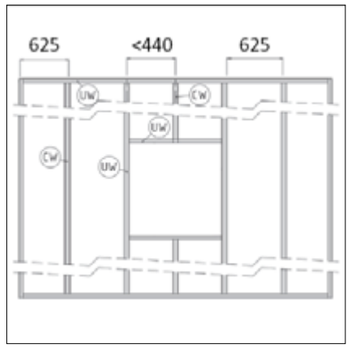


Place the wool on ventilation duct in lenght of 80m and secure it withwelding nails.

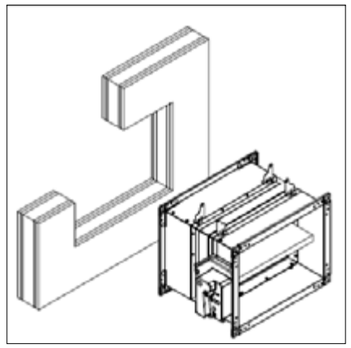
Design changes reserved

Flexible wall mounting

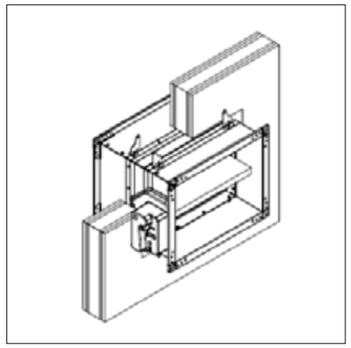
The wall is composed of 2x2 GKF plates, 12.5 mm thick, installed on a 48 mm wide steel construction. The interior of the wall is filled with mineral wool of 100 kg / m3 density.



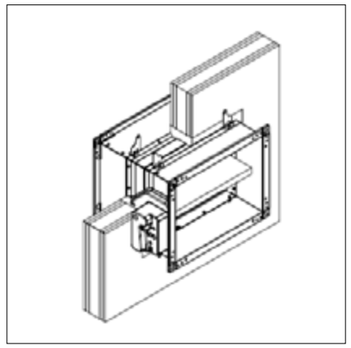
Realization of the steel construction



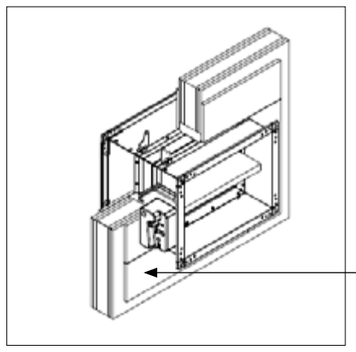
Place the damper in an opening of H + 80 mm and B + 80 mm or more



Fix the damper to the wall using screws



Fill the space between the damper and the wall with mineral wool



Cover the mineral wool with GKF gypsum boards (12,5 mm thick)

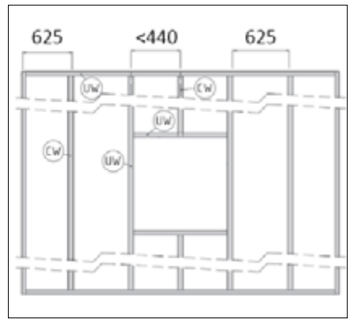
Dimensions (mm)	Mounting kit
All dimensions *	60061444

* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

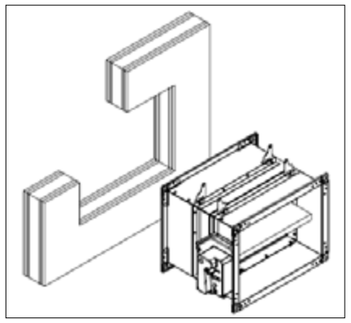
Design changes reserved

Flexible wall mounting

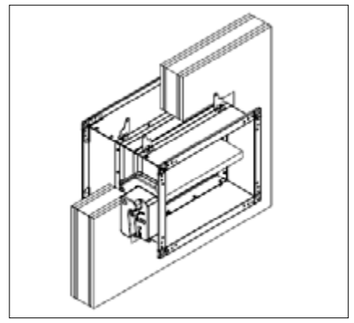
The wall is composed of 2x2 GKF plates (example PROMATECT 100, 12,5 mm thick), installed on a steel construction of 48 mm width.



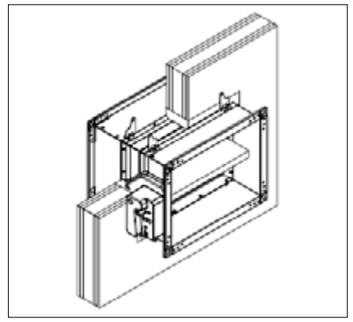
Realization of the steel construction



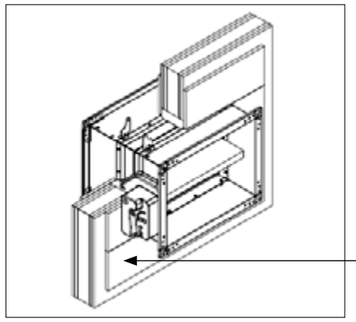
Place the damper in an opening of H + 80 mm and B + 80 mm or more



Fix the damper to the wall using screws



Fill the space between the damper and the wall with mortar



Cover the mortar with GKF gypsum boards (12,5 mm thick)

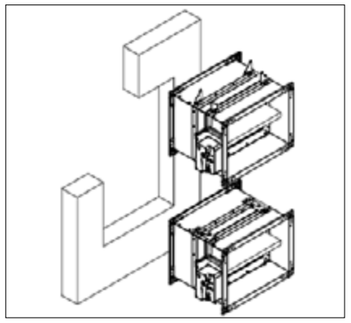
Dimensions (mm)	Mounting kit
All dimensions *	60061444

* The Kit is universal for all dimensions and must be cut to fit the specific dimensions of the damper

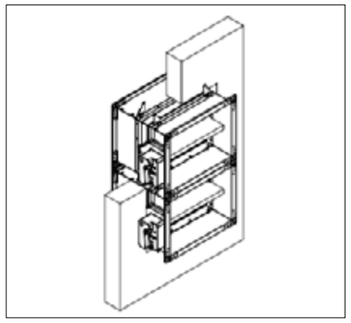
Design changes reserved

Battery installation

The wall is composed of blocks of aerated concrete (minimum density 550 kg/m3) and with a minimum thickness of 100 mm.

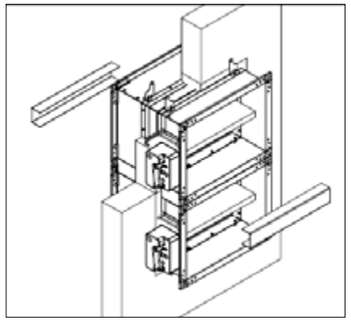


Place the damper in an opening of B + 80 mm and 2xH + 140mm

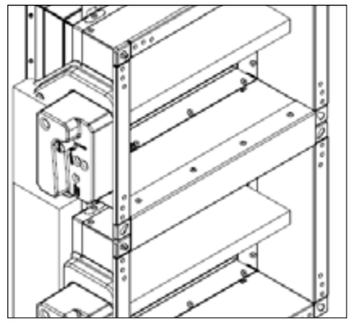


Fix the dampers to the wall using the screws and fill the space between the dampers and the wall with mortar

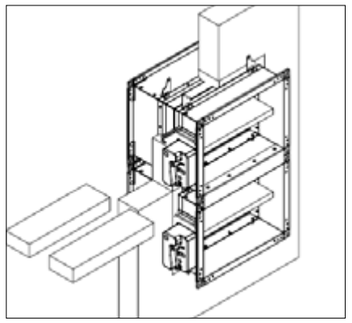
Width of the damper B (mm)	Mounting kit
850	60061445
900	60061446
950	60061447
1000	60061448
1050	60061449
1100	60061450
1150	60061451
1200	60061452
1250	60061453
1300	60061454
1350	60061455
1400	60061456
1450	60061457
1500	60061458



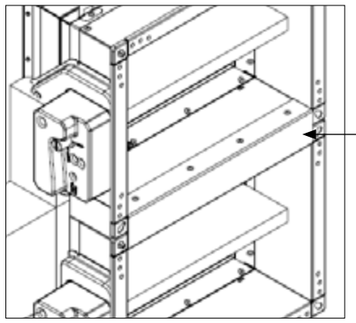
Place the installation kit to the dampers



Attach the installation kit to the dampers using the self-tapping screws (provided in the kit) every 350mm



Fill the space between the dampers with mineral wool (100 kg/m3 of density)

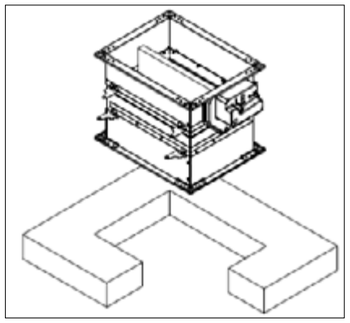


Installation completed

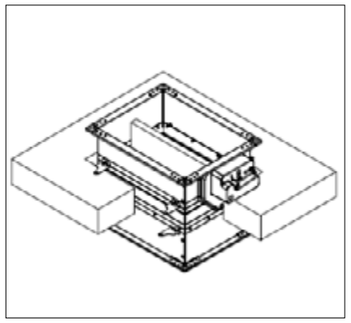
Design changes reserved

Aerated concrete ceiling installation and reinforced concrete ceiling installation

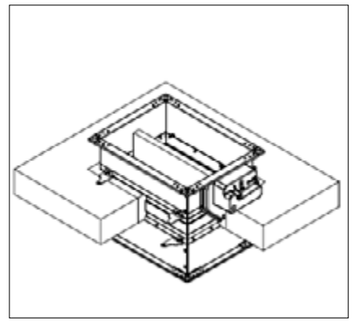
The ceiling is made of aerated concrete with a minimum density of 550 kg/m3 and a minimum thickness of 100 mm.



Place the damper in an opening of H + 80 mm and B + 80 mm or more



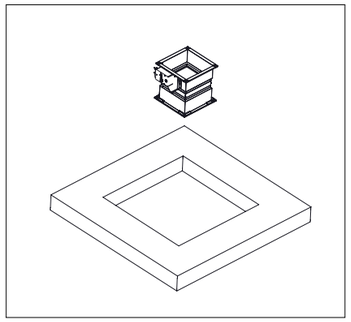
Fix the damper to the slab using screws



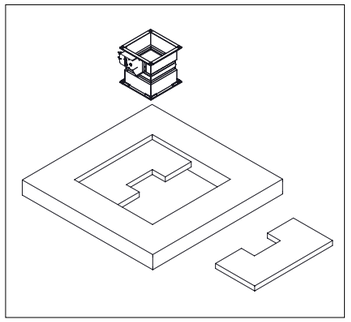
Fill the space between the damper and the slab with mortar

Installation in ceiling (Weichschott)

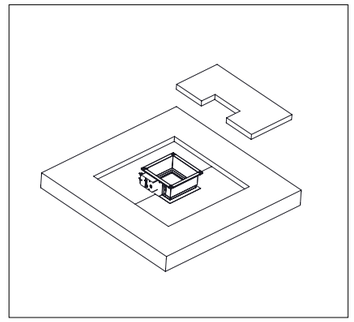
Installation material: Fire damper FD, Mineral wool >140kg/m3, Fire protection coating, (HILTI weichschott system)



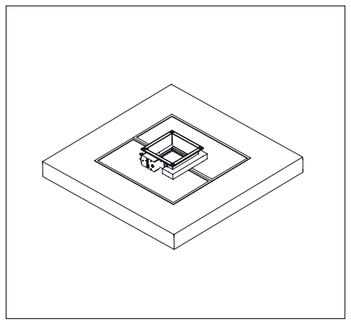
Recommended ceiling opening for fire damper installation is B(H) + 400mm, but openings from B(H) +80…600 mm can also be used



Insert fire damper into ceiling. Damper blade must be closed during installation.



Space between casing and ceiling must be closed with two layers of mineral wool (density 140 kg/m3 or more, coated on one side)

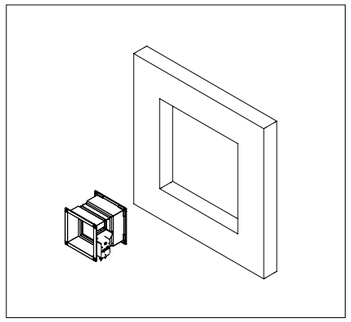


Connections of mineral wool must be sealed with intumescent fire resistant sealant. Mineral wool and damper casing must be coated with 2 mm thick fire protection coating

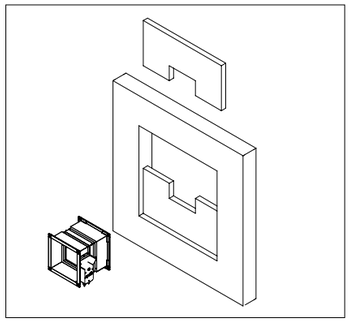
Design changes reserved

Installation in Flexible wall (Weichschott)

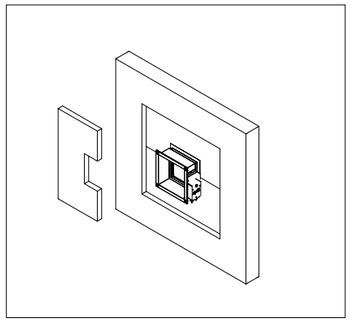
Installation material: Fire damper FD, Mineral wool >140kg/m3, Fire protection coating, (HILTI weichschott system)



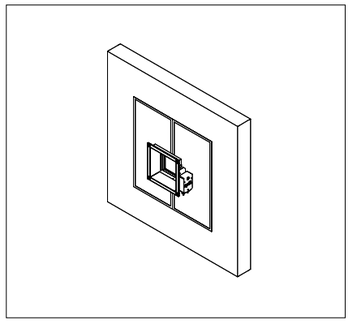
Recommended wall opening for fire damper installation is B(H) + 400mm, but openings from B(H) +80…600 mm can also be used



Insert fire damper into wall. Damper blade must be closed during installation!



Space between casing and wall must be closed with two layers of mineral wool (density 140 kg/m3 or more, coated on one side)

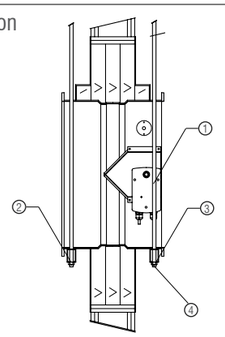


Connections of mineral wool must be sealed with intumescent fire resistant sealant. Mineral wool and damper casing must be coated with 2 mm thick fire protection coating

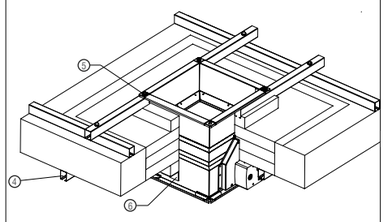
Suspension for mortarless installation

Suspension systems are required for the dry mortarless installation of the fire damper with mineral wool in solid walls, flexible walls and ceiling slabs. Fire dampers can be suspended from solid ceiling slabs using adequately sized threaded rods. Load the suspension system only with the weight of the fire damper. Ducts must be suspended separately. Suspension systems longer than 1.5 m require fire-resistant insulation.

Wall installation



Ceiling installation

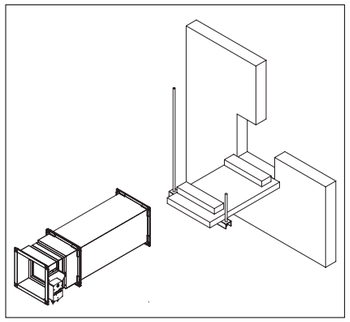


1. Threaded rod (M10), galvanized steel
2. Washer, galvanized steel
3. Nut, galvanized steel
4. Bracket, 45x30x1,5 mm, galvanized steel
5. Screw (M10)
6. L shaped profile (50x50x1) secured with self tapping screw to damper housing, every 400mm

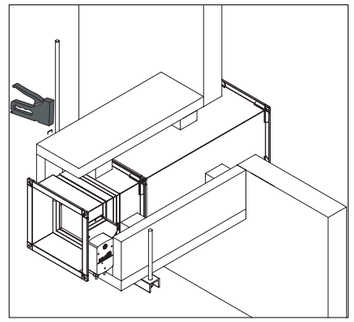
Design changes reserved

Installation in rigid wall (Promat)

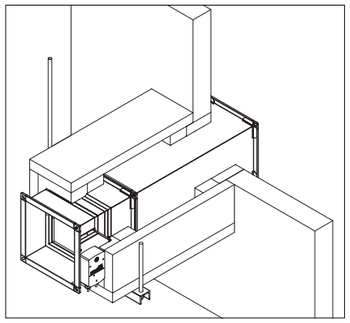
Prepare wall opening B (H) + 100 mm. Place fire damper on pre-cut calcium silicate 52mm (Promat L500). 100mm wide supports from same material need to be used to support the duct as well as the damper.



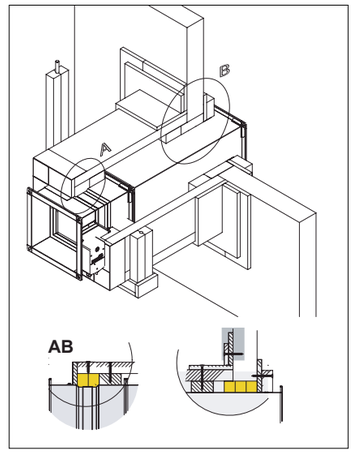
Fit the duct and the damper through the wall, and cover them with 52 mm calcium silicate (Promat L500). Board corner joints must be glued with glue PROMAT K84 and connected with staples every 100mm.



The gap between the damper and the wall must be filled with mineral wool (density 140 kg / m3 or more).



Close the mineral wool with Promatect H plates 20mm thick. Duct and damper supporting brackets have to be insulated with 52 and 20mm calcium silicate boards (Promatect H and L500).



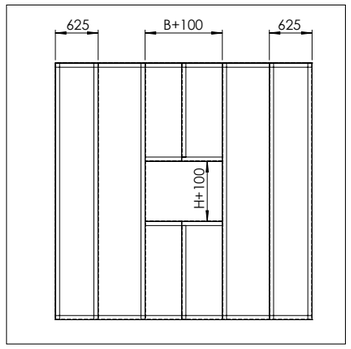
More detail drawing of installation will be send upon request!

Design changes reserved

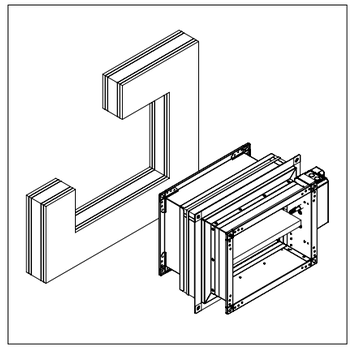
INSTALLATIONS AND SEALING FOR APPLIQUE:

Flexible wall installation

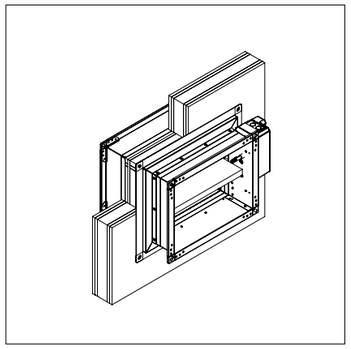
The wall is composed of 2x2 GKF plates, 12.5 mm thick, installed on a 48 mm wide steel construction. The interior of the wall is filled with mineral wool of 100 kg / m3 density.



Arrangement of steel profiles.



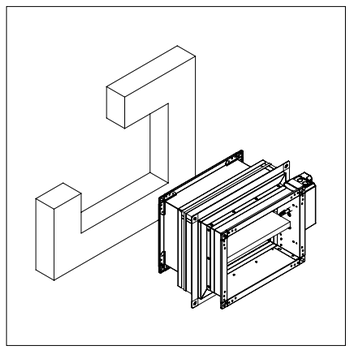
Installation hole is B(H) + 80 mm



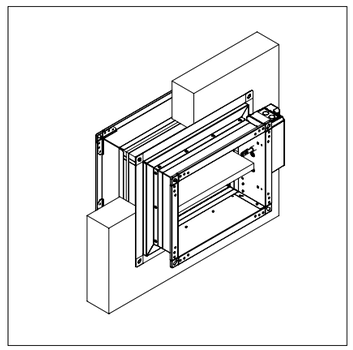
Insert fire damper into wall and fasten with screws (4 pcs, 4.8x45 mm)

Concrete wall and reinforced concrete wall installation

The wall is made of aerated concrete with a minimum density of 550 kg/m3 and a minimum thickness of 100 mm.



Installation hole is B(H) + 80 mm



Insert fire damper into wall and fasten with screws (4 pcs, 4.8x45 mm)

Design changes reserved

CONTROL MECANISMS

MANUAL FUSE ONLY MECHANISM

Self-operating mechanism equipped with a thermal fuse.

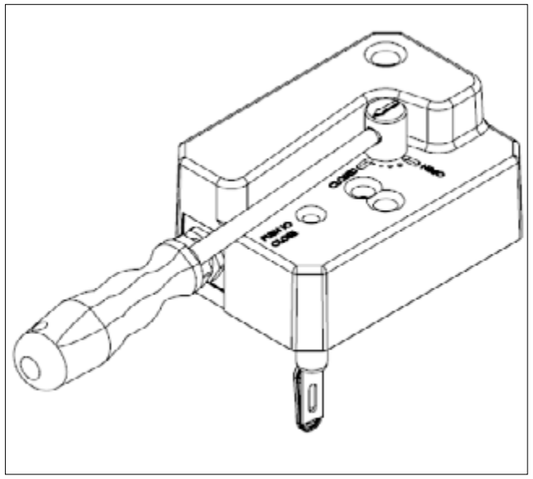
The Manual fuse only control mechanism closes the damper blade automatically if the temperature in the duct exceeds 72 °C. The damper is reset manually by means of a screwdriver.

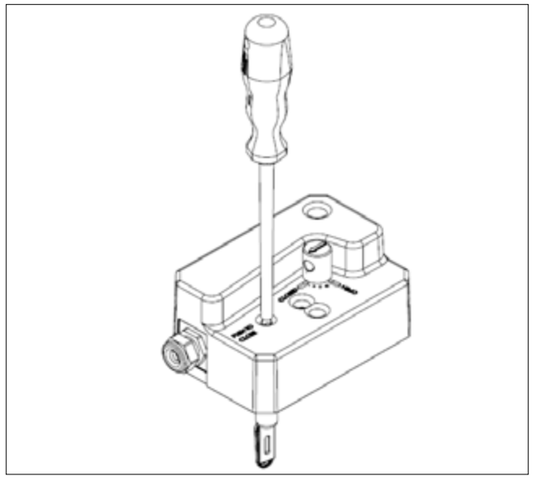
Standard equipment:

- Thermal fuse 72 °C
- Manual triggering is possible
- Manual reset, use the screwdriver (turn counterclockwise)

To open the damper, insert the screwdriver into the shaft (parallel to the ventilation duct axis) and turn counterclock-wise

To close the damper, press the thermal fuse head with a screwdriver





Options :

For this self-operating version, the double contact – S - is available as an option (factory option or after-sales kit):
The double contact S (OPEN / CLOSED) consists of:
- electric limit switch indicating CLOSED position
- electric limit switch indicating OPEN position

MANUAL FUSE ONLY MECHANISM UPGRADABLE TO SOLENOID ACTUATOR

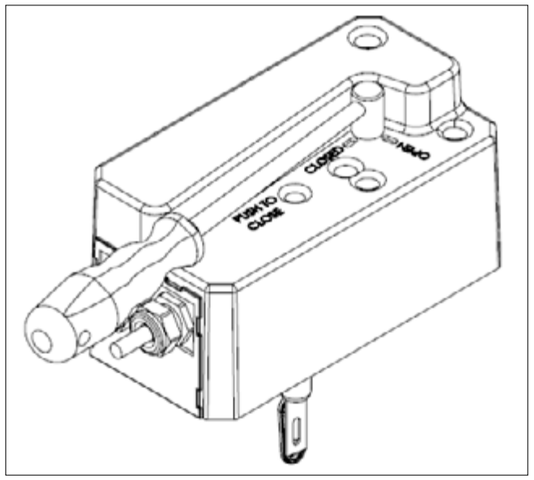
FD in self-operating version

Activation :
- Manual activation: Push the release button.
- Self-operating activation: With a fuse at 72 ºC

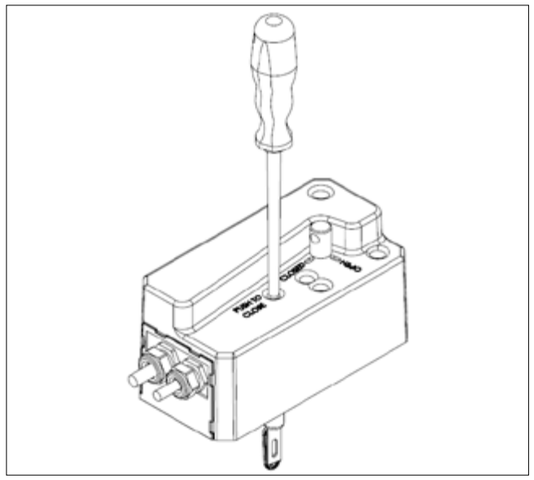
Rearming :
- Manual reset: Turn the screwdriver counter clockwise

Design changes reserved

To open the damper, insert the screwdriver into the shaft (parallel to the ventilation duct axis) and turn counterclock-wise



To close the damper, press the thermal fuse head with a screwdriver



Options:
- For this self-operating version, the double contact – S and the 4-contacts – S2 - are available as an option (factory option or after-sales kit):

The 4-contact – S2 - consists of:
- electric limit switch indicating CLOSED position
- electric limit switch indicating OPEN position
- additional electric limit switch indicating CLOSED position
- additional electric limit switch indicating OPEN

Activation:
- Manual activation: Push the release button.
- Self-operating activation: With a fuse at 72 °C
- Remote activation: By emission or break of current (solenoid with 24/48 V automatic voltage selection)

Rearming:
- Manual reset: Turn the screwdriver counter clockwise

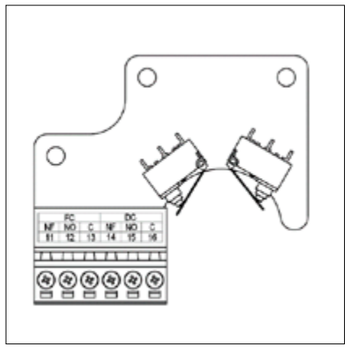
Reminder:
- For this version with remote activation, the double contact S (OPEN / CLOSED) are mounted as standard equipment
- The 4-contact – S2 - are available as an option (factory option or after-sales kit).

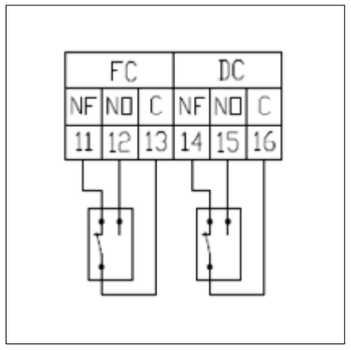
Design changes reserved

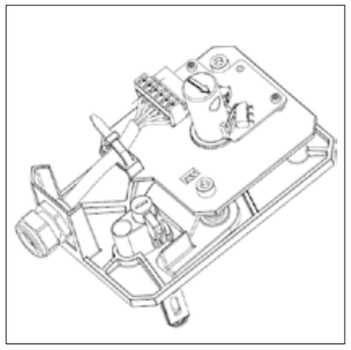
ELECTRICAL CONNECTIONS

MANUAL FUSE ONLY MECHANISM

- Electrical wiring of the S option
  Electronic control board







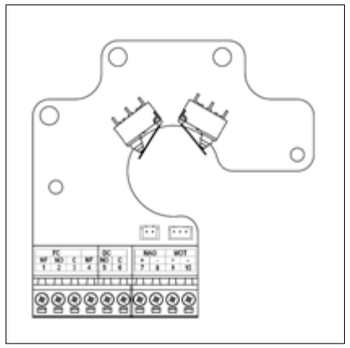
FC = Limit switch - end
DC = Limit switch - start

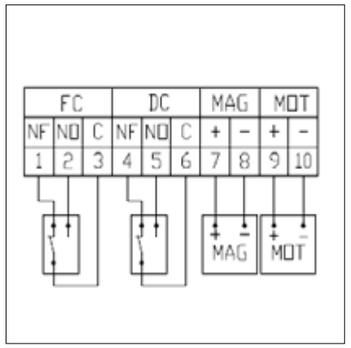
C = common
NO = normally open

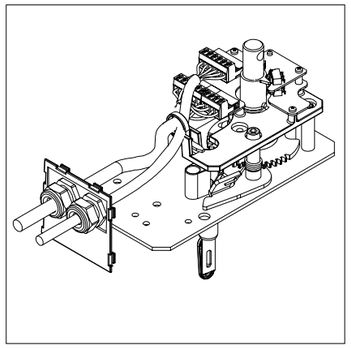
NF = normally closed

MANUAL FUSE ONLY MECHANISM UPGRADABLE TO SOLENOID ACTUATOR

- Electrical wiring of solenoid option
  Main electronic control board of coil supply







MOT = not in use

MAG = solenoid power supply terminals (24 or 48 VDC)

- Electrical wiring of the S option
  Main electronic control board of coil supply

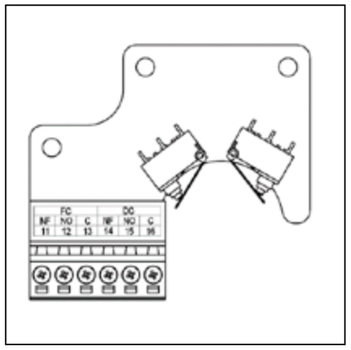
FC = Limit switch - end
DC = Limit switch - start

C = common
NO = normally open

NF = normally closed

Design changes reserved

- Electrical wiring of the S2 option (4 contactors).
  Electronic control board



FC = Limit switch - end
DC = Limit switch - start

C = common
NO = normally open

NF = normally closed

ELECTRICAL SPECIFICATIONS	FD FUSE ONLY	FD FUSE ONLY UPGRADABLE TO SOLENOID ACTUATOR
Nominal voltage	N/A	Solenoid: 24/48 VDC (automatic change on the electronic card)
Power	N/A	Dual voltage SOLENOID: • Break of current: Pnom = 1.6W • Emission of current: Pmax = 3.5 W
Switching capacity	1mA…500mA, 5VDC… 48VDC	1mA…500mA, 5VDC…48VDC
Blade closure time Blade opening time	Spring: 1 second Manual	Spring: 1 second
Degree of protection	IP 42	IP 42

OTHER MECANISMS

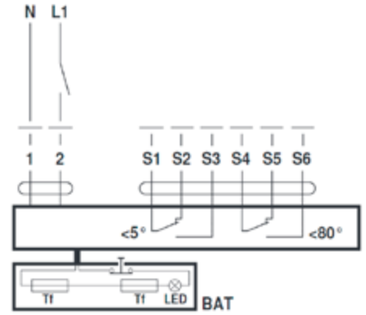
Belimo

Operation

Damper is delivered in closed position. When electric actuator is connected to the power supply damper will open. When the damper reaches the end position (damper open), in which is it blocked, the electromotor will stop. Closing fire damper takes place automatically when a power failure occurs. Thermal tripping device that comes with fire damper causes power circuit break at a temperature of 72 °C (inside or outside duct). If checking is needed for proper functioning of fire damper, pushing the switch on the thermal tripping device will close damper. When switch on tripping device is released, the damper will open.

Damper can be opened without connecting to a voltage with enclosed handle turning in the direction of the arrow on electric actuator (clockwise). Damper can be locked in the desired position by fast turning back handle a quarter of a turn (counterclockwise) for Belimo BF, and by puling brake on Belimo BFL and BFN.
To unlock the electromotor, turn handle clockwise for a quarter of a turn for Belimo BF, or release brake for Belimo BFL and BFN. After release, damper will be closed by return spring. When damper is opened manually, electric actuator will not move the damper into closed position after power failure.

Wiring diagram



1	negative (direct-current) or neutral (alternating current)
2	positive (direct-current) or faze (alternating current)
S1	common micro switch closed damper
S2	normally closed micro switch closed damper
S3	normally open micro switch closed damper
S4	common micro switch open damper
S5	normally closed micro switch open damper
S6	normally open micro switch open damper
Tf1	temperature sensor on the outer side of the duct (ambienttemperature) max. 72°C
Tf2	temperature sensor on the inner side of the duct (temperature in the duct) max. 72°C
Tf3	temperature sensor on the inner side of the duct (temperature in the duct) max. 72°C

Type of Belimo actuator		BFL24-T	BFN24-T	BFL230-T	BFN230-T	BF24-T	BF230-T
Nominal voltage / power consumption	voltage	AC/DC 24V, 50/60Hz	AC 24V, 50/60Hz	AC 230V, 50/60Hz	AC 230V, 50/60Hz	AC/DC 24V, 50/60Hz	AC 230V, 50/60Hz
	opening	2,5 W	4 W	3,5 W	5 W	7 W	8.5 W
	holding	0,8 W	1,4 W	1,1 W	2,1 W	2 W	3 W
	for wire sizing	4 VA	6 VA	6,5 VA	10 VA	10 VA	11 VA
End switch		1 mA...3 A (0,5 A), DC 5 V...AC 250V	1 mA...3 A (0.5 A), DC 5 V...AC 250 V	1 mA...3 A (0.5 A), DC 5 V...AC 250 V	1 mA...3 A (0.5 A), DC 5 V...AC 250 V	1 mA...6 A (3 A), DC 5 V... AC 250 V	1 mA...3 A (0.5 A), DC 5 V...AC 250 V
Running time	motor	<60 s	<60 s	<60 s	<60 s	<120 s	<120 s
	spring-return	~20 s	~20 s	~20 s	~20 s	~16 s	~16 s
Ambient temperature range		min. -30°C, max. 50°C					

SCHISCHEK ExMax

Operation

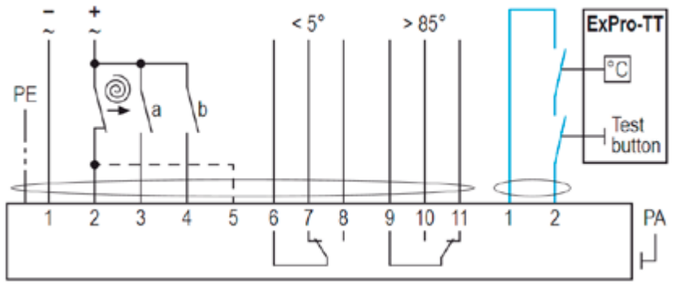
Damper is delivered in closed position. When electric actuator is connected to the power supply damper will open. When the damper reaches the end position (damper open), in which is it blocked, the electromotor will stop. Closing fire damper takes place automatically when a power failure occurs. Thermal tripping device that comes with fire damper causes power circuit break at a temperature of 72 °C (inside or outside duct). If checking is needed for proper functioning of fire damper, pushing the switch on the thermal tripping device will close damper. When switch on tripping device is released, the damper will open.

Damper can be opened without connecting to a voltage with enclosed Allen key, by turning in the direction of the arrow on electric actuator (clockwise). After release of Allen key, damper will go to closed position.
Type Examination Certificate Number:
EXA 14 ATEX0064X
Equippment complies with the essential health and safety requirements relating to the design and construction of equippment intended to use in potentially explosive atmospheres given in annex II of the directive 94/9/EC.

II - 2G - IIC - T6

II - 2D - IIC - T80°

Wiring diagram



Design changes reserved

EVOLUTION / SERVICE KITS

	Designation	Code	
Fuse only mechanism	**Fuse kit**	FD-THERM-72	
	Double contact S kit	FD-S-KIT	
Upgradeable to solenoid	**4-contacts S2 kit**	FD-DS-KIT	
	Solenoid current emission kit	FD-EMS-KIT	
	Solenoid current break kit	FD-EMP-KIT	

MAINTENANCE

- Provide at least one annual check of the damper
- After each intervention, provide a systematic cleaning of dust and especially the solenoid and its movable plate
- Check the if the electrical terminals are tightened

Design changes reserved

8/S1
v 3.3 (en)

FLOOR CONVECTORS

PKN, PKF, PKH, PKH-4C

klimaoprema

TABLE OF CONTENTS

Definition of symbols

V	[m³/h]	Air flow rate	L	[m]	Window length
v_L	[m/s]	Cold jet velocity	t_{UL}	[°C]	Inlet air temperature
Δt_L	[°C]	Temperature difference	t_{IZ}	[°C]	Outlet air temperature
K	[W/m²K]	Heat coefficient	Q_H	[W]	Heating output
Q	[W]	Heat output	Q_C	[W]	Cooling output
L_{WA}	[dB(A)]	Sound power level	Q_S	[W]	Sensible heat output
c_L	[kJ/kgK]	Specific heat coefficient of cold air	U	[V]	Voltage
b	[m]	Window width	I	[A]	Current
h	[m]	Window height	P	[W]	Electric motor rated power
ρ	[kg/m³]	Air density	f	[Hz]	Frequency

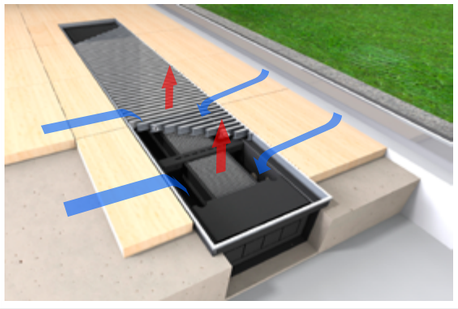
Design changes reserved

Application

- Perfect for use in areas with high interior design requirements and spaces with large glass surfaces.
- Attractive solution used both as a primary heating or secondary cooling source depending on application of space.

Features

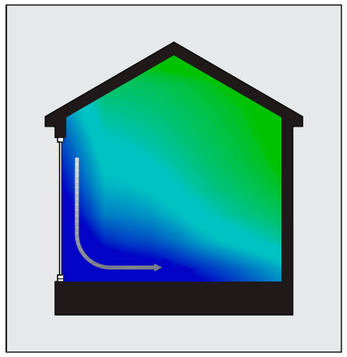
- Steel sheet casing powder coated in black color - RAL9005. Optional external 6 mm tick insulation.
- Cu/Al heat exchanger with profiled fins and 1/2” internal thread
- connections; each tested on 25 bar max pressure.
- Low noise tangential fans: 230V AC or 24V EC
- Wide range of attractive cover grilles made of anodized aluminium, wood or stainless steel in longitudinal or transverse roll-up design.
- Modular design allows easy connection and section adjustments
- Variety of accessories, regulation and inactive connection parts.



Advantages

Intersecting cold air stream

In rooms with large glass surfaces, cold air downwash is present from glass surfaces towards the rest of the room. Floor convectors intersect the cold air stream, creating a warm barrier between cold glass surface and the rest of the room. It improves the room comfort and prevents fogging of the glass surfaces.

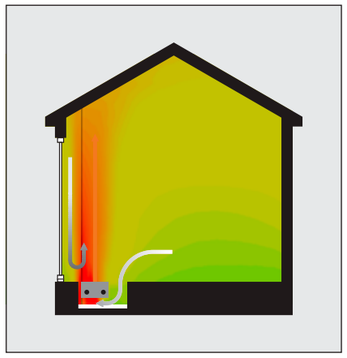


Cost effective

As an addition to floor heating system, floor convectors are great solution for short-term heating requirements during transitional periods between seasons.
In this way heating is only delivered when neccesary, avoiding unwanted heat transfer and saving money.

Instant heating

Heat exchangers provide rapid heat transfer due to large heat exchange surface. It is especially benificial in combination with slow heating systems.



High heat output at low input water temperatures

In heating systems with low water temperatures, floor convectors with forced convection are used. The principle of forced convection greatly increases heat output.

Attractive design

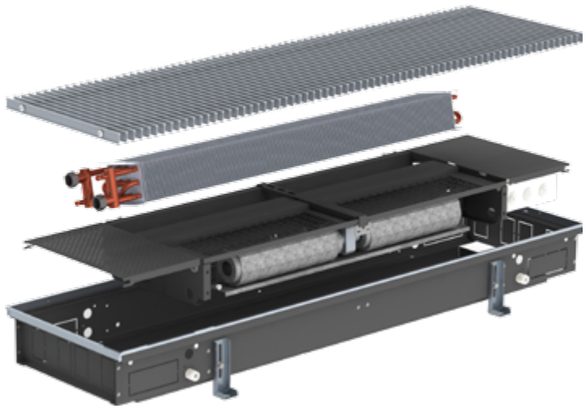
Compared to clasical heating systems, floor convectors are not using up usefull space nor interfering with room arrangement.

Design changes reserved

PKN | NATURAL CONVECTION HEATING

Natural convection is used for heat transfer from heating element to the surrounding air. Cold air is heavier and falls to the bottom of the casing. Air is then heated by a heat exchanger. As it gets warmer, it rises, and leaves the room for new cold air to fill the casing.

Length: 1000 to 3000 mm
Height: 70,110 or 140 mm
Heat output: 66 - 2570 W
Heat exchanger: 1-row, 2-row, 3-row

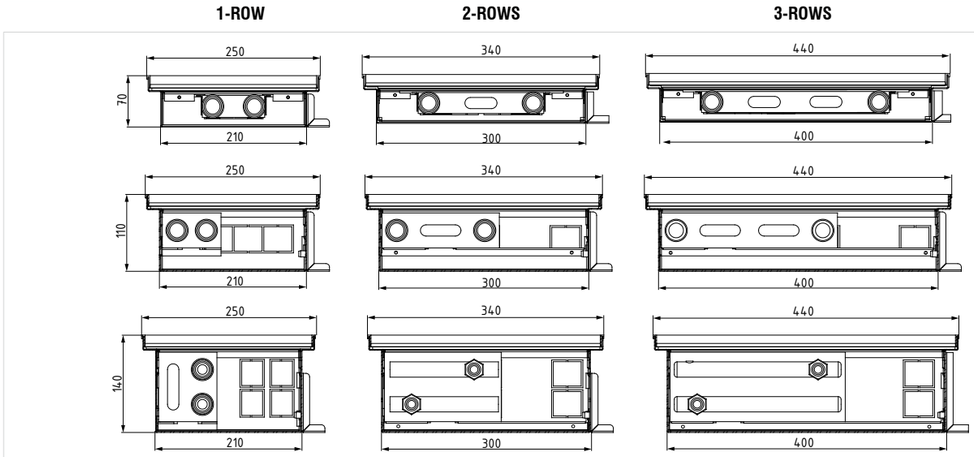


Heat output [W] - PKN

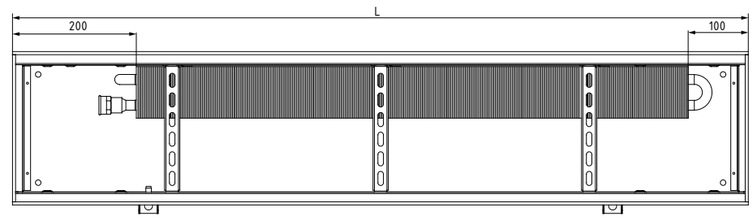
Length [mm]	Temperature regime	1-row			2-row			3-row		
		Height [mm]								
		70	110	140	70	110	140	70	110	140
1000	90/70/20 °C	198	280	329	351	460	532	494	632	831
	75/65/20 °C	153	223	256	279	376	427	398	522	671
	55/45/20 °C	66	102	111	129	186	199	189	264	323
1200	90/70/20 °C	257	349	412	437	571	667	619	781	1021
	75/65/20 °C	198	278	321	347	467	535	498	645	825
	55/45/20 °C	85	128	140	160	230	249	236	326	398
1400	90/70/20 °C	314	421	497	523	682	800	744	928	1213
	75/65/20 °C	242	335	387	416	558	642	599	766	980
	55/45/20 °C	104	154	169	192	275	299	284	387	473
1600	90/70/20 °C	372	492	582	608	893	936	870	1077	1405
	75/65/20 °C	287	392	453	483	731	751	700	889	1135
	55/45/20 °C	123	180	197	223	360	350	332	449	547
1800	90/70/20 °C	430	561	668	695	903	1071	993	1223	1595
	75/65/20 °C	332	447	520	552	739	859	799	1010	1289
	55/45/20 °C	143	205	226	255	364	400	379	511	622
2000	90/70/20 °C	487	632	751	781	1013	1204	1118	1370	1789
	75/65/20 °C	376	503	585	621	829	966	900	1131	1445
	55/45/20 °C	161	231	255	287	409	450	427	572	697
2200	90/70/20 °C	545	702	836	864	1124	1340	1242	1519	1980
	75/65/20 °C	421	559	651	687	920	1075	1000	1254	1600
	55/45/20 °C	180	257	284	317	453	501	474	634	771
2400	90/70/20 °C	602	774	920	951	1234	1475	1367	1665	2172
	75/65/20 °C	465	616	717	7556	1010	1183	1100	1375	1755
	55/45/20 °C	199	283	312	349	498	551	521	695	846
2600	90/70/20 °C	662	845	1005	1039	1346	1608	1491	1814	2363
	75/65/20 °C	511	673	783	826	1101	1290	1200	1498	1909
	55/45/20 °C	219	309	341	381	543	601	569	757	921
2800	90/70/20 °C	718	913	1090	1122	1458	1744	1615	1961	2555
	75/65/20 °C	554	727	849	892	1193	1399	1300	1619	2064
	55/45/20 °C	238	334	370	412	588	652	616	819	955
3000	90/70/20 °C	777	986	1178	1208	1569	1881	1740	2107	2570
	75/65/20 °C	600	785	918	960	1284	1509	1401	1740	2076
	55/45/20 °C	257	360	400	444	633	703	664	880	1001

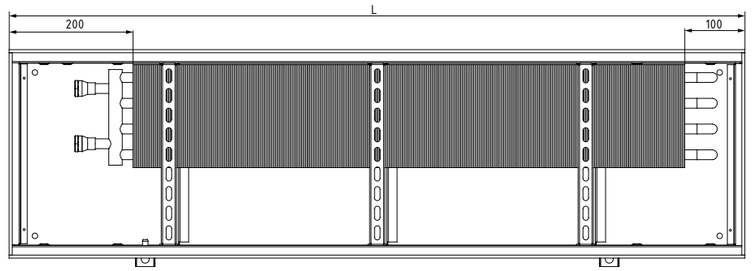
Design changes reserved

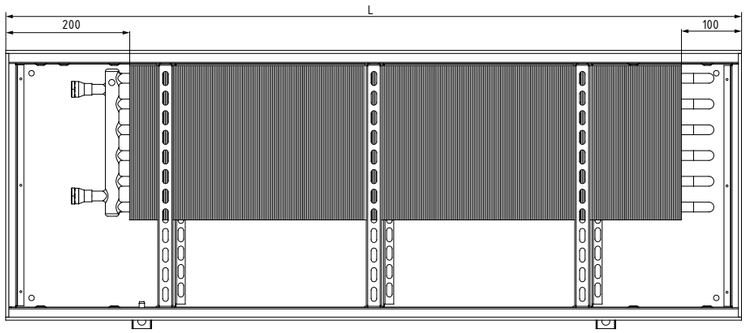
Dimensions - PKN



*water connections R1/2"







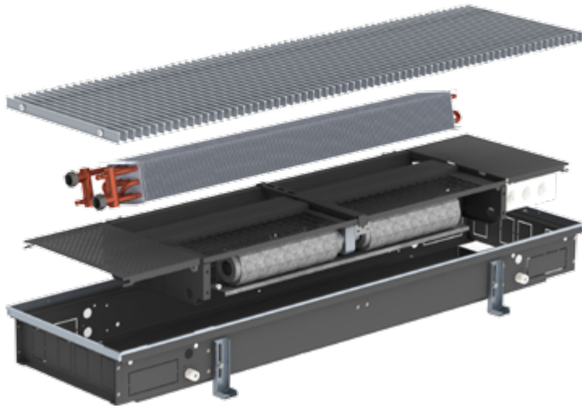
Design changes reserved

PKF | FORCED CONVECTION HEATING

Forced convection is achieved by using a built in fans to increase the airflow over heating surfaces, thus greatly improving heat transfer efficiency.

Length: 1000 to 3000 mm
Height: 110 or 140 mm
Heat output: 57 - 7360 W
Heat exchanger: 1-row, 2-row, 3-row

Fans / Controls
- 230 V AC - 3 speed transformer
- 230 V AC - control 0-10 V
- 24 V EC - control 0-10 V
- 12 V AC - on request



Heat output [W] - PKF-110

Length [mm]	LPHW	1-row				2-row					3-row		
		Fan speed											
		OFF	MIN	MED	MAX	OFF	MIN	MED	MAX	OFF	MIN	MED	MAX
1 fan													
1000	90/70/20 °C	148	575	762	1080	248	846	1130	1645	365	985	1412	1994
	75/65/20 °C	119	488	656	933	197	723	1020	1501	293	834	1303	1829
	55/45/20 °C	57	267	372	540	92	397	532	809	135	456	666	967
1200	90/70/20 °C	179	686	894	1235	318	1027	1343	1915	429	1329	1759	2416
	75/65/20 °C	144	583	770	1067	252	878	1211	1749	345	1128	1618	2207
	55/45/20 °C	69	319	436	618	117	482	631	942	159	617	827	1167
1400	90/70/20 °C	233	739	946	1289	408	1112	1428	2003	549	1444	1869	2528
	75/65/20 °C	188	628	816	1115	324	954	1292	1832	441	1228	1733	2317
	55/45/20 °C	90	343	462	645	151	523	673	987	203	672	886	1225
1600	90/70/20 °C	286	788	994	1339	503	1195	1515	2088	666	1556	1985	2640
	75/65/20 °C	231	670	856	1157	399	1033	1297	1819	535	1333	1698	2275
	55/45/20 °C	110	366	485	670	185	567	716	1034	246	729	940	1285
2 fans													
1800	90/70/20 °C	308	1320	1736	2419	548	1969	2602	3748	744	2547	3411	4720
	75/65/20 °C	248	1122	1595	1495	435	1683	2344	3418	598	2161	3143	4310
	55/45/20 °C	118	613	848	1210	202	924	1221	184	275	1182	1607	2279
2000	90/70/20 °C	361	1371	1789	2473	642	2056	2688	3832	869	2654	3523	4835
	75/65/20 °C	291	1166	1541	2137	509	1758	2419	3499	698	2259	3249	4417
	55/45/20 °C	139	637	873	1236	237	965	1260	1885	321	1235	1661	2335
2200	90/70/20 °C	415	1423	1842	2519	734	2137	2771	3915	979	2775	3632	4945
	75/65/20 °C	335	1210	1586	2182	582	1832	2493	3579	787	2357	3355	4523
	55/45/20 °C	160	662	899	1263	270	1005	1299	1928	362	1289	1716	2392
2400	90/70/20 °C	469	1474	1893	2573	824	2226	2863	4006	1101	2887	3748	5057
	75/65/20 °C	378	1253	1630	2226	654	1907	2436	3469	885	2446	3198	4335
	55/45/20 °C	180	685	924	1288	304	1046	1346	1973	407	1338	1770	2449
3 fans													
2600	90/70/20 °C	490	2004	2631	3654	871	2997	3953	5657	1175	3878	5172	7140
	75/65/20 °C	395	1704	2266	3159	691	2562	3555	5167	944	3290	4766	6517
	55/45/20 °C	188	932	1284	1828	321	1406	1852	2784	434	1799	2437	3446
2800	90/70/20 °C	542	2056	2684	3707	963	3083	4030	5752	1292	3992	5284	7252
	75/65/20 °C	437	1771	2311	3204	764	2636	3634	5247	1038	3388	4872	6623
	55/45/20 °C	208	969	1310	1854	355	1446	1894	2827	478	1853	2492	3502
3000	90/70/20 °C	596	2115	2735	3760	1053	3170	4115	5844	1413	4106	5397	7360
	75/65/20 °C	481	1838	2355	3250	835	2710	3710	5328	1135	3485	4979	6730
	55/45/20 °C	229	1005	1335	1880	388	1487	1935	2871	522	1906	2546	3559

Design changes reserved

FLOOR CONVECTORS - PKN, PKF

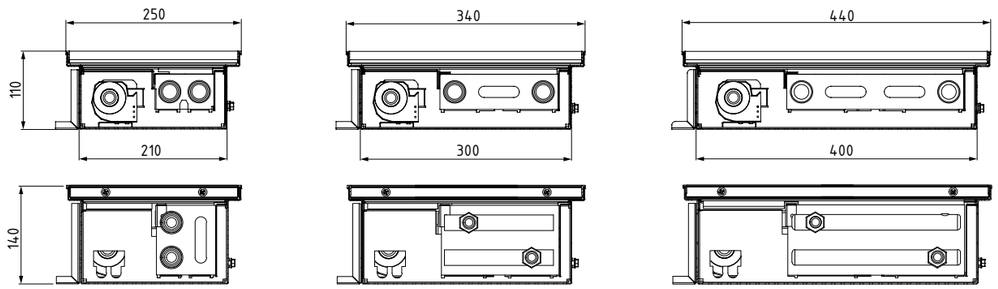
Heat output [W] - PKF-140

Length [mm]	LPHW	1-row				2-row					3-row		
		Fan speed											
		OFF	MIN	MED	MAX	OFF	MIN	MED	MAX	OFF	MIN	MED	MAX
1 fan													
1000	90/70/20 °C	187	693	1066	1532	302	1145	1630	2315	409	1568	1418	1987
	75/65/20 °C	151	586	920	1310	240	965	1388	1986	322	1309	1203	1708
	55/45/20 °C	72	321	530	735	112	520	771	1121	141	684	662	964
1200	90/70/20 °C	257	1042	1347	1834	420	1378	1772	2400	668	1714	2163	2884
	75/65/20 °C	207	881	1162	1568	334	1161	1509	2059	526	1431	1836	2479
	55/45/20 °C	99	482	669	880	155	626	839	1162	231	748	1010	1399
1400	90/70/20 °C	317	1097	1400	1896	515	1467	1864	2492	810	1847	2297	3015
	75/65/20 °C	256	928	1208	1621	409	1236	1588	2138	638	1542	1949	2592
	55/45/20 °C	122	508	696	910	190	666	883	1207	280	806	1072	1463
1600	90/70/20 °C	370	1157	1458	1944	610	1556	1951	2578	941	1984	2417	3145
	75/65/20 °C	298	978	1258	1662	485	1311	1662	2212	741	1656	2051	2703
	55/45/20 °C	142	535	725	933	225	707	924	1248	326	866	1128	1525
2 fans													
1800	90/70/20 °C	445	1606	2077	2803	725	2151	2748	3686	1129	2703	3376	4470
	75/65/20 °C	359	1358	1792	2396	576	1812	2341	3163	889	2257	2865	3842
	55/45/20 °C	171	743	1032	1345	268	997	1301	1785	391	1180	1576	2168
2000	90/70/20 °C	521	2106	2694	3672	839	2747	3527	4789	1327	3420	4211	5435
	75/65/20 °C	420	1781	2324	3139	667	2314	3004	4109	1045	2855	3659	4672
	55/45/20 °C	200	975	1339	1762	310	1247	1669	2319	459	1492	2013	2637
2200	90/70/20 °C	578	2152	2746	3722	925	2838	3629	4876	1470	3559	4468	5916
	75/65/20 °C	466	1820	2369	3282	735	2391	3091	4184	1158	2971	3792	5085
	55/45/20 °C	222	996	1364	1787	342	1289	1718	2361	509	1553	2086	2870
2400	90/70/20 °C	631	2206	2796	3783	1029	2929	3716	4974	1610	3695	4588	6044
	75/65/20 °C	509	1865	2412	3234	818	2468	3165	4268	1268	3085	3894	5195
	55/45/20 °C	243	1021	1389	1816	380	1330	1759	2409	557	1613	2142	2932
3 fans													
2600	90/70/20 °C	708	2679	3421	4659	1134	3515	4515	6083	1801	4414	5536	7362
	75/65/20 °C	571	2265	2951	3983	901	2961	3846	5219	1418	3685	4698	6328
	55/45/20 °C	272	1240	1700	2236	419	1596	2137	2945	623	1926	2584	3571
2800	90/70/20 °C	782	3156	4040	5522	1254	4116	5297	7192	1978	5128	6487	8681
	75/65/20 °C	631	2669	3485	4721	997	3468	4512	6171	1558	4281	5505	7462
	55/45/20 °C	301	1461	2007	2651	463	1869	2508	3482	685	2238	3028	4211
3000	90/70/20 °C	836	3191	4099	5572	1053	3170	4115	5844	2118	5273	6601	8809
	75/65/20 °C	674	2696	3536	4763	1078	3546	4588	6239	1668	4402	5602	7572
	55/45/20 °C	321	1477	2037	2674	1359	4209	5386	7272	733	2301	3082	4273

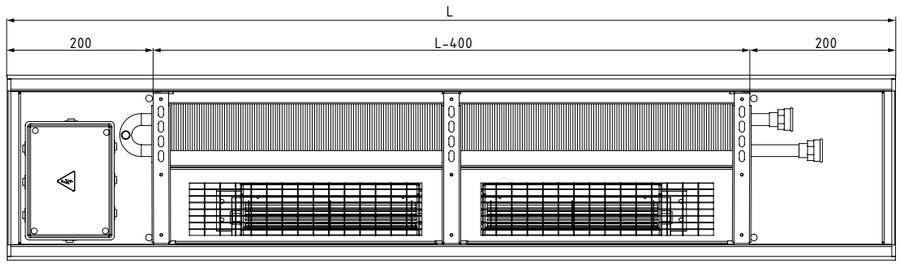
Design changes reserved

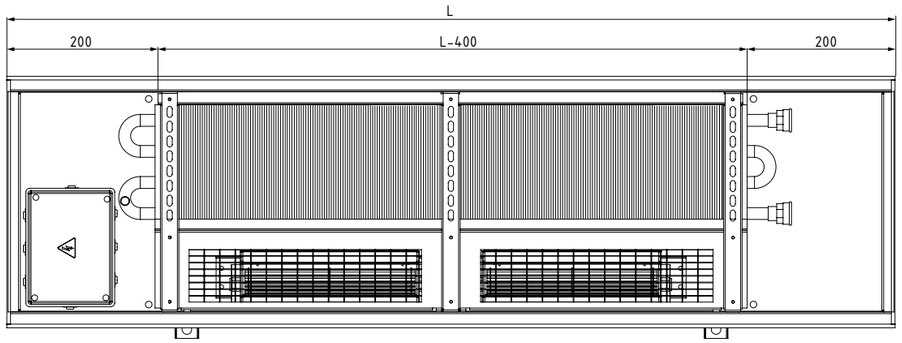
Dimensions - PKF

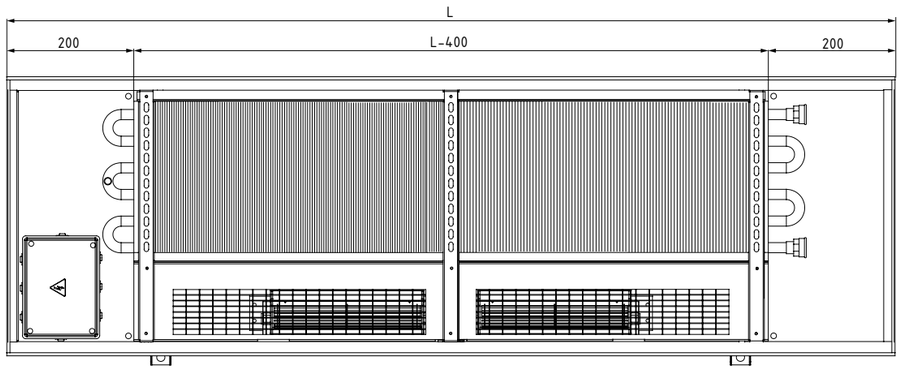
1-ROW **2-ROWS** **3-ROWS**



*water connections R1/2”







Design changes reserved

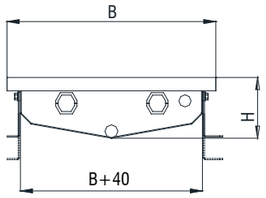
PKV | FOR DAMP LOCATIONS

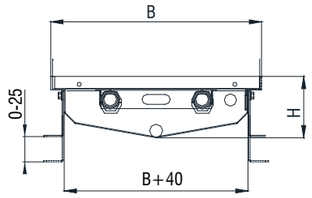
- Version for heating of damp areas (swimming pools, winter gardens etc.)
- Natural or forced convection
- Special 12V crossflow fans (power supply unit has to be provided outside of the floor convector)
- Unique casing design with water drain and dividing rack

Length: 1000 to 3000 mm
Height: 110 or 140 mm
Heat output:
Heat exchanger: 1-row, 2-row, 3-row

Fans / Controls
12 V AC

PKV-N (Natural convection)

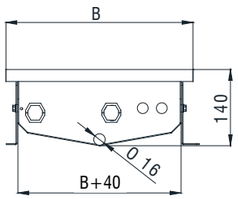


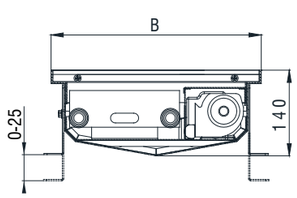


connection - R 1/2”

Heat exchanger	B [mm]	H [mm]
1-row	250	100
		140
		170
2-rows	340	100
		140
		170
3-rows	440	100
		140
		170

PKV-F (Forced convection)





connection - R 1/2”

Heat exchanger	B [mm]	H [mm]
1-row	250	140
2-row	340	140
3-row	440	140

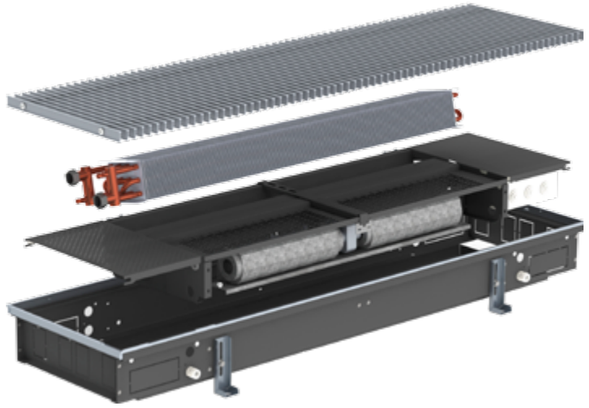
Design changes reserved

PKH | HEATING or COOLING

- 2-pipe system for heating or cooling
- Condensate drain included

Length: 1200 to 3000 mm
Height: 130 or 150 mm
Heat output: 1105 - 13006 W
Cooling output: 406 - 4757 W

Fans / Controls
230 V AC - 3 speed transformer
230 V AC - control 0-10 V
24 V EC - control 0-10 V
12 V AC - on request

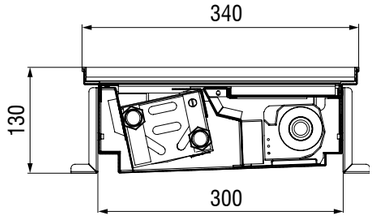


		PKH-130						PKH-150					
		LPHW			LPCW			LPHW			LPCW		
		90/70/20 °C	75/65/20 °C	55/45/20 °C	6/12/26 °C	10/15/26 °C	12/16/26 °C	90/70/20 °C	75/65/20 °C	55/45/20 °C	6/12/26 °C	10/15/26 °C	12/16/26 °C
L = 1200 mm (1 fan)								**L = 1200 mm (1 fan)**					
Fan speed	MIN	1706	1501	852	496	366	321	2662	2251	1355	721	516	461
	MED	2358	2063	1154	534	459	409	3521	2933	1759	921	653	632
	MAX	3377	2926	1650	760	571	527	4474	3849	2287	1205	900	816
L = 2000 mm (2 fans)								**L = 2000 mm (2 fans)**					
Fan speed	MIN	3446	3032	1721	1002	739	648	5377	4547	2737	1456	1042	931
	MED	4763	4167	2331	1079	927	826	7112	5925	3553	1860	1319	1277
	MAX	6754	5852	3300	1657	1245	1149	8948	7698	4574	2627	1962	1779
L = 2600 mm (3 fans)								**L = 2700 mm (3 fans)**					
Fan speed	MIN	4606	4053	2300	1339	988	867	7187	6078	3659	1947	1393	1245
	MED	6367	5570	3116	1442	1239	1104	9507	7919	4749	2487	1763	1706
	MAX	9118	7900	4455	2052	1542	1423	12080	10392	6175	3254	2430	2203
L = 3000 mm (3 fans)								**L = 3000 mm (3 fans)**					
Fan speed	MIN	4975	4377	2484	1446	1067	936	7762	6564	3951	2102	1505	1344
	MED	6876	6016	3365	1557	1338	1193	10267	8553	5129	2686	1904	1843
	MAX	9847	8532	4811	2216	1665	1537	13046	11224	6669	3514	2624	2379

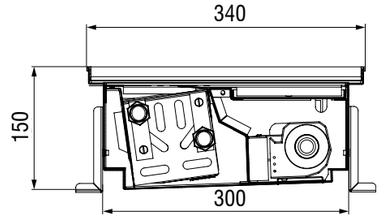
Design changes reserved

Dimensions - PKH

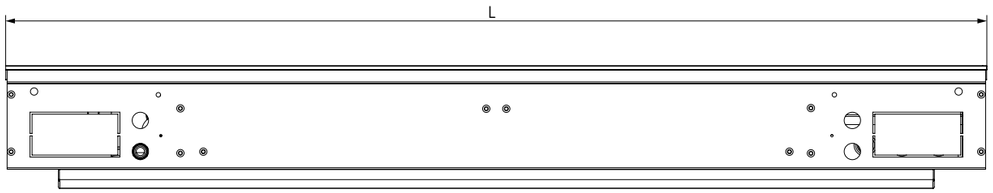
PKH-130



PKH-150



*water connections R1/2"



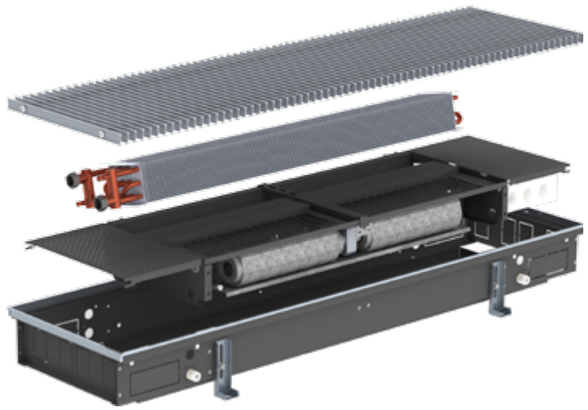
Design changes reserved

PKH-4C | HEATING and/or COOLING

- 4-pipe system for heating and/or cooling
- Condensate drain included

Length: 1200 to 3000 mm
Height: 130 or 150 mm
Heat output: 941 - 9181 W
Cooling output: 440 - 4439 W

Fans / Controls
230 V AC - 3 speed transformer
230 V AC - control 0-10 V
24 V EC - control 0-10 V
12 V AC - on request



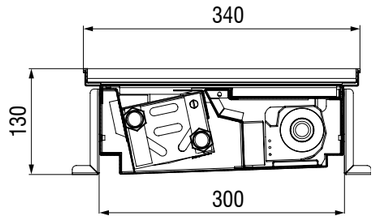
		PKH-4C-130						PKH-4C-150					
		LPHW			LPCW			LPHW			LPCW		
		90/70/20 °C	75/65/20 °C	55/45/20 °C	6/12/26 °C	10/15/26 °C	12/16/26 °C	90/70/20 °C	75/65/20 °C	55/45/20 °C	6/12/26 °C	10/15/26 °C	12/16/26 °C
L = 1200 mm (1 fan)								**L = 1200 mm (1 fan)**					
Fan speed	MIN	1433	1296	723	474	325	281	1739	1586	613	652	449	393
	MED	1915	1620	933	528	403	340	2199	1906	865	779	551	487
	MAX	2401	2100	1162	661	489	413	2600	2287	1133	1045	720	670
L = 2000 mm (2 fans)								**L = 2000 mm (2 fans)**					
Fan speed	MIN	2895	2618	1460	957	657	568	3513	3204	1238	1317	907	794
	MED	3868	3272	1885	1067	814	687	4442	3850	1747	1574	1113	984
	MAX	4802	4200	2324	1441	1066	900	5200	4574	2266	2278	1570	1461
L = 2600 mm (3 fans)								**L = 2700 mm (3 fans)**					
Fan speed	MIN	3869	3499	1952	1280	878	759	4695	4282	1655	1760	1212	1061
	MED	5171	4374	2519	1426	1088	918	5937	5146	2336	2103	1488	1315
	MAX	6483	5670	3137	1785	1320	1115	7020	6175	3059	2822	1944	1809
L = 3000 mm (3 fans)								**L = 3000 mm (3 fans)**					
Fan speed	MIN	4179	3779	2108	1382	948	819	5071	4625	1788	1901	1309	1146
	MED	5584	4724	2721	1540	1175	991	6412	5558	2522	2272	1607	1420
	MAX	7001	6124	3388	1927	1426	1204	7582	6669	3304	3047	2100	1954

Design changes reserved

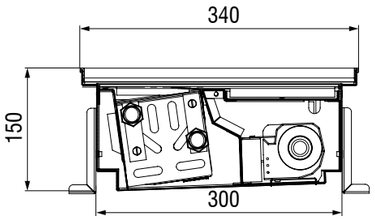
FLOOR CONVECTORS - PKN, PKF

Dimensions - PKH-4C

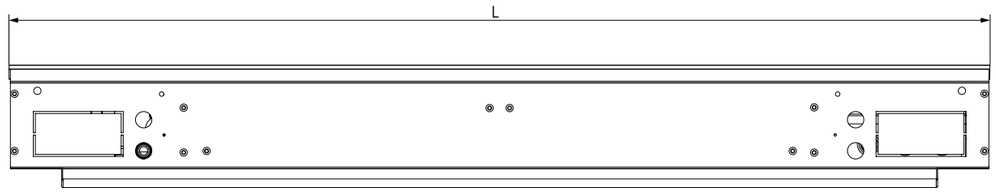
PKH-4C-130



PKH-4C-150



*water connections R1/2”

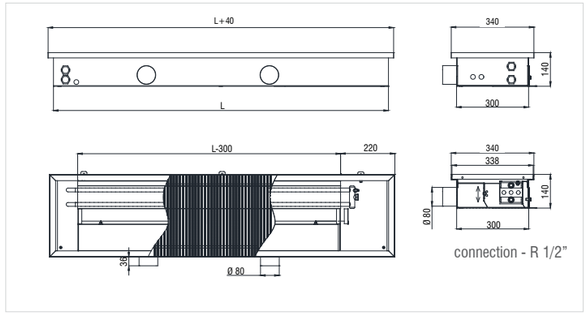


Design changes reserved

OPTIONS

Fresh air supply - PKS

- fresh air supply connection with a flow damper.

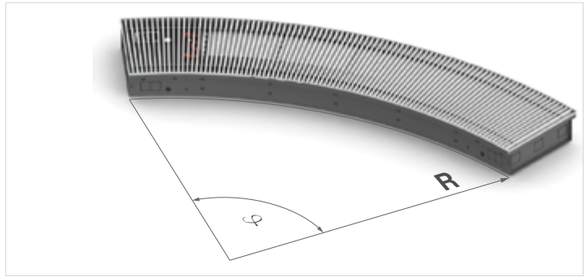


EBM EC - electronically controled motors

- electronic control
- up to 30% more efficient than conventional motors
- low noise levels
- remote control via ModBus

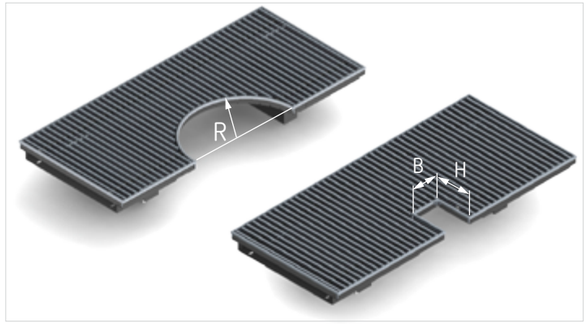
Curved section (QL-518)

Ordering key:	QL-518	110	2	1000	90
Convector height **70, 110, 130, 140, 150**					
No. of rows **1, 2, 3**					
Radius **R**					
Angle **φ**					



Empty section with round/rectangular cut-out (QL-517)

Ordering key:	QL-517	110	2	80x120
Convector height **70, 110, 130, 140, 150**				
No. of rows **1, 2, 3**				
Cut-out dimensions **R / BxH**				



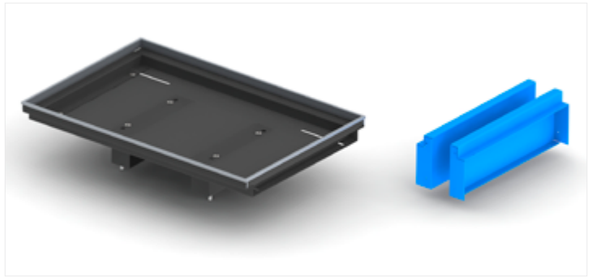
Design changes reserved

OPTIONS

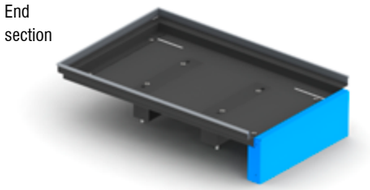
Connecting section QL-512

- Universal connection module
- Fully costumizable module (4 different possibilities)
- All modules can be shortened on site up to 100mm
- Available lengths: 250, 500 and 1000 mm
- Option: load bearing cover (QL-515)

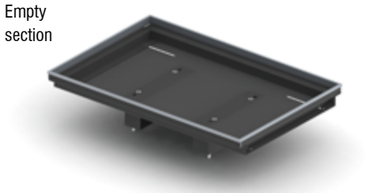
Ordering key:	QL-512	110	2	R
Convector height **70, 110, 130, 140, 150**				
No. of rows **1, 2, 3**				
Grille type (**R** - roll-up / **F** - linear)				



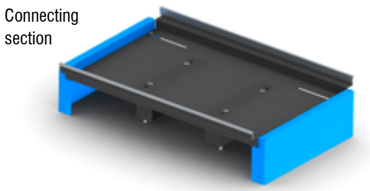
End section



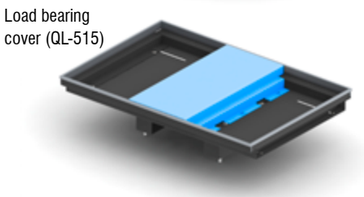
Empty section



Connecting section

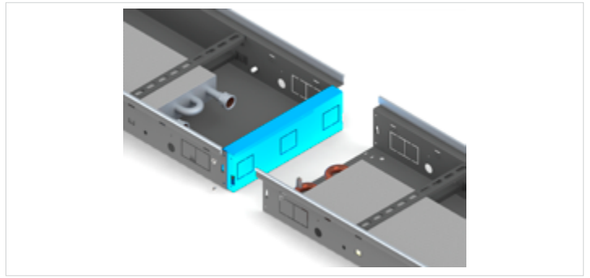


Load bearing cover (QL-515)



Connection piece (QL-516)

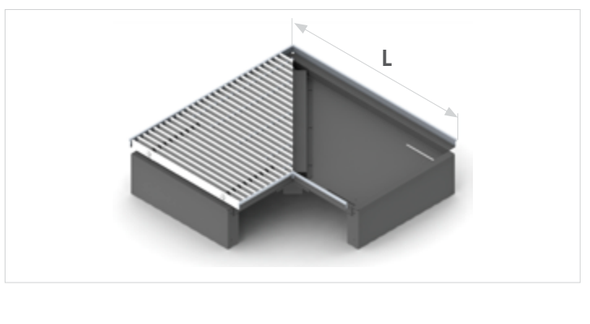
Ordering key:	QL-516	110	2
Convector height **70, 110, 130, 140, 150**			
No. of rows **1, 2, 3**			



Corner connection (QL-519 roll up grille / QL-520 linear grille)

Ordering key:	QL-519	110	2
Convector height **70, 110, 130, 140, 150**			
No. of rows **1, 2, 3**			

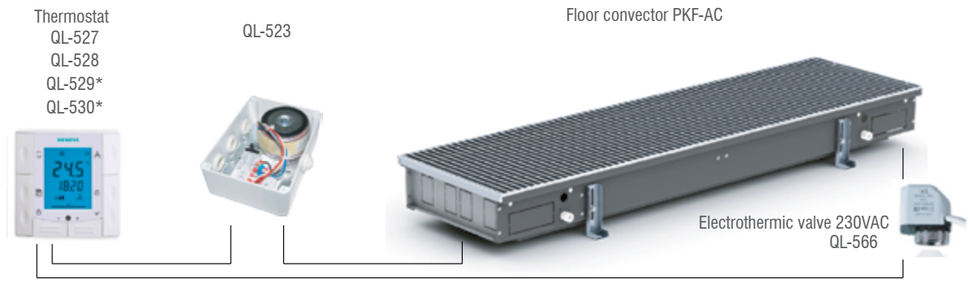
No. of rows	1-row	2-row	3-row
L	300	400	500



Design changes reserved

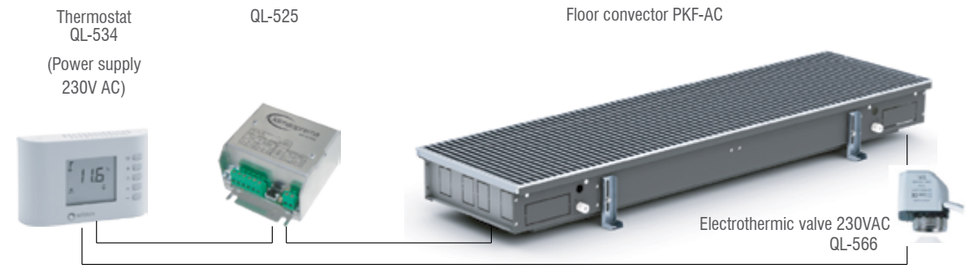
CONTROL OPTIONS

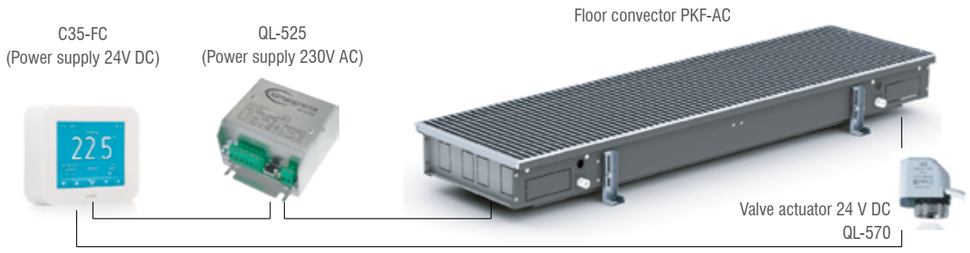
Standard control - 230V (3-speed regulation)



* Relay plate must be included

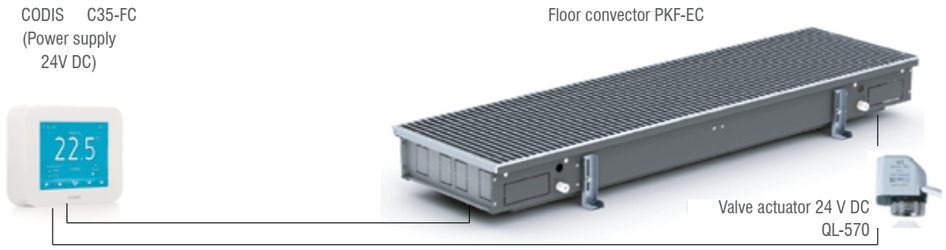
Option - 230V (0-10V regulation)





**Power supply 24V DC should be provided externally

Option - 24V EC (0-10V regulation)



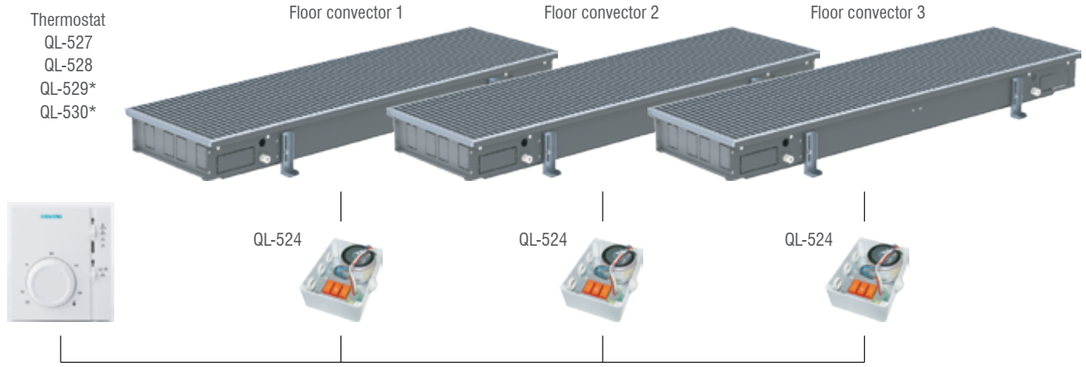
**Power supply 24V DC should be provided externally

Design changes reserved

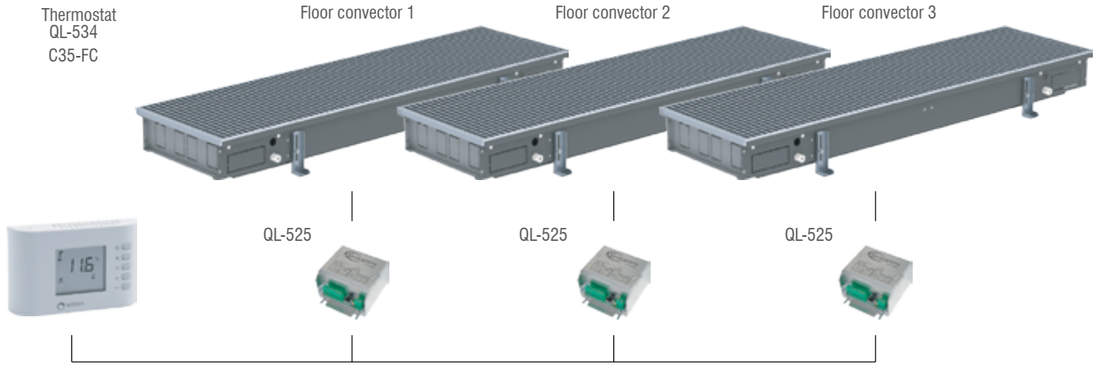
Connecting multiple convectors with one thermostat

- Relay plate QL-524
- Number of relay plates is equal to number of autotransformers that control the group of convectors
- Power supply, motors and electrothermic valves are connected to relay plate
- Relay plate is placed together with the autotransformer in the junction box
- If thermostats QL-529 or QL-530 are used, connection of the relay plate is neccesary

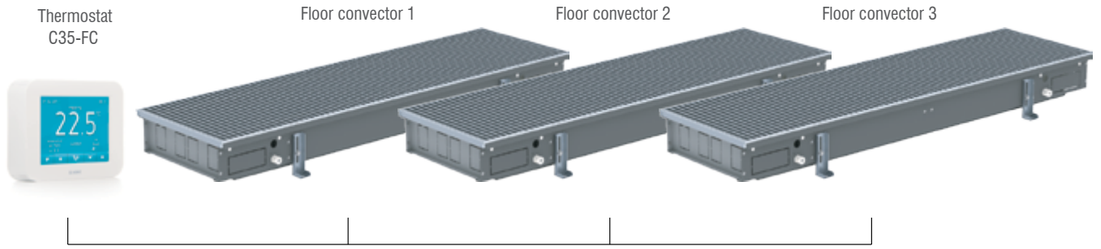
230V AC (3-speed regulation)



230V AC (0-10V regulation)



24V EC (0-10V regulation)



Design changes reserved

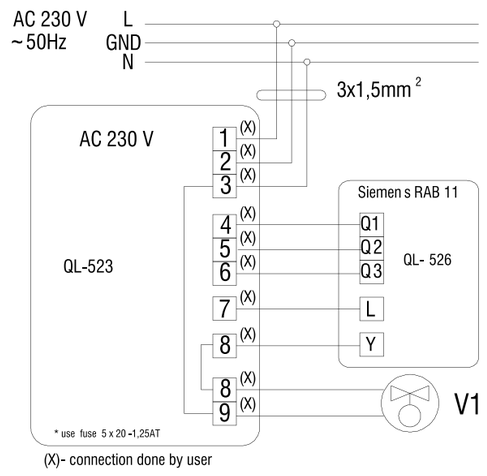
WIRING DIAGRAMS

3 speed regulation - single convector
Manual thermostat
exp. Siemens RAB 11

1 - Power supply (phase)
2 - Power supply (neutral)
3 - Ground
4 - MAX -fan speed
5 - MED - fan speed
6 - MIN - fan speed

7 - power supply (phase)

8 - Zone valve heating
9 - Power supply (neutral)

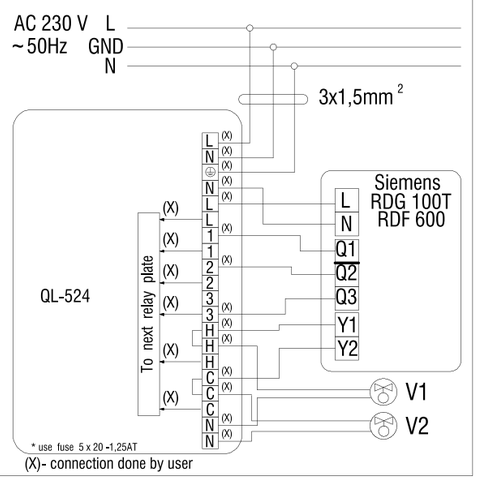


(X)- connection done by user

3 speed regulation - single/multiple convectors
Digital thermostat
exp. Siemens RDG100T

L - Supply (phase)
N - Supply (neutral)
⏚ - Ground
3 - MAX -fan speed
2 - MED - fan speed
1 - MIN - fan speed

H - Zone valve heating
C - Zone valve cooling
N - Neutral, valve



(X)- connection done by user

Design changes reserved

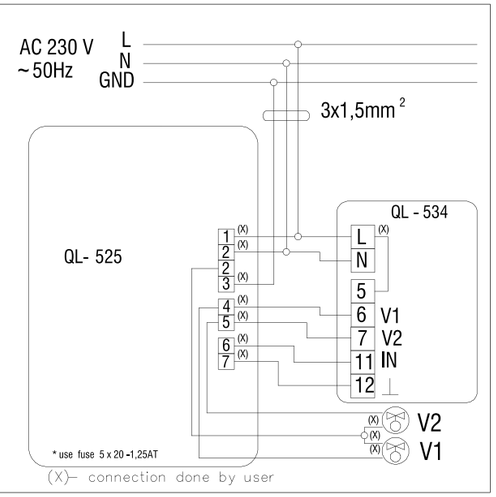
FLOOR CONVECTORS - PKN, PKF

WIRING DIAGRAMS

0-10V regulation - single/multiple convectors
Digital thermostat
exp. Seitron TFZ01M

1 - Power supply (phas e)
2 - Power supply (neutral)
3 - Ground
4 - Zone valve heating
5 - Zone valve cooling

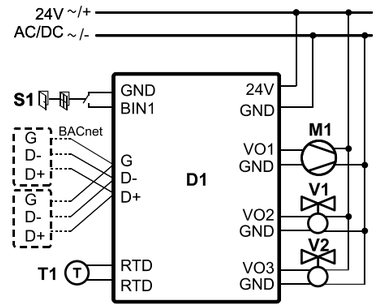
6 - Control signal input
7 - Control signal reference



(X)- connection done by user

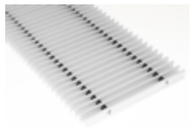
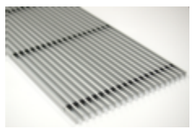
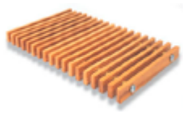
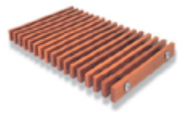
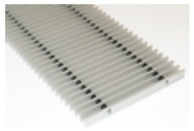
Codis C35-FC 4-pipe fan coil unit with
BACnet/MSTP communication

D1 - Zone controller C35-FD-B/RS
M1 - EMC fan
V1 - valve actuator 0-10V (heating)
V2 -valve actuator 0-10V (cooling)
S1 - Switch for window or door contact
T1 - Remote thermostat Pt1000



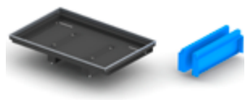
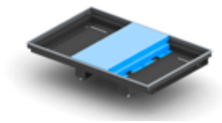
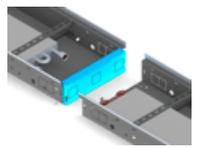
Design changes reserved

ACCESSORIES

Image	Description	Ordering code	Suitable for
	Roll-up al. grille	QL-501-1	**All models**
		QL-501-2	**All models**
		QL-501-3	**All models**
	Roll-up al. grille - anodized		**All models**
		QL-502-2	**All models**
		QL-502-3	**All models**
	Roll-up al. grille - RAL…	QL-503-1	**All models**
		QL-503-2	**All models**
		QL-503-3	**All models**
	Linear al. grille	QL-504-1	**All models**
		QL-504-2	**All models**
		QL-504-3	**All models**
	Linear al. grille - anodized	QL-505-1	**All models**
		QL-505-2	**All models**
		QL-505-3	**All models**
	Linear al. grille - RAL…	QL-506-1	**All models**
		QL-506-2	**All models**
		QL-506-3	**All models**
	Roll-up al. grille - beech	QL-507-1	**All models**
		QL-507-2	**All models**
		QL-507-3	**All models**
	Roll-up al. grille - oak	QL-508-1	**All models**
		QL-508-2	**All models**
		QL-508-3	**All models**
	Roll-up al. grille - cherry	QL-509-1	**All models**
		QL-509-2	**All models**
		QL-509-3	**All models**
	Roll-up grille - inox	QL-510-1	**All models**
		QL-510-2	**All models**
		QL-510-3	**All models**

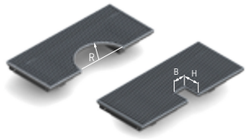
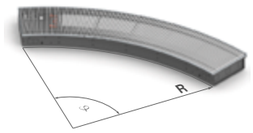
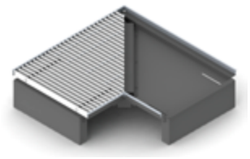
Design changes reserved

ACCESSORIES

Image	Description	Ordering code	Suitable for	
	Optional F frame	QL-511	**All models**	
	Inactive section set (Length=0,25m)	QL-512-701	**PKN 70**	1-row
		QL-512-702		2-row
				3-row
		QL-512-111	**PKN 110 / PKF 110**	1- row
		QL-512-112		2-row
		QL-512-113		3-row
		QL-512-132	**PKH 130**	
		QL-512-141	**PKN 140 / PKF 140**	1-row
		QL-512-142		2-row
		QL-512-143		3-row
		QL-512-152	**PKH 150**	
	Inactive section set (Length=0,5m)	QL-513-701	**PKN 70**	1-row
		QL-513-702		2-row
		QL-513-703		3-row
		QL-513-111	**PKN 110 / PKF 110**	1- row
		QL-513-112		2-row
		QL-513-113		3-row
		QL-513-132	**PKH 130**	
		QL-513-141	**PKN 140 / PKF 140**	1-row
		QL-513-142		2-row
		QL-513-143		3-row
		QL-513-152	**PKH 150**	
	Inactive section set (Length=1,0m)	QL-514-701	**PKN 70**	1-row
		QL-514-702		2-row
		QL-514-703		3-row
		QL-514-111	**PKN 110 / PKF 110**	1- row
		QL-514-112		2-row
		QL-514-113		3-row
		QL-514-133	**PKH 130**	
		QL-514-141	**PKN 140 / PKF 140**	1-row
		QL-514-142		2-row
		QL-514-143		3-row
		QL-514-153	**PKH 150**	
	Load bearing cover	QL-515-701	**All models**	1-row
		QL-515-702		2-row
		QL-515-703		3-row
	Casing connection piece	QL-516-701	**PKN 70**	1-row
		QL-516-702		2-row
		QL-516-703		3-row
		QL-516-111	**PKN 110 / PKF 110**	1- row
		QL-516-112		2-row
		QL-516-113		3-row
		QL-516-132	**PKH 130**	
		QL-516-141	**PKN 140 / PKF 140**	1-row
		QL-516-142		2-row
		QL-516-143		3-row
		QL-516-152	**PKH 150**	

Design changes reserved

ACCESSORIES

Image	Description	Ordering code	Suitable for	
	Cut out section	QL-517-701	**PKN 70**	1-row
		QL-517-702		2-row
				3-row
		QL-517-111	**PKN 110 / PKF 110**	1- row
		QL-517-112		2-row
		QL-517-113		3-row
		QL-517-132	**PKH 130**	
		QL-517-141	**PKN 140 / PKF 140**	1-row
		QL-517-142		2-row
		QL-517-143		3-row
		QL-517-152	**PKH 150**	
	Curved section	QL-518	**All models**	
	Corner section 90° Roll up grille	QL-519-701	**PKN 70**	1-row
		QL-519-702		2-row
		QL-519-703		3-row
		QL-519-111	**PKN 110 / PKF 110**	1- row
		QL-519-112		2-row
		QL-519-113		3-row
		QL-519-132	**PKH 130**	
		QL-519-141	**PKN 140 / PKF 140**	1-row
		QL-519-142		2-row
		QL-519-143		3-row
		QL-519-152	**PKH 150**	
	Corner section 90° Linear grille	QL-520-701	**PKN 70**	1-row
		QL-520-702		2-row
		QL-520-703		3-row
		QL-520-111	**PKN 110 / PKF 110**	1- row
		QL-520-112		2-row
		QL-520-113		3-row
		QL-520-132	**PKH 130**	
		QL-520-141	**PKN 140 / PKF 140**	1-row
		QL-520-142		2-row
		QL-520-143		3-row
		QL-520-152	**PKH 150**	

Design changes reserved

ACCESSORIES

Image	Description	Ordering code	Suitable for
	Filter G2	QL-521	**PKF, PKH, PKH-4C**
	External casing insulation	QL-522	**All models**
	Control box AT6	QL523	**PKF, PKH, PKH-4C**
	Control box AT6-Relay	QL-524	**PKF, PKH, PKH-4C**
	Silent drive (230V AC; 0-10V)	QL-525	**PKF, PKH, PKH-4C**
	Room thermostat RAA21	QL-526	**PKN**
	Thermostat 3-step	QL-527	**PKF, PKH**
	Thermostat 3-step	QL-528	**PKH-4C**
	Thermostat digital	QL-594	**PKF, PKH**
	Termostat digital.	QL-530	**PKF, PKH, PKH-4C**
	Frame for RDF thermostat	QL-531	**PKF, PKH, PKH-4C**
	Remote control for RDG and RDF	QL-532	**PKF, PKH, PKH-4C**
	Thermostat digital	QL-533	**PKF, PKH, PKH-4C**
	Thermostat digital 0-10V	QL-534	**PKF, PKH, PKH-4C**
	FC controller, temperature sensor	C35-FC	**PKF, PKH, PKH-4C**
	FC controller, temperature sensor, BACnet	C35-FC-B/RS	**PKF, PKH, PKH-4C**
	FC controller, temperature sensor, humidity sensor	C35-FC-H	**PKF, PKH, PKH-4C**
	FC controller, temperature sensor, humidity sensor, BACnet	C35-FC-H-B/RS	**PKF, PKH, PKH-4C**

Design changes reserved

ACCESSORIES

Image	Description	Ordering code	Suitable for
	Service valve 1/2” Service valve 3/4”	QL-535 QL-536	**All models**
	Radiator valve straight 1/2” Radiator valve angled 1/2”	QL-537 QL-538	**All models**
	Thermostatic valve straight 1/2” Thermostatic valve straight 3/4”	QL-539 QL-540	**All models**
	Thermostatic valve angular 1/2” Thermostatic valve angular 3/4”	QL-541 QL-542	**All models**
	Lockshield valve straight 1/2” Lockshield valve straight 3/4”	QL-543 QL-544	**All models**
	Lockshield valve angled 1/2” Lockshield valve angled 3/4”	QL-545 QL-546	**All models**
	3-way valve 3p 1/2” 3-way valve 3p 3/4”	QL-547 QL-548	**All models**
	4-way valve 4p 1/2” 4-way valve 4p 3/4”	QL-549 QL-550	**All models**
	Balancing valve 1/2” Balancing valve 3/4”	QL-551 QL-552	**All models**
	Flexible couplings 1/2” Flexible couplings 3/4”	QL-553 QL-554	**All models**
	Thermostat head	QL-555	**All models**
	Thermostate head - RAL 9016	QL-556	**All models**
	Thermostate head - RAL 9005	QL-557	**All models**

Design changes reserved

FLOOR CONVECTORS - PKN, PKF

ACCESSORIES

Image	Description	Ordering code		Suitable for
	Thermostate head - metal matte	QL-558		**All models**
	Thermostate head - metal chrome	QL-559		**All models**
	Thermostate head - white chrome	QL-560		**All models**
	Cable temperature sensor	QL-561		**All models**
	Thermostat head with remote regulator	2m	QL-562	**All models**
		5m	QL-563	**All models**
		8m	QL-564	**All models**
	Thermostat head with remote regulator and temperature sensor	QL-565		**All models**
	Electrothermic valve drive 230 V - NC	QL-566		**All models**
	Electrothermic valve drive 24 V - NC	QL-567		
	Electrothermic valve drive 230 V - NO	QL-568		
	Electrothermic valve drive 24 V - NO	QL-569		
	Valve actuator 24V DC; 0-10V	QL-570		**All models**
	Condensate pump set	QL-571		**All models**
	Magnet switch - window/door	QL-572		**All models**
	Transformer terminal box AC 230V-DC 24V-100 W	QL -595		**PKF, PKH, PKH-4C**
	Transformer terminal box AC 230V-DC 24V-75 W	QL -596		**PKF, PKH, PKH-4C**
	Transformer terminal box AC 230V-DC 24V-50 W	QL -597		**PKF, PKH, PKH-4C**

Design changes reserved

Floor convector selection

For given height and width of glass surface, heat transfer coefficient K and outside temperature, we can calculate convector selection parameters.

Example:

- from diagram 1, $\Delta t_L = 7$ K
- from diagram 2 cold air velocity v=0,36 m/s.
- from diagram 3 airflow rate, $V_L = 52$ m³/h

To prevent cold air intrusion in room, necessary heat output per meter length is determined by:

$$Q_{convector} > Q_{falling\ air}$$

$$Q_{falling\ air} = \frac{V_L * c_L * b * \Delta t_L * \rho}{3600}$$

Inserting known values
$V_L = 52$ m³/h
$c_L = 1{,}006$ kJ/kgK
b =1m (glass width)
$\Delta t_L = 7$ K
$\rho = 1{,}2$ kg/m³

$$Q_{falling\ air} = 0{,}122 \text{ kW}$$

In accordance with result above, a floor convector with minimal length of 1m and minimal heat output of 0,122kW can be selected.

Diagram 1: Temperature difference of glass surface, at room temperature 20°C

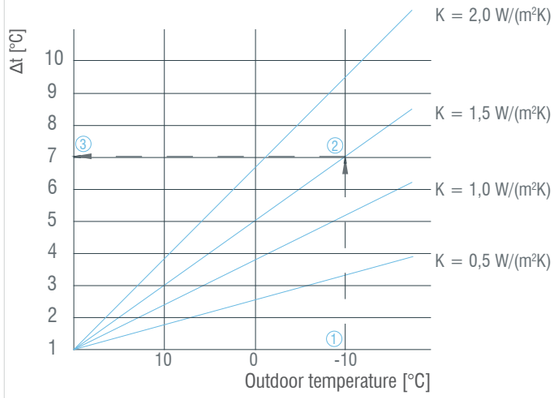


Diagram 2: Cold air velocity

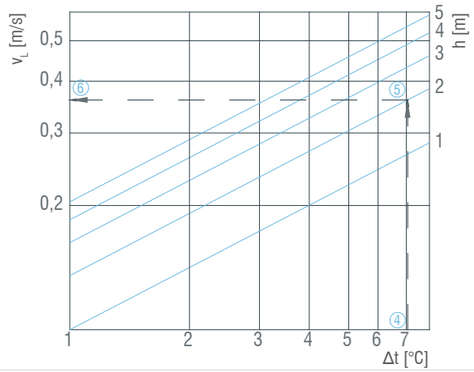
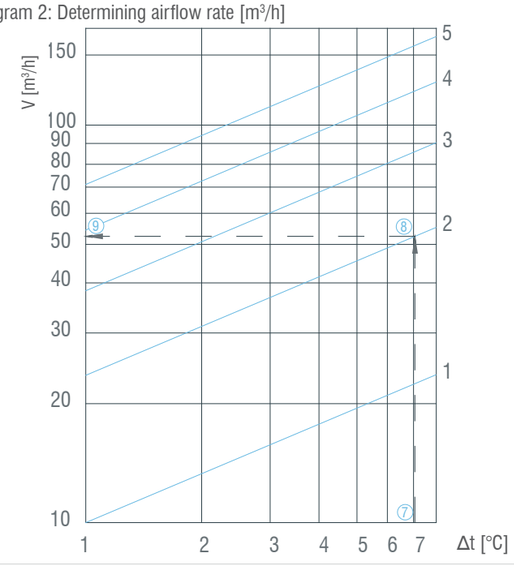


Diagram 2: Determining airflow rate [m³/h]



Design changes reserved

Standard delivery:

Steel and aluminium parts powder coated in RAL 9005		Leveling mounts for height adjusting and casing fixing	
Efficient low volume heat exchanger with bleed valve 1/4”		Protective wooden cover	
Silent 230V AC or 24V EC tangential fans		PVC foil and carton box packaging with polystyrene corner and side protection	
Leveling screws		Installation and operation manual	
Standard U frame			

Ordering key

Type	PKN	- 70	- 1	- 2000
PKN / PKF / PKH / PKH-4C				
Casing height **70** (PKN); **110** (PKN, PKF); **130** (PKH, PKH-4C), **140** (PKN, PKF); **150** (PKH, PKH-4C)				
1- row width 210/250 mm **2**- row width 300/340 mm **3**- row width 400/440 mm				
Casing length [mm]				

Accessories

- QL-xxx

Design changes reserved

8/S2
v 3.3 (en)

RADIATOR CONVECTOR

RKF, RKW

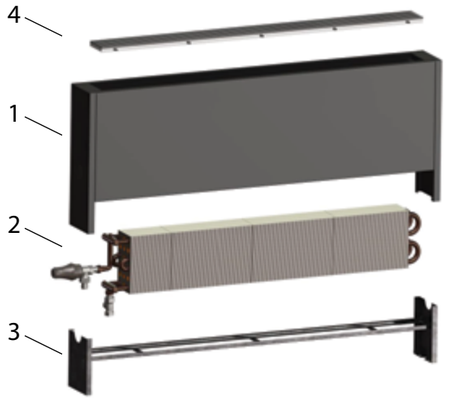
klimaoprema

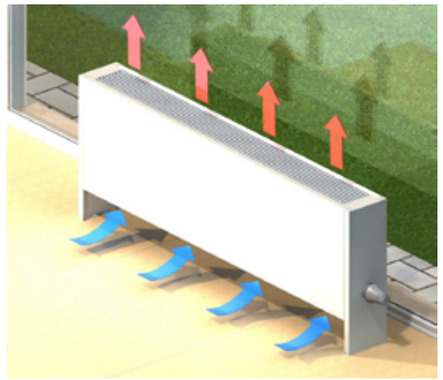
TABLE OF CONTENTS

Definition of symbols:

V	[m³/h]	- air flow rate
v_L	[m/s]	- cold jet velocity
Δt_L	[°C]	- temperature difference
K	[W/m²K]	- heat coefficient
Q	[W]	- heat output
L_{WA}	[dB(A)]	- sound power level
c_L	[kJ/kgK]	- specific heat coefficient of cold air
b	[m]	- window width
h	[m]	- window height
ρ	[kg/m³]	- air density
L	[m]	- window length
t_{UL}	[°C]	- inlet air temperature
t_Z	[°C]	- outlet air temperature
Q_H	[W]	- heating output
Q_C	[W]	- cooling output
Q_S	[W]	- sensible heat output
U	[V]	- voltage
I	[A]	- current
P	[W]	- electric motor rated power
f	[Hz]	- frequency

Design changes reserved





RADIATOR CONVECTOR - RKF

- Case is made of steel sheet, powder coated in any RAL colour.
- Made in standard lengths from 600mm to 2800mm, three standard widths(140, 200, 270) and four standar heights (150, 250, 350, 450) are available.
- Heat exchanger is made of copper tubing with aluminium fins. Water connections are 1/2", inner thread.
- Heat exchanger is made fo water as a working medium, and designed for mean pressure 10 bar. Tested to 105°C and 25 bar.
- Heat capacities are in accordance with HRN EN 422.

Radiator convector consists of :

1. Casing
2. Heat exchanger
3. Frame subassembly
4. Covering grille

Model, design and size

Wide range of product sizes and designs are available

Type: floor fixing

Covering grille model:
1. Perforated plate
2. Aluminium grille

Case lengths: 600 - 2800mm
Case widths: 150, 200, 270 mm
Case heights: 150, 250, 350, 450 mm

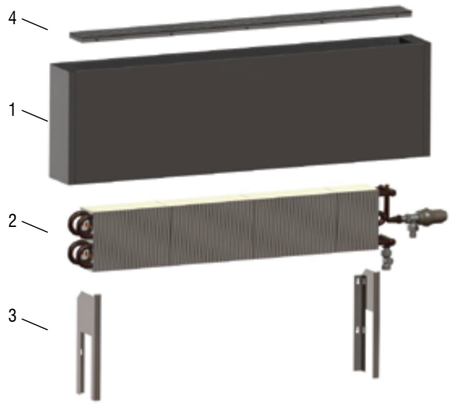
Product selection software

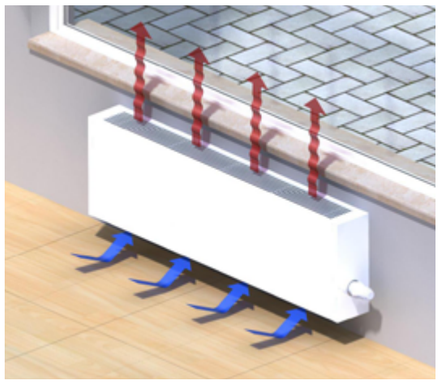
· Software enables quick and easyselection of the model based on the size and working regime and provides information regarding overall capacity, water flow and pressure drop.

Delivery

Standard delivery in white RAL 9010, with perforated plate and without water regulation element.
All available accessories and RAL colours are listed on pages 72-73.

Design changes reserved





RADIATOR CONVECTOR - RKW

- Case is made of steel sheet, powder coated in any RAL colour.
- Made in standard lengths from 600 mm to 2800 mm, three standard widths(140, 200, 270) and three standar heights (250, 350, 450) are available.
- Heat exchanger is made of copper tubing with aluminium fins. Water connections are 1/2", inner thread.
- Heat exchanger is made fo water as a working medium, and designed for mean pressure 10 bar. Tested to 105°C and 25 bar.
- Heat capacities are in accordance with HRN EN 422.

Radiator convector consists of :

1. Casing
2. Heat exchanger
3. Frame subassembly
4. Covering grille

Model, design and size

Wide range of product sizes and designs are available

Type: floor fixing

Covering grille model:
1. Perforated plate
2. Aluminium grille

Case lengths: 600 - 2800 mm
Case widths: 150, 200, 270 mm
Case heights: 150, 250, 350, 450 mm

Product selection software

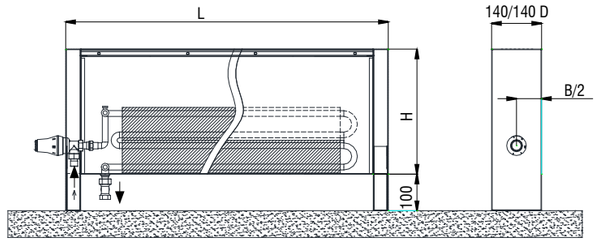
· Software enables quick and easyselection of the model based on the size and working regime and provides information regarding overall capacity, water flow and pressure drop.

Delivery

Standard delivery in white RAL 9010, with perforated plate and without water regulation element.
All available accessories and RAL colours are listed on pages 72-73.

Design changes reserved

RK - type 140

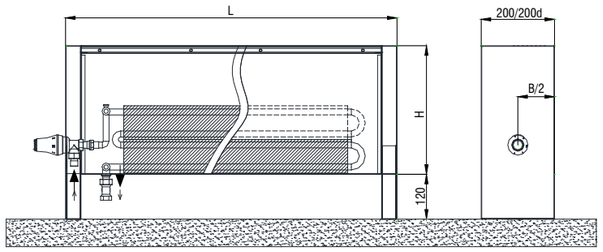


RK - type 140													
H [mm]	L [mm]	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
150	90°C / 70°C / 20°C	483	644	805	966	1127	1288	1449	1610	1771	1932	2093	2254
	V_w [m³/h]	21	28	35	42	48	55	62	69	76	83	90	97
	75°C / 65°C / 20°C	371	495	619	743	867	991	1114	1238	1362	1486	1610	1734
	V_w [m³/h]	32	43	53	64	75	85	96	106	117	128	138	149
	55°C / 45°C / 20°C	178	237	297	356	415	475	534	593	653	712	771	831
	V_w [m³/h]	15	20	26	31	36	41	46	51	56	61	66	71
250	90°C / 70°C / 20°C	609	811	1014	1216	1418	1622	1824	2027	2230	2432	2635	2838
	V_w [m³/h]	26	35	44	52	61	70	78	87	96	105	113	122
	75°C / 65°C / 20°C	468	624	780	935	1091	1247	1403	1559	1715	1870	2027	2183
	V_w [m³/h]	40	54	67	80	94	107	121	134	147	161	174	188
	55°C / 45°C / 20°C	224	299	374	448	523	598	672	747	822	896	971	1046
	V_w [m³/h]	19	26	32	39	45	51	58	64	71	77	84	90
350	90°C / 70°C / 20°C	708	943	1180	1416	1651	1888	2122	2359	2595	2831	3068	3302
	V_w [m³/h]	30	41	51	61	71	81	91	101	112	122	132	142
	75°C / 65°C / 20°C	545	725	908	1089	1270	1452	1632	1814	1996	2177	2360	2540
	V_w [m³/h]	47	62	78	34	109	125	140	156	172	187	203	218
	55°C / 45°C / 20°C	261	348	435	522	609	696	782	869	956	1043	1131	1217
	V_w [m³/h]	22	30	37	45	52	60	67	75	82	90	97	105
450	90°C / 70°C / 20°C	790	1053	1316	1579	1842	2106	2368	2632	2895	3158	3422	3685
	V_w [m³/h]	34	45	57	68	79	91	102	113	124	136	147	158
	75°C / 65°C / 20°C	608	810	1012	1214	1417	1620	1821	2024	2227	2429	2632	2834
	V_w [m³/h]	52	70	87	104	122	139	157	174	191	209	226	244
	55°C / 45°C / 20°C	291	388	485	582	679	776	873	970	1067	1167	1261	1358
	V_w [m³/h]	25	33	42	50	58	67	75	83	92	100	108	117

RK - type 140 D (DOUBLE EXCHANGER)													
H [mm]	L [mm]	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
250	90°C / 70°C / 20°C	831	1108	1385	1662	1938	2216	2493	2769	3044	3323	3601	3877
	V_w [m³/h]	36	48	60	71	83	95	107	119	131	143	155	167
	75°C / 65°C / 20°C	639	852	1065	1278	1491	1704	1917	2130	2341	2556	2770	2982
	V_w [m³/h]	55	73	92	110	128	147	165	183	201	220	238	256
	55°C / 45°C / 20°C	306	408	510	613	714	817	919	1021	1122	1225	1327	1429
	V_w [m³/h]	26	35	44	53	61	70	79	88	96	105	114	123
350	90°C / 70°C / 20°C	936	1248	1561	1873	2186	2498	2809	3122	3434	3747	4058	4371
	V_w [m³/h]	40	54	67	81	94	107	121	134	148	161	174	188
	75°C / 65°C / 20°C	720	960	1201	1441	1681	1921	2160	2401	2641	2882	3121	3362
	V_w [m³/h]	62	83	103	124	145	165	186	206	227	248	268	289
	55°C / 45°C / 20°C	345	460	575	690	806	921	1035	1151	1266	1381	1496	1611
	V_w [m³/h]	30	40	49	59	69	79	89	99	109	119	129	139
450	90°C / 70°C / 20°C	1027	1369	1711	2053	2396	2739	3081	3423	3765	4107	4450	4792
	V_w [m³/h]	44	59	74	88	103	118	132	147	162	177	191	206
	75°C / 65°C / 20°C	790	1053	1316	1579	1843	2107	2370	2633	2896	3159	3422	3685
	V_w [m³/h]	68	91	113	136	158	181	204	226	249	272	294	317
	55°C / 45°C / 20°C	379	505	631	757	883	1010	1136	1262	1388	1514	1640	1766
	V_w [m³/h]	33	43	54	65	76	87	98	108	119	130	141	152

Design changes reserved

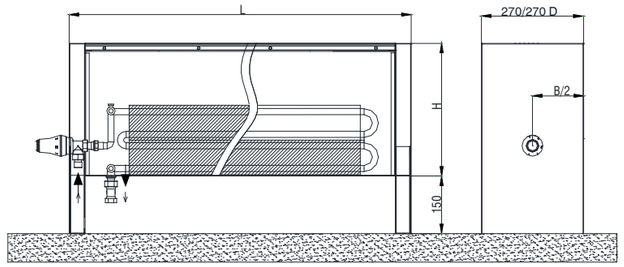
RK - type 200



RK - type 200													
H [mm]	L [mm]	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
150	90°C / 70°C / 20°C	845	1127	1409	1691	1973	2254	2536	2818	3100	3382	3663	3945
	V_w [m³/h]	35	48	61	73	85	97	109	121	133	145	158	170
	75°C / 65°C / 20°C	650	867	1084	1301	1517	1734	1950	2167	2384	2601	2817	3034
	V_w [m³/h]	56	75	93	112	130	149	168	186	205	224	242	261
	55°C / 45°C / 20°C	311	415	519	532	727	831	935	1039	1143	1246	1350	1454
	V_w [m³/h]	27	35	45	54	63	71	80	89	98	107	116	125
250	90°C / 70°C / 20°C	998	1332	1665	1999	2332	2664	2997	3331	3664	3997	4329	4663
	V_w [m³/h]	43	57	72	86	100	115	127	143	158	172	186	201
	75°C / 65°C / 20°C	765	1021	1276	1532	1787	2041	2297	2553	2808	3063	3317	3573
	V_w [m³/h]	66	88	110	132	154	176	198	220	241	263	285	307
	55°C / 45°C / 20°C	363	484	605	727	848	968	1089	1211	1332	1453	1574	1695
	V_w [m³/h]	31	42	52	62	73	83	94	104	115	125	135	146
350	90°C / 70°C / 20°C	1150	1533	1917	2302	2685	3069	3451	3835	4219	4602	4986	5368
	V_w [m³/h]	49	66	82	99	115	132	148	165	181	198	214	232
	75°C / 65°C / 20°C	881	1175	1469	1764	2057	2352	2644	2939	3233	3526	3821	4113
	V_w [m³/h]	76	101	126	152	177	202	227	253	278	303	329	354
	55°C / 45°C / 20°C	418	557	697	837	976	1116	1254	1394	1534	1673	1812	1951
	V_w [m³/h]	36	48	60	72	84	96	108	120	132	144	156	168
450	90°C / 70°C / 20°C	1269	1693	2116	2539	2963	3385	3809	4231	4655	5079	5501	5924
	V_w [m³/h]	55	73	91	109	127	146	164	182	200	218	237	255
	75°C / 65°C / 20°C	972	1297	1621	1946	2271	2594	2919	3242	3567	3892	4215	4540
	V_w [m³/h]	84	112	139	167	195	223	251	279	307	335	363	390
	55°C / 45°C / 20°C	461	615	769	923	1077	1230	1385	1538	1692	1846	2000	2153
	V_w [m³/h]	40	53	66	79	93	106	119	132	146	159	172	185

RK - type 200 D (DOUBLE EXCHANGER)													
H [mm]	L [mm]	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
250	90°C / 70°C / 20°C	1100	1467	1834	2200	2567	2934	3300	3667	4034	4400	4767	5134
	V_w [m³/h]	47	63	79	95	110	126	142	158	173	189	205	221
	75°C / 65°C / 20°C	843	1124	1405	1686	1967	2248	2529	2810	3091	3372	3653	3934
	V_w [m³/h]	72	97	121	145	169	193	217	242	266	290	314	338
	55°C / 45°C / 20°C	400	533	667	800	933	1066	1200	1333	1466	1599	1733	1866
	V_w [m³/h]	34	46	57	69	80	92	103	115	126	138	149	160
350	90°C / 70°C / 20°C	1264	1686	2107	2529	2951	3373	3793	4215	4637	5058	5480	5901
	V_w [m³/h]	54	72	91	109	127	145	163	181	199	217	236	254
	75°C / 65°C / 20°C	969	1292	1615	1938	2261	2585	2907	3230	3553	3876	4199	4522
	V_w [m³/h]	83	111	139	167	194	222	250	278	306	333	361	389
	55°C / 45°C / 20°C	459	613	766	919	1073	1226	1379	1532	1686	1839	1992	2145
	V_w [m³/h]	40	53	66	79	92	105	119	132	145	158	171	184
450	90°C / 70°C / 20°C	1413	1883	2355	2826	3297	3768	4238	4709	5181	5652	6123	6593
	V_w [m³/h]	61	81	101	122	142	162	182	202	223	243	263	283
	75°C / 65°C / 20°C	1083	1443	1805	2166	2526	2887	3248	3608	3970	4331	4692	5052
	V_w [m³/h]	61	124	155	186	217	248	279	310	341	372	404	434
	55°C / 45°C / 20°C	514	684	856	1027	1198	1370	1540	1712	1883	2054	2226	2397
	V_w [m³/h]	44	59	74	88	103	118	132	147	162	177	191	206

RK - type 270

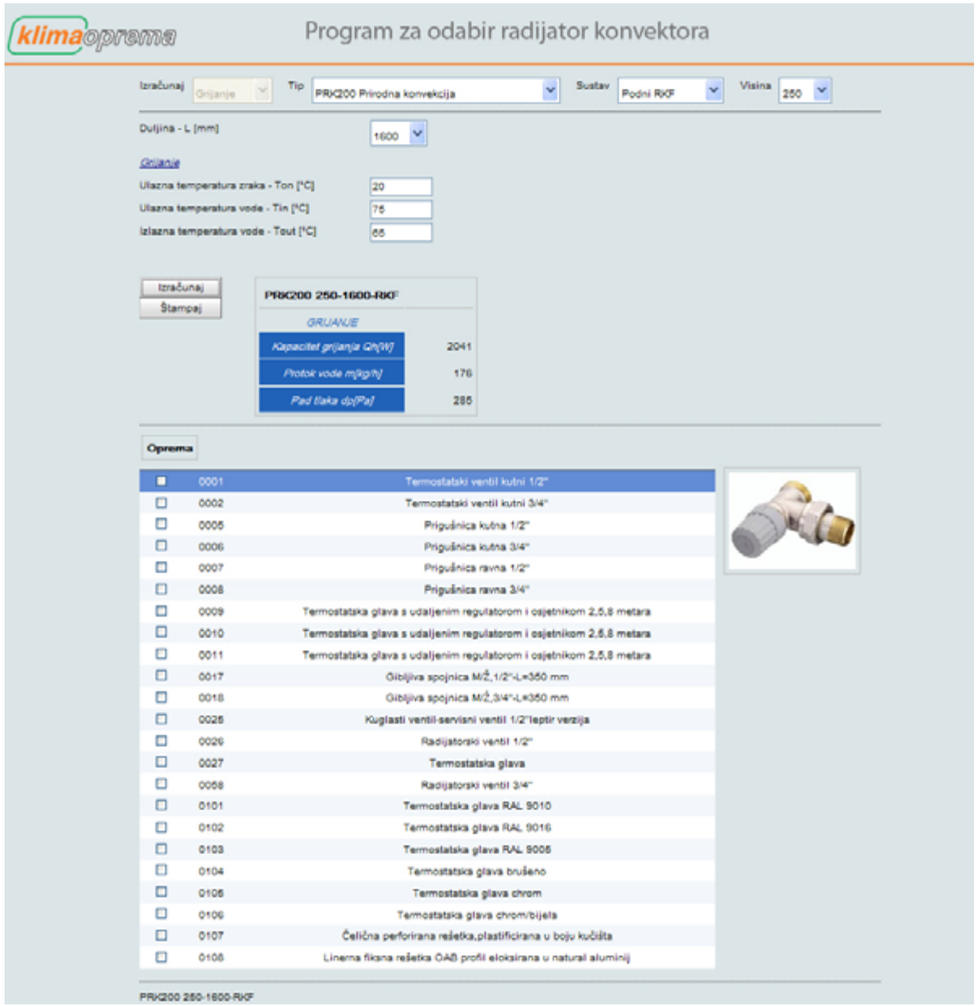


RK - type 270													
H [mm]	L [mm]	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
150	90°C / 70°C / 20°C	1129	1506	1881	2257	2634	3010	3387	3763	4138	4515	4892	5269
	V_w [m³/h]	49	65	81	97	113	129	146	162	178	194	210	227
	75°C / 65°C / 20°C	873	1165	1455	1745	2037	2328	2619	2910	3200	3492	3783	4075
	V_w [m³/h]	75	100	125	150	175	200	225	250	275	300	325	350
	55°C / 45°C / 20°C	425	567	708	849	991	1133	1275	1416	1557	1699	1841	1983
	V_w [m³/h]	37	49	61	73	85	97	110	122	134	146	158	171
250	90°C / 70°C / 20°C	1402	1869	2335	2803	3269	3737	4204	4671	5138	5605	6072	6540
	V_w [m³/h]	60	80	100	121	141	161	181	201	221	241	261	281
	75°C / 65°C / 20°C	1070	1427	1783	2140	2496	2853	3210	3566	3923	4279	4636	4993
	V_w [m³/h]	92	123	153	184	215	245	276	307	337	368	399	429
	55°C / 45°C / 20°C	503	670	837	1005	1172	1340	1507	1675	1842	2009	2177	2345
	V_w [m³/h]	43	58	72	86	101	115	130	144	158	173	187	202
350	90°C / 70°C / 20°C	1611	2148	2685	3221	3758	4297	4834	5370	5907	6444	6982	7518
	V_w [m³/h]	69	92	115	139	162	185	208	231	254	277	300	323
	75°C / 65°C / 20°C	1230	1640	2050	2459	2869	3281	3691	4100	4510	4920	5331	5740
	V_w [m³/h]	106	141	176	211	247	282	317	353	388	423	458	494
	55°C / 45°C / 20°C	578	770	963	1155	1347	1540	1733	1925	2118	2310	2503	2695
	V_w [m³/h]	50	66	83	99	116	132	149	166	182	199	215	232
450	90°C / 70°C / 20°C	1776	2367	2959	3551	4143	4735	5327	5919	6510	7101	7963	8285
	V_w [m³/h]	76	102	127	153	178	2004	229	255	280	305	342	356
	75°C / 65°C / 20°C	1356	1807	2259	2711	3163	3615	4067	4519	4970	5422	6080	6326
	V_w [m³/h]	117	155	194	233	272	311	350	389	427	466	523	544
	55°C / 45°C / 20°C	637	849	1061	1273	1485	1697	1910	2122	2334	2546	2855	2970
	V_w [m³/h]	55	73	91	109	128	146	164	182	201	219	245	255

RK - type 270 (DOUBLE EXCHANGER)													
H [mm]	L [mm]	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
250	90°C / 70°C / 20°C	1452	1934	2419	2903	3386	3870	4358	4837	5321	5805	6288	6722
	V_w [m³/h]	62	83	104	125	146	166	187	208	229	250	270	289
	75°C / 65°C / 20°C	1109	1477	1847	2216	2585	2955	3327	3693	4063	4432	4801	5132
	V_w [m³/h]	95	127	159	191	222	254	286	318	349	381	413	441
	55°C / 45°C / 20°C	521	693	867	1041	1214	1387	1562	1734	1908	2081	2254	2410
	V_w [m³/h]	45	60	75	89	104	119	134	149	164	179	194	207
350	90°C / 70°C / 20°C	1697	2262	2828	3393	3960	4529	5090	5655	6222	6788	7352	7918
	V_w [m³/h]	73	97	122	146	170	195	219	243	268	292	316	340
	75°C / 65°C / 20°C	1296	1727	2159	2591	3023	3454	3886	4318	4751	5183	5613	6045
	V_w [m³/h]	111	149	186	223	260	297	334	371	409	446	483	520
	55°C / 45°C / 20°C	608	811	1014	1216	1420	1622	1825	2027	2231	2433	2636	2839
	V_w [m³/h]	52	70	87	105	122	139	157	174	192	209	227	244
450	90°C / 70°C / 20°C	1929	2573	3216	3858	4502	5145	5788	6432	7074	7718	8360	9004
	V_w [m³/h]	83	111	138	166	194	221	249	277	304	332	359	387
	75°C / 65°C / 20°C	1473	1964	2455	2946	3437	3928	4419	4911	5401	5893	6383	6875
	V_w [m³/h]	127	169	211	253	296	338	380	422	464	507	549	591
	55°C / 45°C / 20°C	692	922	1153	1383	1614	1844	2075	2306	2536	2767	2997	3228
	V_w [m³/h]	59	79	99	119	139	159	178	198	218	238	258	278

PRODUCT SELECTION SOFTWARE

On Klimaoprema website (www.klimaoprema.hr) you can find our selection software. It allows you to define model, size and type of radiator convector. Input variables are heat capacity, water flow and pressure drop.



Design changes reserved

ACCESSORIES

QL-006

Thermostatic valve angular 1/2”

QL-010

Shut off cock, straight 1/2”

0027

Thermostatic head Collection S

QL - 022

Thermostatic head - RAL 9016

QL - 026

Thermostatic head - White / chrome

QL - 023

Thermostatic head - RAL 9005

QL - 024

Thermostatic head - metal matte

QL - 025

Thermostatic head - metal chrome

QL-107

Cover grille - perforirated plate (standard)

QL-108

Cover grille - linear fixed

Ordering key

Type	**RKF**	-	**150**	-	**600**	-	**140D**	- **L** - **RAL...**

RKW - wall radiator convector
RKF - floor radiator convector

Height
150
250
350
450

Length
600-2800

Width
140
200
270
D: double heat exchanger

Water connection **L** - left side
D - right side

Accessories
- QL-xxx

Design changes reserved

8/S3
v 3.3 (en)

AIR CURTAINS

SONATA EVO

klimaoprema

TABLE OF CONTENTS

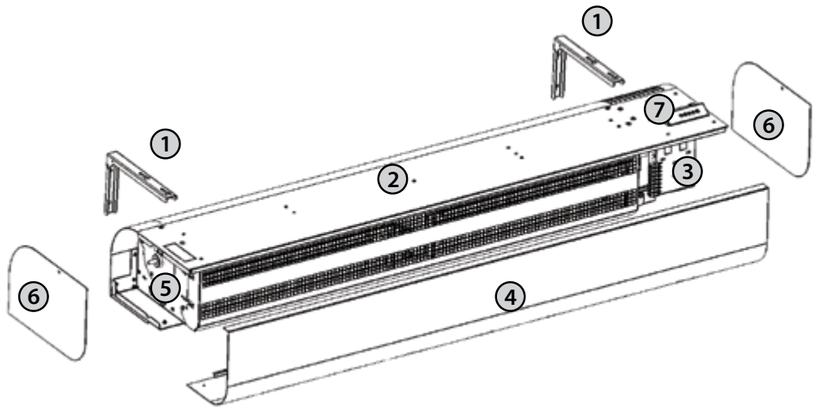
Design changes reserved

AIR CURTAINS GRAND / SONATA

PRIMARY PARAMETERS

- Air curtains with electric heaters are equiped with an automatic heat thermostat and emergency thermostat with manual reset. Air curtains with LPHW are designed for a maximum operating water temperature of +130 °C and a maximum operating pressure of 1.6 MPa.

MAIN PARTS



1. Mounting brackets (included with delivery)
2. Top cover
3. Connection dock for controls module
4. Intake grill
5. Connection dock for LPHW (only on water versions)
6. Side cover
7. Main power supply connection

Sonata EVO

BASIC FEATURES

- Lengths: 1.0; 1.5; 2.0; 2.5 m
- Air flow up to 5700 m3/h (ISO 27 327-1)
- Straw System – maximized screening effect
- Universal interface for control module connection (BA, CO, SU)
- Low profile design
- Standard colour RAL 9010 (any RAL – based colours may be provided on customer's request)
- The SONATA EVO is low profile design air curtain for use in retail shops, shopping centres, restaurants, administrative buildings and manufacturing facilities with a recommended installation height up to 4 m.
- The air curtain shall be installed indoors in a dry enviroment with ambient temperatures ranging from 0 °C up to +40 °C and relative humidity of up to 80 %. It is designed for conveying air free of fine dust, grease, chemical fumes, and other impurities. IP rating of the air curtain is IP 20. It is recommended that air curtain projects always be developed by an HVAC designer or engineer.

Design changes reserved

SONATA EVO-32

Type	Recommended installation height [m]	Air output [m³/h] *1			Acoustic pressure at 3m [dB(A)]*2			Sound power [dB(A)]*3
		Speed 3	Speed 2	Speed 1	Speed 3	Speed 2	Speed 1	
SONATA EVO 32 10-E5	3,2	1500	1000	650	53,8	48,9	43,3	71,3
SONATA EVO 32 15-E8	3,2	2250	1650	1200	55,1	50,5	44,3	72,6
SONATA EVO 32 20-E10	3,2	3300	2500	1900	56,8	48,6	41,9	74,3
SONATA EVO 32 25-E12	3,2	3800	3000	2200	58,6	51,2	46,3	76,1
SONATA EVO 32 10-E6	3,2	1500	1000	650	53,8	48,9	43,3	71,3
SONATA EVO 32 15-E10	3,2	2250	1650	1200	55,1	50,5	44,3	72,6
SONATA EVO 32 20-E12	3,2	3300	2500	1900	56,8	48,6	41,9	74,3
SONATA EVO 32 25-E16	3,2	3800	3000	2200	58,6	51,2	46,3	76,1
SONATA EVO 32 10-W	3,2	1500	1000	650	53,8	48,9	43,3	71,3
SONATA EVO 32 15-W	3,2	2250	1650	1200	55,1	50,5	44,3	72,6
SONATA EVO 32 20-W	3,2	3300	2500	1900	56,8	48,6	41,9	74,3
SONATA EVO 32 25-W	3,2	3800	3000	2200	58,6	51,2	46,3	76,1
SONATA EVO 32 10-N	3,2	1500	1000	650	53,8	48,9	43,3	71,3
SONATA EVO 32 15-N	3,2	2250	1650	1200	55,1	50,5	44,3	72,6
SONATA EVO 32 20-N	3,2	3300	2500	1900	56,8	48,6	41,9	74,3
SONATA EVO 32 25-N	3,2	3800	3000	2200	58,6	51,2	46,3	76,1

SONATA EVO-32

Type	Heater power output [kW]		Total consumption [V/A]	Motor consumption [W/A]	Temperature increase Δt [°C]*4	Frequency [Hz]	Weight [kg]*5
	1st level	1st level					
SONATA EVO 32 10-E5	3,2	4,7	400 / 13,7	120 / 0,6	9,3	50	25,5
SONATA EVO 32 15-E8	3,8	7,5	400 / 11,6	200 / 0,9	9,9	50	32,6
SONATA EVO 32 20-E10	4,8	9,5	400 / 14,4	305 / 1,4	8,6	50	39,8
SONATA EVO 32 25-E12	6,9	12,2	400 / 19,4	410 / 2,0	9,6	50	46,9
SONATA EVO 32 10-E6	3,2	6,3	400 / 14,4	120 / 0,6	13,2	50	25,5
SONATA EVO 32 15-E10	5	10	400 / 21,3	200 / 0,9	13,3	50	32,6
SONATA EVO 32 20-E12	6,3	12,6	400 / 27,9	305 / 1,4	12,0	50	39,8
SONATA EVO 32 25-E16	8,2	16,3	400 / 24,7	410 / 2,0	13,1	50	46,9
SONATA EVO 32 10-W	16,9		230 / 0,6	120 / 0,6	33,7	50	26,1
SONATA EVO 32 15-W	24,7		230 / 0,9	200 / 0,9	32,9	50	32,9
SONATA EVO 32 20-W	35,7		230 / 1,4	305 / 1,4	32,5	50	40,1
SONATA EVO 32 25-W	43,3		230 / 2,0	410 / 2,0	34,2	50	47,4
SONATA EVO 32 10-N	-	-	230 / 0,6	120 / 0,6	-	50	24,8
SONATA EVO 32 15-N	-	-	230 / 0,9	200 / 0,9	-	50	31,3
SONATA EVO 32 20-N	-	-	230 / 1,4	305 / 1,4	-	50	38,3
SONATA EVO 32 25-N	-	-	230 / 2,0	410 / 2,0	-	50	45,1

*1 Airflow volume according ISO27327-1
*2 Acoustic pressure values at 3 and 5 m distance for maximum speed.
Directional factor: Q=2.
*3 Sound power (LWA) measurements according to ISO 27327-2.
*4 Intake air temperature +18°C, at maximum heating level and highest fan speed.
*5 Weight without regulation.

Design changes reserved

AIR CURTAINS GRAND / SONATA

SONATA EVO-40

Type	Recommended installation height [m]	Air output [m³/h] *1			Acoustic pressure at 3m [dB(A)]*2			Sound power [dB(A)]*3
		Speed 3	Speed 2	Speed 1	Speed 3	Speed 2	Speed 1	
SONATA EVO 40 10-E10	4,0	2300	1750	1300	64,5	59,5	53,5	71,3
SONATA EVO 40 15-E15	4,0	3200	2400	1600	65	60	54	72,6
SONATA EVO 40 20-E19	4,0	4500	3500	2500	64	59	53	74,3
SONATA EVO 40 25-E25	4,0	5700	4600	3500	64,2	59,2	53,2	76,1
SONATA EVO 40 10-W	4,0	2300	1750	1300	64,5	59,5	53,5	71,3
SONATA EVO 40 15-W	4,0	3200	2400	1600	65	60	54	72,6
SONATA EVO 40 20-W	4,0	4500	3500	2500	64	59	53	74,3
SONATA EVO 40 25-W	4,0	5700	4600	3500	64,2	59,2	53,2	76,1
SONATA EVO 40 10-N	4,0	2300	1750	1300	64,5	59,5	53,5	71,3
SONATA EVO 40 15-N	4,0	3200	2400	1600	65	60	54	72,6
SONATA EVO 40 20-N	4,0	4500	3500	2500	64	59	53	74,3
SONATA EVO 40 25-N	4,0	5700	4600	3500	64,2	59,2	53,2	76,1

SONATA EVO-40

Type	Heater power output [kW]		Total consumption [V/A]	Motor consumption [W/A]	Temperature increase Δt [°C]*4	Frequency [Hz]	Weight [kg]*5
	1st level	1st level					
SONATA EVO 40 10-E10	4,7	9,5	400 / 15,1	325 / 1,5	12,3	50	27,3
SONATA EVO 40 15-E15	7,5	15,0	400 / 23,6	420 / 1,9	14,0	50	37,4
SONATA EVO 40 20-E19	9,5	19,0	400 / 30,8	630 / 3,3	12,6	50	47,7
SONATA EVO 40 25-E25	12,2	24,5	400 / 39,0	850 / 4,4	12,8	50	55,8
SONATA EVO 40 10-W	22,4		230 / 1,5	325 / 1,5	29,2	50	27,6
SONATA EVO 40 15-W	31,8		230 / 1,9	420 / 1,9	29,8	50	39,3
SONATA EVO 40 20-W	44,4		230 / 3,3	630 / 3,3	29,6	50	47,6
SONATA EVO 40 25-W	53,7		230 / 4,4	850 / 4,4	28,3	50	55,3
SONATA EVO 40 10-N	-	-	230 / 1,5	325 / 1,5	-	50	26,3
SONATA EVO 40 15-N	-	-	230 / 1,9	420 / 1,9	-	50	35,7
SONATA EVO 40 20-N	-	-	230 / 3,3	630 / 3,3	-	50	45,8
SONATA EVO 40 25-N	-	-	230 / 4,4	850 / 4,4	-	50	53,1

*1 Airflow volume according ISO27327-1
*2 Acoustic pressure values at 3 and 5 m distance for maximum speed.
Directional factor: Q=2.
*3 Sound power (LWA) measurements according to ISO 27327-2.
*4 Intake air temperature +18°C, at maximum heating level and highest fan speed.
*5 Weight without regulation.

Design changes reserved

LPHW parameters for water temperature gradient of 90/70 °C

Type	Air output [m³/h]	Heating output [kW]	Temperature at exhaust [°C]	Pressure loss [Hz]	Water flow [kg]
SONATA EVO 32 10 V	1200	16,85	51,7	13,93	0,74
SONATA EVO 32 15 V	1800	24,7	50,9	10,01	1,09
SONATA EVO 32 20 V	2640	35,74	50,5	14,52	1,57
SONATA EVO 32 25 V	3040	43,26	52,2	22,76	1,91
SONATA EVO 40 10 V	1840	22,35	47,2	23,25	0,99
SONATA EVO 40 15 V	2560	31,81	47,8	15,99	1,4
SONATA EVO 40 20 V	3600	44,41	47,6	21,78	1,96
SONATA EVO 40 25 V	4560	53,73	46,3	33,94	2,37

* Temperature of intake air: +18 °C

LPHW parameters for water temperature gradient of 80/60 °C

Type	Air output [m³/h]	Heating output [kW]	Temperature at exhaust [°C]	Pressure loss [Hz]	Water flow [kg]
SONATA EVO 32 10 V	1200	14,1	46,2	10,3	0,62
SONATA EVO 32 15 V	1800	20,58	45,4	7,26	0,9
SONATA EVO 32 20 V	2640	29,79	45,1	10,59	1,31
SONATA EVO 32 25 V	3040	36,22	46,6	16,68	1,59
SONATA EVO 40 10 V	1840	18,59	42,2	16,97	0,82
SONATA EVO 40 15 V	2560	26,36	42,7	11,48	1,16
SONATA EVO 40 20 V	3600	36,93	42,6	15,79	1,62
SONATA EVO 40 25 V	4560	44,8	41,6	24,72	1,97

* Temperature of intake air: +18 °C

LPHW parameters for water temperature gradient of 70/50 °C

Type	Air output [m³/h]	Heating output [kW]	Temperature at exhaust [°C]	Pressure loss [Hz]	Water flow [kg]
SONATA EVO 32 10 V	1200	11,23	40,5	6,97	0,49
SONATA EVO 32 15 V	1800	16,34	39,8	4,91	0,72
SONATA EVO 32 20 V	2640	23,65	39,5	6,97	1,04
SONATA EVO 32 25 V	3040	28,93	40,8	11,18	1,27
SONATA EVO 40 10 V	1840	14,74	37,2	11,38	0,65
SONATA EVO 40 15 V	2560	20,75	37,5	7,55	0,91
SONATA EVO 40 20 V	3600	29,14	37,4	10,3	1,28
SONATA EVO 40 25 V	4560	35,62	36,7	16,38	1,56

* Temperature of intake air: +18 °C

LPHW parameters for water temperature gradient of 60/40 °C

Type	Air output [m³/h]	Heating output [kW]	Temperature at exhaust [°C]	Pressure loss [Hz]	Water flow [kg]
SONATA EVO 32 10 V	1200	8,27	34,5	4,12	0,36
SONATA EVO 32 15 V	1800	11,86	33,8	2,75	0,52
SONATA EVO 32 20 V	2640	17,26	33,7	4,02	0,75
SONATA EVO 32 25 V	3040	21,33	34,8	6,47	0,93
SONATA EVO 40 10 V	1840	10,71	32,0	6,57	0,47
SONATA EVO 40 15 V	2560	14,97	32,0	4,22	0,65
SONATA EVO 40 20 V	3600	21,06	32,0	5,79	0,92
SONATA EVO 40 25 V	4560	26,03	31,7	9,42	1,14

* Temperature of intake air: +18 °C

Recommended mixing points for LPHW

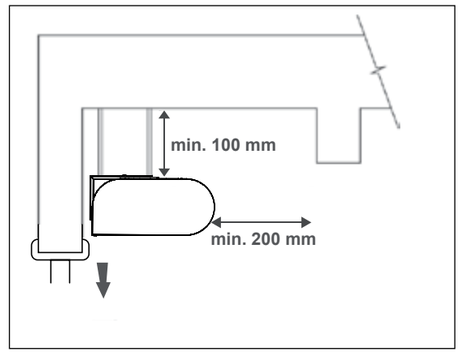
Type	Control module	90/70 °C	80/60 °C	70/50 °C	60/40 °C
SONATA EVO 32 10 V	SONATA EVO-BA	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-CO	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-NU	ZV-3-24V-04,0	ZV-3-24V-04,0	ZV-3-24V-02,5	ZV-3-24V-01,6
SONATA EVO 32 15 V	SONATA EVO-BA	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-CO	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-NU	ZV-3-24V-06,3	ZV-3-24V-04,0	ZV-3-24V-04,0	ZV-3-24V-02,5
SONATA EVO 32 20 V	SONATA EVO-BA	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-CO	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-NU	ZV-3-24V-06,3	ZV-3-24V-06,3	ZV-3-24V-06,3	ZV-3-24V-04,0
SONATA EVO 32 25 V	SONATA EVO-BA	RT-3-15	RT-3-15	RT-3-15	RT-3-15
	SONATA EVO-CO	RT-3-15	RT-3-15	RT-3-15	RT-3-15
	SONATA EVO-NU	ZV-3-24V-12,0	ZV-3-24V-06,3	ZV-3-24V-06,3	ZV-3-24V-04,0
SONATA EVO 40 10 V	SONATA EVO-BA	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-CO	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-NU	ZV-3-24V-06,3	ZV-3-24V-04,0	ZV-3-24V-04,0	ZV-3-24V-02,5
SONATA EVO 40 15 V	SONATA EVO-BA	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-CO	ZV-3	ZV-3	ZV-3	ZV-3
	SONATA EVO-NU	ZV-3-24V-06,3	ZV-3-24V-06,3	ZV-3-24V-04,0	ZV-3-24V-04,0
SONATA EVO 40 20 V	SONATA EVO-BA	RT-3-15	RT-3-15	RT-3-15	RT-3-15
	SONATA EVO-CO	RT-3-15	RT-3-15	RT-3-15	RT-3-15
	SONATA EVO-NU	ZV-3-24V-12,0	ZV-3-24V-06,3	ZV-3-24V-06,3	ZV-3-24V-04,0
SONATA EVO 40 20 V	SONATA EVO-BA	RT-3-15	RT-3-15	RT-3-15	RT-3-15
	SONATA EVO-CO	RT-3-15	RT-3-15	RT-3-15	RT-3-15
	SONATA EVO-NU	ZV-3-24V-12,0	ZV-3-24V-12,0	ZV-3-24V-06,3	ZV-3-24V-06,3

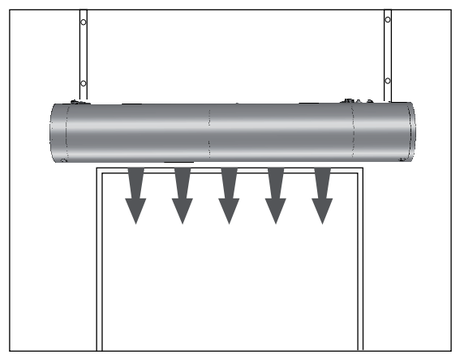
Design changes reserved

AIR CURTAINS GRAND / SONATA

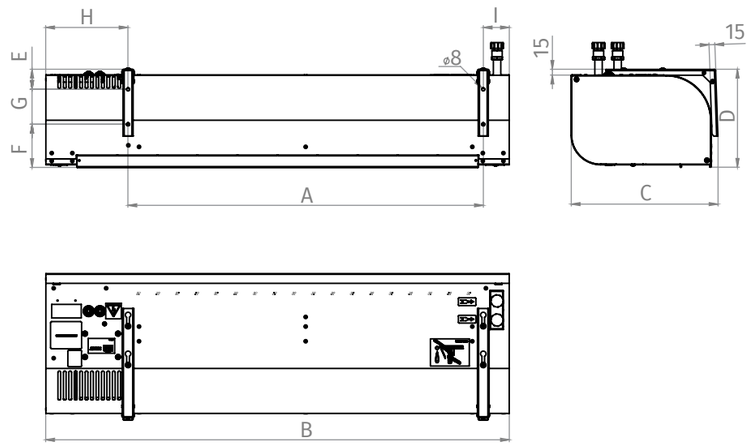
INSTALLATION AND ASSEMBLY

- The air curtain must be installed in a horizontal position only.
- The air curtain shall be located as close as possible to the top edge of the doorway, and a distance from walls that is in accordance with fre safety and building codes of the country where unit is installed. For manufacturer recommended distance see fgures below.
- To ensure proper function it is recommended that the air curtain overlaps the doorway by 100 mm on both sides.
- Correct operation of the air curtain requires that specifed distances from the surrounding objects are observed, see fIgure.
- Please take note of water and power supply connections when installing air curtain.
- The air curtain shall be installed using supplied brackets.





DIMENSIONS



Type	A	B	C	D	E	F	G	H	I
SONATA EVO 32 10	913	1190	377	252	51	111	90	211	67
SONATA EVO 40 10	913	1190	377	252	51	111	90	211	67
SONATA EVO 32 15	1321	1600	377	252	51	111	90	211	67
SONATA EVO 40 15	1321	1600	377	252	51	111	90	211	67
SONATA EVO 32 20	1822	2100	377	252	51	111	90	211	67
SONATA EVO 40 20	1822	2100	377	252	51	111	90	211	67
SONATA EVO 32 25	2232	2510	377	252	51	111	90	211	67
SONATA EVO 40 25	2232	2510	377	252	51	111	90	211	67

Design changes reserved

CONTROL

	BASIC SONATA EVO-BA	COMFORT SONATA EVO-CO	SUPERIOR SONATA EVO-NU
Type of controller / Mode	Manual / Manual	Touch screen / Manual or Auto*	Touch screen / Manual or Auto
Regulation of air output	3 speeds	3 speeds	3 speeds (AC) 10 speeds (EC)
Regulation of electric heater	OFF / Level1 / Level2	OFF / Level1 / Level2	YES (PWM)
Regulation of water heater	ON/OFF	ON/OFF	0-10V
Antifreeze protection of LPHW	NO	NO	YES
Possibility of connecting a door contact	YES (230V)	YES (12V)	YES (12V)
External control	NO	YES	YES
Temperature measurement	YES (Room thermostat)	YES (Room thermostat)	Yes (NTC)**
Chaining air curtains	NO	YES – max 10+1 pcs	YES – max 10+1 pcs
Indication of selected function	YES	YES (Display)	YES (Display)
Controller connection to air curtain	Power wire	Communication cable (UTP)	Communication cable (UTP)
Self learning mode	NO	NO	YES
BMS connection	NO	Modbus RTU	Modbus RTU, Modbus TCP
Error contact	NO	YES	YES
2nd control panel ready	NO	YES	YES

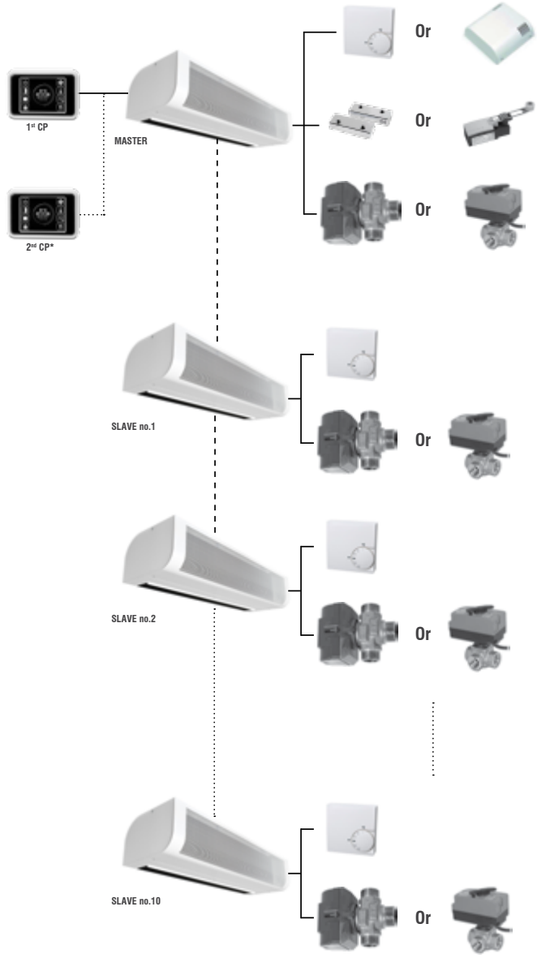
*) Auto mode only ON/OFF with connected Room thermostat
**) Temperature sensor included in standard. Temperature shown on display

Design changes reserved

CHAINING EXAMPLE

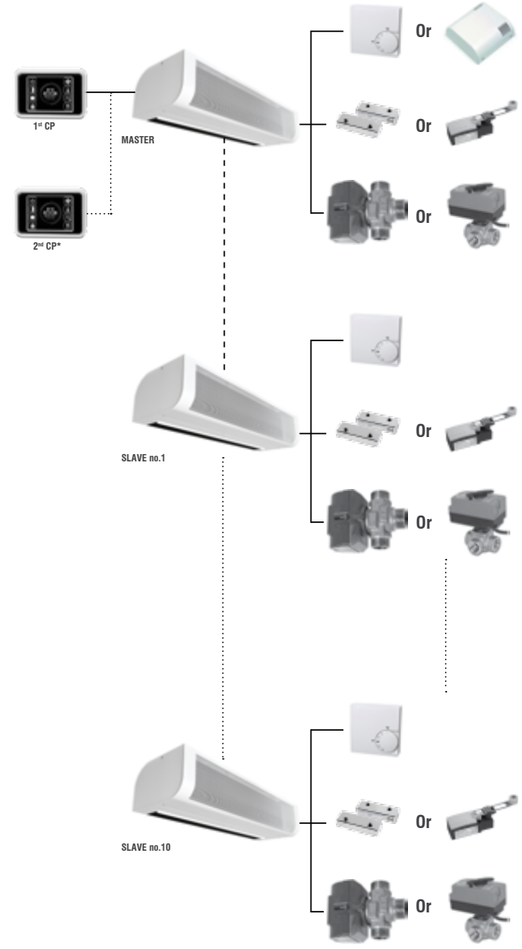
COMFORT / SUPERIOR

- Global Door contact function active



COMFORT / SUPERIOR

- Global Door contact function not active



*) Optional accessories

Design changes reserved

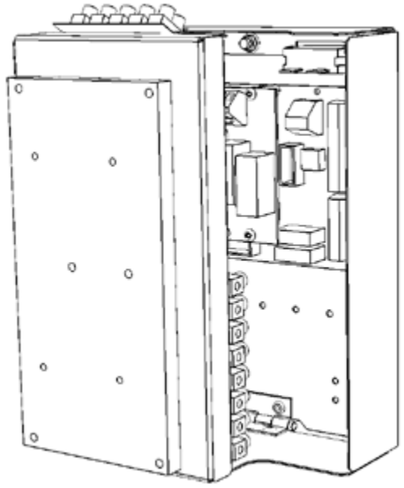
ACCESSORIES

REQUIRED ACCESSORIES

These accessories are required to make the curtain functional.

Control module

- A control module is a required accessory for SONATA EVO air curtain and are required for each air curtain.
- A control panel is included in the delivery with the control module. The ordering key for control modules is provided below. The control panel of Basic control module is connected using common wiring cable (230 V control voltage). A suitable cross-Nection of the cable shall be determined based on the particular installation conditions. This cable should be provided by a company performing the air curtain electrical wiring. The control panel of Comfort/Superior module is connected using UTP communication cable (not included).



ORDERING KEY

Air curtain	SONATA EVO	- BA	- E	- MA	- 1	- AC
BA – Basic control (mechanical) **CO** – Comfort control (touch screen) **SU** – Superior control (touch screen)						
S – without heating regulation **E** – with electric heater regulation **V** – with water heater regulation						
SL – SLAVE (only for CO, SU) **MA** – MASTER (only for CO, SU)						
1 – only for E versions, air curtain lenght 100, 150 **2** – only for E versions, air curtain lenght 200, 250						
AC – AC motor						

Design changes reserved

OTHER ACCESSORIES

Thermostatic valve TV-1-1/1
TV-1-1/1

Zone valve with servo drive ZV-3
ZV-3 (for control BA, CO)

Water valve
RT-3-11 (KVS 11)
RT-3-15 (KVS 15)
(for control BA, CO)

Water valve (0-10V)
ZV-3-24V-XX
(für Steuerung SU)

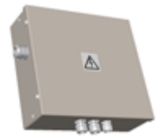
Mixing node
SMU2-230-xx (for control BA, CO)
SMU2-024-xx (for control SU)

Mechanical door switch (230V)
DS

Magnetic door contact (12V)
DK-1

Magnetic door contact (12V) in a metal housing
with higher protection against mechanical damage
DK-B-3

Timer with a weekly program
SH-TM-848



OpenEnd module (Control module for BMS)
OE-M-AC3 (for control BA)

Room thermostat
TER-P

Room thermostat
TER-P

Room temperature sensor
CT-ROOM (for control SU)

	BASIC SONATA EVO-BA	COMFORT SONATA EVO-CO	SUPERIOR SONATA EVO-NU
DS	●	●	●
DK-1	●	●	●
DK-B-3	●	●	●

* Recommended for industry use

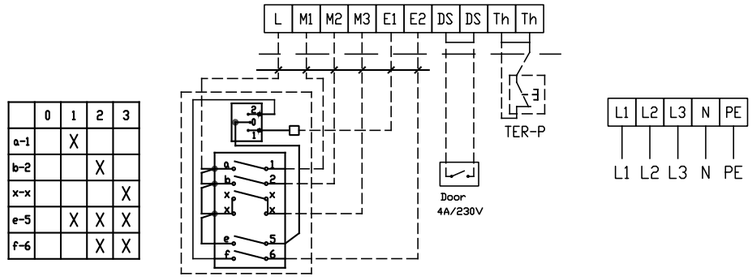
Design changes reserved

WIRING DIAGRAMS

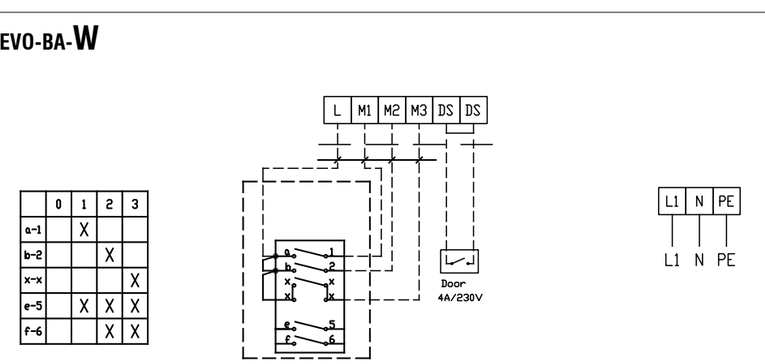
- Air curtains with electric heaters are equiped with an automatic heat thermostat and emergency thermostat with manual reset. Air curtains with LPHW are designed for a maximum operating water temperature of +130 °C and a maximum operating pressure of 1.6 MPa.

BASIC

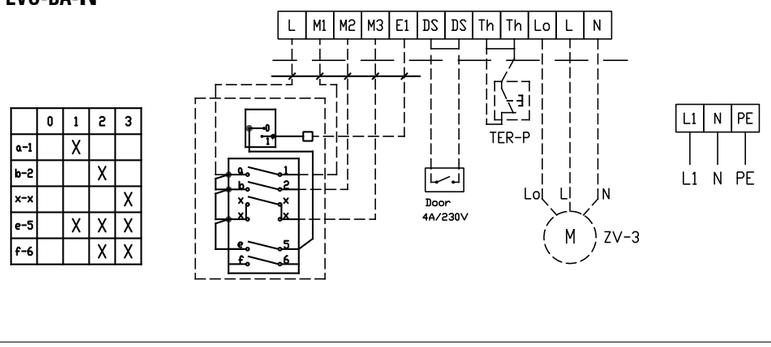
SONATA EVO-BA-E



SONATA EVO-BA-W



SONATA EVO-BA-N



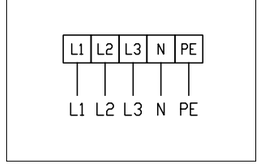
Design changes reserved

AIR CURTAINS GRAND / SONATA

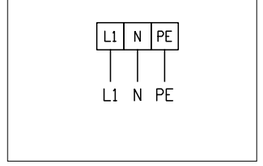
WIRING DIAGRAMS

COMFORT MASTER

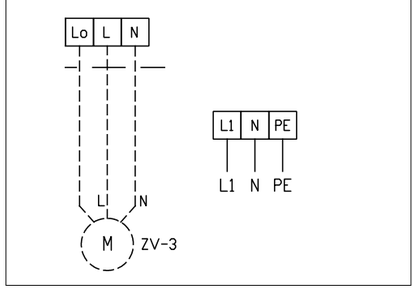
SONATA EVO-CO-*-E

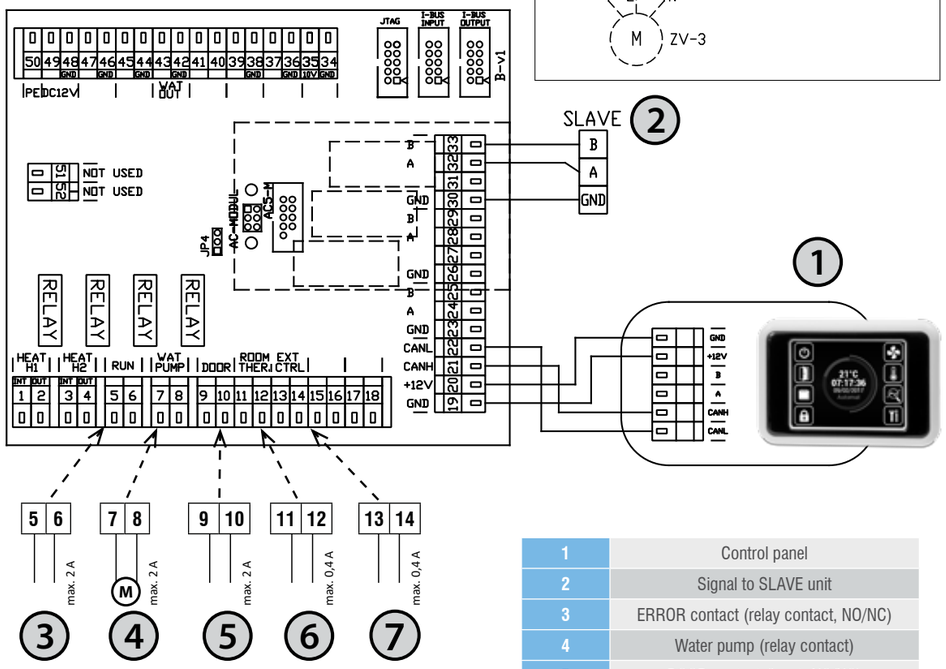


SONATA EVO-CO-*-N



SONATA EVO-CO-*-W





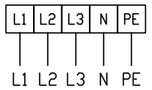
1	Control panel
2	Signal to SLAVE unit
3	ERROR contact (relay contact, NO/NC)
4	Water pump (relay contact)
5	DOOR contact (input, NO/NC)
6	Room thermosat (input, NO/NC)
7	External control (input, NO/NC)

Design changes reserved

WIRING DIAGRAMS

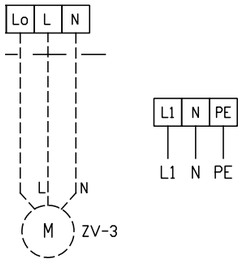
COMFORT SLAVE

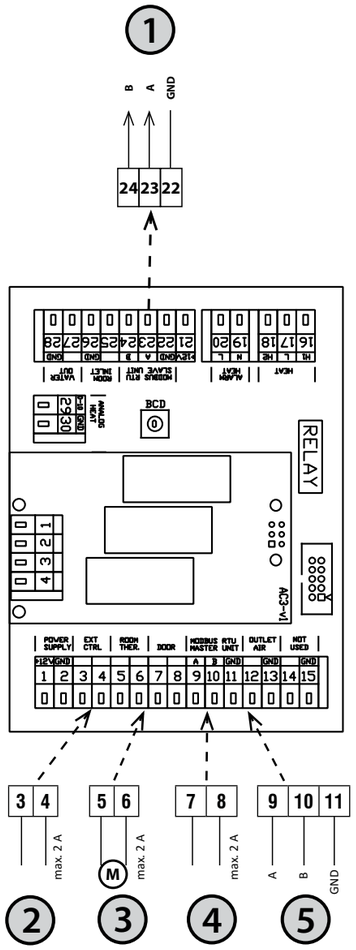
SONATA EVO-CO-*-E



SONATA EVO-CO-*-N

SONATA EVO-CO-*-W



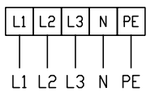


1	Signal to SLAVE unit
2	External control - ON/OFF
3	Room thermostat (input)
4	DOOR contact (input)
5	Signal from MASTER unit

Design changes reserved

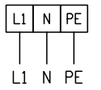
WIRING DIAGRAMS

SONATA EVO-CO-*-E

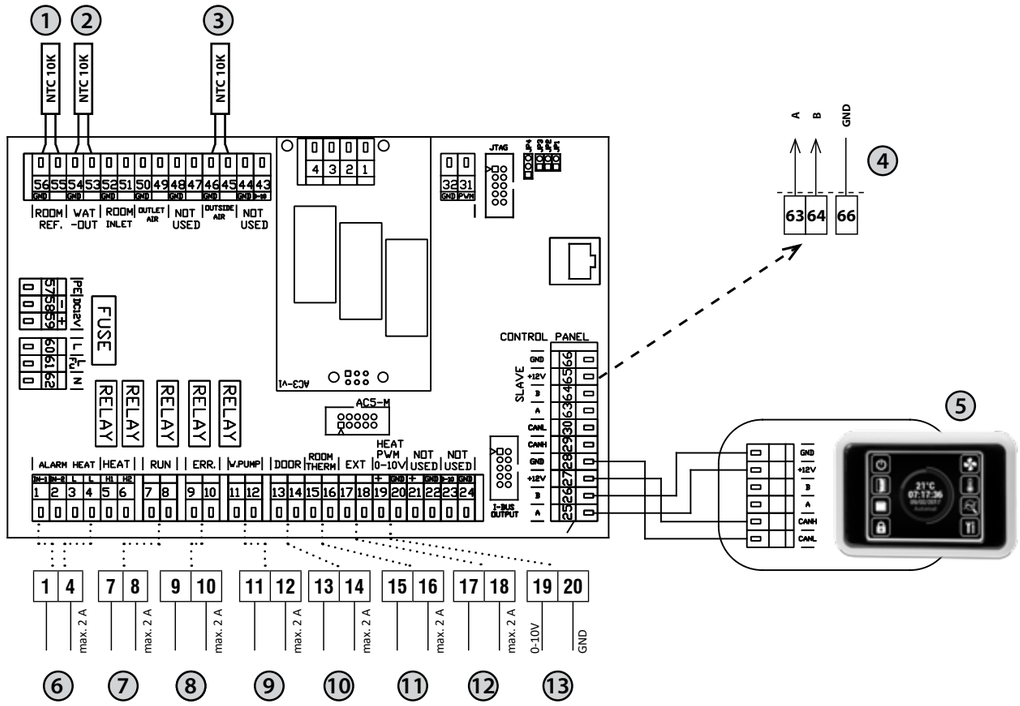


SONATA EVO-CO-*-N

SONATA EVO-CO-*-W



SUPERIOR MASTER

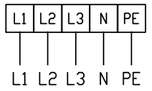


1	Room sensor (accessories)
2	LPHW out sensor (included in delivery)
3	Outside air sensor (included in delivery)
4	Signal to SLAVE unit
5	Control panel
6	Antifreeze thermostat (NC)
7	RUN contact (relay contact, NO/NC)
8	ERROR contact (relay contact, NO/NC)
9	Water pump (relay contact)
10	DOOR contact (input, NO/NC)
11	Room thermosat (input, NO/NC)
12	External control (input, NO/NC)
13	Water valve control (0-10V)

Design changes reserved

WIRING DIAGRAMS

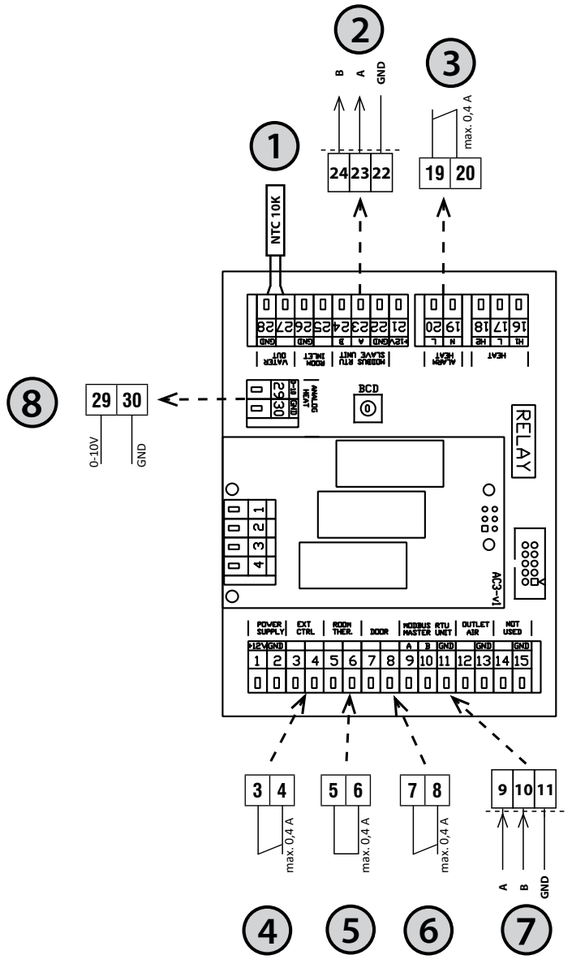
SONATA EVO-CO-*-E



SONATA EVO-CO-*-N

SONATA EVO-CO-*-W

SUPERIOR SLAVE

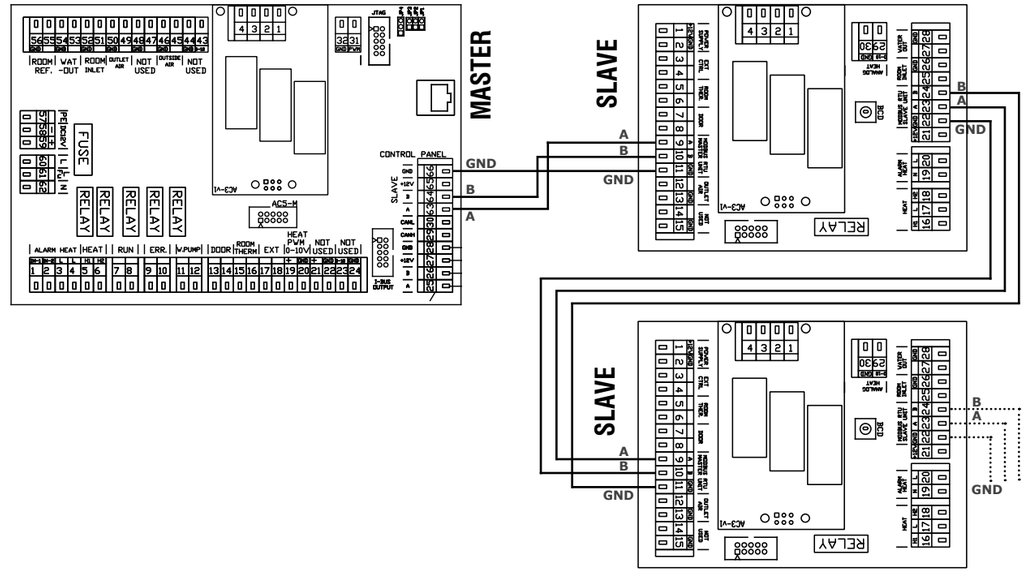


1	LPHW out sensor (included in delivery)
2	Signal to SLAVE unit
3	Antifreeze thermostat (NC)
4	External control - ON/OFF
5	Room thermostat (input)
6	DOOR contact (input)
7	Signal from MASTER unit
8	Water valve control (0-10V)

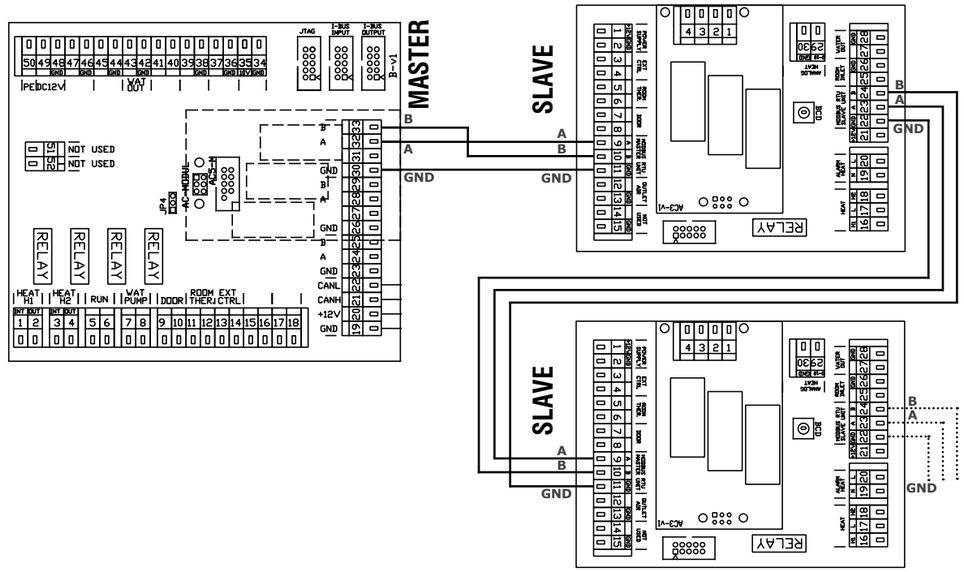
Design changes reserved

WIRING DIAGRAMS

SUPERIOR



COMFORT



Design changes reserved

ORDERING KEY

Air curtain	**SONATA EVO**	**- E**	**- 10**	**- 32**
E – Electric heater with 10kW power **V** – Water heater **S** – Air-only (ambient)				
10 – Nominal width 1000 mm **15** – Nominal width 1500 mm **20** – Nominal width 2000 mm **25** – Nominal width 2500 mm				
32 – Output series (3,2m) **40** – Output series (4,0m)				

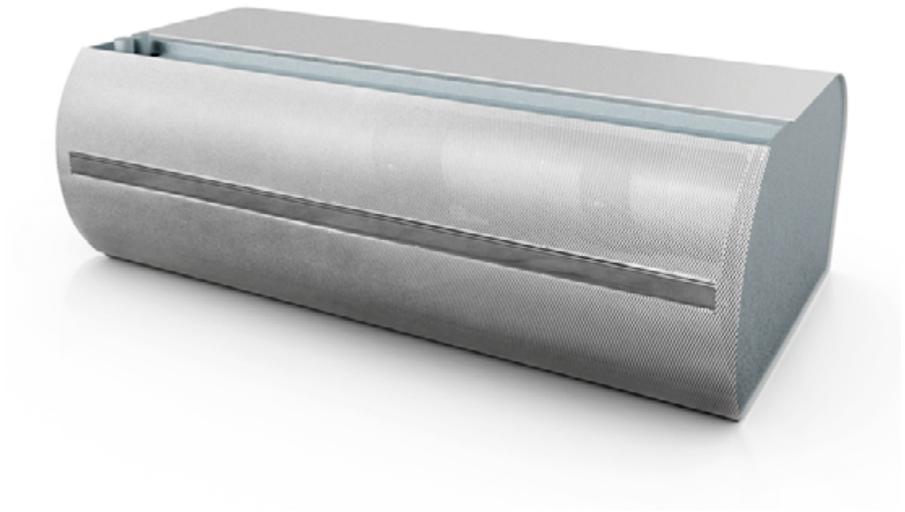
AIR CURTAINS GRAND / SONATA

NOTES:

8/S4
v 3.3 (en)

AIR CURTAINS

GRAND



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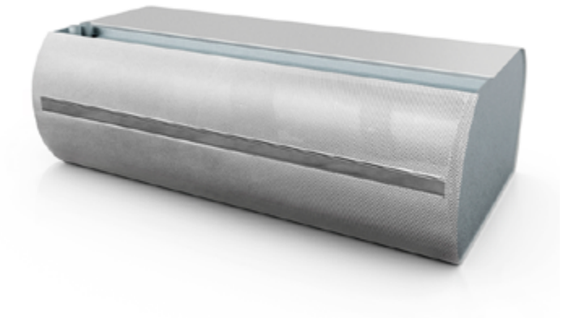
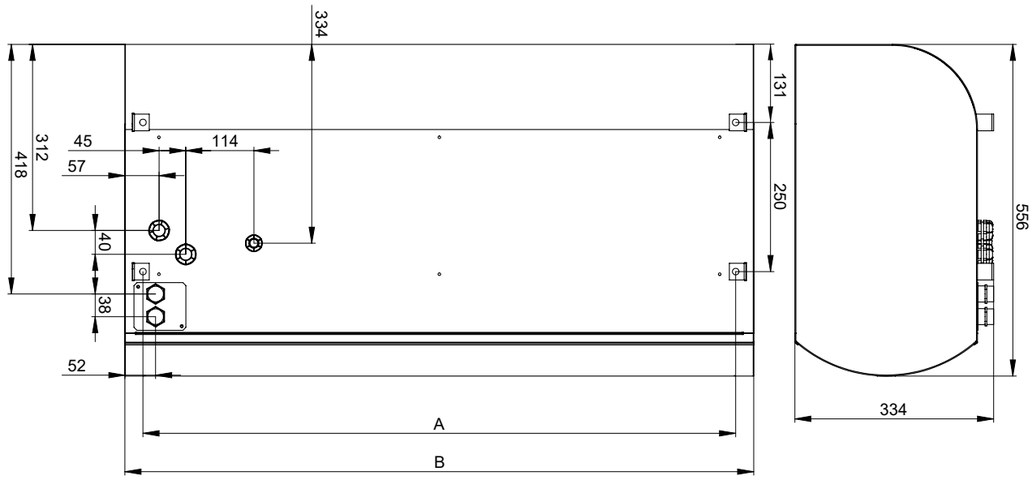
AIR CURTAINS GRAND / SONATA



PRIMARY PARAMETERS

- Air curtains with electric heater are ftted with automatic heat thermostat and emergency thermostat with manual reset. The warm-water exchangers are designed for the maximum oper ating water temperature of +100 °C and maximum operating pressure of 1.6 MPa.

DIMENSIONS



Type	Spacing of installation holes A [mm]	Width B [mm]
GRAND-xx-10	994	1054
GRAND-xx-15	1494	1554
GRAND-xx-20	1994	2054
GRAND-xx-25	2394	2454

GRAND

BASIC FEATURES

- Lengths: 1; 1.5; 2 and 2.5 m
- Air flow up to 5090 m3/h (ISO 27 327-1)
- Very low noise level
- FACE 2 in 1 – suction grille + fIter = 2 in 1
- Universal interface for control module connection (BA, CO, SU)
- Easy installation and service
- Wireless control option
- Standard colour RAL 9010 (any RAL – based colours may be provided on customer's request
- The Grand is an extraordinary high-performance and visually attractive comfortable air curtain for use in representative premises, such as banks, luxury shops, shopping centres, airports and administrative buildings with a recommended installation height up to 5 m.
- The air curtain shall be installed indoor in a dry area with ambient temperatures ranging from 0 °C up to +35 °C and relative humidity of up to 80 %. It is designed for conveying air free of rough dust, grease, chemical fumes, and other impurities. IP rating of the air curtain is IP 20. The air curtain project shall always be developed by the HVAC designer.

Design changes reserved

Type	Recommended installation height [m]	Air output [m³/h] *1			Acoustic pressure at 3m [dB(A)]*2			Sound power [dB(A)]*3	Heater power output [kW]	Total consumption [V/A]	Motor consumption [W/A]	Weight [kg]*5
		Speed 3	Speed 2	Speed 1	Speed 3	Speed 2	Speed 1					
GRAND-40-10-N-	4,0	1626	1182	813	56,0	47,9	39,8	73,5	-	-	230/2,25	42
GRAND-40-15-N-	4,0	2513	1774	1256	58,7	50,9	43,2	76,2	-	-	230/3,50	59
GRAND-40-20-N-	4,0	3362	2328	1626	59,7	51,8	43,8	77,2	-	-	230/4,70	76
GRAND-40-25-N-	4,0	4065	2956	2106	60,8	53,4	44,8	78,3	-	-	230/5,60	93
GRAND-40-10-E10-	4,0	1589	1145	813	56,0	47,9	39,8	73,5	9,5	400/13,7	230/2,25	46
GRAND-40-15-E15-	4,0	2476	1700	1219	58,7	50,9	43,2	76,2	15	400/21,7	230/3,50	63
GRAND-40-20-E19-	4,0	3362	2291	1589	59,7	51,8	43,8	77,2	19	400/27,5	230/4,70	81
GRAND-40-25-E25-	4,0	3991	2919	2069	60,8	53,4	44,8	78,3	24,5	400/35,4	230/5,60	99
GRAND-40-10-W-	4,0	1552	1109	776	55,8	47,9	39,7	73,3	16,97*4	-	230/2,25	48
GRAND-40-15-W-	4,0	2439	1663	1182	57,6	49,4	41,6	75,1	38,47*4	-	230/3,50	65
GRAND-40-20-W-	4,0	3252	2180	1552	59,3	51,0	42,9	76,8	52,64*4	-	230/4,70	83
GRAND-40-25-W-	4,0	3880	2734	1884	60,6	52,7	45,4	78,1	65,46*4	-	230/5,60	97
GRAND-50-10-N-	5,0	2303	1656	1172	59,6	51,7	43,6	77,1	-	-	230/3,30	48
GRAND-50-15-N-	5,0	3353	2424	1737	60,0	52,1	44,2	77,5	-	-	230/4,60	64
GRAND-50-20-N-	5,0	4161	2990	2101	60,3	52,6	44,5	77,9	-	-	230/5,55	80
GRAND-50-25-N-	5,0	5090	3636	2666	61,1	53,4	45,6	78,6	-	-	230/6,90	98
GRAND-50-10-E10-	5,0	2262	1616	1131	59,6	51,7	43,6	77,1	9,5	400/13,7	230/3,30	53
GRAND-50-15-E15-	5,0	3272	2384	1697	60,0	52,1	44,2	77,5	15	400/21,7	230/4,60	68
GRAND-50-20-E19-	5,0	4080	2949	2060	60,3	52,6	44,5	77,9	19	400/27,5	230/5,55	86
GRAND-50-25-E25-	5,0	4888	3555	2586	61,1	53,4	45,6	78,6	24,5	400/35,4	230/6,90	110
GRAND-50-10-W-	5,0	2222	1576	1115	59,1	51,4	42,9	76,6	20,80*4	-	230/3,30	55
GRAND-50-15-W-	5,0	3151	2182	1616	59,7	52,2	43,9	77,2	43,87*4	-	230/4,60	70
GRAND-50-20-W-	5,0	3878	2788	1939	60,2	52,6	44,8	77,7	56,21*4	-	230/5,55	88
GRAND-50-25-W-	5,0	4808	3434	2424	60,7	53,3	45,5	78,2	72,12*4	-	230/6,90	108

*1 Air flow volume according ISO27327-1
*2 Acoustic pressure values at 3 and 5 m distance for maximum speed. Directional factor: Q=2.
*3 Sound power (LWA) measurements according to ISO 27327-2.
*4 Intake air temperature +18°C, at maximum heating level and highest fan speed.
*5 Weight without regulation.

Air curtain type	Air capacity [m3/h]	Heater power [kW]*2 *3	Temperature increase* Δt [°C]
GRAND-40-10-E10-	1589	9,5	13,19
GRAND-40-15-E15-	2476	15	13,36
GRAND-40-20-E19-	3362	19	12,46
GRAND-40-25-E25-	3391	24,5	13,54
GRAND-50-10-E10-	2262	9,5	10,12
GRAND-50-15-E15-	3272	15	11,05
GRAND-50-20-E19-	4080	19	11,23
GRAND-50-25-E25-	4888	24,5	12,08

* At the maximum air flow and maximum heater power
*2 Air curtains with BA and CO control modules has heating steps divided 50% / 100%
*3 Air curtains with SU control module has stepless heating

Design changes reserved

Water exchanger parameters for water temperature gradient of 60/40 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
GRAND-40-10-W-	1552	8,21	30	0,10	1,33
GRAND-40-15-W-	2439	18,72	36	0,22	2,57
GRAND-40-20-W-	3252	25,83	37	0,31	3,49
GRAND-40-25-W-	3880	32,13	37	0,38	5,47
GRAND-50-10-W-	2222	10,00	30	0,12	1,79
GRAND-50-15-W-	3151	21,23	35	0,25	2,94
GRAND-50-20-W-	3878	27,48	36	0,33	3,83
GRAND-50-25-W-	4808	35,22	37	0,42	6,34

* Temperature of intake air: +18 °C

Water exchanger parameters for water temperature gradient of 70/50 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
GRAND-40-10-W-	1552	11,05	35	0,13	2,09
GRAND-40-15-W-	2439	25,15	43	0,30	3,54
GRAND-40-20-W-	3252	34,60	43	0,41	5,48
GRAND-40-25-W-	3880	43,03	44	0,51	8,82
GRAND-50-10-W-	2222	13,50	34	0,16	2,88
GRAND-50-15-W-	3151	28,58	42	0,34	4,08
GRAND-50-20-W-	3878	36,86	43	0,44	6,06
GRAND-50-25-W-	4808	47,25	44	0,56	10,30

* Temperature of intake air: +18 °C

Water exchanger parameters for water temperature gradient of 80/60 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
GRAND-40-10-W-	1552	13,97	40	0,17	3,04
GRAND-40-15-W-	2439	31,72	49	0,38	4,58
GRAND-40-20-W-	3252	43,52	50	0,52	7,93
GRAND-40-25-W-	3880	54,13	52	0,64	12,96
GRAND-50-10-W-	2222	17,09	38	0,20	4,24
GRAND-50-15-W-	3151	36,12	48	0,43	5,31
GRAND-50-20-W-	3878	46,42	49	0,55	8,82
GRAND-50-25-W-	4808	59,54	51	0,71	15,26

* Temperature of intake air: +18 °C

Water exchanger parameters for water temperature gradient of 90/70 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
GRAND-40-10-W-	1552	16,97	45	0,20	4,19
GRAND-40-15-W-	2439	38,47	56	0,46	5,72
GRAND-40-20-W-	3252	52,64	57	0,63	10,90
GRAND-40-25-W-	3880	65,46	59	0,78	17,98
GRAND-50-10-W-	2222	20,80	43	0,25	5,92
GRAND-50-15-W-	3151	43,87	55	0,52	6,66
GRAND-50-20-W-	3878	56,21	57	0,67	12,19
GRAND-50-25-W-	4808	72,12	58	0,86	21,29

* Temperature of intake air: +18 °C

Design changes reserved

CONTROL

- The Grand air curtains are produced with universal interface for control module connection. There are three types of control modules available (BA, CO and SU). Control module is an required accessorie for each air curtain.
- Additional change of control system is available. Control module is connected with air curtain by quick connection sockets. The basic differences among individual control module types are given in table underneath.

	BASIC SONATA EVO-BA	COMFORT SONATA EVO-CO	SUPERIOR SONATA EVO-NU
Type of controller / Mode	Manual / Manual	Touch screen / Manual or Auto*	Touch screen / Manual or Auto
Regulation of air output	3 speeds	3 speeds	3 speeds (AC) 10 speeds (EC)
Regulation of electric heater	OFF / Level1 / Level2	OFF / Level1 / Level2	YES (PWM)
Regulation of water heater	ON/OFF	ON/OFF	0-10V
Antifreeze protection of LPHW	NO	NO	YES
Possibility of connecting a door contact	YES (230V)	YES (12V)	YES (12V)
External control	NO	YES	YES
Temperature measurement	YES (Room thermostat)	YES (Room thermostat)	Yes (NTC)**
Chaining air curtains	NO	YES – max 10+1 pcs	YES – max 10+1 pcs
Indication of selected function	YES	YES (Display)	YES (Display)
Controller connection to air curtain	Power wire	Communication cable (UTP)	Communication cable (UTP)
Self learning mode	NO	NO	YES
BMS connection	NO	Modbus RTU	Modbus RTU, Modbus TCP
Error contact	NO	YES	YES
2nd control panel ready	NO	YES	YES

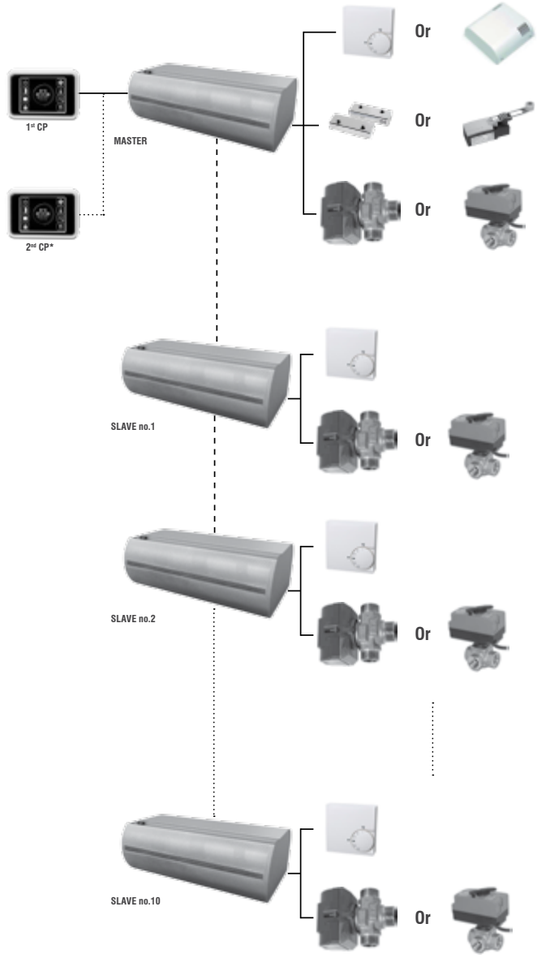
*) Auto mode only ON/OFF with connected Room thermostat
**) Temperature sensor included in standard. Temperature shown on display

Design changes reserved

CHAINING EXAMPLE

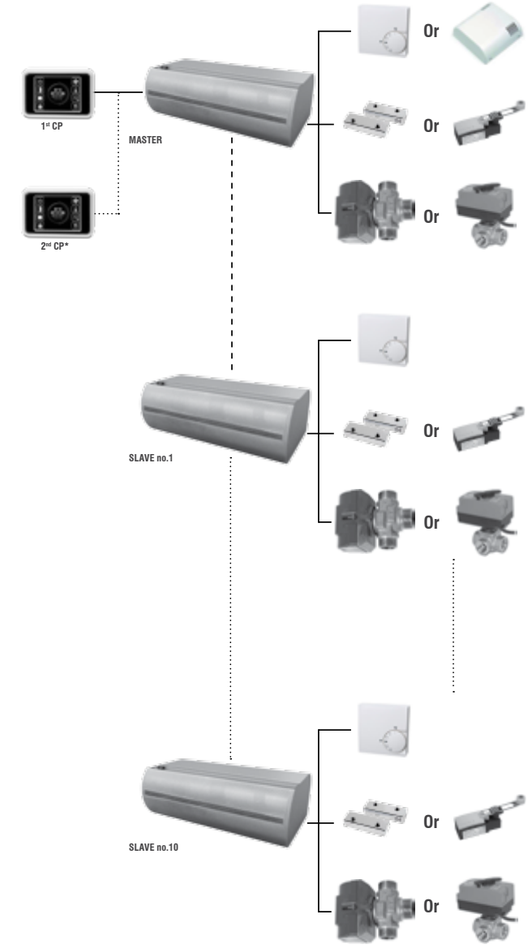
COMFORT / SUPERIOR

- Global Door contact function active



COMFORT / SUPERIOR

- Global Door contact function not active

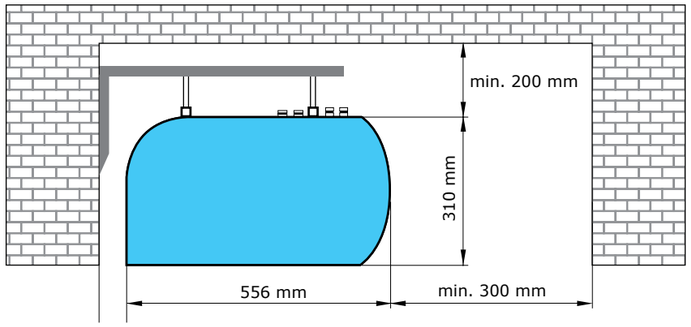


*) Optional accessories

Design changes reserved

INSTALLATION AND ASSEMBLY

- The air curtain shall be installed in a horizontal position only.
- The air curtain shall be located as close to the top edge of the doorway as possible, see fgure.
- To ensure a correct function it is recommended that the air curtain overlaps the doorway by 100 mm on both sides.
- Correct operation of the air curtain requires that specifed distances from the surrounding objects are observed, see fgure.
- Position of the heating water and power supply connections shall be taken into consideration during installation.
- Suspension holders are used for installing the air curtains see ACCESSORIES.



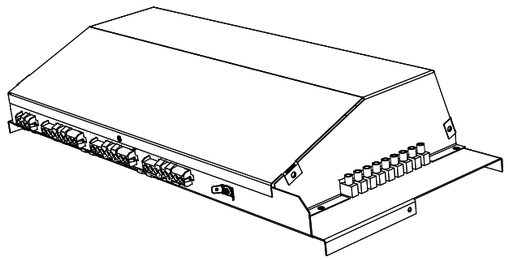
ACCESSORIES

REQUIRED ACCESSORIES

These accessories are required to make the curtain functional.

Control module

- A control module is an required accessorie for air curtain and shall be ordered for each air curtain. Control panel is included in delivery of control module. The ordering key for control modules is provided below.
- Communication cable has to be ordered separatelly as an optional accessorie.



ORDERING KEY

Air curtain	GRAND	- NU	- E	- MA	- AC
BA – Basic control (mechanical) **CO** – Comfort control (touch screen) **SU** – Superior control (touch screen)					
N – without heating regulation **E** – with electric heater regulation **W** – with water heater regulation					
SL – SLAVE (only for CO, SU) **MA** – MASTER (only for CO, SU)					
AC – AC motor					

Design changes reserved

OTHER ACCESSORIES

Thermostatic valve TV-1-1/1
TV-1-1/1

Zone valve with servo drive ZV-3
ZV-3 (for control BA, CO)

Water valve
RT-3-11 (KVS 11)
RT-3-15 (KVS 15)
(for control BA, CO)

Water valve (0-10V)
ZV-3-24V-XX
(for control SU)

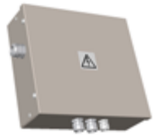
Mixing node
SMU2-230-xx (for control BA, CO)
SMU2-024-xx (for control SU)

Mechanical door switch (230V)
DS

Magnetic door contact (12V)
DK-1

Magnetic door contact (12V) in a metal housing
with higher protection against mechanical damage
DK-B-3

Timer with a weekly program
SH-TM-848



OpenEnd module (Control module for BMS)
OE-M-AC3 (for control BA)

Room thermostat
TER-P

Room thermostat
TER-P

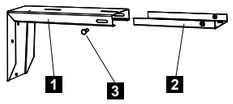
Room temperature sensor
CT-ROOM (for control SU)

	BASIC SONATA EVO-BA	COMFORT SONATA EVO-CO	SUPERIOR SONATA EVO-NU
DS	●	●	●
DK-1	●	●	●
DK-B-3	●	●	●

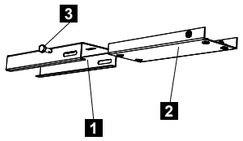
* Recommended for industry use

Design changes reserved

OTHER ACCESSORIES



Wall mounting bracket
Bracket designed for mounting the air curtain to the wall.
1 Bracket
2 Hanging strip
3 Securing screw
GRAND-KONZ-STE
– for B and C air curtains (2 pcs. in package)
– wall mounting bracket



Ceiling holder
The holder is designed for attaching the air curtain to a ceiling.
1 Ceiling bracket
2 Hanging strip
3 Securing screw
GRAND-KONZ-STR
– for B and C air curtains (2 pcs. in package)
– ceiling holder

Exit sign for marking of emergency exits.
Suitable for all types of air curtains.
GRAND-EXIT

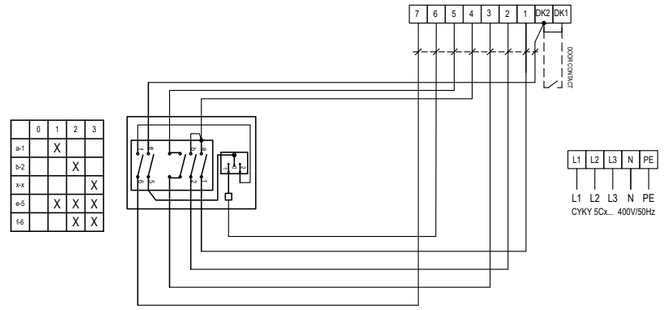
Design changes reserved

WIRING DIAGRAMS

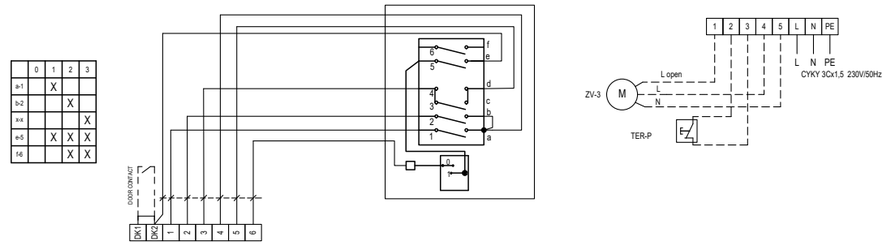
- The recommended cross-section of the main power supply cables is stated in the Instruction Manual.
- All wiring diagrams provided in the technical catalog are indicative only. When assembling the product, carefully observe the nameplate ratings as well as directions and diagrams afxed directly to the product or enclosed with the product.

BASIC

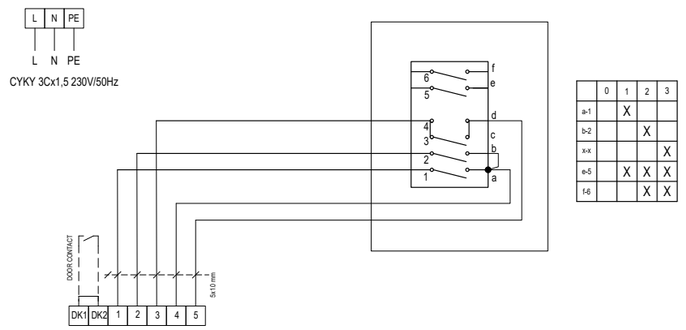
SONATA EVO-BA-E



SONATA EVO-BA-W



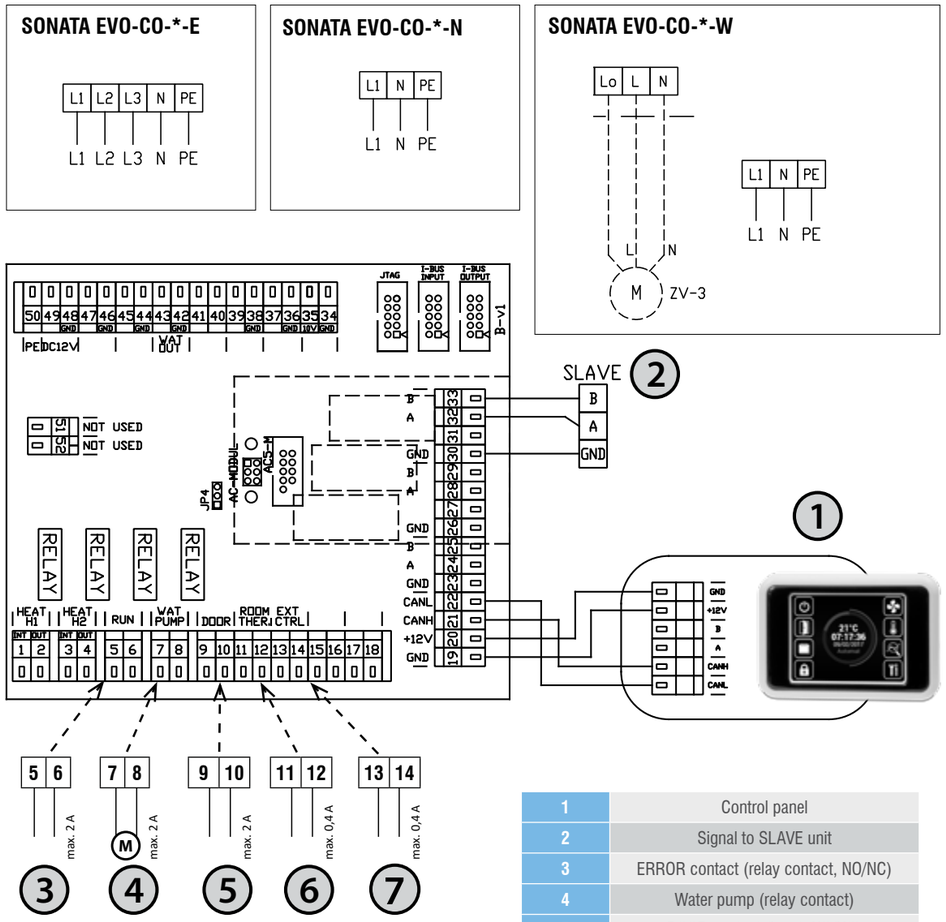
SONATA EVO-BA-N



Design changes reserved

WIRING DIAGRAMS

COMFORT MASTER

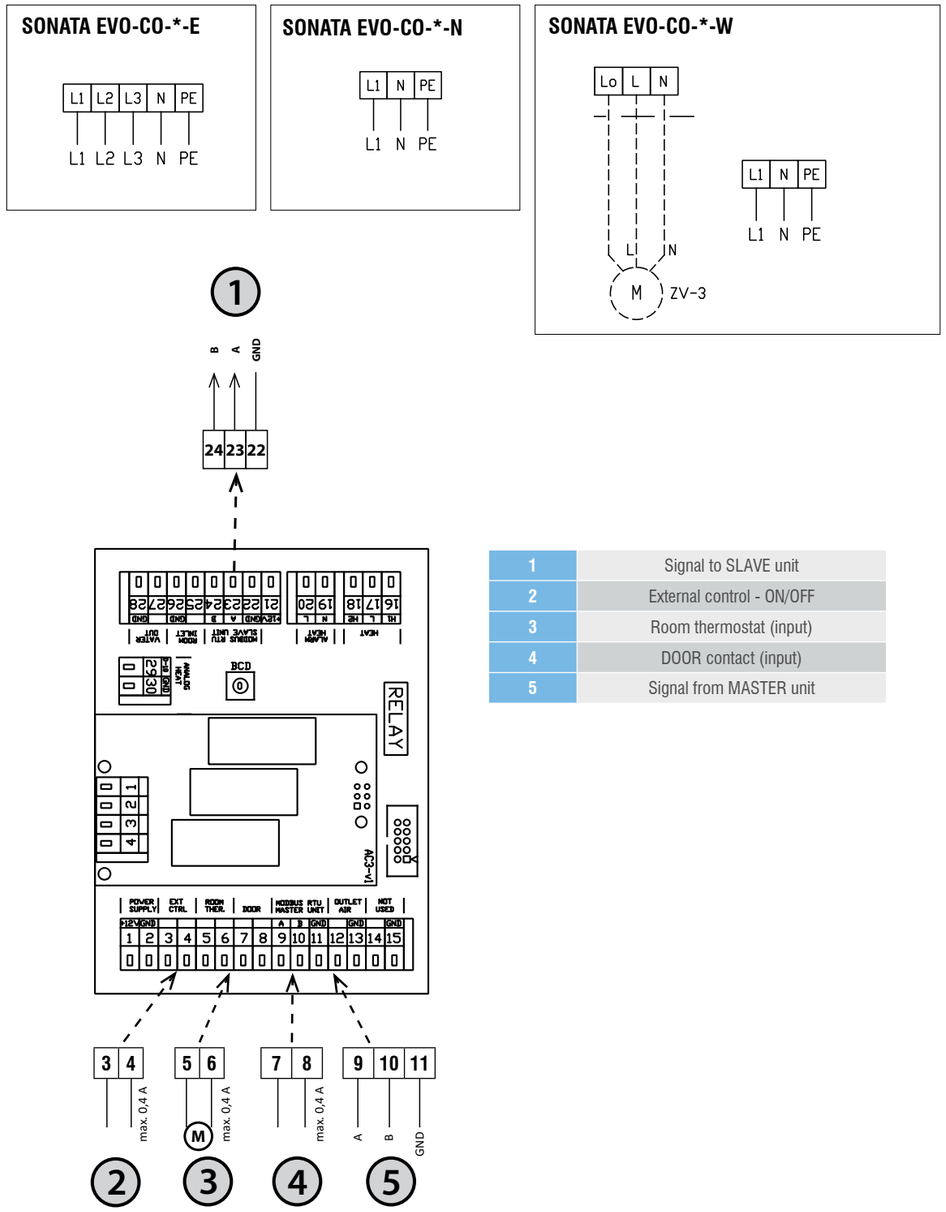


1	Control panel
2	Signal to SLAVE unit
3	ERROR contact (relay contact, NO/NC)
4	Water pump (relay contact)
5	DOOR contact (input, NO/NC)
6	Room thermosat (input, NO/NC)
7	External control (input, NO/NC)

Design changes reserved

WIRING DIAGRAMS

COMFORT SLAVE

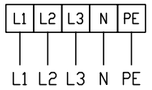


1	Signal to SLAVE unit
2	External control - ON/OFF
3	Room thermostat (input)
4	DOOR contact (input)
5	Signal from MASTER unit

Design changes reserved

WIRING DIAGRAMS

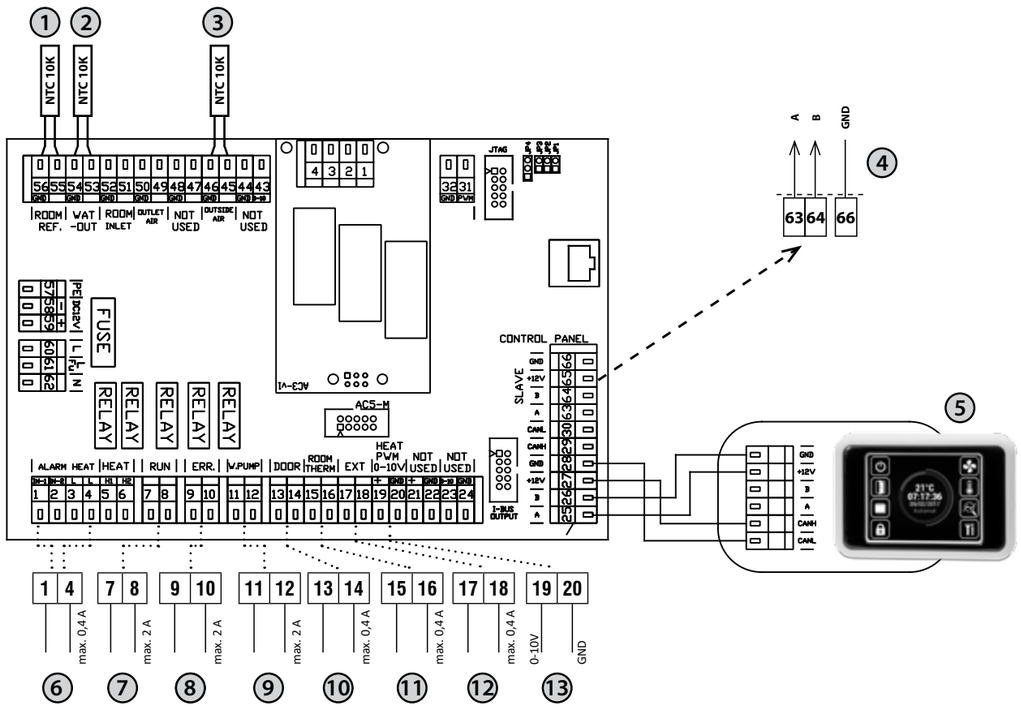
SONATA EVO-CO-*-E



SONATA EVO-CO-*-N

SONATA EVO-CO-*-W

SUPERIOR MASTER



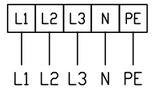
1	Room sensor (accessories)
2	LPHW out sensor (included in delivery)
3	Outside air sensor (included in delivery)
4	Signal to SLAVE unit
5	Control panel
6	Antifreeze thermostat (NC)
7	RUN contact (relay contact, NO/NC)
8	ERROR contact (relay contact, NO/NC)
9	Water pump (relay contact)
10	DOOR contact (input, NO/NC)
11	Room thermosat (input, NO/NC)
12	External control (input, NO/NC)
13	Water valve control (0-10V)

Design changes reserved

AIR CURTAINS GRAND / SONATA

WIRING DIAGRAMS

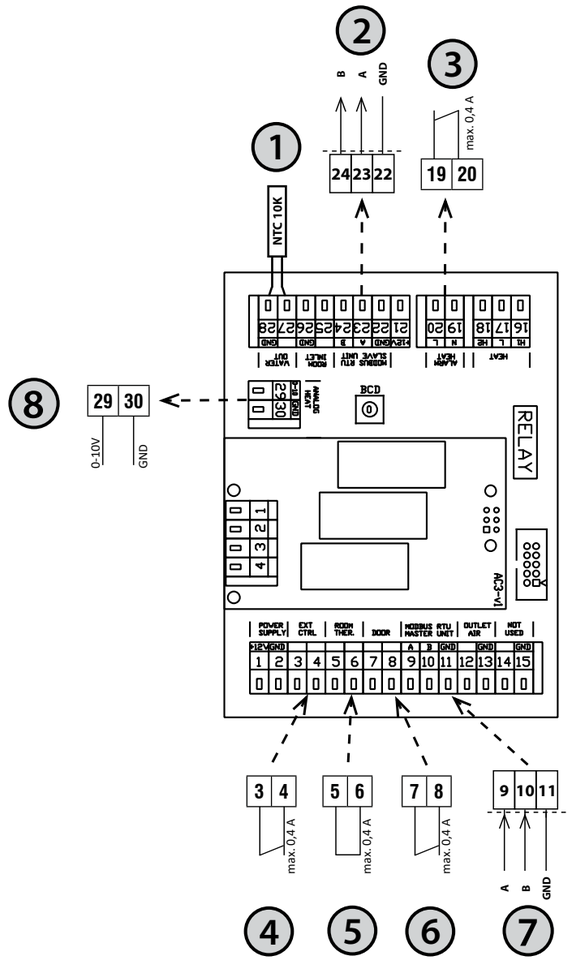
SONATA EVO-CO-*-E



SONATA EVO-CO-*-N

SONATA EVO-CO-*-W

SUPERIOR SLAVE

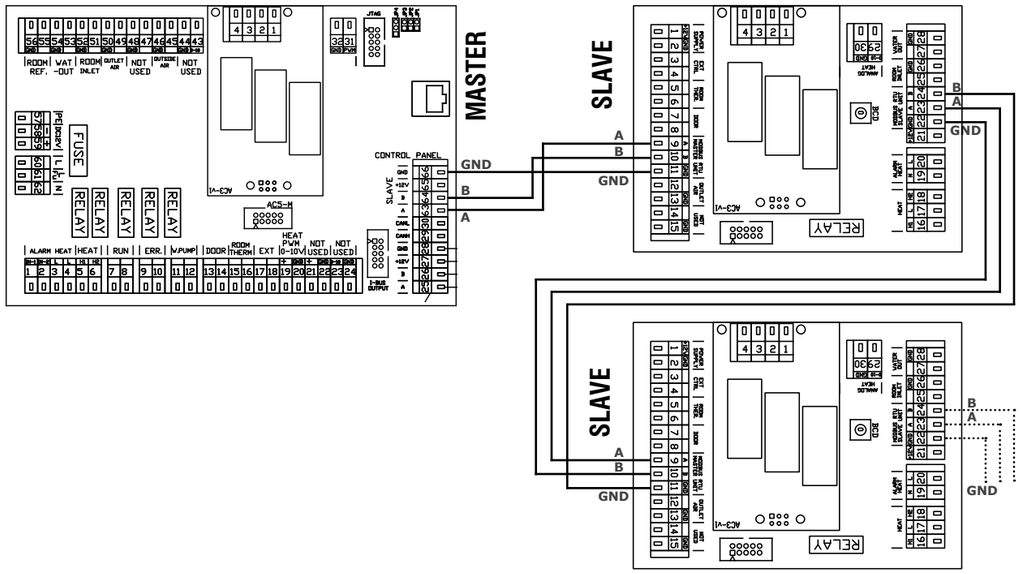


1	LPHW out sensor (included in delivery)
2	Signal to SLAVE unit
3	Antifreeze thermostat (NC)
4	External control - ON/OFF
5	Room thermostat (input)
6	DOOR contact (input)
7	Signal from MASTER unit
8	Water valve control (0-10V)

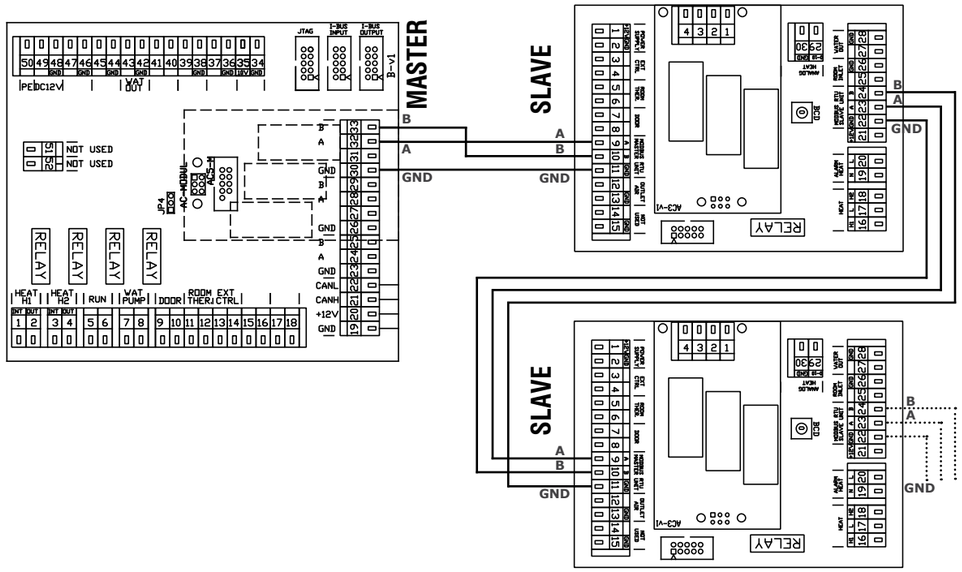
Design changes reserved

WIRING DIAGRAMS

SUPERIOR



COMFORT



ORDERING KEY

Air curtain	**GRAND**	**- 40**	**- 10**	**- W**
40 – B Output series **50** – C Output series				
10 – Nominal width 1000 mm **15** – Nominal width 1500 mm **20** – Nominal width 2000 mm **25** – Nominal width 2500 mm				
N – Air-only **E** – Electrical heater **W** – Water heater				

Design changes reserved
Design changes reserved

8/S5
v 3.3 (en)

AIR CURTAINS

XS

klimaoprema

TABLE OF CONTENTS

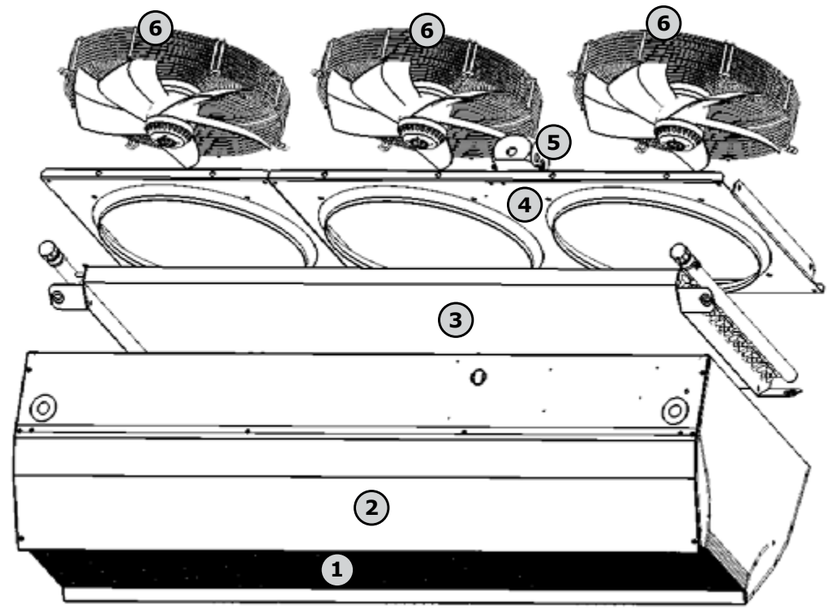
Design changes reserved

AIR CURTAINS GRAND / SONATA

PRIMARY PARAMETERS

- Air curtains with an electric heater are ftted with safety thermostats. Fan motors are equipped with thermal contacts, which can be used to turn off the air curtain in case of the overheating of the motor. The warm-water exchangers are designed for maximum operating water temperature of +110 °C and a maximum operation pressure of 1.6 MPa.

1 Exhaust (Straw system)
2 Main body
3 Heat coil
4 Back side
5 Motor connection box
6 Motor



XS

BASIC FEATURES

- Lengths: 1.65; 2.20 and 2.75 m
- AC Version: Air flow up to 18500 m3/h (ISO 27 327-1)
- EC Version: Air flow up to 19000 m3/h (ISO 27 327-1)
- Straw System exhaust with maximized screening effect thanks to the laminar air flow
- Horizontal and vertical installation with the adjustable exhaust available by air curtain holders
- Maintenance-free air curtain with a long service life
- Fast and easy connection of individual modules
- Option to choose from 4 types of regulation
- Standard version with galvanized casing or in RAL 9010 (any RAL – based colours may be upon the customer's request)
- The XS is a high-performance industrial curtain for vertical and horizontal installation for use in manufacturing halls, warehouses and other industrial buildings with a recommended installation height / width up to 8 m. The air curtain shall be installed indoors in a dry area with ambient temperatures ranging from (+5 °C)* up to +40 °C and relative humidity of up to 80 %. It is designed for conveying air free of rough dust, grease, chemical fumes, and other impurities. The IP rating of air curtains without a heater and with water heating is IP44. The IP rating of the air curtain with the electric heating is IP 20. The fans comply with requirements of IP 44. The air curtain project shall always be developed by the HVAC designer.

Design changes reserved

Air curtain type	Recommended installation height [m]	Air capacity [m³/h] *1		Noise [dB(A)] *2				Sound power [dB(A)]*3	Heater power [kW]	Total consumption [V/A]	Electric heater consumption [V/A]			Weight [kg]*5
		50Hz	60Hz	3 m		5 m					[V]	[A] 50Hz	[A] 60Hz	
				50Hz	60Hz	50Hz	60Hz							
XS-15-N-AC	7,5	11550	11520	67,5	67,9	63,0	63,9	85	-	-	230	3,9	3,98	51
XS-15-N-EC	7,5	11400	11400	67,6	67,6	63,1	63,1	84	-	-	230	6,5	6,5	51
XS-15-W-AC	7,5	10300	10270	67,5	67,5	63,1	63,5	85	-	-	230	3,9	3,96	60
XS-15-W-EC	7,5	10500	10500	67,6	67,6	63,2	63,2	84	-	-	230	6,6	6,6	60
XS-15-E25-AC	7,5	11550	11520	67,5	67,9	63,0	63,9	85	9,5	400/35,2	230	3,9	3,96	55
XS-15-E25-EC	7,5	11400	11400	67,6	67,6	63,1	63,1	84	15	400/35,2	230	6,5	6,5	55
XS-20-N-AC	8,0	15100	15070	69,3	69,8	64,9	65,3	86,8	19	-	230	5,1	5,2	69
XS-20-N-EC	8,0	15200	15200	69,4	69,4	64,9	64,9	85,7	24,5	-	230	8,6	8,6	69
XS-20-W-AC	8,0	13700	13670	68,4	69,7	64,0	64,5	85,9	16,97*4	-	230	5,4	5,5	78
XS-20-W-EC	8,0	14000	14000	68,5	68,5	64,1	64,1	84,8	38,47*4	400/47,0	230	8,8	8,8	78
XS-20-E32-AC	8,0	15100	15070	69,3	69,7	64,9	65,3	86,8	52,64*4	400/47,0	230	5,1	5,2	74
XS-20-E32-EC	8,0	15200	15200	69,5	69,5	64,9	64,9	85,7	65,46*4	-	230	8,6	8,6	74
XS-25-N-AC	7,5	18500	18470	71,1	71,5	66,7	67,3	88,6	-	-	230	6,5	6,6	83
XS-25-N-EC	7,5	19000	19000	71,3	71,3	66,8	66,8	87,5	-	-	230	10,8	10,8	83
XS-25-W-AC	7,5	17000	16970	70,0	70,3	65,5	66,1	87,5	-	-	230	6,7	6,9	98
XS-25-W-EC	7,5	17500	17500	70,3	70,3	65,6	65,6	86,6	-	400/58,6	230	11,0	11,0	98
XS-25-E40-AC	7,5	18500	18470	71,1	71,5	66,7	67,3	88,6	9,5	400/58,6	230	6,5	6,6	89
XS-25-E40-EC	7,5	19000	19000	71,3	71,3	66,8	66,8	87,5	15	400/21,7	230	10,8	10,8	89

*1 Airflow volume according ISO27327-1
*2 Acoustic pressure values at 3 and 5 m distance for maximum speed. Directional factor: Q=2.
*3 Sound power (LWA) measurements according to ISO 27327-2.
*4 Intake air temperature +18°C, at maximum heating level and highest fan speed.
*5 Weight without regulation.

Design changes reserved

Water exchanger parameters for water temperature gradient of 60/40 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-AC	10300	37,6	26,1	0,45	8
XS-20-W-AC	13700	50,2	26,2	0,61	7
XS-25-W-AC	17000	62,7	26,2	0,76	5

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 70/50 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-AC	10300	50,4	30,1	0,61	13
XS-20-W-AC	13700	67,6	30,2	0,82	9
XS-25-W-AC	17000	84,5	30,4	1,03	9

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 80/60 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-AC	10300	62,9	34,1	0,76	18
XS-20-W-AC	13700	84,6	34,3	1,03	14
XS-25-W-AC	17000	106	34,5	1,29	11

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 90/70 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-AC	10300	75,2	38,1	0,92	24
XS-20-W-AC	13700	101	38,4	1,24	17
XS-25-W-AC	17000	127	38,7	1,55	15

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 110/80 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-AC	10300	91,3	43,6	0,75	16
XS-20-W-AC	13700	123	43,9	1	12
XS-25-W-AC	17000	154	44,3	1,26	10

* Temperature of intake air: +15 °C

Electric heater parameters

Type	Air flow volume [m³/h]	Heat power [kW]	Electric heater consumption [V/A]	Temperature increase* Δt [°C]
XS-15-E24-AC	11550	24,3	400 / 35,2	6,3
XS-20-E32-AC	15100	32,4	400 / 47,0	6,4
XS-25-E40-AC	18500	40,5	400 / 58,6	6,5

* At the maximum air flow and maximum heater power

Design changes reserved

Water exchanger parameters for water temperature gradient of 60/40 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-EC	10500	37,9	26,0	0,45	8
XS-20-W-EC	14000	50,8	26,1	0,61	7
XS-25-W-EC	17500	63,6	26,1	0,76	5

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 70/50 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-EC	10500	50,9	29,9	0,61	13
XS-20-W-EC	14000	68,4	30,1	0,82	9
XS-25-W-EC	17500	85,8	30,1	1,03	9

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 80/60 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-EC	10500	63,6	33,9	0,76	18
XS-20-W-EC	14000	85,5	34,1	1,03	14
XS-25-W-EC	17500	108	34,2	1,29	11

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 90/70 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-EC	10500	76,0	37,9	0,92	24
XS-20-W-EC	14000	102	38,2	1,24	17
XS-25-W-EC	17500	129	38,3	1,55	15

* Temperature of intake air: +15 °C

Water exchanger parameters for water temperature gradient of 110/80 °C

Type	Air flow [m³/h]	Heat output [kW]	Outlet temperature [°C]	Water flow [l/s]	Pressure loss [kPa]
XS-15-W-EC	10500	92,2	43,3	0,75	16
XS-20-W-EC	14000	124	43,6	1	12
XS-25-W-EC	17500	156	43,8	1,26	10

* Temperature of intake air: +15 °C

Electric heater parameters

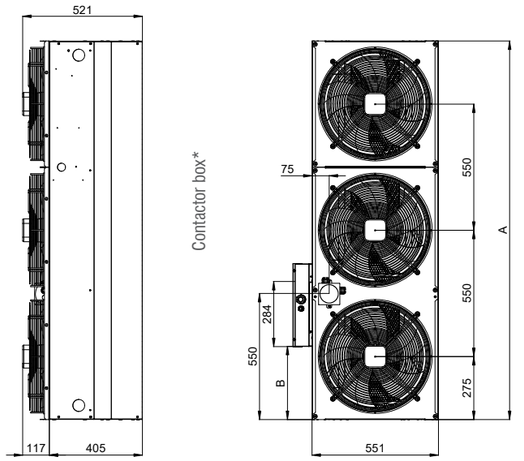
Type	Air flow volume [m³/h]	Heat power [kW]	Electric heater consumption [V/A]	Temperature increase* Δt [°C]
XS-15-E24-AC	11400	24,3	400 / 35,2	6,4
XS-20-E32-AC	15200	32,4	400 / 47,0	6,4
XS-25-E40-AC	19000	40,5	400 / 58,6	6,4

* At the maximum air flow and maximum heater power

Design changes reserved

XS DIMENSIONS

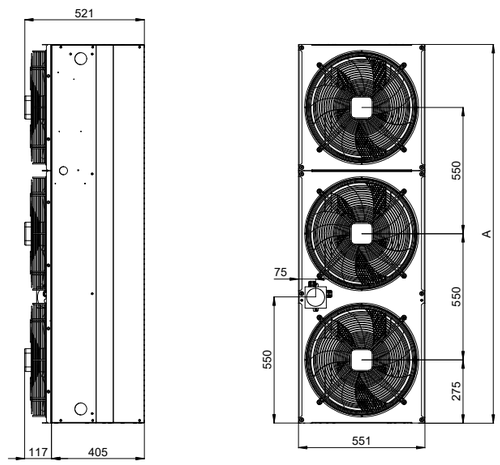
XS-...-E-...



* - Accessories

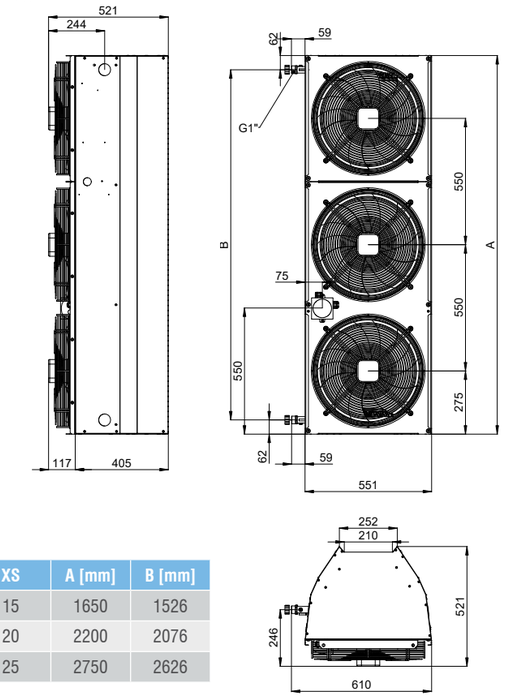
XS	A [mm]	B [mm]
15	1650	320
20	2200	870
25	2750	870

XS-...-N-...



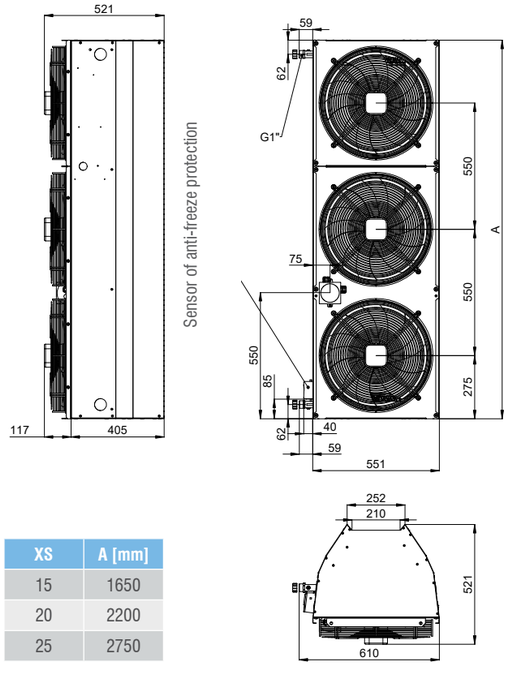
XS	A [mm]
15	1650
20	2200
25	2750

XS-...-W-...



XS	A [mm]	B [mm]
15	1650	1526
20	2200	2076
25	2750	2626

XS-...-P2-...



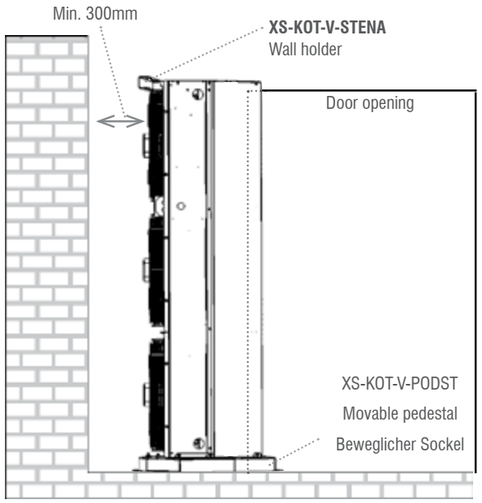
XS	A [mm]
15	1650
20	2200
25	2750

Design changes reserved

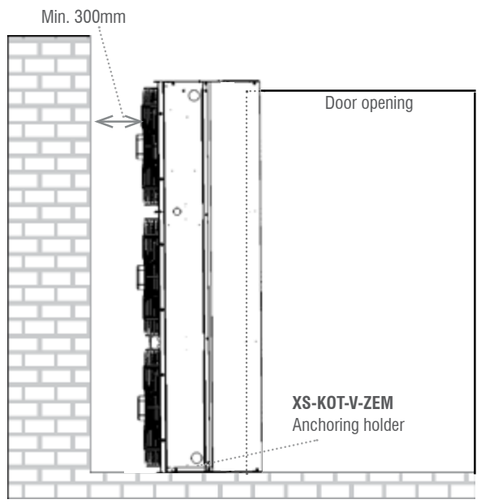
INSTALLATION AND ASSEMBLY

- The air curtain can be installed both in vertical and horizontal positions.
- The air curtain shall be located as close to the top (side) edge of the doorway as possible.
- To ensure correct function it is recommended that the air curtain is located 100 mm above the doorway or overlaps the doorway by 100 mm on both sides.
- Correct operation of the air curtain requires that specifed distances from the surrounding objects are observed, see fgure.
- Suspension holders are used for installing (hanging) the air curtain see ACCESSORIES.

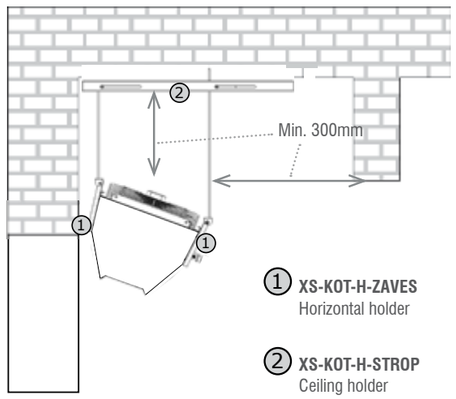
Vertical installation, side view, movable pedestal



Vertical installation, side view, fxed

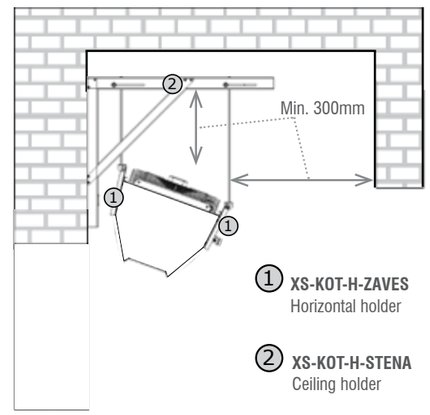


Vertical installation, side view, movable pedestal



Door opening

Vertical installation, side view, fxed



Door opening

Design changes reserved

CONTROL

- The XS air curtains are shipped without an integrated control system. The following accessories are recommended to allow their regulation.

Possibilities of individual types of controller

	ROVE	STRA1	IC-C
Type of controller	Manual	Manual	Touch
Regulation of air output	5 speeds	5 speeds	5 speeds
Regulation of electric heater	NO	NO	YES
Regulation of water heater	NO	NO	Open / Closed / 0-10V
Possibility of connecting a door contact	NO	YES	YES
Temperature measurement	NO	NO	YES
External control	NO	YES	YES
Integrated Timer	NO	NO	YES
Service indication	NO	YES	YES
Open door indication	NO	NO	YES
Electric heater aftercooling	NO	NO	YES
Antifreeze protection	NO	NO	YES
Chaining of controllers	NO	NO	YES
Light indication of selected function	NO	NO	YES
Control panel lock	NO	NO	YES
BMS capability	NO	NO	YES

Design changes reserved

The following table states the number of fans in the individual modules of the XS air curtain.

Module type	XS-150	XS-200	XS-250
Number of fans in module	3	4	5

The following table indicates the maximum number of fans for the XS air curtains that can beconnected to the individual types of the ROVE controllers.

Controller type	ROVE4	ROVE5
Maximum number of fans connected	3	5

The following table indicates the maximum number of fans for the XS air curtains that can be connected to the individual types of the STRA1 controllers.

Controller type	STRA1-050L22	STRA1-075L22	STRA1-160L20
Maximum number of fans connected	3	6	12

The following table indicates the maximum number of fans for the XS air curtains that can be connected to the individual types of the STRA1 controllers.

Controller type	IC-C AC5-4	IC-C AC5-7	IC-C AC5-16
Maximum number of fans connected	3	6	12

Water heater output control

Precise by mixing

The following table indicates the number of modules of the XS air curtains that should be connected to the individual types of the mixing point.

Type	Number of modules of VCIN					
	1			2		
	K_{VS}	Water flow (m^3/h)	Min. pump pressure (kPa)	K_{VS}	Water flow (m^3/h)	Min. pump pressure (kPa)
XS-15	11	2,8	28,5	22	5,5	28,5
XS-20	11	3,7	29,0	22	7,4	29,0
XS-25	11	4,7	34,7	22	9,3	34,7

Suitable combinations of the XS modules and the mixing nodes apply at a water temperature gradient of 80/60, and an inlet air temperature of 15 °C and pressure difference at connection point 5 kPa.

Design changes reserved

ACCESSORIES

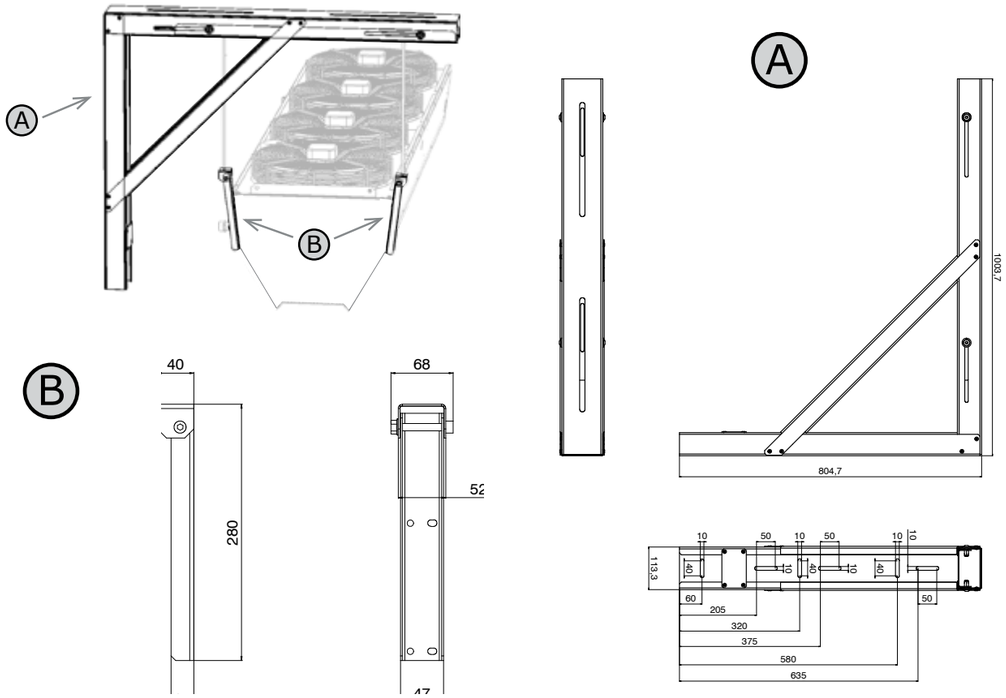
REQUIRED ACCESSORIES

- No special accessories are needed to ensure a proper function of the stand-alone air curtain. If the air curtain is fitted with the control system, the control system is connected using common wiring cables, see the “Wiring diagrams” chapter. A suitable cross-section of the cables, protection of the unit, and utilization of other wiring materials shall be determined based on the particular installation conditions. These components shall be delivered by a company performing the air curtain electrical wiring.

OPTIONAL ACCESSORIES

WALL HOLDER SET - HORIZONTAL

- This set include:
  A part - Wall holder (1 pcs)
  B part - Air curtain holder (2 pcs)



Wall holder set (1 set)	XS-KOT-H-STENA	- 0
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL		
Color		

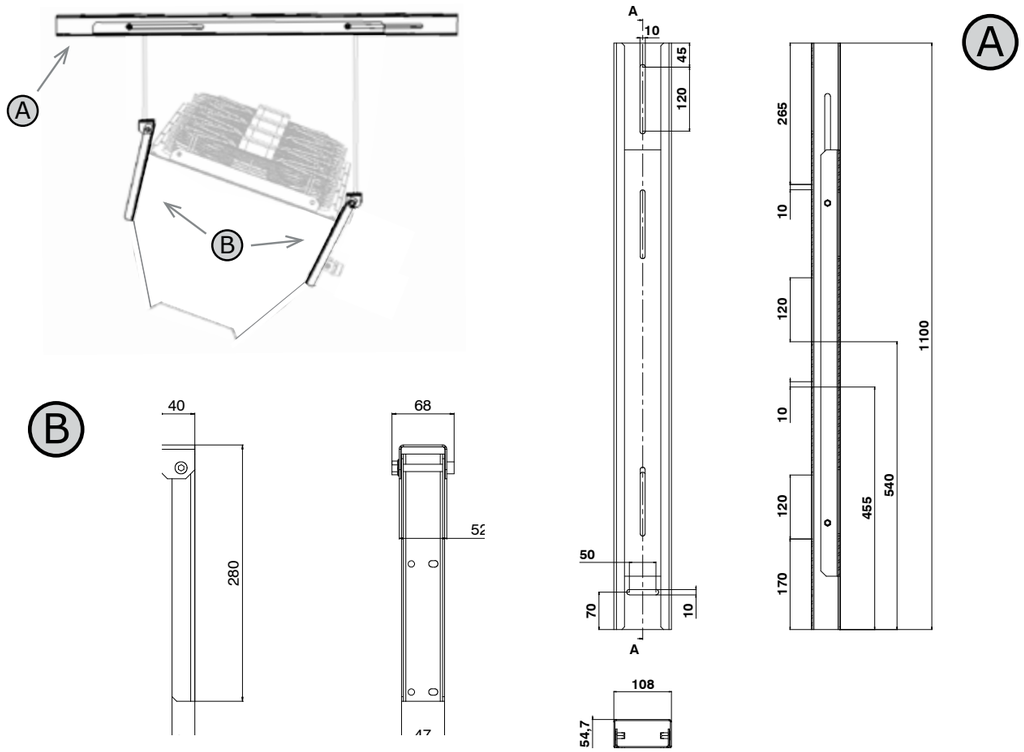
	Number of XS air curtain modules connected								
	1	2	3	4	5	6	7	...	n
No. of holders	2	3	4	5	6	7	8	...	n + 1

Design changes reserved

OPTIONAL ACCESSORIES

CEILING HOLDER SET - HORIZONTAL

- This set include:
  - A part - Ceiling holder (1 pcs)
  - B part - Air curtain holder (2 pcs)



Ceiling holder set (1 set (A+2xB))	XS-KOT-H-STROP	- 0
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL		
Color		

	Number of XS air curtain modules connected								
	1	2	3	4	5	6	7	...	n
No. of holders	2	3	4	5	6	7	8	...	n + 1

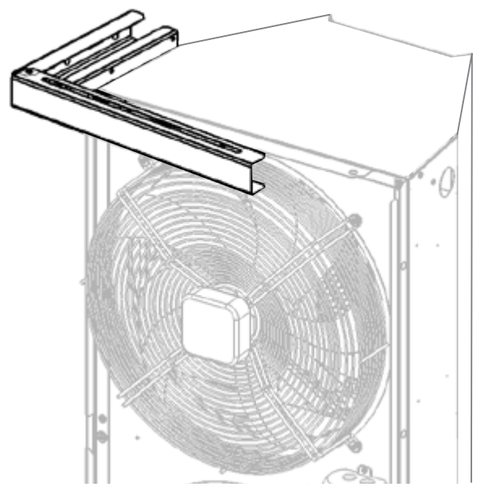
Design changes reserved

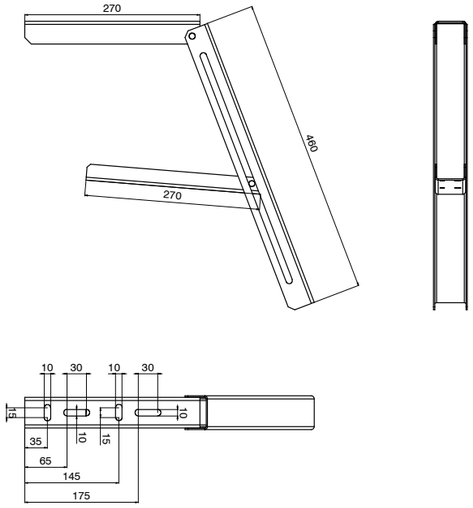
AIR CURTAINS GRAND / SONATA

OPTIONAL ACCESSORIES

WALL HOLDER - VERTICAL

- For anchoring the air curtain to the wall





Wall holder (1 pcs)	XS-KOT-V-STENA	- 0
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL		
Color		

	Number of XS air curtain modules connected			
	1	2	3**	4**
No. of holders	1*	1*	2	3

* - This holder is not needed up to a height of 4 m, but we recommend to using it.

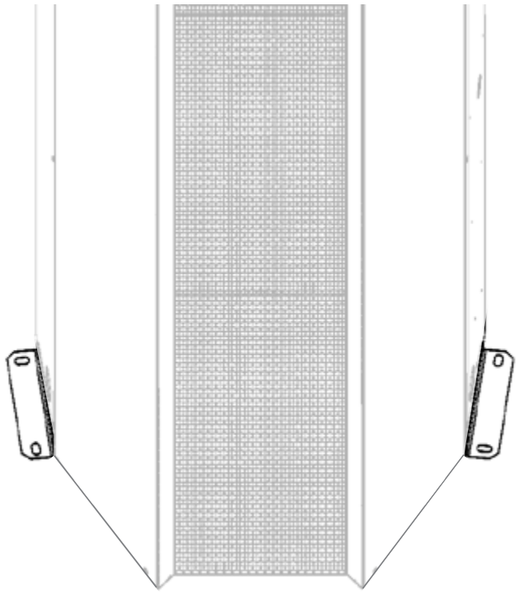
** - The maximum height of air curtains, which can be installed in the vertical position (air curtain on air curtain) is 6,6 m. If you need a higher distance, then an additional supporting system must be made (not supplied by Klimaoprema).

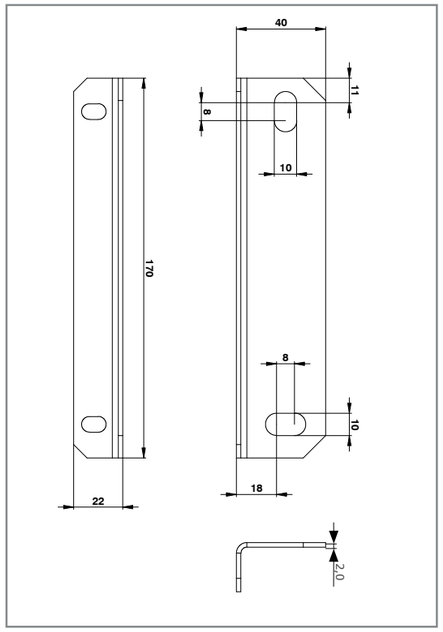
Design changes reserved

OPTIONAL ACCESSORIES

ANCHORING HOLDER - VERTICAL

- For anchoring the air curtain to the floor





Floor holder set (2 pcs)	XS-KOT-V-ZEM	- 0
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL		
Color		

	Number of XS air curtain modules connected			
	1	2	3*	4*
No. of sets of holders	1	1	1	1

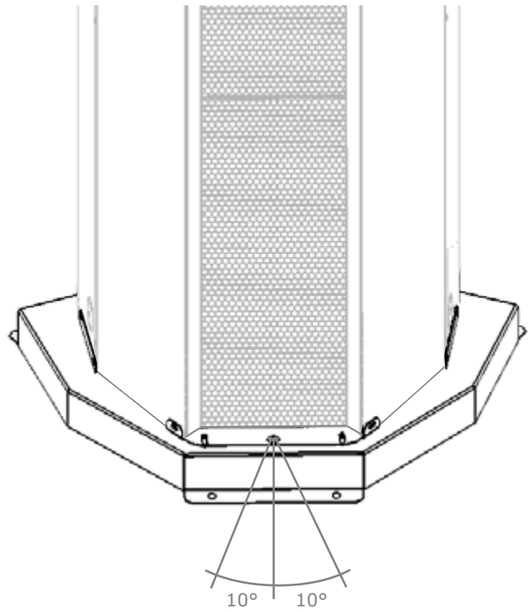
* - The maximum height of air curtains, which can be installed in the vertical position (air curtain on air curtain) is 6,5 m.
If you need a higher distance, then an additional supporting system must be made (not supplied by Klimaoprema).

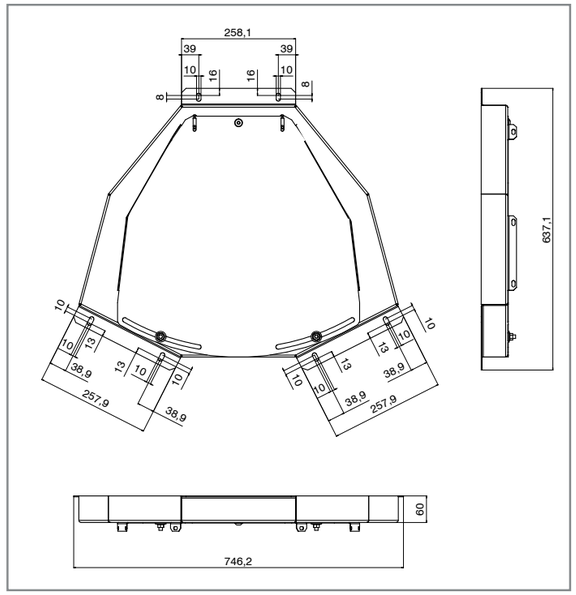
Design changes reserved

OPTIONAL ACCESSORIES

ADJUSTABLE ANCHORING HOLDER - VERTICAL

- For anchoring the air curtain to the floor with the possibility of moving (20° max)





Movable pedestal (1 pcs)	XS-KOT-V-PODST	- 0
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL		
Color		

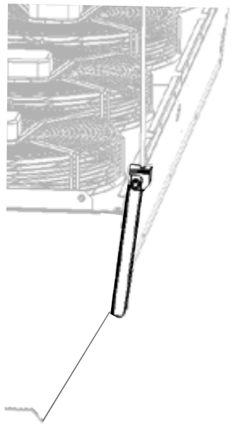
	Number of XS air curtain modules connected			
	1	2	3*	4*
No. of holders	1	1	1	1

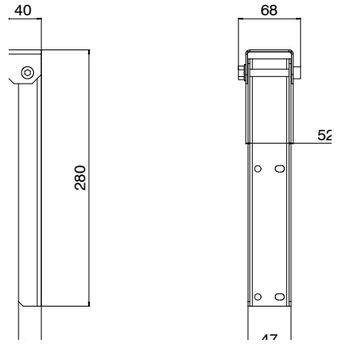
* - The maximum height of air curtains, which can be installed in the vertical position (air curtain on air curtain) is 6,6 m.
If you need a higher distance, then an additional supporting system must be made (not supplied by Klimaoprema).

Design changes reserved

OPTIONAL ACCESSORIES

THREADED BAR HOLDER - HORIZONTAL





Air curtain holder (1pcs only)	XS-KOT-H-ZAVES	- 0
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL		
Color		

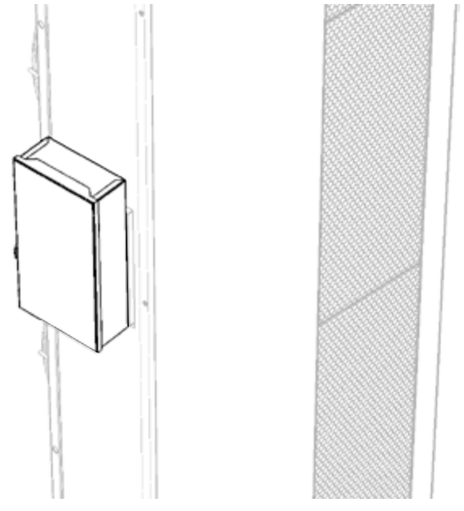
	Number of XS air curtain modules connected				
	1	2	3	...	n
No. of sets of holders	4	6	8	...	n*2 + 2

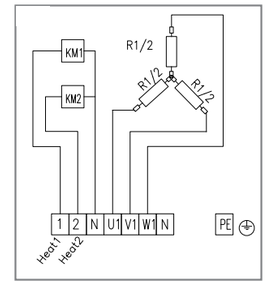
Design changes reserved

AIR CURTAINS GRAND / SONATA

OPTIONAL ACCESSORIES

CONTACTORS BOX





Contactors box (IP20)	XS-KRAB-EL-STYKAC	- 25A	- 0
Max current load **25A -** suitable for: XSA150 or XSA200 **40A-** suitable for: XSA250			
0 Standard (RAL9010) **1** Galvanized steel **9** Other RAL			
Color			

Motor filter (1 pcs)
FI-PYTEL-KRUH-G2-SAV-4

Design changes reserved

OTHER ACCESSORIES

Speed controller
ROV

Speed controller
STRA1

Control unit
IC-C

IC Modbus
IC-M-AC5-04 (07, 16)
Control module for BMS (4A / 7A / 16A)

TFlexible connection hoses
OH-01-1/1-300
OH-01-1/1-500

Door switch – industrial
DS

Water valve
RT-3-xx

Mixing node
SMU2-xx-xx

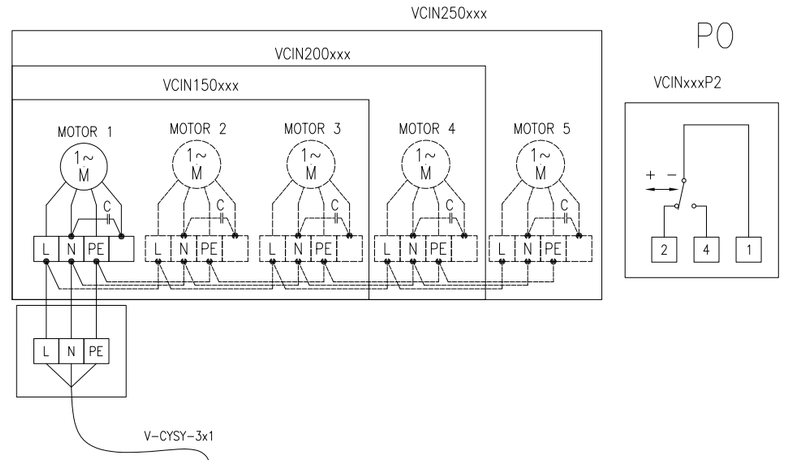
Design changes reserved

AIR CURTAINS GRAND / SONATA

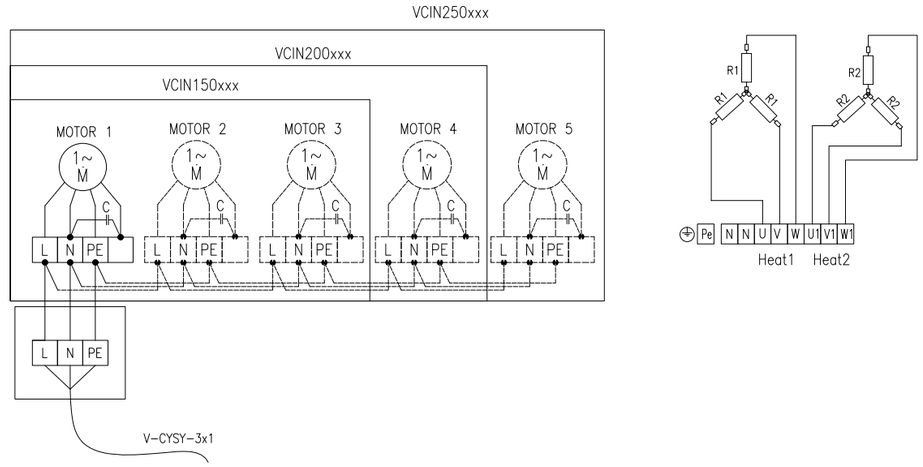
WIRING DIAGRAMS

- The recommended cross-section of the main power supply cables is stated in the Instruction Manual
- All wiring diagrams provided in the technical catalog are indicative only. When assembling the product, strictly observe the nameplate ratings as well as the directions and diagrams afxed directly to the product or enclosed with the product.

XS-xxx-N-AC / XS-xxx-W-AC

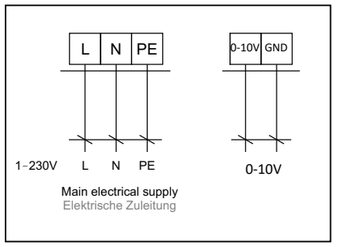


XS-xxx-E-AC



Design changes reserved

XS-xxx-EC



ORDERING KEY

Air curtain	**XS**	**- 15**	**- E**	**- AC**	**- XX**	**- 0**	**- B**	**- 0**
15 – length 1650mm **20** – length 2200mm **25** – length 2750mm								
N – no heat coil (cold) **E** – electric heat coil **W** – water heat coil (2row; 110°C) **P2** – water heat coil with antifreeze protection								
AC – AC motors **EC** – EC motors **A6** – 60Hz motors (available only for N-, W-, P2)								
XX – No control								
0 – Standard (RAL9010) **1** – Galvanized steel **9** – Other RAL								
A – Packed horizontally (std. XS-250) (non std. XS-150,200) **B** – Packed vertically (std. XS-150,200) **C** – Packed horizontally (HT palette)								
0 – Reserve								

Design changes reserved

AIR CURTAINS GRAND / SONATA

NOTES:

Design changes reserved

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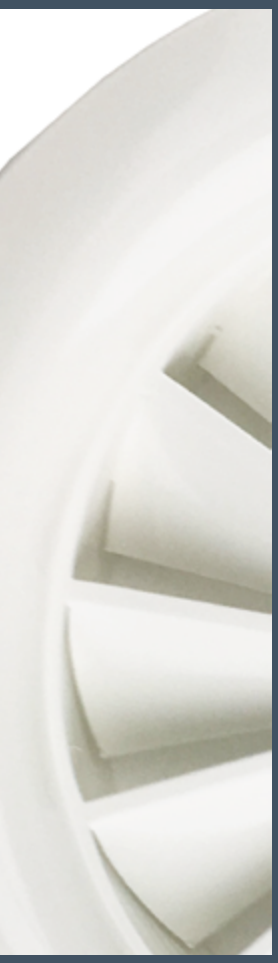
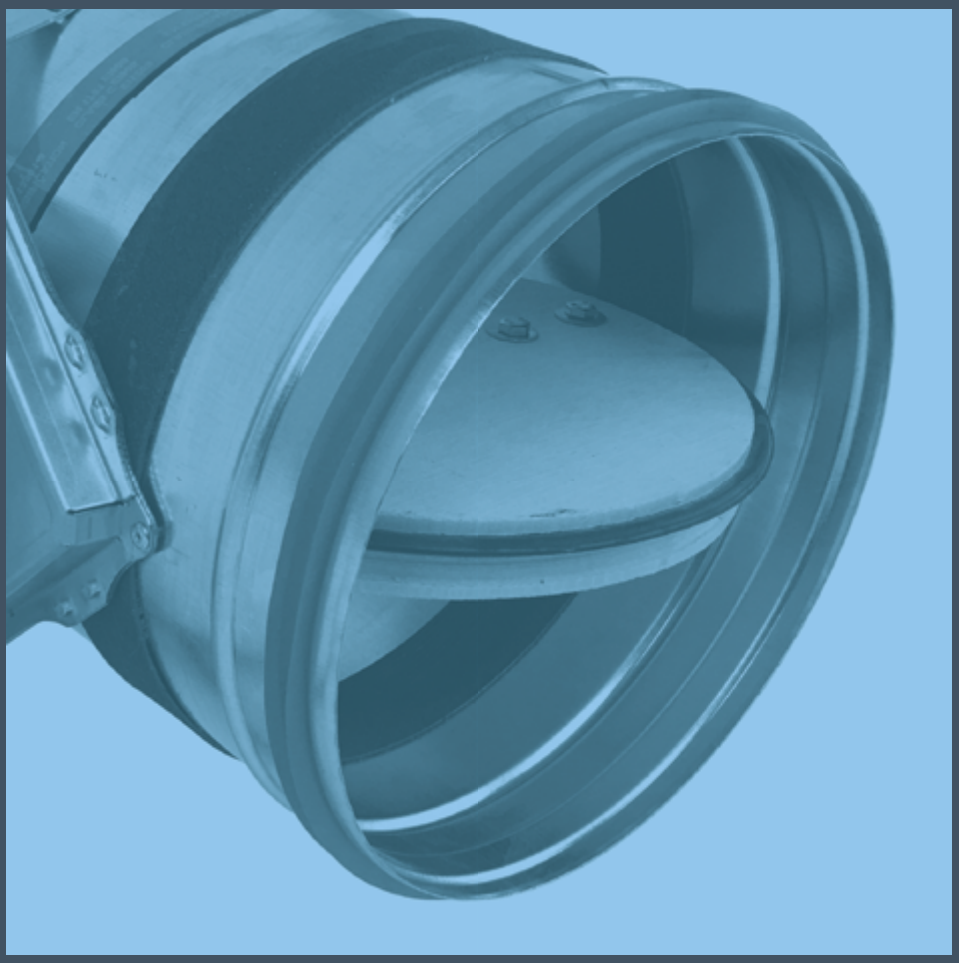
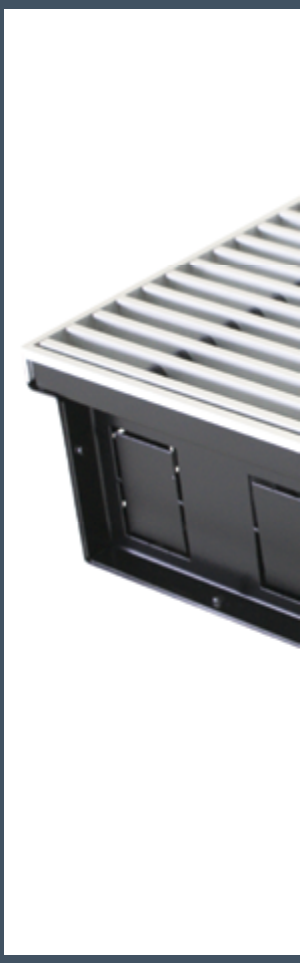
HVAC SOLUTIONS







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