

# Air displacement units SD-1

## Air displacement units SD-1

### Application

Air displacement units are suitable for both industrial and comfort air conditioning applications. They are suitable for rooms characterised by high heat loads or heavy air pollution. Air displacement units supply air at large flow rates (up to 10.000 m<sup>3</sup>/h), at low air velocities (in the range from 0.1 to 0.3 m/s). Supplied air forms a so called »fresh air pool« in the occupied zone. Air is lifted in convection currents from heat sources to the ceiling layer, from which it is extracted from the room. In this way, even temperature field is maintained in the room, free of draught. Diffusers can be installed suspended from the ceiling, standing on the floor or hanging immediately above the occupied zone.

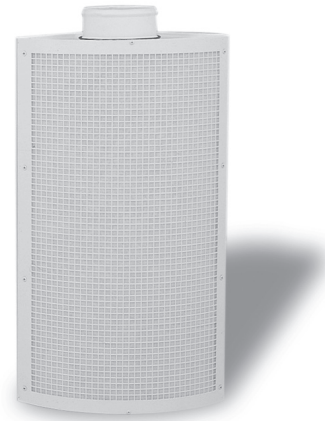
### Description

Air displacement units are made of sheet steel and painted in RAL 9010. They can be coloured in any other RAL colour at to the customer's request. They consist of a mantle, a bottom plate and a top plate equipped with an inlet spigot. The standard shape of the spigot is round. At the customer's request, it can be rectangular according to the dimension of the unit.

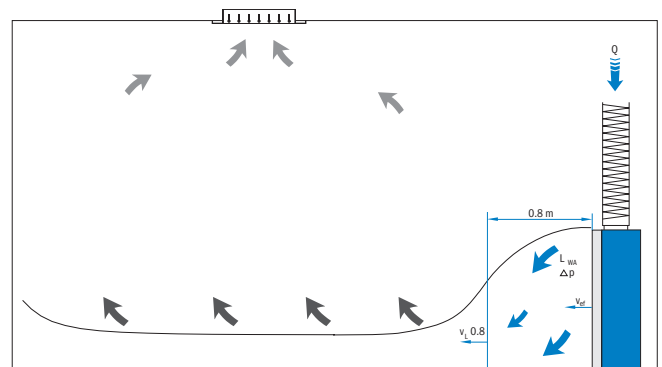
The air displacement unit mantle perforation is designed according to the version. The versions without a filter (F5) have mantle perforation with round openings ( $\phi$  5.5 x 8 mm, 37 % free area). The versions with a filter (F3 and F6) have square openings (10 x 10 x 2 mm, 69 % free area).

To achieve a uniform distribution of air across the entire displacement surface, versions F3 and F6 are recommended.

**SD-1**

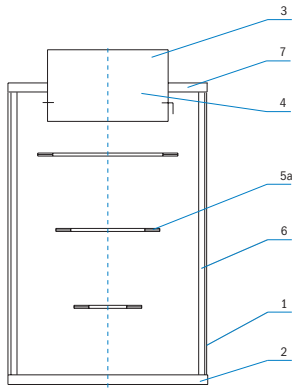


**SD-1: corner**



### Definition of symbols

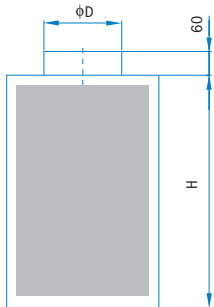
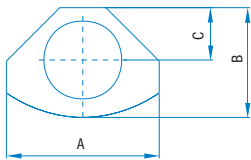
<b>Q (m<sup>3</sup>/h)</b>	Air flow rate
<b>v<sub>l</sub> (m/s)</b>	Supplied air velocity at the throw distance L=0.8 m
<b>v<sub>ef</sub></b>	Effective discharge air velocity
<b>Δp<sub>t</sub> (Pa)</b>	Pressure drop
<b>L<sub>wA</sub> (dB(A))</b>	Sound power level



- 1. Perforated mantle
- 2. Bottom plate
- 3. Round inlet spigot
- 4. Control flap
- 5a. Dividing rings
- 6. Filter
- 7. Top plate

## Dimensions

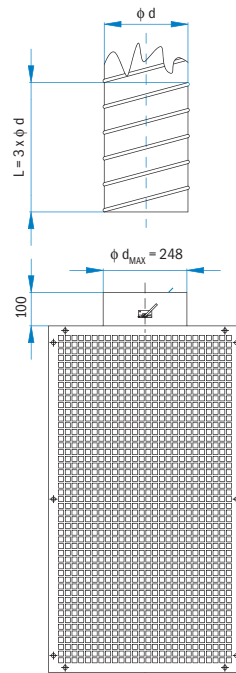
### SD-1



Size	A	B	C	φD	H
400	283	180	100	123	750
600	424	275	135	148	1000
800	566	300	150	178	1250
1000	707	400	200	198	1500
1500	1061	450	220	248	2000
2000	1414	700	350	298	2500

### Inlet spigot $\phi d_{\max} = 248 \text{ mm}$

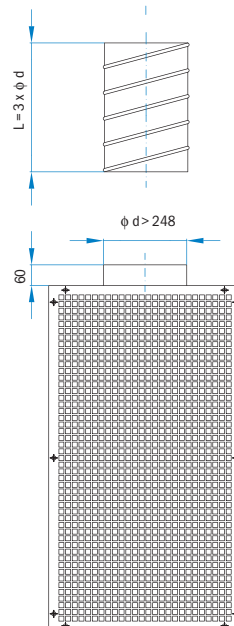
The minimum straight duct length  $L = 3 \times \phi d$  before the diffuser is sufficient to stabilise the airflow at the diffuser inlet.



$\phi d$ (mm)	$Q_{\max}$ (m <sup>3</sup> /h)
78	80
98	130
123	200
138	260
148	300
158	340
178	440
198	540
223	690
248	850

### Example of correct assembly of airflow regulation SD-1

Maximum airflow  $Q_{\max}$  for the chosen inlet spigot with a size of  $\phi d$  has been calculated for the maximum recommended air velocity in the spigot of  $V = 5 \text{ m/s}$ . Optimum air velocity in the spigot is  $2 - 3 \text{ m/s}$ .



$\phi d$ (mm)	$Q_{\max}$ (m <sup>3</sup> /h)
278	1080
298	1240
313	1370
353	1740
398	2220
448	2810
498	3480
558	4370
628	5540

## Ordering key

**SD-1 / F3 / Size 400 H=750**

**1      2      3      4**

1 Diffuser type

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**SD-1**      Corner displacement unit

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2 Versions

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**F3**      With peripheral filter, perforation with square openings (10x10x2 mm, 69% free area)

**F5**      With dividing rings without filters, perforation with round openings (5.5 x 8 mm, 37% free area)

**F6**      With dividing rings and peripheral filter, perforation with square openings (10x10x2 mm, 69% free area)

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3 Standard sizes

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**400**

**600**

**800**

**1000**

**1500**

**2000**

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4 Standard heights in mm

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**750**

**1000**

**1250**

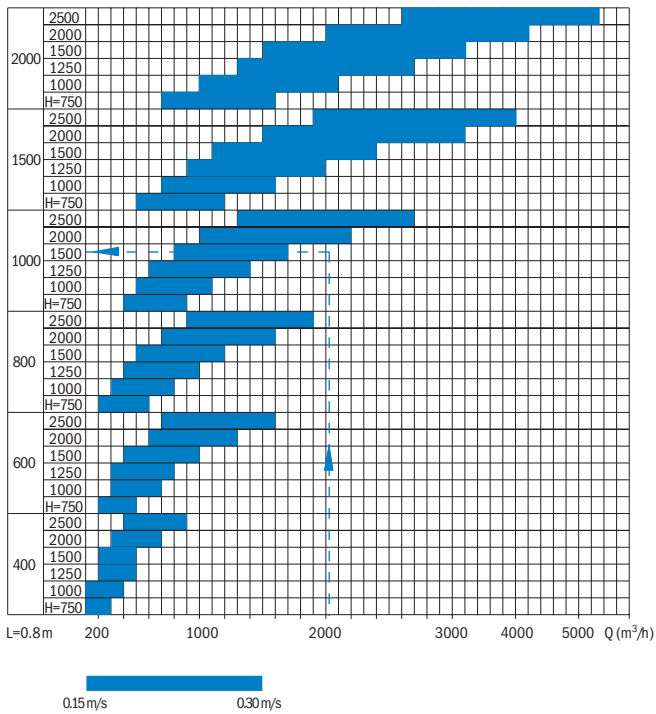
**1500**

**2000**

**2500**

## Technical data for SD-1

Diagrams to determine the supplied air velocity at the throw distance L=0.8 m:

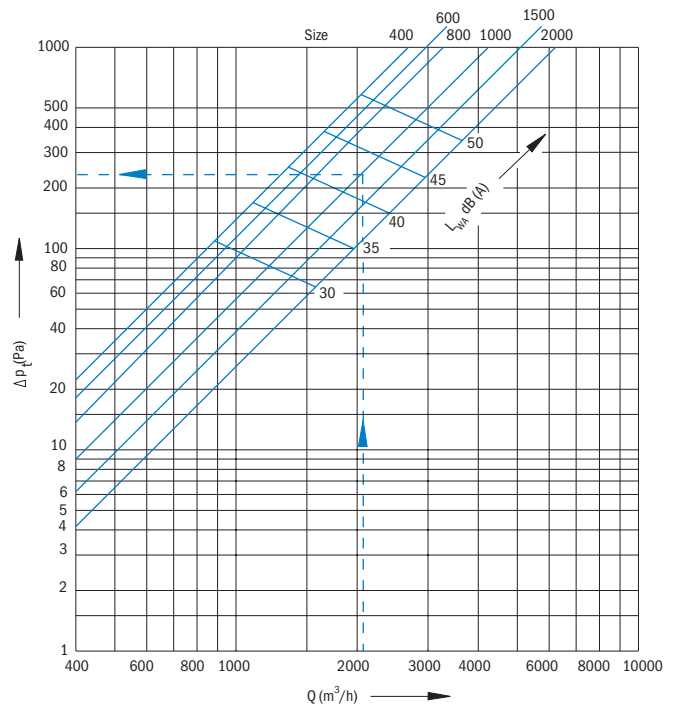


### KF correction factor table

Correction	Size	750	1000	1250	1500	2000	2500
$\Delta p_t$ for the type F3	400	1.44	1.00	0.80	0.26	0.16	0.11
	600	1.10	1.00	0.96	0.28	0.26	0.25
	800	1.06	1.00	0.97	0.29	0.27	0.27
	1000	1.10	1.00	0.96	<b>0.33</b>	0.31	0.30
	1500	1.04	1.00	0.98	0.34	0.33	0.33
	2000	1.02	1.00	0.99	0.38	0.38	0.37
$\Delta p_t$ for the type F5	400	0.55	0.51	0.50	0.05	0.04	0.04
	600	0.56	0.51	0.49	0.14	0.13	0.13
	800	0.93	0.93	0.93	0.26	0.26	0.26
	1000	0.90	0.89	0.89	<b>0.28</b>	0.28	0.28
	1500	0.96	0.95	0.95	0.32	0.32	0.32
	2000	0.98	0.98	0.98	0.37	0.37	0.37

Size	400	600	800	1000	1500	2000
L (m)	0.214	0.406	0.502	<b>0.718</b>	1.066	1.400

Pressure drop and noise level diagram:



### Definition of symbols

- $Q$  (m<sup>3</sup>/h) Air flow rate
- $v_L$  (m/s) Supplied air velocity at the throw distance L=0.8 m
- $\Delta p_t$  (Pa) Pressure drop
- $L_{WA}$  (dB(A)) Sound power level

### Example calculation

$$Q = 2000 \text{ m}^3/\text{h}$$

We select size 1000; H = 1500

$$A_{ef} = 0.718 \times 1.5 \times 0.6944 = 0.748 \text{ (m}^2\text{)}$$

$$v_{ef} = Q / (A_{ef} \times 3600) = 2000 / (0.748 \times 3600) = 0.74 \text{ m/s}$$

$$L_{WA} = 42 \text{ dB(A)}$$

Pressure drop:

#### Tip F3

$$\Delta p_t = \text{from the diagram} \times \text{KF (za H = 1500)} = 230 \times 0.33 = 75.9 \text{ Pa}$$

#### Tip F5

$$\Delta p_t = \text{from the diagram} \times \text{KF (za H = 1500)} = 230 \times 0.33 = 75.9 \text{ Pa}$$

Free area  $A_{ef}$ :

$$A_{ef} = L \times H \times 0.6944 \text{ (m}^2\text{) L-from the table}$$

$A_{ef} = L \times H \times 0.37 \text{ (m}^2\text{) for the versions F5 (without filter) and mantle perforation with round openings}$