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Thermo-adjustable swirl diffuser

DF-TR



DF-TR-R



DF-TR-V

The **DF-TR variable geometry diffuser** has been specially designed for its use in installations higher than 3,5 m.

Operations

The thermo-adjustable diffuser has a thermo element that dilates and contracts as the temperature varies. Operating a mechanism that causes the unit to supply cold air in a horizontal position and hot air in a vertical position. When the temperature is below 22°C the air jet is fully horizontal, and when it is above 28°C it is fully vertical.

This unit prevents the possible problems of stratifying, which can sometimes occur with a conventional swirl diffuser in a horizontal position at heights of 3.5 m and above, when using warm air

The air jet penetration varies depending on the difference between the supplied air temperature and the ambient, as well as with the air-flow, in such a way that decrease when the ΔT increases and also when the air flow decreases.

The values in the tables correspond to a ΔT , which is the difference between the air supplied temperature and the ambient; it ranges from -10° C to +10° C.

Models

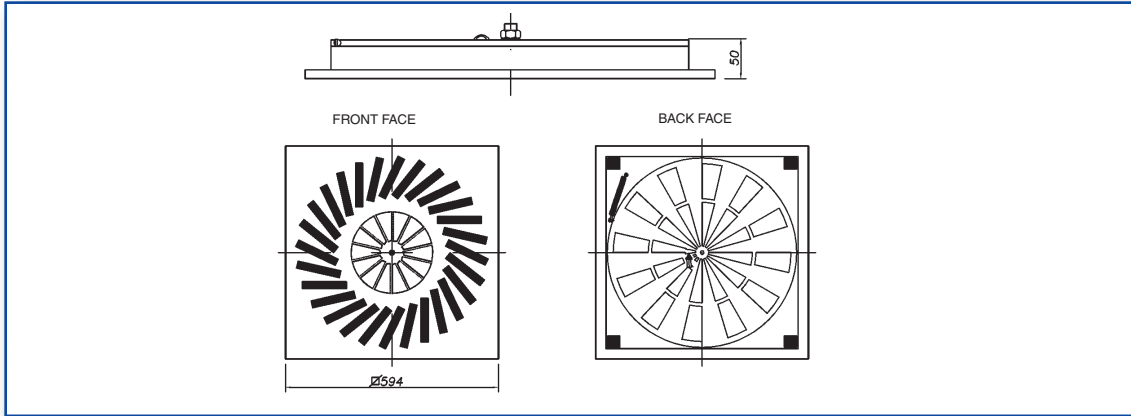
There are two models. The geometry used for cold air is common for both models, chasing the central part which determines the vertical configuration.

The central section of model DF-TR-V has no blades, making it suitable for use at heights of 5 m and over. When supplying hot air it is fully vertical.

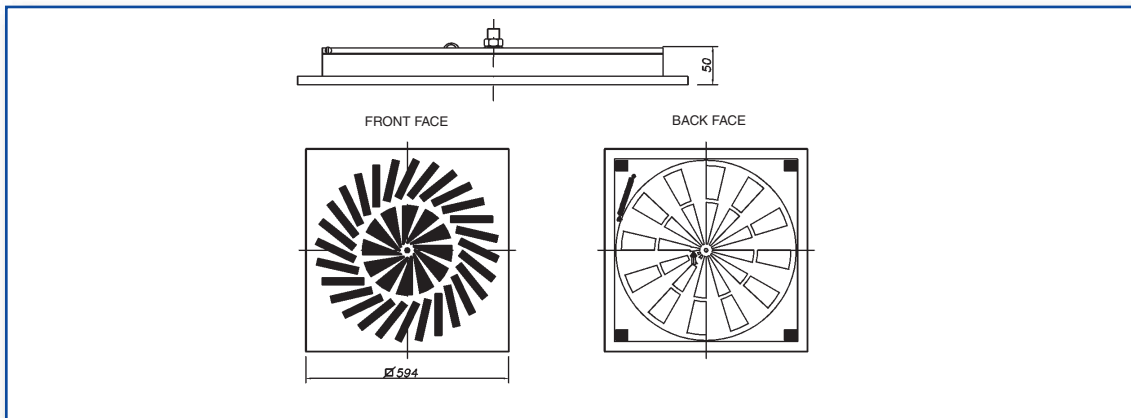
Model DF-TR-R's central section has a fixed blade swirl diffuser. In this case, the air jet has a swirl effect that generates a shorter throw than DF-TR-V. The recommended installation height is between 3.5 m and 5 m.

Models and dimensions

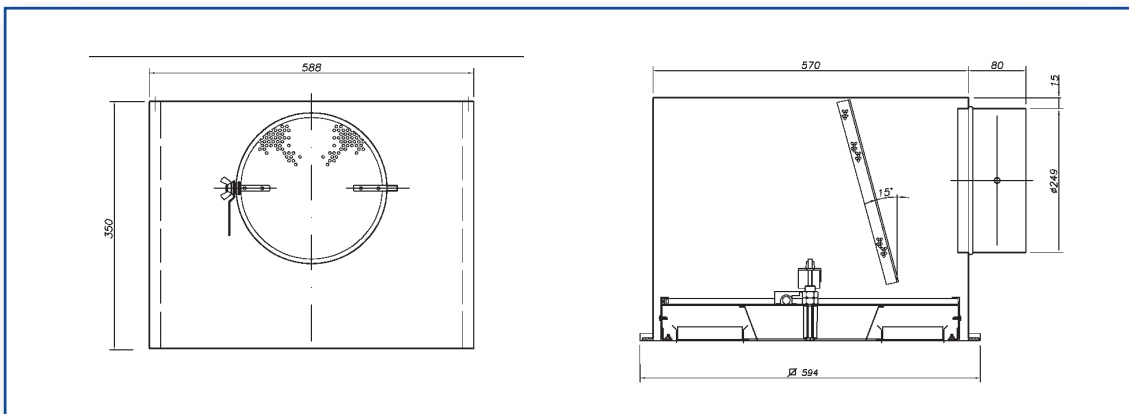
DF-TR-R



DF-TR-V



PLENUM FOR DF-TR



Technical data. Selection tables

**COLD AIR
(COMMON TO BOTH MODELS)**

Table 1

Q		Horizontal configuration	
(m ³ /h)	(l/s)		
300	83,3	X (m)	1,4
		ΔP_t (Pa)	8
		L_{wA} - dB(A)	18
400	111,1	X (m)	1,9
		ΔP_t (Pa)	12
		L_{wA} - dB(A)	26
500	138,9	X (m)	2,4
		ΔP_t (Pa)	18
		L_{wA} - dB(A)	32
600	166,7	X (m)	2,9
		ΔP_t (Pa)	25
		L_{wA} - dB(A)	37
700	194,4	X (m)	3,4
		ΔP_t (Pa)	34
		L_{wA} - dB(A)	41
800	222,2	X (m)	3,8
		ΔP_t (Pa)	44
		L_{wA} - dB(A)	45
900	250,0	X (m)	4,3
		ΔP_t (Pa)	55
		L_{wA} - dB(A)	48

SYMBOLS

ΔP_t Total pressure drop in Pa

L_{wA} -dB(A) Sound power, in dB(A)

X Horizontal range of the air jet at a maximum speed of 0,25 m/s in the occupied area, for a $\Delta T = -10^\circ \text{C}$

Technical data. Selection tables

HOT AIR
DF-TR-R

Table 2

Q		MODEL	DF-TR-R		
(m ³ /h)	(l/s)	Supply	VERTICAL ($\Delta T = +10^{\circ} C$)		
300	83,3	Y _{0,5} Y _{0,3} Y _{max} (m)	1,5	1,8	2,0
		ΔPt (Pa)	10		
		L _{wA} - dB(A)	21		
400	111,1	Y _{0,5} Y _{0,3} Y _{max} (m)	2,0	2,5	2,7
		ΔPt (Pa)	17		
		L _{wA} - dB(A)	29		
500	138,9	Y _{0,5} Y _{0,3} Y _{max} (m)	2,5	3,1	3,4
		ΔPt (Pa)	26		
		L _{wA} - dB(A)	36		
600	166,7	Y _{0,5} Y _{0,3} Y _{max} (m)	3,0	3,8	4,1
		ΔPt (Pa)	38		
		L _{wA} - dB(A)	41		
700	194,4	Y _{0,5} Y _{0,3} Y _{max} (m)	3,5	4,4	4,7
		ΔPt (Pa)	52		
		L _{wA} - dB(A)	46		
800	222,2	Y _{0,5} Y _{0,3} Y _{max} (m)	4,0	5,0	5,4
		ΔPt (Pa)	68		
		L _{wA} - dB(A)	50		
900	250,0	Y _{0,5} Y _{0,3} Y _{max} (m)	4,5	5,6	6,1
		ΔPt (Pa)	86		
		L _{wA} - dB(A)	53		

SYMBOLS

Y_{0,5} , 0,3 Vertical range for a terminal air velocity of 0,5 or 0,3 m/s respectively at $\Delta T = 10^{\circ} C$

Y_{max} Maximum vertical penetration at $\Delta T = 10^{\circ} C$

Technical data. Selection tables

**HOT AIR
DF-TR-V**

Table 3

Q		MODEL	DF-TR-V		
(m ³ /h)	(l/s)	Supply	VERTICAL ($\Delta T = +10^\circ \text{C}$)		
300	83,0	Y _{0,5} Y _{0,3} Y _{max} (m)	2,0	2,3	2,4
		ΔPt (Pa)	11		
		L _{wA} - dB(A)	21		
400	111,0	Y _{0,5} Y _{0,3} Y _{max} (m)	2,6	3,1	3,2
		ΔPt (Pa)	19		
		L _{wA} - dB(A)	29		
500	138,0	Y _{0,5} Y _{0,3} Y _{max} (m)	3,3	3,8	4,0
		ΔPt (Pa)	29		
		L _{wA} - dB(A)	35		
600	166,0	Y _{0,5} Y _{0,3} Y _{max} (m)	3,9	4,6	4,8
		ΔPt (Pa)	40		
		L _{wA} - dB(A)	40		
700	194,0	Y _{0,5} Y _{0,3} Y _{max} (m)	4,6	5,4	5,6
		ΔPt (Pa)	54		
		L _{wA} - dB(A)	44		
800	222,0	Y _{0,5} Y _{0,3} Y _{max} (m)	5,2	6,1	6,4
		ΔPt (Pa)	70		
		L _{wA} - dB(A)	48		
900	250,0	Y _{0,5} Y _{0,3} Y _{max} (m)	5,9	6,9	7,2
		ΔPt (Pa)	88		
		L _{wA} - dB(A)	51		

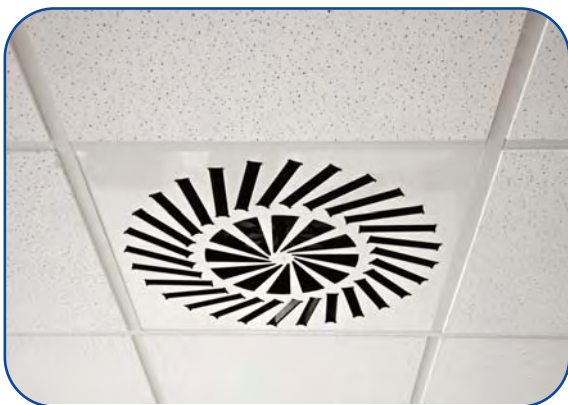
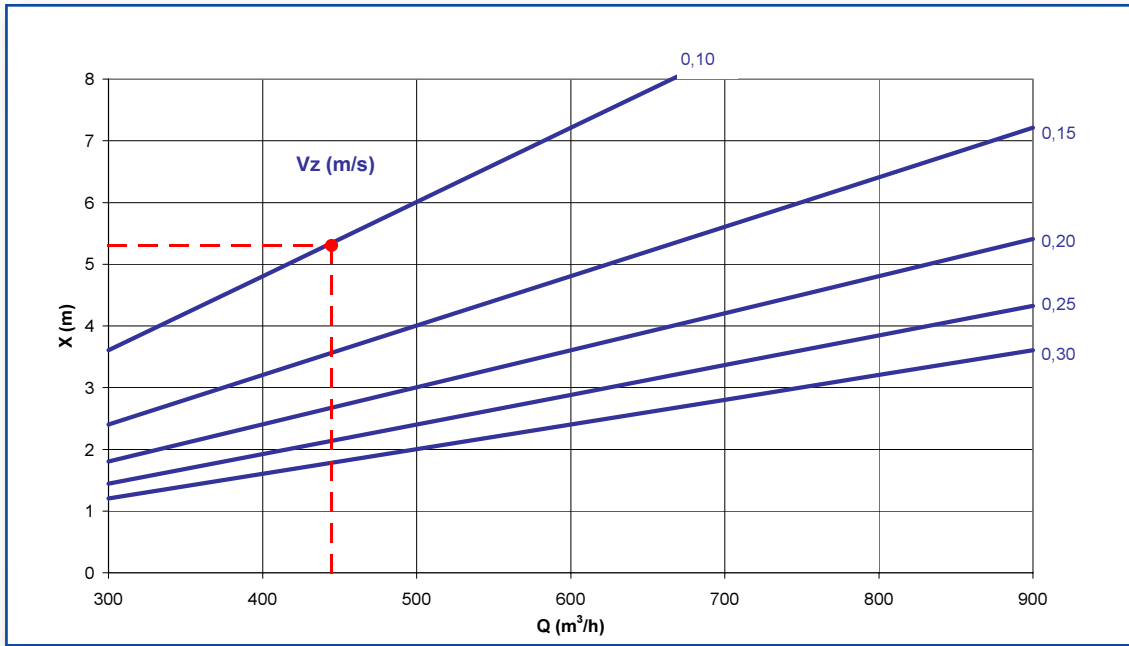
SYMBOLS

Y_{0,5} , 0,3 Vertical range for a terminal air velocity of 0,5 or 0,3 m/s respectively
at $\Delta T = 10^\circ \text{C}$

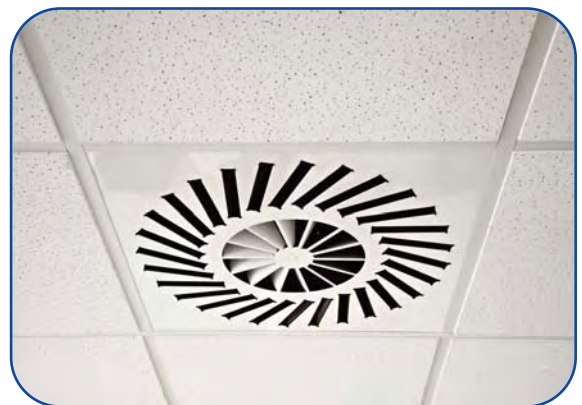
Y_{max} Maximum vertical penetration at $\Delta T = 10^\circ \text{C}$

Technical data. Selection graphs

Graph 1. HORIZONTAL THROW. MODELS DF-TR-R AND DF-TR-V



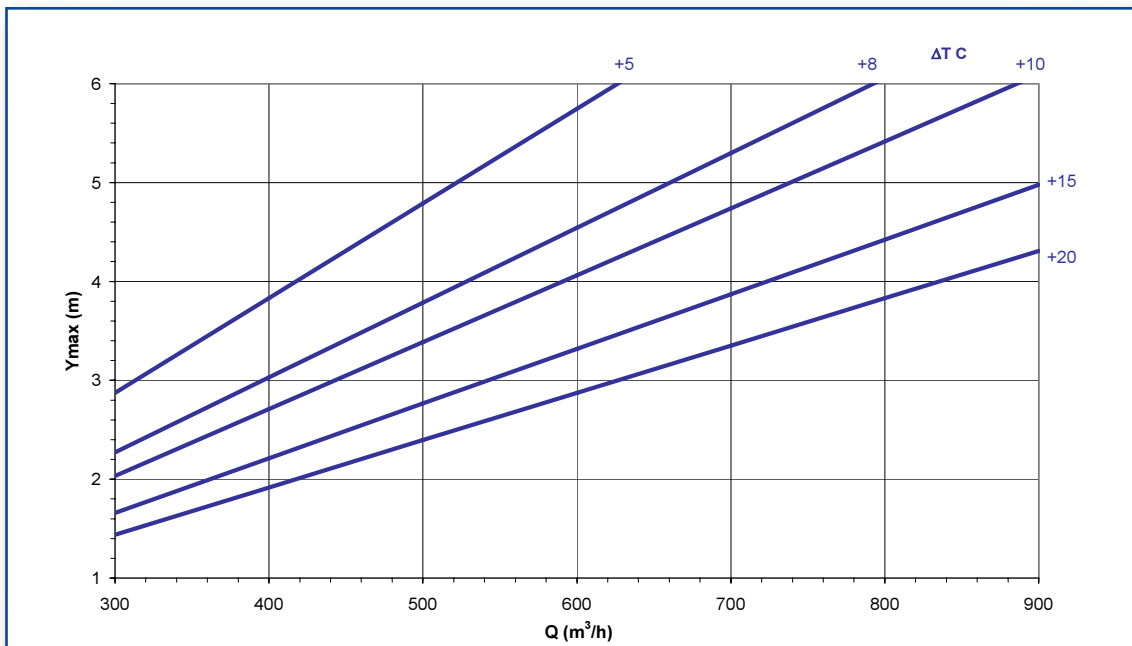
DF-TR-V



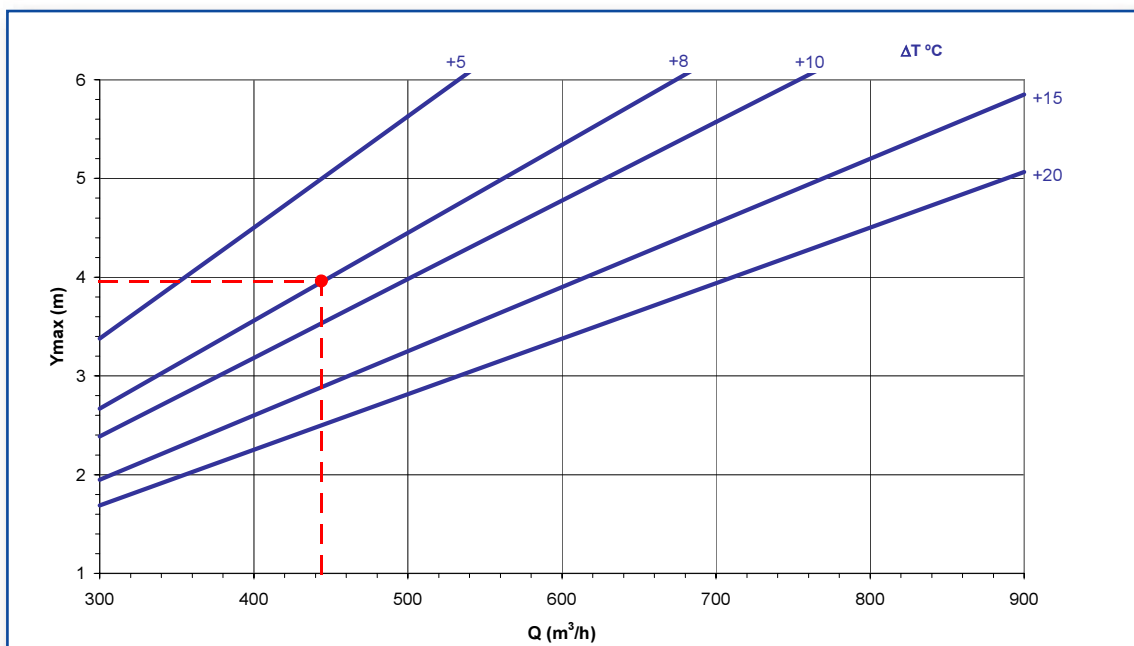
DF-TR-R

Technical data. Selection graphs

Graph 2. MAXIMUM VERTICAL PENETRATION. DIFFUSER DF-TR-R



Graph 3. MAXIMUM VERTICAL PENETRATION. DIFFUSER DF-TR-V



Selection example

DESIGN CONDITIONS:

- Type of room: **Meeting room**
- Dimensions: (L x H) **10 x 10 m**. Height of installation **5 m**
- Total air volume : **4000 m³/h**
- Summer conditions: Supply temperature **14° C**; Room temperature **24° C**
- Winter conditions: Supply temperature **31° C**; Room temperature **23° C**
- Maximum noise level required: **35 dB(A)**
- Height of the occupied area: **1,3 m** (person sitting)

SOLUTION:

Choose 9 diffusers distributed in a 3 x 3 formation (distance between diffuser centres: 3,3 m). Air flow per unit: 445 m³/h.

At an installation height of 5 m and a height occupied area of 1,3 m. for a vertical penetration of 3,7 m, maximum air jet velocity should not exceed 0,25 m/s or be less than 0,10 m/s, for a correct air diffusion.

Based on the information contained in the previous tables (vertical supply) for each model, the **DF-TR-V** diffuser best adapts to the required air velocity in occupied areas in accordance with the established sound restrictions.

If we apply graph 3 (vertical penetration) at a air flow of 445 m³/h and $\Delta T=8^{\circ}$ C we get maximum vertical penetration of 4 m. This value is within the range of values specified for correct diffusion, in accordance with the established design conditions.

TECHNICAL DATA, HOT AIR:	
$L_{WA} = 32 \text{ dB(A)}$	(Table 3)
$\Delta P_t = 23 \text{ Pa}$	
$Y_{max} = 4 \text{ m}$	(Graph 3)
TECHNICAL DATA, COLD AIR SUPPLYING:	
$L_{WA} = 32 \text{ dB(A)}$	(Table 1)
$\Delta P_t = 23 \text{ Pa}$	

If we apply graph 1 (horizontal throw) at a air flow of 445 m³/h and throw X (m) equal to half the distance between diffuser centres plus the distance from the ceiling to the occupied area, resulting in $X \text{ (m)} = 1,6 + 3,7 = 5,3 \text{ m}$, maximum velocity in the occupied zone is **0,10 m/s**.

Coding

the coding defines both the diffuser and plenum:

DF-TR C	Thermo-adjustable swirl diffuser on a 600x600 plate Circular plate
R V	Central section with rotational diffuser Central section without blades
-- E	For modular ceiling For plaster board
PD PDA	Removable plenum box, uninsulated with side opening and regulation damper Removable plenum box, insulated with side opening and regulation damper
RAL 9010 RAL...	Standard finish in white Other RAL finish

Coding example:

DF-TR-R PD RAL 9010

Thermo-adjustable swirl diffuser in 600x600 stainless steel plate with uninsulated removable plenum box in white.