STRAVENT

STRATIFYING VENTILATION

OPTIMAL is a chilled beam designed for stratifying ventilation. Optimal fits in different premises such as Offices, conference rooms etc..

- ***Stravent technology = effective cooling capacity***
- ***Effectiv and energy-saving supply air***
- ***Draught-free air distribution***
- ***Delivered pre-adjusted for right air flow***
- ***Silent***
- ***Wall-to-wall design accesories***

STRAVENT OPTIMAL

Chilled beam for stratifying ventilation

Quick facts – Optimal

- *Supply air flow ..... Optional 10 - 35 l/s*
- *Supply air temperature ..... min. + 16° C*
- *Pressure drop..... Optional 60 – 150 Pa*
- *Size (Ø)..... 125 mm*
- *Dimensions (h x w)..... 294 x 220 mm*
- *Nom. standard length ...1200, 2300, 2900*
- *Finish..... Powder coating, RAL 9010*
- *ISO 9001 and ISO 14001*

OPTIMAL works effectively

To ventilate and chill a room effective is the same as remove heat and pollutions efficient. If the exchange rate shall be higher than 50 percent, the indoor air has to be stratified by the supply air. Optimal is working with Stravent-technique which always stratifies the indoor air. If the planning recommendations are followed the air- and heatchange rate always will exceed 60 percent. And as a result of the stratifying technique the present zone will have correct temperature with lower cooling effect compared to mixing ventilation.

The CFD visualisations show that an office is 3 to 4 degrees colder using Optimal than with traditional mixing ventilation with cilled beam, despite the same conditions. The air from Optimal is supplied to the room down, along the wall and out across the floor. The room air is stratified to give cleaner air in the occupied zone, while used air rises up to the ceiling.

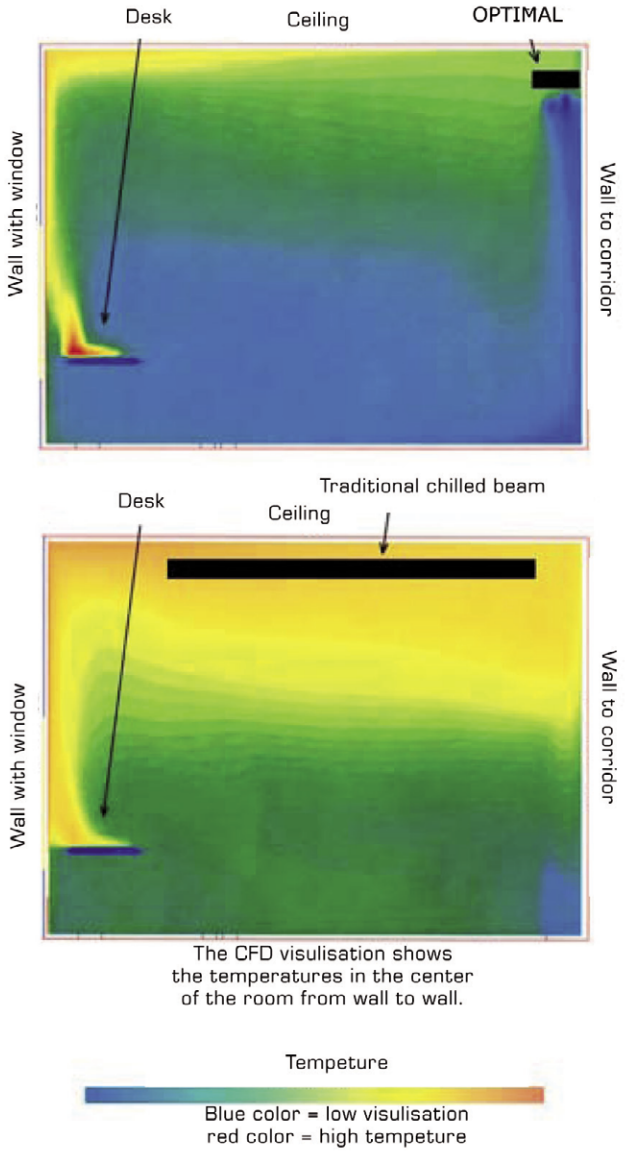


Figure 1. Stravent-technique compared to traditional mixing ventilation.

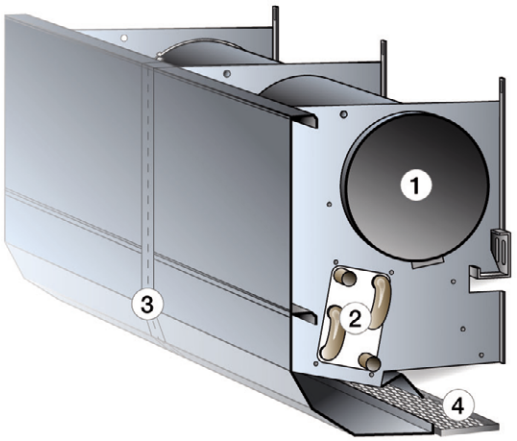
This is OPTIMAL

1. Supply air with STRAVENT nozzles

2. Coil optimised for maximum heat transfer.

3. Removable outer casing

4. Diffuser



The active part is available in three sizes, for different cooling capacities. The outer casing can be made as wall to wall design, to give an esthetic installation in the room. The outer casing is made in two different versions, with or without diffuser. In rooms where working places are situated close to the Optimal, the version with diffuser is preferable.

The silent operation of Optimal allows you to freely set the pressure on the supply air diffuser. Optimal can then govern the system from pressures of 80 Pa and higher. Creating the prerequisites for simpler installations:

- ***The air flow rate can be preset at the factory.***
- ***Adjustable dampers and silencers can be omitted from branch and connection ducts.***
- ***Without dampers and silencers, electrical efficiency is usually higher.***
- ***Adjustment will be much simpler***
- ***Future maintenance will be easier and cheaper.***
- ***Optimal does not occupy any ceiling space, which benefits other technical installations in ceiling.***

Planning

Instructions för optimized function for Stravent Optimal

1. Calculate the cooling effect $P_{tot,}$ needed for the room with mixing ventialtion.

2. Settle the supply air volume q for the room.

Tip! If possible use only 70-75% of supply airflow volume. The air change rate is up to twice as high as with mixing ventilation.

3. Set design room temperature $T_{max\ 1.1\ m}$ at 1,1 meters altitude and the supply air temperatur T_{in}.

4. Calculate the cooling capacity of the supply air.

P_{air} = 1.2 x ΔT x q x 1.38

1.38 = correction coefficient for more effective function of stratifying ventilations. Ptot is calculated for the whole room volume, and CFD-simulations shows that the correction can be done to not oversize products with stratifying technique.

5. Calculate the cooling capacity of the heat exchanger (water-side)

P_{coil}= P_{tot} - P_{air}

6. Pick size and numbers of Optimals according to the result above (5). The diagram shows cooling capacity of OPTIMAL. Cooling for supply air excluded.

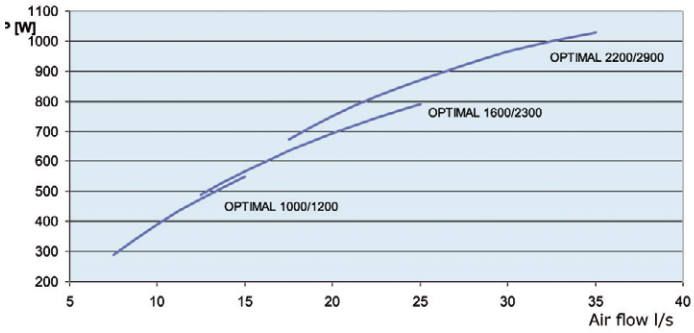


Diagram 1. Cooling capacity at waterflow 0,06 l/s, ΔT_{vl} 9,0 K and RH 50%.

The stratification in the room gives a temperature gradient of 1,0 – 1,5 K/m at designed conditions. The higher temperature at ceiling level is positive for the heat transfer in the heat exchanger in Optimal.

Notice! The Stravent-technique with stratification is more efficient than mixing ventilation. The reduction in needed cooling capacity is at least 29%. This directly effects the chiller, P = 0,71 x Pcoil

7. Pressuredrop for supply air is optional between 60 and 150 Pa.

Tips! Between 80-100 Pa pressure drop, the heat exchange is optimal and the Optimal can then govern the system. Adjustable dampers and silencers then often can be omitted from branch and connection ducts.

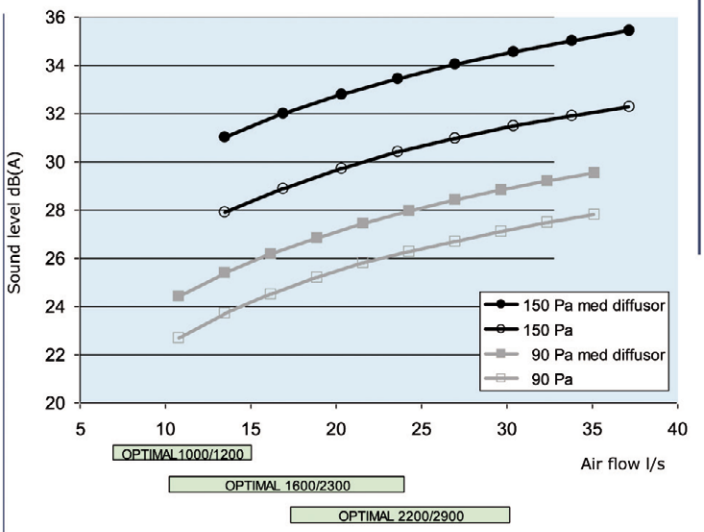


Diagram 2. Soundlevel at specified airflow and pressure drop with or without diffuser.

Sound effect levels L_{wA} are shown in diagram 2 in dB(A).

Sound effect levels are obtained in the different octave bands by correcting the sound level from the diagram with the figures in the table.

Hz	63	125	250	500	1k	2k	4k	8k
Korr idB	-5	-4	-3	-2	-4	-8	-12	-15

Tabell 1. Correction of sound levels to sound effect levels.

Hz	63	125	250	500	1k	2k	4k	8k
Korr idB	16	12	9	6	9	11	6	8

Tabell 2. Integrated sound attenuation

8. Pressure drop for heat exchanger (water) are shown in diagram 3.

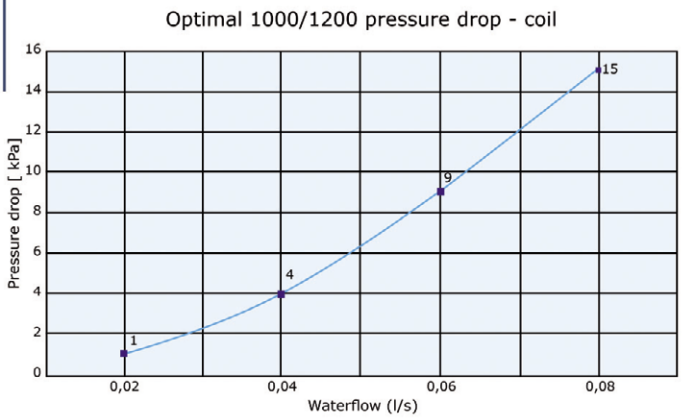
Notice! Water flow shall be at least 0.033 l/s to get turbulent flow. Water flow at 0.06 kg/s gives the best total economy.

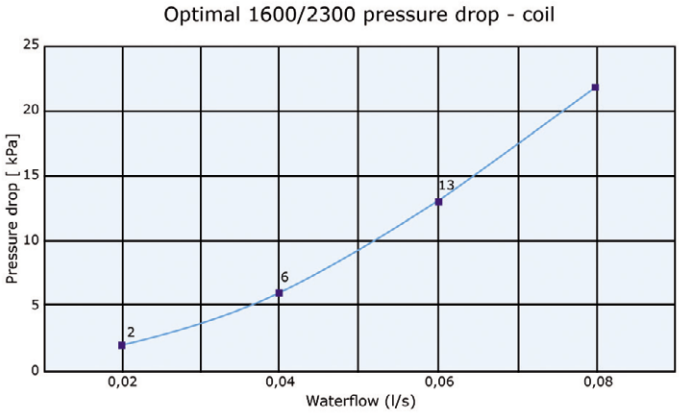
9. Optimal is best placed in the corner of the ceiling and the wall parallel to the facade. The distance to the ceiling shall be at least 40 mm. Optimal stratifies the indoor air in a room with the depth of 3,5 times the height.

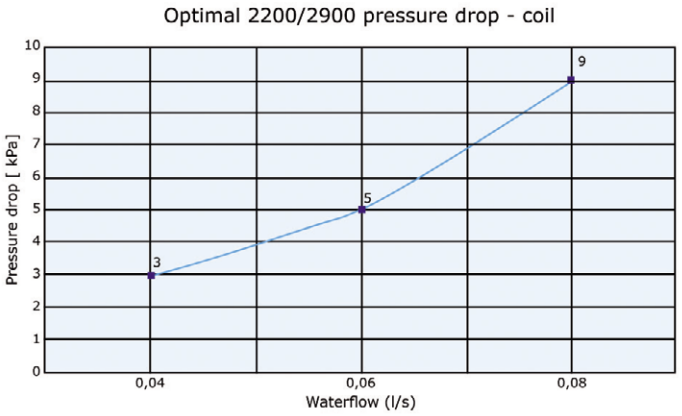
Notice! Exhaust air shall be as high and as far away from supply air as possible.

10. Choose connection side for supply air and chilled water. See specifications on page 6.

Diagram 3. Water flow - pressure drop







Exemple. An Office, 3 x 4 meters has a cooling requirement of 50 W/m² (mixing ventilation).

1. Total cooling requirement P_{tot} is 600 W

2. Normal air flow for this roomsize with mixing ventilation is 20 l/s. We choose q = 14 l/s (20 x 0,7).

3. Designing room temperature $T_{max\ 1.1\ m}$ = 23 °C and supply air temperature T_{In} = 16 °C gives

ΔT = 7,0 °C

4. Heat removel / cooling capacity from supply air:
P_{air} = 1.38 x 1.2 x ΔT x q = 1,38 x 1,2 x 7 x 14 = 162 W

5. Heat removel / cooling capacity left for the heat exchanger / coil: **P_{coil}= P_{tot} - P_{air} =600 – 162 W = 438 W**

6. In diagram 1 we read that Optmal 1000/1200 give approx. 500 W cooling capacity at 14 l/s which is enough.

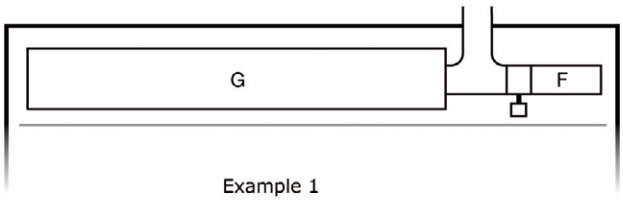
7. For optimal function we set the pressure drop to 90 Pa. Diagram 2 gives us sound level 24 dB(A) for an Optimal without diffuser. Correction of sound levels to sound effect levels:

Hz	63	125	250	500	1k	2k	4k	8k
L_{wA}	24	24	24	24	24	24	24	24
Korr idB	-5	-4	-3	-2	-4	-8	-12	-15
L_{wA}	19	20	21	22	20	16	12	9

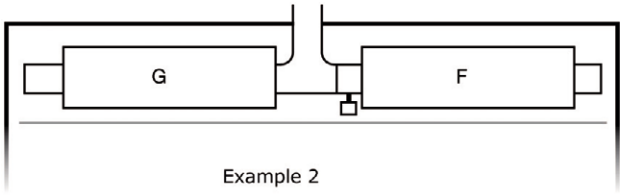
8. In diagram 3 we get the pressure drop for the coil (water). Waterflow 0,06 l/s, 9 kPa.

9. The best place for the Optimal is the wall parallel to the facade.

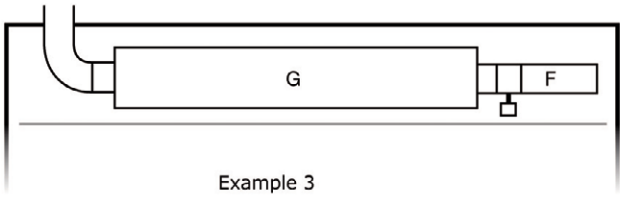
10. State the connection sides for water and air!



Example 1



Example 2



Example 3

Principles on forced ventilation.
G = Constant ventilation, F = forced ventilation unit.

Forced ventilation

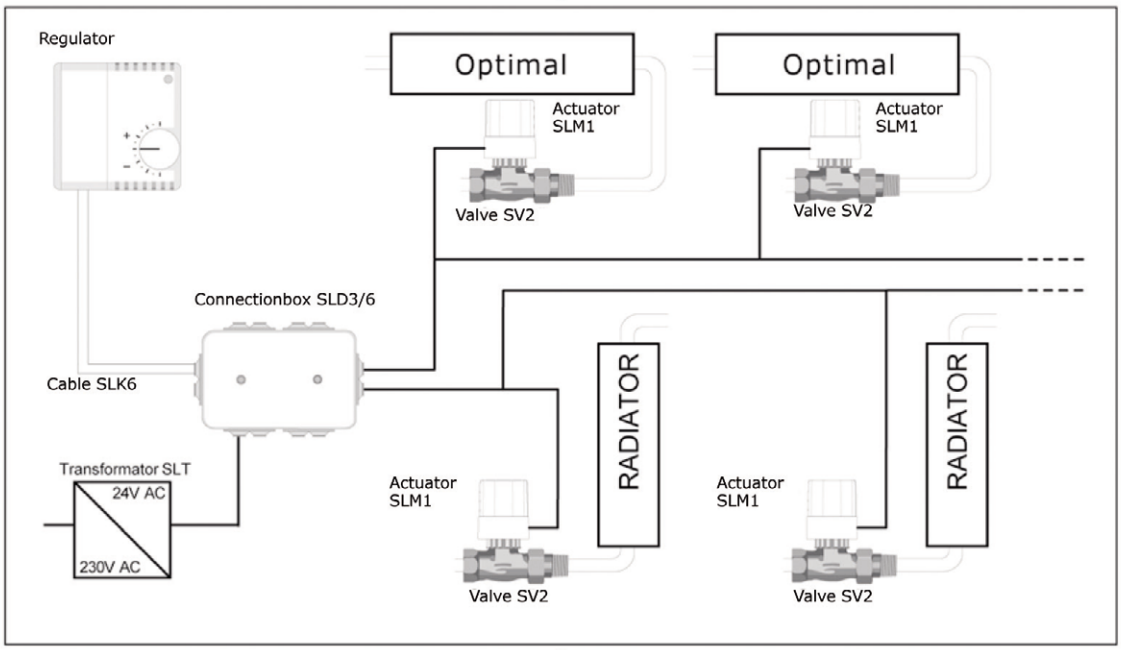
Function with forced ventilation can easily be achieved. Three variants of forced ventilation are presented here. These principles acquire a pressure drop of at least 80 Pa. The installation is hidden by the same outer casing. Contact your supplier for more information.

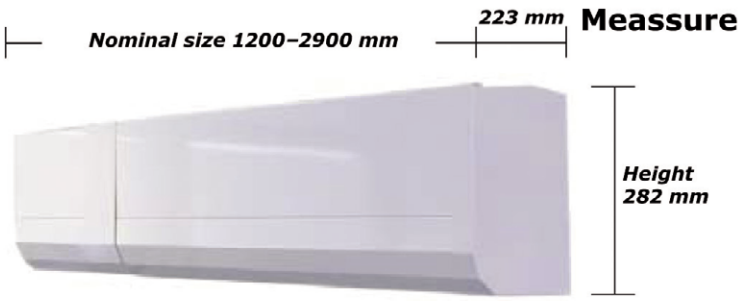
Installation and maintenance

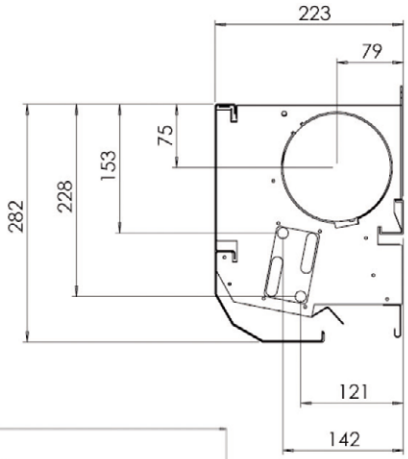
Optimal is mounted on the wall. Distance to the ceiling is minimum 40 mm. Supply air is connected on the left or right side with junction piece Ø125 mm. Chilled water is connected to 12 mm copper pipes on the right or left side. Connection sides for water and air must be specified when ordered. The outer casing is easy to remove for cleaning. The heat exchanger is best cleaned with a vacuum cleaner. Other surfaces are to be wiped of with a wet towel.

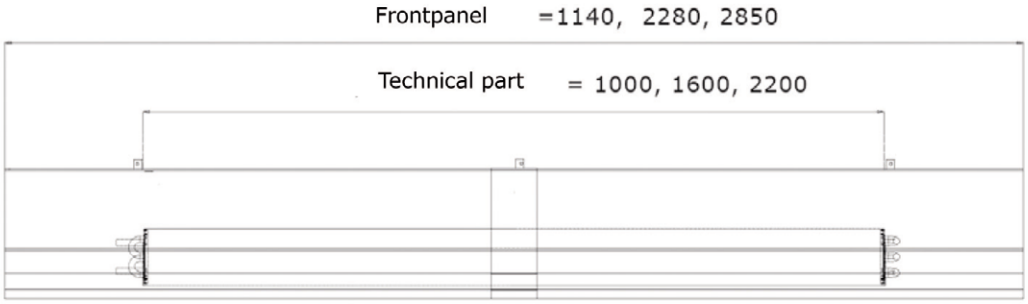
Control equipment – temperature

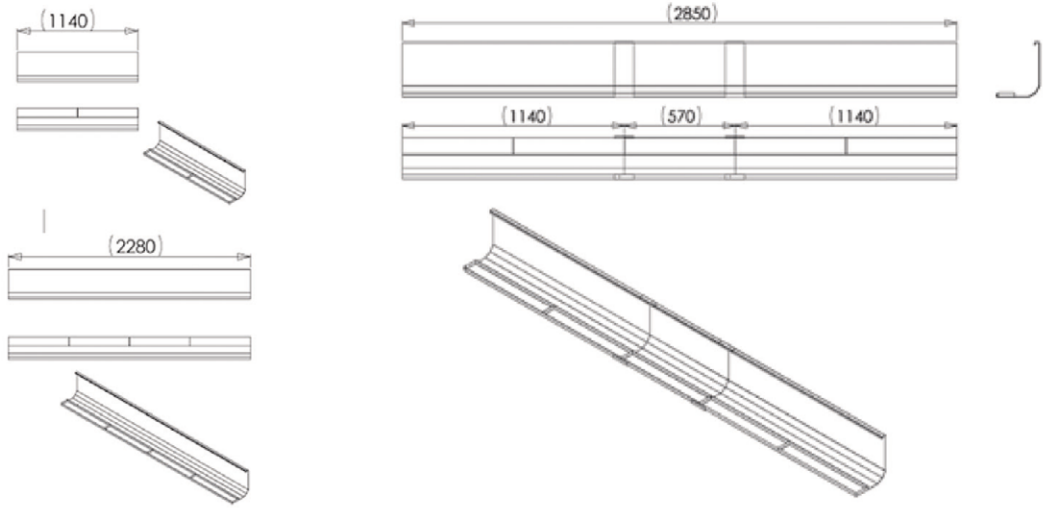
Optimal can be supplied with the control equipment required for the system in question. Max 6 actuators per cooling respective heating output using power pack SLD3. Max 15 with power pack SLD6. Actuator SLM1 switches off with a power failure.











Specification

Stravent Optimal – a – b – c – d – e – f – g – h

a.	**Nominal size**	Standard 1200, 2300, 2900 mm
b.	**Diffusor**	0 = Without diffusor, 1 = with diffusor
c.	**Pipe connection (water)**	R1 = Left, R2 = Right (view from room)
d.	**Duct connection (air)**	K1 = Left, K2 =Right (view from room)
e.	**Color**	Powder coating RAL 9010 (White, standard)
f.	**Supply air flow**	stated in l/s
g.	**Pressure drop (supply air)**	stated in Pa
h.	**Control equipment**	stated in plain text

Example of specification:

STRAVENT OPTIMAL – 1200 – 0 – R1 – K1 – RAL 9010 – 20 l/s – 90 Pa

We reserve the right to change the technical specification without prior notice