# PARAGON

Compact comfort module

## Comfort module PARAGON

PARAGON is the name of a new family of compact comfort modules especially designed for use in hotels and hospitals.

PARAGON provides high cooling/heating capacity through optimal utilisation of its cooling/heating coil at low air pressure and airflows. At the same time, the installation height of the product is kept at an absolute minimum which enables maximum room height in the entrance to a hotel room, for example.

## Quick facts

- Cooling, heating and ventilation
- Low installation height
- High capacity
- Simple installation
- Closed system
- Adjustable airflow rate
- Adjustable direction of air discharge

## Key figures

| | |
|---|---|
| Airflow range: | 21 - 153 cfm |
| Pressure range: | 0.2 – 0.8 inWG |
| Total cooling capacity: | Up to 8200 Btuh* |
| Heating capacity – water: | Up to 10200 Btuh** |
| Size: | Length = 35, 43, 51 and 59 in.<br>Depth = 27 in.<br>Height = 7 in. |

| Length | Primary air (cfm) | Nozzle pressure (inWG) | Noise level, dB(A) | Cooling capacity (Btuh) * | Heating capacity (Btuh) ** |
|---|---|---|---|---|---|
| 43 | 40 | 0.4 | <20 | 2935 | 4778 |
| 43 | 66 | 0.8 | 28 | 4283 | 6536 |

* Applies to $\Delta T_l$ and $\Delta T_{mk}$ 18 °F
** Applies to $\Delta T_{mv}$ 72 °F

PARAGON

*Figure 1. PARAGON*

# Technical description

## Outstanding features of the PARAGON comfort module

The PARAGON has been developed for the purpose of creating an optimal indoor climate mainly in hotel rooms and hospital patient rooms. Strong focus has been directed on a high degree of comfort as well as low operating costs in these applications. Since the PARAGON is driven by a central air handling unit, there is no built-in fan that would otherwise generate noise and require servicing. Through patent-pending technology, the built-in coil is optimally utilized which provides high cooling/heating capacity at low air pressure and airflows. The optimal use of the coil at the same time provides a design that minimizes the height of the unit. This makes it possible to increase the ceiling height in a hotel room entrance, for instance, and in this way create more volume and a brighter entrance.

## PARAGON in a nutshell

- Low flow-generated noise level
- Draft-free indoor climate
- No fan in the room
- Dry system without condensation
- No need for any drainage system
- No filters
- Requires minimal maintenance
- Low energy consumption
- Flexible adjustment of the air volume (VariFlow)
- Guaranteed comfort through flexible adjustment of the direction of air discharge (ADC[II])

## How the Unit Operates

### Hotel & Hospital

The primary air is supplied through a duct connection in the rear edge of the unit and this builds up positive pressure inside the unit. The positive pressure distributes the primary air with relatively high velocity via two rows of nozzle holes, one row in the upper edge and one row in the lower edge of the outlet. The high velocity of the primary air creates negative pressure which generates induction of the room air. The recirculation air is sucked up through the recirculation grille of the unit and flows on through the coil where it is cooled, heated, if required, or just passes untreated, before it mixes with the primary air and is discharged into the room.

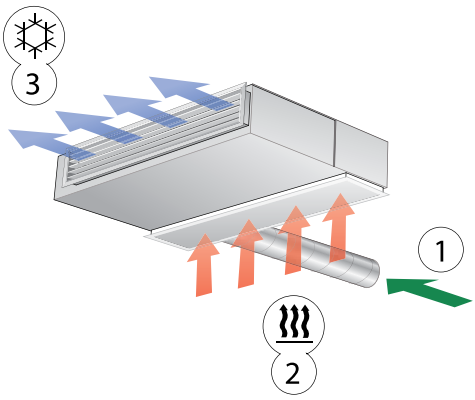



*Figure 2. PARAGON cooling function*
*1 = Primary air*
*2 = Induced room air*
*3 = Primary air mixed with chilled room air*

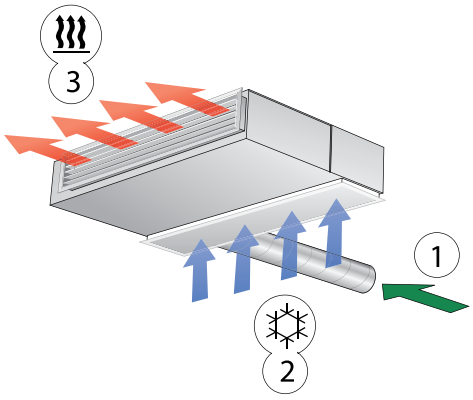



*Figure 3. PARAGON heating function*
*1 = Primary air*
*2 = Induced room air*
*3 = Primary air mixed with heated room air*

The supply air discharged into hotel rooms and hospital patient rooms is advantageously distributed as straight as possible by allowing it to follow the ceiling, i.e. utilize the Coanda effect. This enables the air to reach all the way to the perimeter wall. If Fan shape air distribution is desirable, this is simply achieved by means of the ADC[II] (Anti Draft Control) feature, which is included as standard in all PARAGON comfort modules. If vertical air distribution is desirable, this is achieved by setting the louvers of the outlet grille to slant upward or downward. If you like, you can lock the angle setting of the outlet grille using an accessory that secures the louvers in fixed position.

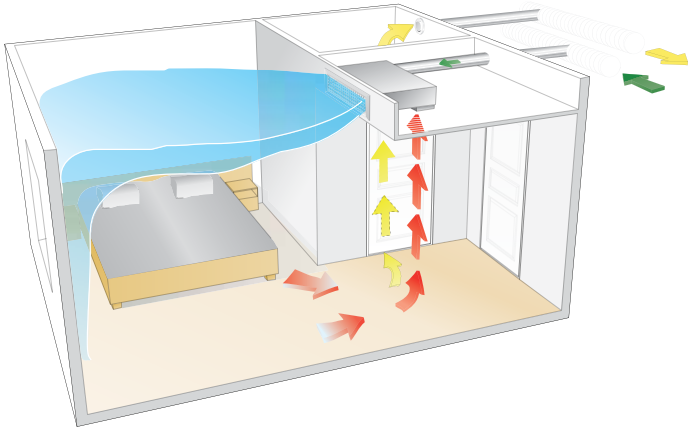


*Figure 4. Air distribution with the PARAGON in a hotel room*

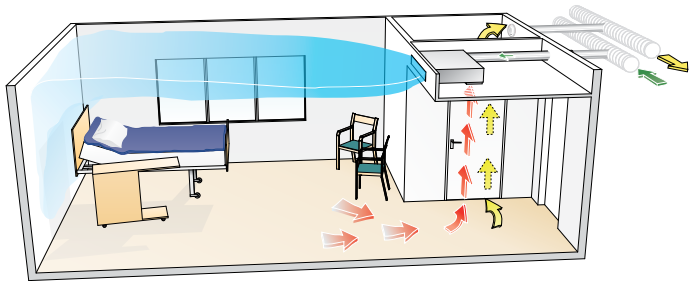


*Figure 5. Air distribution with the PARAGON in a hospital patient room*

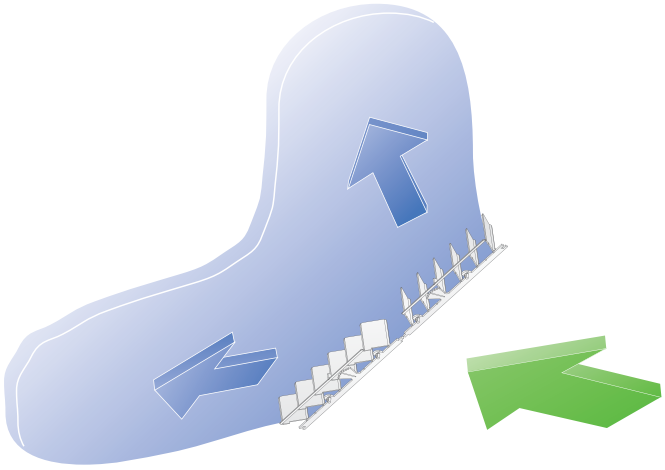


*Figure 6. Fan shape air distribution with ADC$^{II}$*

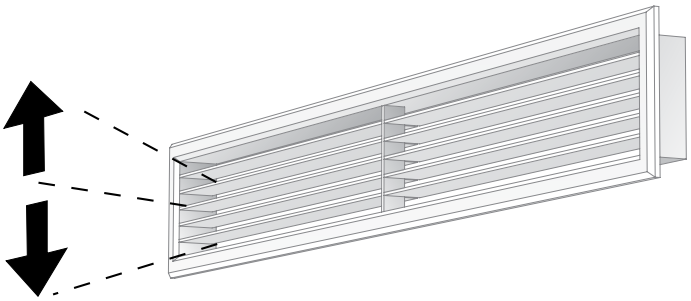


*Figure 8. Vertical air distribution with adjustable louvers in the supply air grille.*

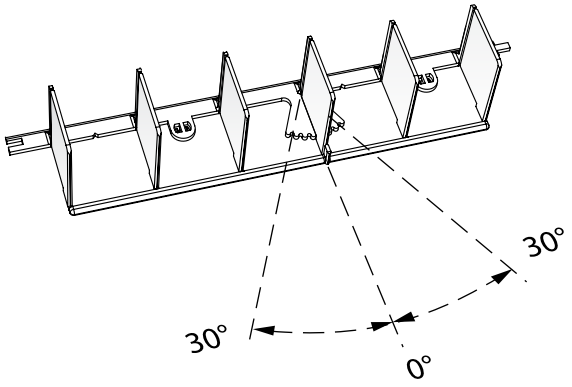



*Figure 7. PARAGON ADC$^{II}$*

*Figure 9. Adjustment, nozzle L*

*Figure 10. Adjustment, nozzle, M*

*Figure 11. Adjustment, nozzle H*

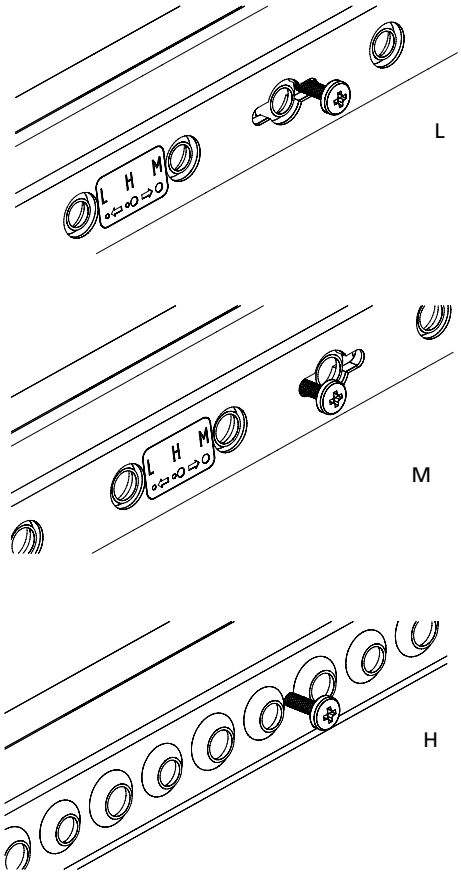



*Figure 12. Adjustment of the nozzles L, M and H (the throttling strip by nozzle H has been removed).*

# Planning

Both planning and sizing are made easier by using Swegon's ProSelect Project design computer program.
ProSelect is available at Swegon's home page: www.swegon.com.

# Sizing

## Designations

P: Capacity (Btuh)

v: Velocity (fpm)

q: Airflow (cfm)

p: Air pressure, (inWG)

$t_r$: Room temperature (°F)

$t_m$: Mean water temperature (°F)

$\Delta T$: Temperature difference [$t_r$–$t_m$] (°F)

$\Delta T_m$: Temperature difference, between inlet and return (°F)

$\Delta T_l$: Temperature difference, between room and supply air (°F)

$\Delta p$: Water pressure drop (ftWG)

$k_p$: Pressure drop constant
*Supplementary index: k = cooling, l = air, v = heating, i = commissioning*

## Recommended limit values, water

| | |
|---|---|
| Max. recommended operating pressure (above coil only): | 230 psi |
| Max. recommended test pressure (across coil only): | 350 psi |
| Max. recommended pressure drop across standard valve: | 6.7 ftWG |
| Min. permissible hot water flow: | 0.2 gpm |
| Max. permissible inlet flow temperature: | 140 °F |
| Min. permissible cooling water flow: | 0.48 gpm |
| Lowest permissible inlet flow temperature: | Should always be dimensioned so that the system works without condensation |

# Cooling

## Cooling capacity

Cooling capacities achieved from both the primary air and chilled water for various lengths of unit, damper settings and airflows are tabulated in **Tables 3-10**. The total cooling capacity for one unit is the sum of the cooling capacity of the primary air and the chilled water.

Below are some formula that enable the user to calculate which comfort module selection is applicable:

### Cooling capacity of the air

$$P_l = 1.07384 \cdot q_l \cdot \Delta T_l$$

| | |
|---|---|
| $P_l$ | Cooling capacity of the primary air (Btuh) |
| $q_l$ | Flow of primary air (cfm) |
| $\Delta T_l$ | Temperature difference between primary air ($t_l$) and room air ($t_r$) (°F) |

### Water's cooling capacity

$$P_k = 500 \cdot q_k \cdot \Delta T_k$$

| | |
|---|---|
| $P_k$ | Cooling capacity of the water (Btuh) |
| $q_k$ | Cooling water flow (gpm) |
| $\Delta T_k$ | Temperature difference of cooling water supply and return (°F) |

## Pressure drop

The pressure drop on the water side can be calculated using the formula:

$$\Delta p = (q / k_{pk})^2$$

| | |
|---|---|
| $\Delta p$ | Pressure drop in the water circuit (ftWG) |
| q | Water flow (gpm), see **Diagram 1** |
| $k_{pk}$ | Pressure drop constant read from **Table 1** |

**Table 1. Pressure drop**

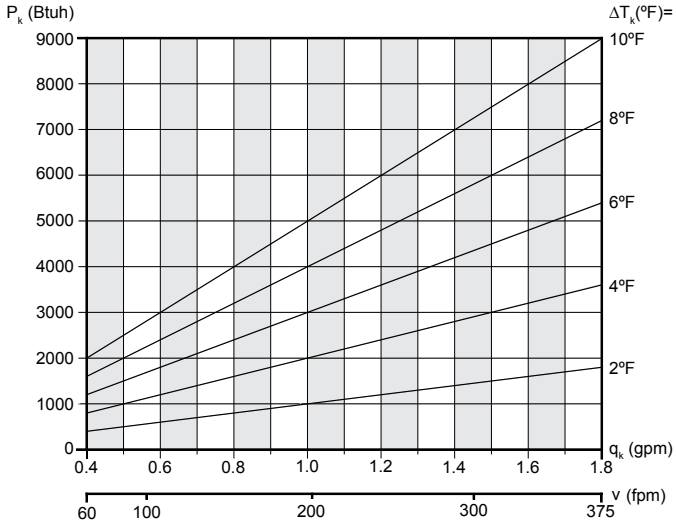
| Pressure drop, water | | |
|---|---|---|
| NC | Length (in.) | $k_{pk}$ Cooling |
| | 35 | 0.5947 |
| | 43 | 0.5536 |
| | 51 | 0.5207 |
| | 59 | 0.4933 |
| HC | Length (in.) | $k_{pk}$ Cooling |
| | 35 | 0.5097 |
| | 43 | 0.4768 |
| | 51 | 0.4494 |
| | 59 | 0.4248 |

**Table 2. Cooling Capacity for Natural Convection**

| Natural convection: The cooling capacity of water (Btuh) for $\Delta T_{mk}$ (°F ) | | | | | | |
|---|---|---|---|---|---|---|
| Size | 10 | 12 | 14 | 16 | 18 | 20 |
| 35 | 59 | 74 | 87 | 101 | 113 | 127 |
| 43 | 79 | 94 | 112 | 128 | 147 | 162 |
| 51 | 93 | 116 | 136 | 158 | 177 | 200 |
| 59 | 114 | 136 | 162 | 186 | 212 | 235 |

**Diagram 1 – Cooling capacity**

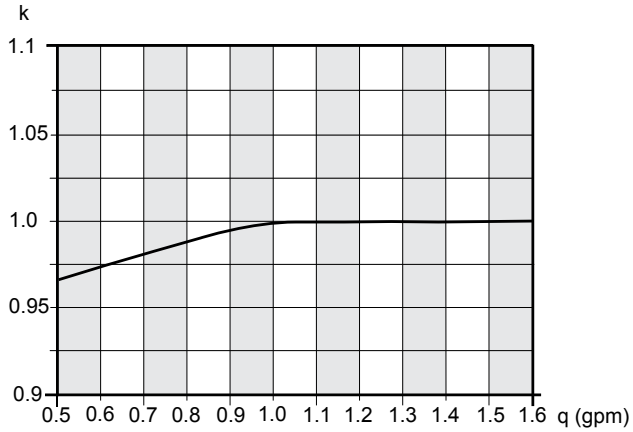
The function between cooling capacity $P_k$ (Btuh), change in temperature $\Delta T_k$ (°F) and cooling water flow $q_k$ (gpm).




## Capacity correction

Different water flows influence the available cooling effect to a certain degree. To calculate the actual cooling power based on a flow-dependant correction factor, use Swegon's ProSelect computer program, available at www.swegon.com.

**Diagram 2. Water flow – capacity correction**



## Table 3 – Cooling capacity, NC, 0.28 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_I$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 26 | <20 | 0.28 | 285 | 398 | 512 | 626 | 766 | 917 | 1066 | 1217 | 1369 | 1520 | 50.20 |
| 35 | M | M | 34 | <20 | 0.28 | 360 | 504 | 648 | 791 | 837 | 1005 | 1172 | 1338 | 1502 | 1668 | 63.26 |
| 35 | H | H | 58 | <20 | 0.28 | 617 | 864 | 1111 | 1358 | 1012 | 1205 | 1395 | 1585 | 1778 | 1968 | 108.44 |
| 43 | L | L | 34 | <20 | 0.28 | 370 | 519 | 667 | 815 | 979 | 1176 | 1371 | 1565 | 1758 | 1951 | 64.93 |
| 43 | M | M | 43 | <20 | 0.28 | 462 | 646 | 831 | 1016 | 1080 | 1297 | 1511 | 1723 | 1939 | 2151 | 81.66 |
| 43 | H | H | 74 | <20 | 0.28 | 800 | 1120 | 1440 | 1760 | 1306 | 1556 | 1804 | 2050 | 2297 | 2543 | 140.24 |
| 51 | L | L | 41 | <20 | 0.28 | 440 | 616 | 792 | 969 | 1204 | 1443 | 1682 | 1921 | 2160 | 2396 | 77.65 |
| 51 | M | M | 52 | <20 | 0.28 | 553 | 774 | 995 | 1217 | 1328 | 1590 | 1852 | 2114 | 2375 | 2637 | 97.73 |
| 51 | H | H | 89 | <20 | 0.28 | 956 | 1338 | 1720 | 2103 | 1603 | 1906 | 2209 | 2513 | 2816 | 3115 | 167.34 |
| 59 | L | L | 35 | <20 | 0.28 | 376 | 526 | 677 | 827 | 1267 | 1529 | 1793 | 2062 | 2328 | 2597 | 65.93 |
| 59 | M | M | 60 | <20 | 0.28 | 639 | 895 | 1150 | 1406 | 1543 | 1858 | 2175 | 2491 | 2809 | 3128 | 112.12 |
| 59 | H | H | 91 | 21 | 0.28 | 977 | 1368 | 1759 | 2150 | 1855 | 2210 | 2567 | 2923 | 3276 | 3629 | 171.36 |

## Table 4 – Cooling capacity, NC, 0.40 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_I$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 32 | <20 | 0.40 | 344 | 481 | 619 | 756 | 896 | 1071 | 1245 | 1420 | 1590 | 1764 | 50.20 |
| 35 | M | M | 40 | <20 | 0.40 | 430 | 601 | 773 | 945 | 985 | 1175 | 1365 | 1554 | 1744 | 1934 | 63.26 |
| 35 | H | H | 68 | 20 | 0.40 | 736 | 1030 | 1324 | 1618 | 1167 | 1390 | 1614 | 1835 | 2055 | 2275 | 108.44 |
| 43 | L | L | 41 | <20 | 0.40 | 440 | 616 | 792 | 969 | 1159 | 1384 | 1607 | 1831 | 2055 | 2278 | 64.93 |
| 43 | M | M | 52 | 20 | 0.40 | 553 | 774 | 995 | 1217 | 1271 | 1516 | 1763 | 2007 | 2249 | 2492 | 81.66 |
| 43 | H | H | 89 | 22 | 0.40 | 956 | 1338 | 1720 | 2103 | 1505 | 1794 | 2082 | 2368 | 2655 | 2936 | 140.24 |
| 51 | L | L | 49 | <20 | 0.40 | 526 | 737 | 947 | 1158 | 1418 | 1695 | 1972 | 2246 | 2519 | 2792 | 77.65 |
| 51 | M | M | 62 | 21 | 0.40 | 666 | 932 | 1198 | 1465 | 1558 | 1861 | 2162 | 2461 | 2761 | 3057 | 97.73 |
| 51 | H | H | 106 | 23 | 0.40 | 1138 | 1594 | 2049 | 2504 | 1840 | 2197 | 2551 | 2900 | 3249 | 3598 | 167.34 |
| 59 | L | L | 42 | 21 | 0.40 | 446 | 624 | 802 | 980 | 1500 | 1803 | 2109 | 2414 | 2720 | 3024 | 65.93 |
| 59 | M | M | 71 | 22 | 0.40 | 762 | 1067 | 1372 | 1677 | 1808 | 2168 | 2531 | 2892 | 3256 | 3616 | 112.12 |
| 59 | H | H | 108 | 26 | 0.40 | 1165 | 1631 | 2097 | 2563 | 2123 | 2532 | 2944 | 3352 | 3761 | 4167 | 171.36 |

[1] The specified noise level is applicable to connection without damper or with fully open damper. In other cases where the airflow is demand-controlled with motor-driven dampers, the required data can be read from Swegon's ProSelect sizing program. Room attenuation = 10 dB

[2] The specified capacities are based on a complete unit including standard distribution and recirculation grille. Without grille the water capacity increases by approx. 5%. With ADC[II] adjusted to Fan shape you lose approx. 5% in water capacity. The primary air capacity is not affected.

**NOTE!** 1. The total cooling capacity is the sum of the air-based and water-based cooling capacities.
2. NC = Normal Capacity version

## Table 5 – Cooling capacity, NC, 0.60 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_I$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 39 | <20 | 0.60 | 419 | 586 | 754 | 921 | 1053 | 1254 | 1455 | 1652 | 1850 | 2051 | 50.20 |
| 35 | M | M | 49 | 25 | 0.60 | 526 | 737 | 947 | 1158 | 1151 | 1371 | 1591 | 1807 | 2020 | 2236 | 63.26 |
| 35 | H | H | 84 | 26 | 0.60 | 902 | 1263 | 1624 | 1984 | 1344 | 1602 | 1859 | 2117 | 2372 | 2626 | 108.44 |
| 43 | L | L | 50 | <20 | 0.60 | 542 | 759 | 976 | 1193 | 1357 | 1618 | 1876 | 2134 | 2389 | 2646 | 64.93 |
| 43 | M | M | 64 | 26 | 0.60 | 682 | 955 | 1227 | 1500 | 1485 | 1766 | 2046 | 2327 | 2604 | 2880 | 81.66 |
| 43 | H | H | 108 | 27 | 0.60 | 1165 | 1631 | 2097 | 2563 | 1734 | 2067 | 2398 | 2732 | 3061 | 3391 | 140.24 |
| 51 | L | L | 60 | 20 | 0.60 | 644 | 902 | 1160 | 1417 | 1660 | 1979 | 2298 | 2614 | 2928 | 3239 | 77.65 |
| 51 | M | M | 76 | 27 | 0.60 | 811 | 1135 | 1459 | 1784 | 1818 | 2163 | 2508 | 2850 | 3191 | 3529 | 97.73 |
| 51 | M | H | 103 | 28 | 0.60 | 1106 | 1548 | 1991 | 2433 | 2009 | 2396 | 2780 | 3163 | 3546 | 3925 | 132.54 |
| 59 | L | L | 51 | 25 | 0.60 | 548 | 767 | 986 | 1205 | 1768 | 2117 | 2466 | 2815 | 3164 | 3509 | 65.93 |
| 59 | M | M | 87 | 28 | 0.60 | 934 | 1308 | 1682 | 2055 | 2113 | 2530 | 2944 | 3358 | 3771 | 4184 | 112.12 |
| 59 | M | H | 110 | 29 | 0.60 | 1181 | 1654 | 2126 | 2599 | 2305 | 2756 | 3204 | 3655 | 4102 | 4547 | 141.91 |

## Table 6 – Cooling capacity, NC, 0.80 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_I$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 45 | 23 | 0.80 | 483 | 677 | 870 | 1063 | 1158 | 1378 | 1598 | 1814 | 2031 | 2247 | 50.20 |
| 35 | M | M | 56 | 29 | 0.80 | 607 | 849 | 1092 | 1335 | 1266 | 1505 | 1741 | 1976 | 2212 | 2443 | 63.26 |
| 43 | L | L | 58 | 24 | 0.80 | 623 | 872 | 1121 | 1370 | 1495 | 1778 | 2062 | 2344 | 2621 | 2898 | 64.93 |
| 43 | M | M | 73 | 30 | 0.80 | 784 | 1097 | 1411 | 1725 | 1635 | 1942 | 2249 | 2554 | 2853 | 3153 | 81.66 |
| 51 | L | L | 70 | 25 | 0.80 | 746 | 1045 | 1343 | 1642 | 1838 | 2183 | 2531 | 2874 | 3218 | 3556 | 77.65 |
| 51 | M | M | 88 | 31 | 0.80 | 940 | 1315 | 1691 | 2067 | 2007 | 2382 | 2758 | 3130 | 3502 | 3870 | 97.73 |
| 59 | L | L | 59 | 29 | 0.80 | 634 | 887 | 1140 | 1394 | 1964 | 2343 | 2725 | 3105 | 3485 | 3864 | 65.93 |
| 59 | M | M | 100 | 32 | 0.80 | 1079 | 1511 | 1943 | 2374 | 2327 | 2782 | 3234 | 3685 | 4133 | 4581 | 112.12 |

[1] The specified noise level is applicable to connection without damper or with fully open damper. In other cases where the airflow is demand-controlled with motor-driven dampers, the required data can be read from Swegon's ProSelect sizing program. Room attenuation = 10 dB

[2] The specified capacities are based on a complete unit including standard distribution and recirculation grille. Without grille the water capacity increases by approx. 5%. With ADC[II] adjusted to Fan shape you lose approx. 5% in water capacity. The primary air capacity is not affected.

**NOTE!** 1. The total cooling capacity is the sum of the air-based and water-based cooling capacities.
2. NC = Normal Capacity version

## Table 7 – Cooling capacity, HC, 0.28 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_l$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 26 | <20 | 0.28 | 285 | 398 | 512 | 626 | 774 | 929 | 1083 | 1237 | 1389 | 1544 | 50.20 |
| 35 | M | M | 34 | <20 | 0.28 | 360 | 504 | 648 | 791 | 875 | 1050 | 1222 | 1396 | 1567 | 1741 | 63.26 |
| 35 | H | H | 58 | <20 | 0.28 | 617 | 864 | 1111 | 1358 | 1089 | 1294 | 1501 | 1707 | 1911 | 2112 | 108.44 |
| 43 | L | L | 34 | <20 | 0.28 | 370 | 519 | 667 | 815 | 1006 | 1204 | 1401 | 1601 | 1799 | 1996 | 64.93 |
| 43 | M | M | 43 | <20 | 0.28 | 462 | 646 | 831 | 1016 | 1128 | 1353 | 1576 | 1797 | 2020 | 2244 | 81.66 |
| 43 | H | H | 74 | <20 | 0.28 | 800 | 1120 | 1440 | 1760 | 1404 | 1673 | 1940 | 2205 | 2471 | 2733 | 140.24 |
| 51 | L | L | 41 | <20 | 0.28 | 440 | 616 | 792 | 969 | 1232 | 1479 | 1723 | 1968 | 2212 | 2454 | 77.65 |
| 51 | M | M | 52 | <20 | 0.28 | 553 | 774 | 995 | 1217 | 1384 | 1661 | 1935 | 2209 | 2481 | 2754 | 97.73 |
| 51 | H | H | 88 | <20 | 0.28 | 950 | 1330 | 1711 | 2091 | 1720 | 2045 | 2372 | 2697 | 3020 | 3343 | 167.34 |
| 59 | L | L | 35 | <20 | 0.28 | 376 | 526 | 677 | 827 | 1295 | 1564 | 1836 | 2110 | 2382 | 2659 | 65.93 |
| 59 | M | M | 60 | <20 | 0.28 | 639 | 895 | 1150 | 1406 | 1620 | 1912 | 2226 | 2551 | 2881 | 3207 | 112.12 |
| 59 | H | H | 90 | 21 | 0.28 | 972 | 1361 | 1749 | 2138 | 1985 | 2372 | 2756 | 3136 | 3515 | 3895 | 171.36 |

## Table 8 – Cooling capacity, HC, 0.40 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_l$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 32 | <20 | 0.40 | 344 | 481 | 619 | 756 | 942 | 1123 | 1305 | 1487 | 1669 | 1851 | 50.20 |
| 35 | M | M | 40 | <20 | 0.40 | 430 | 601 | 773 | 945 | 1057 | 1257 | 1461 | 1663 | 1867 | 2068 | 63.26 |
| 35 | H | H | 68 | 20 | 0.40 | 736 | 1030 | 1324 | 1618 | 1280 | 1527 | 1774 | 2017 | 2259 | 2502 | 108.44 |
| 43 | L | L | 41 | <20 | 0.40 | 440 | 616 | 792 | 969 | 1217 | 1452 | 1687 | 1925 | 2154 | 2388 | 64.93 |
| 43 | M | M | 52 | 20 | 0.40 | 553 | 774 | 995 | 1217 | 1359 | 1621 | 1883 | 2145 | 2406 | 2664 | 81.66 |
| 43 | H | H | 89 | 22 | 0.40 | 956 | 1338 | 1720 | 2103 | 1655 | 1973 | 2289 | 2604 | 2918 | 3229 | 140.24 |
| 51 | L | L | 49 | <20 | 0.40 | 526 | 737 | 947 | 1158 | 1493 | 1781 | 2068 | 2357 | 2645 | 2930 | 77.65 |
| 51 | M | M | 62 | 21 | 0.40 | 666 | 932 | 1198 | 1465 | 1670 | 1992 | 2311 | 2634 | 2952 | 3271 | 97.73 |
| 51 | H | H | 106 | 23 | 0.40 | 1138 | 1594 | 2049 | 2504 | 2025 | 2415 | 2803 | 3190 | 3573 | 3956 | 167.34 |
| 59 | L | L | 42 | 21 | 0.40 | 446 | 624 | 802 | 980 | 1575 | 1894 | 2212 | 2531 | 2853 | 3172 | 65.93 |
| 59 | M | M | 71 | 22 | 0.40 | 762 | 1067 | 1372 | 1677 | 1950 | 2288 | 2654 | 3037 | 3420 | 3799 | 112.12 |
| 59 | H | H | 108 | 26 | 0.40 | 1165 | 1631 | 2097 | 2563 | 2330 | 2785 | 3238 | 3685 | 4137 | 4581 | 171.36 |

[1] The specified noise level is applicable to connection without damper or with fully open damper. In other cases where the airflow is demand-controlled with motor-driven dampers, the required data can be read from Swegon's ProSelect sizing program. Room attenuation = 10 dB

[2] The specified capacities are based on a complete unit including standard distribution and recirculation grille. Without grille the water capacity increases by approx. 5%. With ADC[II] adjusted to Fan shape you lose approx. 5% in water capacity. The primary air capacity is not affected.

**NOTE!** 1. The total cooling capacity is the sum of the air-based and water-based cooling capacities.
2. HC = High Capacity version

## Table 9 – Cooling capacity, HC, 0.60 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_l$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 39 | <20 | 0.60 | 419 | 586 | 754 | 921 | 1126 | 1341 | 1555 | 1770 | 1983 | 2195 | 50.20 |
| 35 | M | M | 49 | 25 | 0.60 | 526 | 737 | 947 | 1158 | 1252 | 1491 | 1728 | 1966 | 2198 | 2433 | 63.26 |
| 35 | H | H | 84 | 26 | 0.60 | 902 | 1263 | 1624 | 1984 | 1505 | 1794 | 2082 | 2370 | 2659 | 2943 | 108.44 |
| 43 | L | L | 50 | <20 | 0.60 | 542 | 759 | 976 | 1193 | 1456 | 1733 | 2010 | 2286 | 2560 | 2832 | 64.93 |
| 43 | M | M | 64 | 26 | 0.60 | 682 | 955 | 1227 | 1500 | 1617 | 1927 | 2233 | 2539 | 2840 | 3143 | 81.66 |
| 43 | H | H | 108 | 27 | 0.60 | 1165 | 1631 | 2097 | 2563 | 1939 | 2314 | 2687 | 3059 | 3430 | 3798 | 140.24 |
| 51 | L | L | 60 | 20 | 0.60 | 644 | 902 | 1160 | 1417 | 1783 | 2121 | 2461 | 2799 | 3133 | 3466 | 77.65 |
| 51 | M | M | 76 | 27 | 0.60 | 816 | 1143 | 1469 | 1795 | 1990 | 2365 | 2741 | 3116 | 3488 | 3860 | 97.73 |
| 51 | M | H | 103 | 28 | 0.60 | 1106 | 1548 | 1991 | 2433 | 2232 | 2660 | 3088 | 3514 | 3935 | 4359 | 132.54 |
| 59 | L | L | 51 | 25 | 0.60 | 548 | 767 | 986 | 1205 | 1891 | 2266 | 2639 | 3013 | 3386 | 3757 | 65.93 |
| 59 | M | M | 87 | 27 | 0.60 | 934 | 1308 | 1682 | 2055 | 2281 | 2774 | 3238 | 3692 | 4154 | 4598 | 112.12 |
| 59 | M | H | 110 | 29 | 0.60 | 1181 | 1654 | 2126 | 2599 | 2548 | 3063 | 3569 | 4066 | 4570 | 5060 | 141.91 |

## Table 10 – Cooling capacity, HC, 0.80 inWG

| Length of the unit | Nozzle settings | | Air-flow | Noise level [1] | Nozzle pressure $p_i$ | Cooling capacity, primary air (Btuh) $\Delta T_l$ (°F) | | | | Cooling capacity of water (Btuh) for $\Delta T_{mk}$ [2] (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 14 | 18 | 22 | 10 | 12 | 14 | 16 | 18 | 20 | $k_{pl}$ |
| 35 | L | L | 45 | 23 | 0.80 | 483 | 677 | 870 | 1063 | 1252 | 1491 | 1730 | 1966 | 2198 | 2433 | 50.20 |
| 35 | M | M | 56 | 29 | 0.80 | 607 | 849 | 1092 | 1335 | 1396 | 1661 | 1921 | 2182 | 2440 | 2697 | 63.26 |
| 43 | L | L | 58 | 24 | 0.80 | 623 | 872 | 1121 | 1370 | 1618 | 1925 | 2232 | 2537 | 2836 | 3139 | 64.93 |
| 43 | M | M | 73 | 30 | 0.80 | 784 | 1097 | 1411 | 1725 | 1804 | 2141 | 2478 | 2816 | 3147 | 3480 | 81.66 |
| 51 | L | L | 70 | 25 | 0.80 | 746 | 1045 | 1343 | 1642 | 1985 | 2364 | 2738 | 3112 | 3481 | 3853 | 77.65 |
| 51 | M | M | 88 | 31 | 0.80 | 940 | 1315 | 1691 | 2067 | 2212 | 2629 | 3043 | 3454 | 3864 | 4270 | 97.73 |
| 59 | L | L | 59 | 29 | 0.80 | 634 | 887 | 1140 | 1394 | 2125 | 2538 | 2951 | 3362 | 3771 | 4181 | 65.93 |
| 59 | M | M | 100 | 32 | 0.80 | 1079 | 1511 | 1943 | 2374 | 2485 | 3167 | 3733 | 4248 | 4775 | 5269 | 112.12 |

[1] The specified noise level is applicable to connection without damper or with fully open damper. In other cases where the airflow is demand-controlled with motor-driven dampers, the required data can be read from Swegon's ProSelect sizing program. Room attenuation = 10 dB

[2] The specified capacities are based on a complete unit including standard distribution and recirculation grille. Without grille the water capacity increases by approx. 5%. With ADC$^{II}$ adjusted to Fan shape you lose approx. 5% in water capacity. The primary air capacity is not affected.

**NOTE!** 1. The total cooling capacity is the sum of the air-based and water-based cooling capacities.
2. HC = High Capacity version

# Heating

## Heating capacity

Heating capacities are tabulated in **Tables 13-16**.

The heating capacity of the water can be calculated using the formula:

### Water's heating capacity

$\mathbf{P_v = 500 \cdot q_v \cdot \Delta T_v}$ where

$P_v$ Heating capacity of the water (Btuh)

$q_v$ Flow of heating water (gpm)

$\Delta T_v$ Temperature difference between the heating water's flow and return flow (°F)

## Pressure drop

The pressure drop on the water side can be calculated using the formula:

$\mathbf{\Delta p_v = (q_v / k_{pv})^2}$ where

$\Delta p_v$ Pressure drop in heating circuit (ftWG)

$q_v$ Flow of heating water (gpm), see **Diagram 3**

$k_{pv}$ Pressure drop constant for heating circuit, see **Table 11**

For a more detailed pressure drop calculation, use the Swegon ProSelect computer program available at www.swegon.com.

**Table 11. Pressure drop**

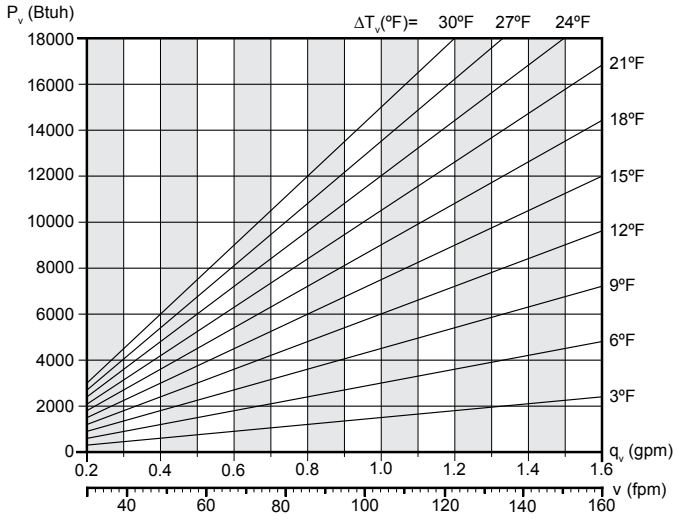
| Pressure drop, water | | |
|---|---|---|
| NC | Length (in.) | $k_{pv}$ Heating |
| | 35 | 0.4878 |
| | 43 | 0.4549 |
| | 51 | 0.4275 |
| | 59 | 0.4056 |
| HC | Length (in.) | $k_{pv}$ Heating |
| | 35 | 0.4878 |
| | 43 | 0.4549 |
| | 51 | 0.4275 |
| | 59 | 0.4056 |

**Table 12 - Heating capacity for natural convection**

| | Heat emission when $\Delta T_{mv}$ [°F] (Btuh) | | | | | | |
|---|---|---|---|---|---|---|---|
| Length (in.) | 9 | 18 | 27 | 36 | 45 | 54 | 63 |
| 35 | 7 | 24 | 48 | 82 | 119 | 167 | 218 |
| 43 | 10 | 31 | 61 | 106 | 157 | 215 | 283 |
| 51 | 10 | 38 | 75 | 126 | 191 | 263 | 348 |
| 59 | 14 | 44 | 89 | 150 | 225 | 314 | 413 |

**Diagram 3 - Heating capacity**

The function between heating capacity $P_v$ (Btuh), change in temperature $\Delta T_v$ (°F) and heating water flow, $q_v$ (gpm).



## Table 13 – Heating capacity, NC [2]/HC [3], 0.28 inWG

| Length of the unit | Nozzle settings | | Airflow | Noise level [1] | Nozzle pressure $p_i$ | Heating capacity, water (Btuh) for $\Delta T_{mv}$ (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 20 | 30 | 40 | 50 | 60 | $k_{pl}$ |
| 35 | L | L | 26 | <20 | 0.28 | 436 | 873 | 1314 | 1759 | 2205 | 2651 | 50.20 |
| 35 | M | M | 34 | <20 | 0.28 | 558 | 1114 | 1668 | 2221 | 2775 | 3329 | 63.26 |
| 35 | H | H | 58 | <20 | 0.28 | 588 | 1182 | 1806 | 2434 | 3069 | 3711 | 108.44 |
| 43 | L | L | 34 | <20 | 0.28 | 562 | 1128 | 1701 | 2275 | 2851 | 3430 | 64.93 |
| 43 | M | M | 43 | <20 | 0.28 | 717 | 1436 | 2150 | 2865 | 3579 | 4291 | 81.66 |
| 43 | H | H | 74 | <20 | 0.28 | 759 | 1530 | 2333 | 3145 | 3968 | 4798 | 140.24 |
| 51 | L | L | 41 | <20 | 0.28 | 690 | 1386 | 2089 | 2794 | 3501 | 4213 | 77.65 |
| 51 | M | M | 52 | <20 | 0.28 | 880 | 1762 | 2638 | 3513 | 4387 | 5263 | 97.73 |
| 51 | H | H | 88 | <20 | 0.28 | 929 | 1869 | 2855 | 3846 | 4851 | 5865 | 167.34 |
| 59 | L | L | 35 | <20 | 0.28 | 819 | 1640 | 2471 | 3305 | 4143 | 4983 | 65.93 |
| 59 | M | M | 60 | <20 | 0.28 | 1043 | 2081 | 3116 | 4151 | 5187 | 6220 | 112.12 |
| 59 | H | H | 90 | 21 | 0.28 | 1100 | 2213 | 3376 | 4551 | 5742 | 6942 | 171.36 |

## Table 14 – Heating capacity, NC [2]/HC [3], 0.40 inWG

| Length of the unit | Nozzle settings | | Airflow | Noise level [1] | Nozzle pressure $p_i$ | Heating capacity, water (Btuh) for $\Delta T_{mv}$ (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 20 | 30 | 40 | 50 | 60 | $k_{pl}$ |
| 35 | L | L | 32 | <20 | 0.40 | 512 | 1020 | 1532 | 2044 | 2556 | 3071 | 50.20 |
| 35 | M | M | 40 | <20 | 0.40 | 633 | 1264 | 1885 | 2503 | 3119 | 3734 | 63.26 |
| 35 | H | H | 68 | 20 | 0.40 | 645 | 1298 | 1985 | 2681 | 3387 | 4099 | 108.44 |
| 43 | L | L | 41 | <20 | 0.40 | 659 | 1317 | 1980 | 2639 | 3301 | 3965 | 64.93 |
| 43 | M | M | 52 | 20 | 0.40 | 816 | 1631 | 2431 | 3228 | 4023 | 4817 | 81.66 |
| 43 | H | H | 89 | 22 | 0.40 | 830 | 1673 | 2563 | 3460 | 4370 | 5289 | 140.24 |
| 51 | L | L | 49 | 14 | 0.40 | 808 | 1616 | 2427 | 3237 | 4051 | 4862 | 77.65 |
| 51 | M | M | 62 | 21 | 0.40 | 1001 | 1999 | 2981 | 3960 | 4934 | 5909 | 97.73 |
| 51 | H | H | 106 | 23 | 0.40 | 1017 | 2050 | 3138 | 4236 | 5353 | 6479 | 167.34 |
| 59 | L | L | 42 | 21 | 0.40 | 955 | 1909 | 2867 | 3824 | 4784 | 5745 | 65.93 |
| 59 | M | M | 71 | 22 | 0.40 | 1183 | 2362 | 3522 | 4680 | 5832 | 6983 | 112.12 |
| 59 | H | H | 108 | 26 | 0.40 | 1206 | 2428 | 3713 | 5013 | 6334 | 7667 | 171.36 |

**NOTES**

[1] The specified noise level is applicable to connection without damper or with fully open damper. In other cases where the airflow is demand-controlled with motor-driven dampers, the required data can be read from Swegon's ProSelect sizing program. Room attenuation = 10 dB

[2] NC = Normal Capacity version

[3] HC = High Capacity version

## Table 15 – Heating capacity, NC [2]/HC [3], 0.60 inWG

| Length of the unit | Nozzle settings | | Airflow | Noise level [1] | Nozzle pressure $p_i$ | Heating capacity, water (Btuh) for $\Delta T_{mv}$ (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 20 | 30 | 40 | 50 | 60 | $k_{pl}$ |
| 35 | L | L | 39 | <20 | 0.60 | 595 | 1186 | 1777 | 2365 | 2953 | 3541 | 50.20 |
| 35 | M | M | 49 | 25 | 0.60 | 717 | 1433 | 2127 | 2821 | 3507 | 4191 | 63.26 |
| 35 | H | H | 84 | 26 | 0.60 | 709 | 1425 | 2188 | 2959 | 3744 | 4538 | 108.44 |
| 43 | L | L | 50 | <20 | 0.60 | 766 | 1531 | 2294 | 3054 | 3812 | 4571 | 64.93 |
| 43 | M | M | 64 | 26 | 0.60 | 929 | 1849 | 2748 | 3642 | 4529 | 5414 | 81.66 |
| 43 | H | H | 108 | 27 | 0.60 | 914 | 1841 | 2824 | 3818 | 4831 | 5855 | 140.24 |
| 51 | L | L | 60 | 20 | 0.60 | 940 | 1876 | 2809 | 3741 | 4669 | 5596 | 77.65 |
| 51 | M | M | 76 | 27 | 0.60 | 1138 | 2269 | 3371 | 4466 | 5556 | 6642 | 97.73 |
| 51 | M | H | 103 | 28 | 0.60 | 1127 | 2260 | 3425 | 4599 | 5783 | 6973 | 132.54 |
| 59 | L | L | 51 | 25 | 0.60 | 1108 | 2217 | 3316 | 4416 | 5514 | 6610 | 65.93 |
| 59 | M | M | 87 | 27 | 0.60 | 1343 | 2680 | 3980 | 5275 | 6561 | 7842 | 112.12 |
| 59 | M | H | 110 | 29 | 0.60 | 1331 | 2674 | 4051 | 5435 | 6831 | 8236 | 141.91 |

## Table 16 – Heating capacity, NC [2]/HC [3], 0.80 inWG

| Length of the unit | Nozzle settings | | Airflow | Noise level [1] | Nozzle pressure $p_i$ | Heating capacity, water (Btuh) for $\Delta T_{mv}$ (°F) | | | | | | Pressure drop constant, air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | | cfm | dB(A) | inWG | 10 | 20 | 30 | 40 | 50 | 60 | $k_{pl}$ |
| 35 | L | L | 45 | 23 | 0.80 | 652 | 1302 | 1944 | 2587 | 3229 | 3867 | 50.20 |
| 35 | M | M | 56 | 29 | 0.80 | 781 | 1553 | 2303 | 3047 | 3786 | 4521 | 63.26 |
| 43 | L | L | 58 | 24 | 0.80 | 842 | 1681 | 2511 | 2159 | 2986 | 4989 | 64.93 |
| 43 | M | M | 73 | 30 | 0.80 | 1005 | 2006 | 2972 | 3932 | 4886 | 5833 | 81.66 |
| 51 | L | L | 70 | 25 | 0.80 | 1031 | 2061 | 3080 | 4096 | 5110 | 6120 | 77.65 |
| 51 | M | M | 88 | 31 | 0.80 | 1236 | 2459 | 3645 | 4822 | 5992 | 7155 | 97.73 |
| 59 | L | L | 59 | 29 | 0.80 | 1221 | 2439 | 3644 | 4845 | 6043 | 7239 | 65.93 |
| 59 | M | M | 100 | 32 | 0.80 | 1460 | 2908 | 4308 | 5702 | 7085 | 8459 | 112.12 |

**NOTES**

[1] The specified noise level is applicable to connection without damper or with fully open damper. In other cases where the airflow is demand-controlled with motor-driven dampers, the required data can be read from Swegon's ProSelect sizing program. Room attenuation = 10 dB

[2] NC = Normal Capacity version

[3] HC = High Capacity version

# Example

## Cooling

### Conditions

A hotel room having dimensions L × W × H = 12 × 10 × 9 ft is to be ventilated, cooled and heated by the PARAGON. The cooling demand is estimated to be 22 Btuh/sq.ft for an occupied room and normal load conditions.

In rare cases, the load conditions may be slightly higher and are then estimated to be 27 Btuh/sq.ft. The cooling demand is then a total of 22 x 12 x 10 = 2640 Btuh and 27 x 12 x 10 = 3240 Btuh respectively.

Under normal load conditions, the supply air flow should be 51 cfm and have a temperature of 59 °F. For higher load conditions, an increase in supply air flow up to a maximum of 63 cfm is permissible. The available duct pressure is kept constant at 0.65 inWG. The sound level must not exceed 25 dB(A) under normal circumstances and 30 dB(A) in the event of higher load conditions.

The design room temperature in the summer case is set to 75 °F. The inlet temperature of the cooling water is 57 °F and its outlet temperature on returning is 61 °F.

### Solution

The 59 °F supply air temperature and the 75 °F room temperature provide $\Delta T_l$ = 16 °F.

The temperature increase of the cooling water is 61 – 57 = 4 °F.

The mean temperature of the cooling water is:
(57 + 61) / 2 = 59 °F.
The 59 °F mean temperature of the cooling water and the 75 °F room temperature provide $\Delta T_{mk}$ = 16 °F.

Normal case

The cooling capacity of the supply air is calculated: $P_l$ = 1.07384 x 51 x 16 = 876 Btuh.
The residual cooling capacity demanded by the cooling water is:
2640 – 876 = 1764 Btuh.

In **Table 4**, we read that a PARAGON 43 with MM nozzle adjustment produces 2007 Btuh in cooling capacity for 51 cfm supply airflow, 0.40 inWG nozzle pressure and $\Delta T_{mk}$ = 16 °F. This is more than adequate to meet the cooling demand.

From **Diagram 1** we read 1764 Btuh capacity and an increase in cooling water temperature of 4 °F as well as a water flow of approx. 0.88 gpm. Using the water flow and pressure drop constant $k_{pk}$ which is taken from **Table 1**. The pressure drop across the coil will then be:
$\Delta P_k$ = (0.88 / 0.5536)2 = 2.5 ftWG.

Read from **Table 4**, the sound level is 20 dB(A), which meets the max. permissible level of 25 dB(A) required.

### High load

Under high load conditions, a motorized damper is opened to set boost level by the control equipment. A supply airflow of 63 cfm is obtained, if the nozzle pressure is 0.60 inWG, which is in conformity with the demand on maximal 63 cfm.

Calculate the cooling capacity of the supply air:
$P_l$ = 1.07384 x 60 x 16 = 1031 Btuh.
The residual cooling capacity demanded by the cooling water is:
2890 – 881 = 2009 Btuh.

In **Table 5**, we read that a PARAGON 43 with MM nozzle adjustment produces 2327 Btuh in cooling capacity for 63 cfm supply airflow, 0.60 inWG nozzle pressure and $\Delta T_{mk}$ = 16 °F. This is adequate to meet the higher cooling load.

From **Diagram 1** we read 2209 Btuh capacity and an increase in cooling water temperature of 4 °F as well as a water flow of approx. 1.10 gpm. Using the water flow and pressure drop constant $k_{pk}$ which is taken from **Table 1**. The pressure drop across the coil will then be:
$\Delta P_k$ = (1.10 / 0.5536)$^2$ = 3.95 ftWG.

The sound level as specified in **Table 5** and is 26 dB(A), which is clearly lower than the requirement of maximal permissible 30 dB(A) under max load conditions.

However note that the sound levels in the tables do not include the sound generated from the damper.

## Heating

### Conditions

The prerequisites are the same as in the example for cooling, with the exception that the design room temperature in the winter case is 72 °F and the supply air temperature is 64 °F.

The heating load is estimated to be 14.7 Btuh/sq.ft for an occupied room and normal load conditions. In rare cases, the load conditions may be slightly higher and are then estimated to be 19.8 Btuh/sq.ft. The heating demand is then a total of 14.7 x 11.3 × 10.7 = 1777 Btuh and 19.8 x 11.3 × 10.7 = 2394 Btuh respectively.

The inlet temperature of the heating water is 122 °F and the return temperature is 111 °F.

### Solution

The 64 °F supply air temperature is lower than the 72 °C design room temperature and then has a negative effect on the heating capacity:
1.07384 x 42 x (72 – 64) = 361 Btuh.

The heating demand for heating water then increases to 1777 + 363 = 2140 Btuh and 2394 + 363 = 2757 Btuh respectively.

The 117 °F mean temperature of the heating water and the 72 °F room temperature provide $\Delta T_{mv}$ = 117 – 72 = 45 °F.

In **Table 13**, we read that a PARAGON 43 with MM nozzle adjustment produces 3222 Btuh in heating capacity for 43.2 cfm supply airflow, 0.28 inWG nozzle pressure and $\Delta T_{mv}$ = 45 K.

This is enough to manage the heating demand when normal load (2096 Btuh). From **Table 14**, we read 48 Btuh for a supply airflow of 51.7 cfm, which meets the demand under high load conditions (2713 Btuh).

From **Diagram 3** we read a capacity of 3222 Btuh and a 11 °F decrease in heating water temperature as well as a water flow of approx. 0.602 gpm.

By means of the water flow and the pressure drop constant $k_{pv}$ which is taken from **Table 11**. The pressure drop can be calculated across the coil:
$\Delta p_v = (0.602 / 0.4549)^2 = 1.75$ ftWG.

The same calculation for the heating capacity during high load provides the pressure drop $\Delta p_v = (0.666 / 0.4549)^2 =$ 2.14 ftWG.

### ProSelect

Planning and sizing based on given design considerations can also be carried out in Swegon's ProSelect project design program.

ProSelect is available at Swegon's home page: www.swegon.com.

# Acoustics

## Natural attenuation

Natural attenuation is the total reduction in sound power from duct to room including the end reflection of the unit.

**Table 17. Natural attenuation with lining**

| Natural attenuation (dB) for mid frequency f (Hz) $\Delta L_w$ [dB] | | | | | | | |
|---|---|---|---|---|---|---|---|
| 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| 24 | 14 | 9 | 6 | 9 | 14 | 14 | 18 |

# Accessories

## Supply air kit – PARAGON T-SAK-VAV

A motor-driven damper is needed in applications where the user wants to apply demand control to the supply air by means of CONDUCTOR control equipment The damper causes a certain amount of flow-generated sound. Therefore a sound attenuator is also needed to guarantee a low sound level in the room.

As standard the connecion has an OD of 5 in.. There is also a connection with an OD of 4 in. available, which is suitable when the space is limited.

The following components are included in PARAGON T-SAK-VAV:

| | |
|---|---|
| Motor-driven damper | CRTc including Belimo CM24 |
| Sound attenuator | CLA rectangular sound attenuator with circular connection spigots |

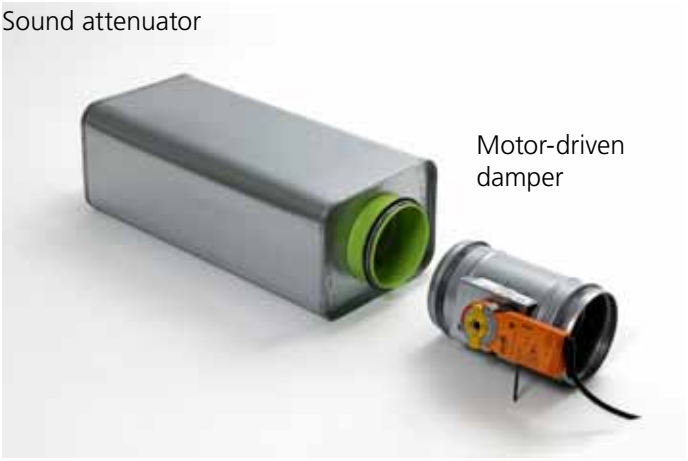



*Figure 13. PARAGON T-SAK-VAV*

## Supply air kit – PARAGON T-SAK-CAV

A commissioning damper is needed to ensure the correct airflow if a simpler regulation system with constant airflow has been selected. Commissioning dampers also generate a certain amount of sound. We therefore recommend the use of a sound attenuator for keeping the sound level at a minimum.

As standard the connecion has an OD of 5 in.. There is also a connection with an OD of 4 in. available, which is suitable when the space is limited.

The following components are included in PARAGON T-SAK-CAV:

| | |
|---|---|
| Commissioning damper | CRPc-9 commissioning damper with perforated damper blade and manually adjustable blade. |
| Sound attenuator | CLA rectangular sound attenuator with circular connection spigots |


*Figure 14. PARAGON T-SAK-CAV*

## Extract air kit – PARAGON T-EAK-VAV

If the supply air is demand-controlled, the extract air also needs to be feed-back controlled. An extract air kit is needed for balancing the supply air and the extract air. Precisely like the supply air kit, this kit consists of a motor-driven damper and a sound attenuator. In addition an extract air register and two alternative mounting frames are included: one with a nipple and one with a joint.

| | |
|---|---|
| Motor-driven damper | CRTc including Belimo CM24 |
| Sound attenuator | CLA rectangular sound attenuator with circular connection spigots |
| Extract air register | EXCa and accompanying mounting frames: one with circular connection spigot and one with circular connection sleeve. |


*Figure 15. Extract air kit, PARAGON T-EAK-VAV*

## Extract air kit – PARAGON T-EAK-CAV

A commissioning damper is needed in systems with constant airflows in order to balance the extract airflow with the supply airflow.

Therefore a kit designed for constant airflows is available for simpler systems. This kit contains commissioning damper, sound attenuator, extract air register and mounting frames.

| | |
|---|---|
| Commissioning damper | CRPc-9 commissioning damper with perforated damper blade and manually adjustable blade. |
| Sound attenuator | CLA rectangular sound attenuator with circular connection spigots |
| Extract air register | EXCa and accompanying mounting frames: one with a nipple and one with a joint. |


*Figure 16. Extract air kit - PARAGON T-EAK-CAV*

## SYST MS M6 suspension kit

In the applications in which the PARAGON is not mounted in direct contact with the ceiling, there is a suspension kit available in order to simplify hanging it at the level desired.

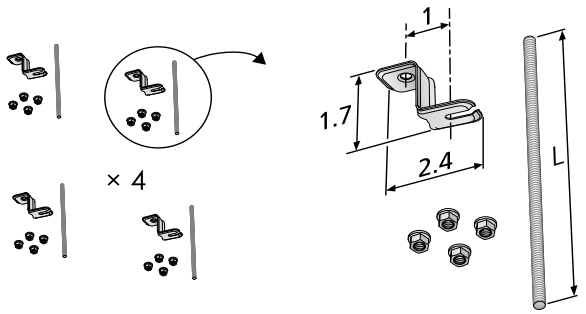



*Figure 17. Suspension kit, SYST MS M6 (L = according to ordering key)*

# Installation

## Assembly

The PARAGON is delivered with two mounting brackets designed for installation tight against the ceiling. By loosening the mounting brackets from the unit, they can be easily fastened to the ceiling beams with approximate distance to the desired final position of the outlet grille. Then lift the PARAGON unit and push it into the mounting brackets. When you have precision-adjusted the unit to the correct position, lock the mounting brackets to totally secure the unit is fixed position. The next step is to connect the air duct, cooling pipes and heating pipes.

## Water connections

All water pipes (supply/return – cooling/heating) are delivered as stub copper pipes with OD 0.5 in. x length 0.04 in..

*NOTE! Support sleeves must be used if compression ring couplings are fitted. It is important use a pipe wrench to adequately restrain the pipe connections when tightening external connections to prevent damage to the connection pipes.*

## Air connection

A 5 in. air duct including gasket is connected directly to a circular connection spigot.

If the supply air kit is included in the installation, connect the parts in the following order, viewed from the PARAGON:

1. Comfort module PARAGON
2. Air duct
3. Sound attenuator CLA
4. Air duct
5. CRT damper

Note that the supply and extract air kit is also available with an OD of 4 in.. This kit is suitable for use if the space is limited and low airflows are discharged into the room.

## Finishing

The work of building the soffit around the terminal can begin when the PARAGON has been completely installed. PARAGON is adapted so that load-bearing T-bar systems in combination with mineral wool slabs or the like could be used to build the soffit. Plasterboard also works well. To make your work simpler, detailed dimensions for cutting the opening are specified below the "Dimensions" section on page 21 in this brochure. More detailed information is also available in separate installation instructions at www.swegon.com.

## Maintenance

Since the PARAGON operates without any built-in fan, without filter and without a drainage system, very little maintenance is required. In a hotel room or a hospital room, it is normally sufficient to vacuum clean the back side of the coil every six months to remove loose dust. A simple visual inspection of connections and wiping the supply air grille and return air grille with a damp cloth is also recommended. Avoid aggressive cleaning agents which may harm painted surfaces. Normally a mild soap or alcohol solution is fully adequate for cleaning. Note that the dry operation without condensation minimises the risk of bacteria growth that otherwise is occurs in wet systems.

The requirement for maintenance is yet lower in an office room, since this type of environment is normally much more dust-free, and this allows longer intervals between scheduled maintenance. It is normally enough to clean the coil in an office room once every second year.

# Dimensions and Weights

**Table 18 - Weight**

| NC | RYY Dry | RYN Dry | RNY Dry | RNN Dry | Water volume gallons | |
|---|---|---|---|---|---|---|
| L | lb | lb | lb | lb | Cooling | Heating |
| 35 | 49.4 | 46.5 | 45.4 | 42.5 | 0.18 | 0.05 |
| 43 | 57.3 | 53.8 | 52.5 | 48.9 | 0.21 | 0.08 |
| 51 | 65.5 | 61.3 | 59.7 | 55.6 | 0.24 | 0.09 |
| 59 | 73.4 | 68.6 | 66.8 | 61.9 | 0.29 | 0.11 |
| HC L | RYY Dry | RYN Dry | RNY Dry | RNN Dry | Water volume gallons | |
| L | lb | lb | lb | lb | Cooling | Heating |
| 35 | 50.7 | 47.8 | 46.7 | 43.9 | 0.26 | 0.05 |
| 43 | 59.5 | 56.0 | 62.6 | 51.1 | 0.32 | 0.08 |
| 51 | 68.3 | 64.2 | 62.6 | 58.4 | 0.36 | 0.08 |
| 59 | 77.2 | 72.3 | 70.5 | 65.7 | 0.42 | 0.11 |

NOTE! The abbreviations in the table are explained in the Order nomenclature.

**Table 19 - Dimensions**

| PARAGON | L | A | B | L/2 |
|---|---|---|---|---|
| 35 | 35.4 | 30.9 | 29.5 | 17.7 |
| 43 | 43.3 | 38.8 | 37.4 | 21.7 |
| 51 | 51.2 | 46.7 | 45.3 | 25.6 |
| 59 | 59.1 | 54.5 | 53.1 | 29.5 |

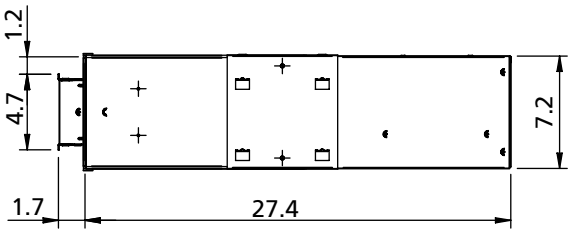



*Figure 18. Side view excl. grille*

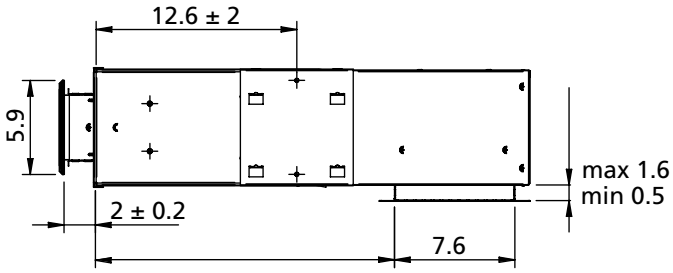



*Figure 19. Side view incl. grille*

## Connection on the right hand side – R

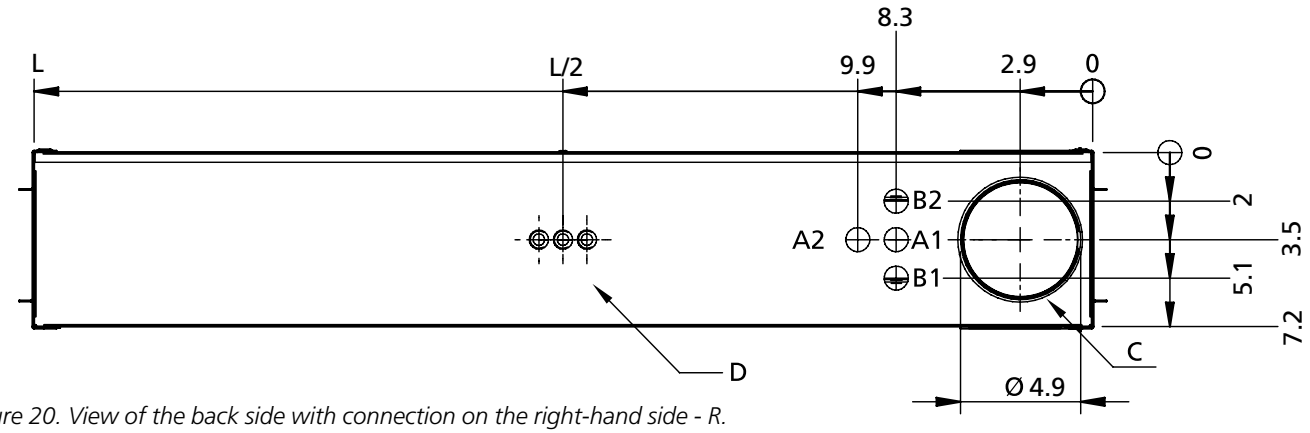



*Figure 20. View of the back side with connection on the right-hand side - R.*

*A1 = Chilled water supply*
*B1 = Hot water supply*
*A2 = Chilled water return*
*B2 = Hot water return*
*C = Supply air*
*D = Cable grommets*

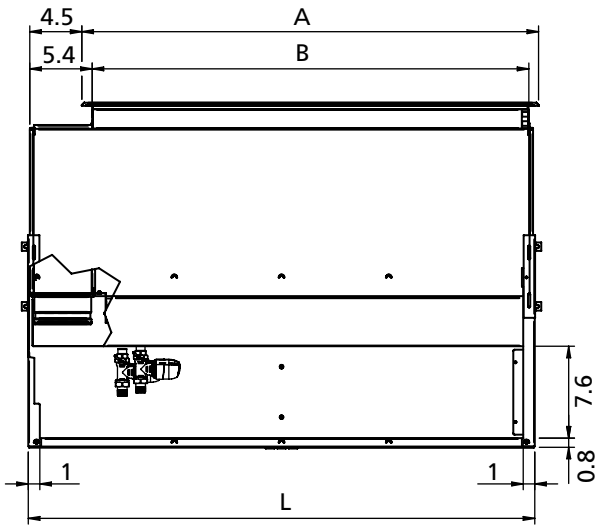



*Figure 21. Bottom view*

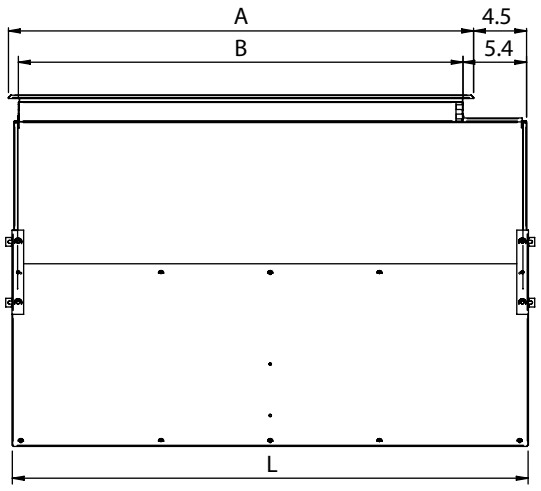



*Figure 22. Top view*

## Connection on the left hand side -L

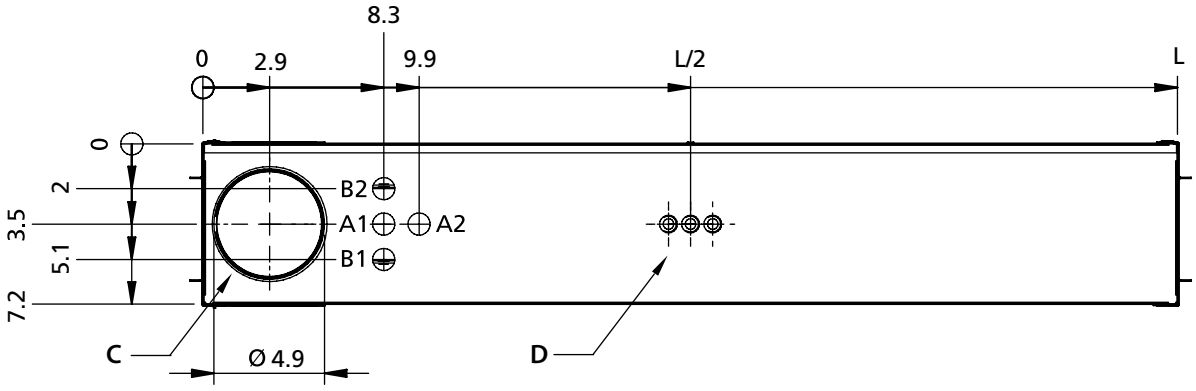



*Figure 23. View of the backside, L – left-hand version*

*A1 = Cooling water, inlet pipe*
*B1 = Heating water, inlet water*
*A2 = Cooling water, return*
*B2 = Heating water, return*
*C = Supply air*
*D = Cable grommets*

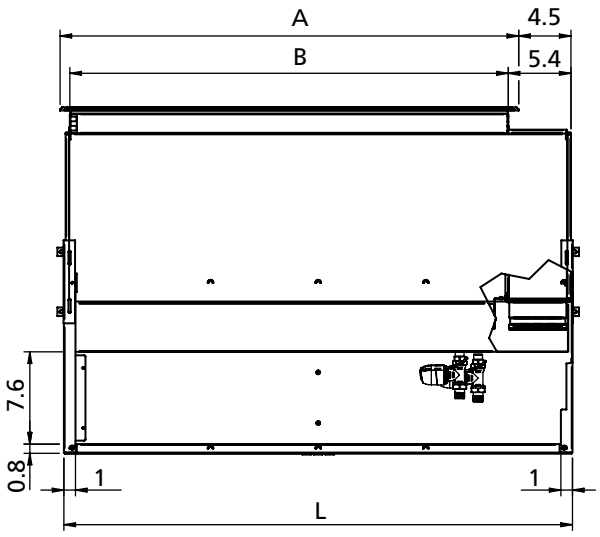



*Figure 24. Bottom view*

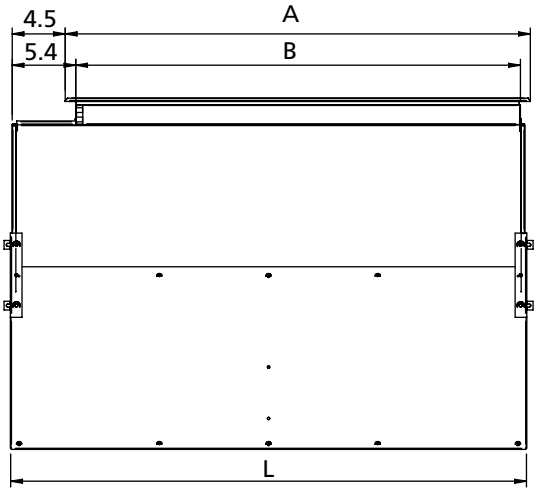



*Figure 25. Top view.*

## Dimensions, accessories

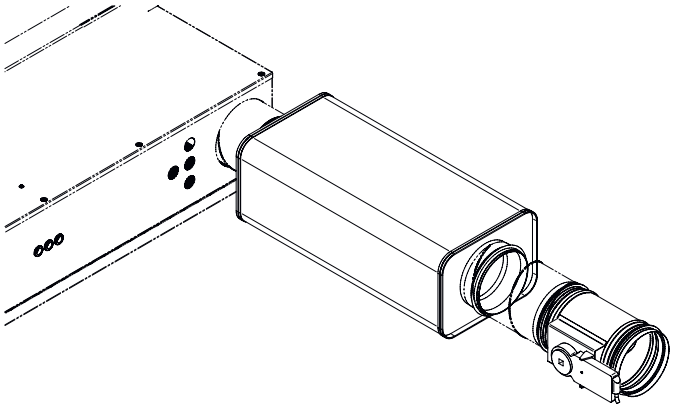


*Figure 26. Supply air kit, PARAGON T-SAK-VAV*

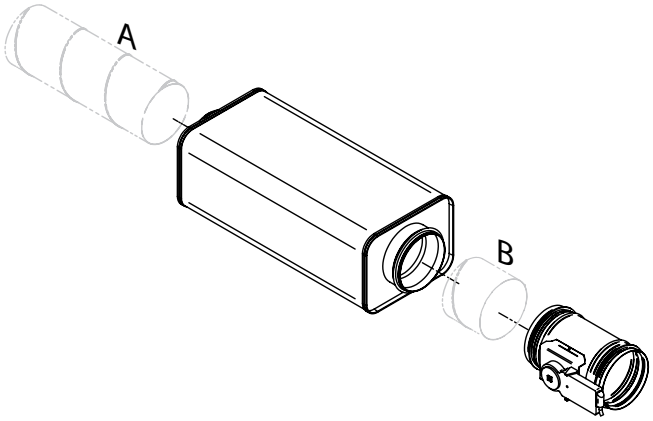



*Figure 27. Supply air kit, PARAGON T-SAK-VAV-5*

*Spiral ducts are not included.*
*Spiral duct A: Min. length: 13.0 in.*
*Spiral duct B: Min. length: 2.8 in.*

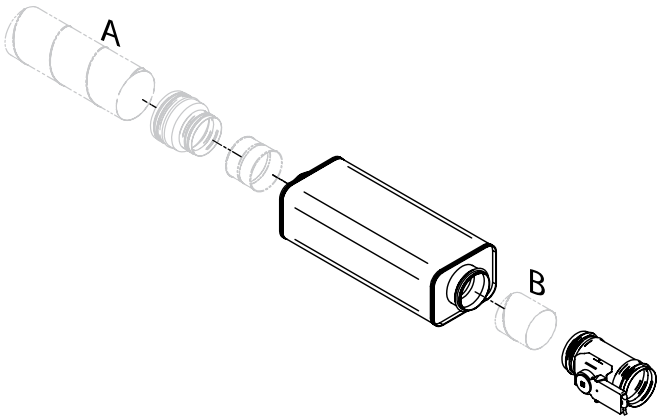



*Figure 28. Supply air kit, PARAGON T-SAK-VAV-4*

*Size 4 spiral ducts and sleeve are not included.*
*Spiral duct A: Min. length: 13.0 in.*
*Spiral duct B: Min. length: 2.8 in.*

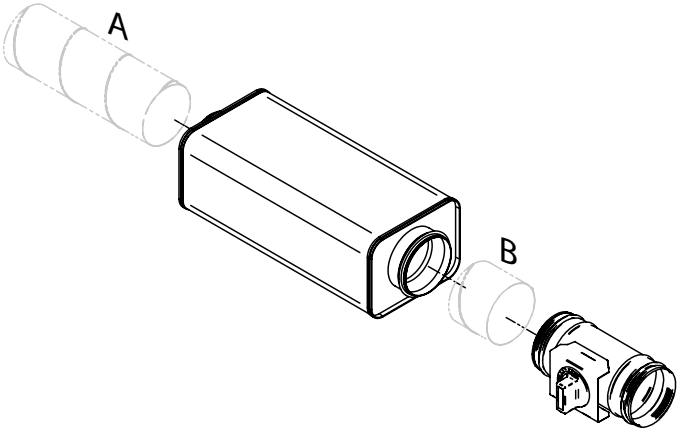



*Figure 29. Supply air kit, PARAGON T-SAK-CAV-5*

*Spiral ducts are not included.*
*Spiral duct A: Min. length: 13.0 in.*
*Spiral duct B: Min. length: 2.8 in.*

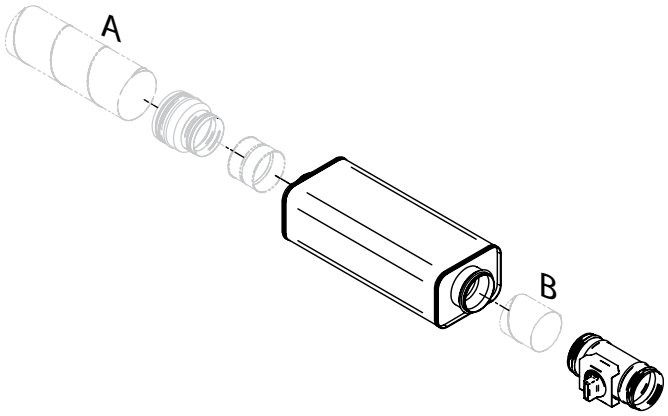



*Figure 30. Supply air kit, PARAGON T-SAK-CAV-4*

*Size 4 spiral ducts and sleeve are not included.*
*Spiral duct A: Min. length: 13.0 in.*
*Spiral duct B: Min. length: 2.8 in.*

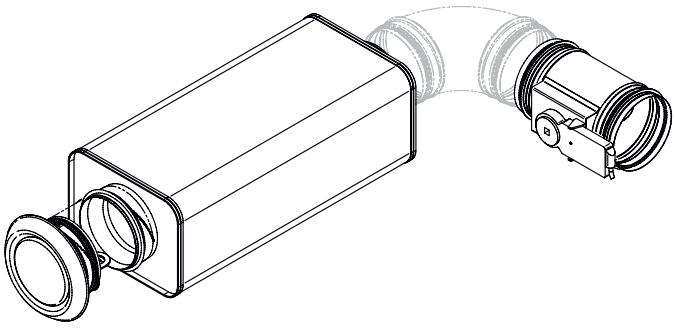


*Figure 31. Extract air kit, PARAGON T-EAK*

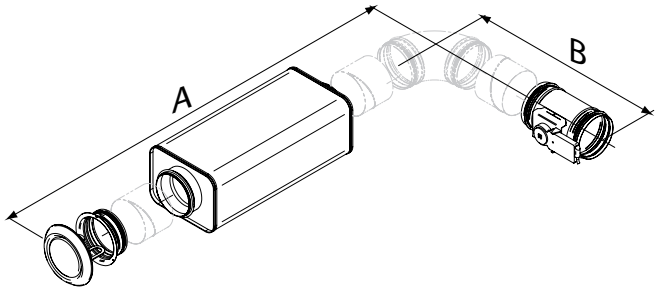



*Figure 32. Extract air kit, PARAGON T-EAK-VAV*

*Available for connection sizes 5 in. and 4 in.*
*Spiral ducts and jointing sleeve are not included*
*A: Min. length: 30.3 in.*
*B: Min. length: 14.2 in.*

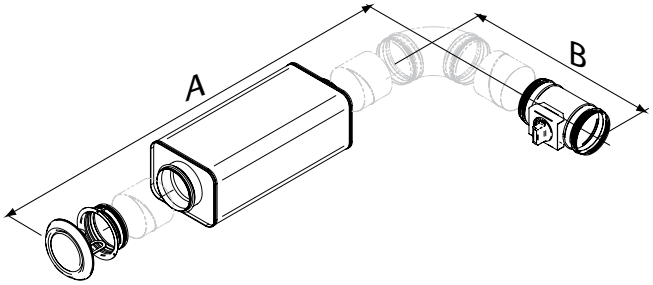



*Figure 33. Extract air kit, PARAGON T-EAK-CAV*

*Available for connection sizes 5 in. and 4 in.*
*Spiral ducts and jointing sleeve are not included*
*A: Min. length: 30.3 in.*
*B: Min. length: 14.2 in.*

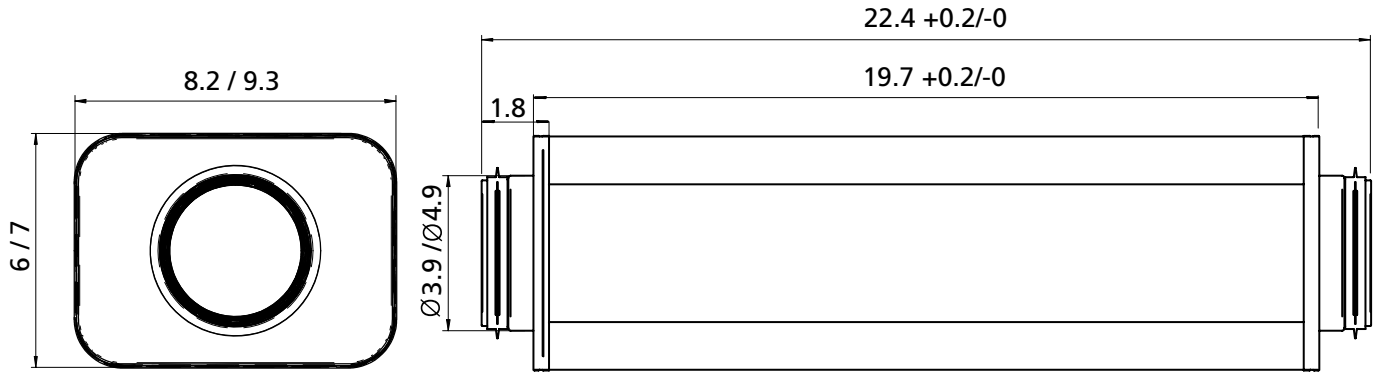



*Figure 34. Dimensions CLA sound attenuator. Included in PARAGON T-SAK and PARAGON T-EAK.*

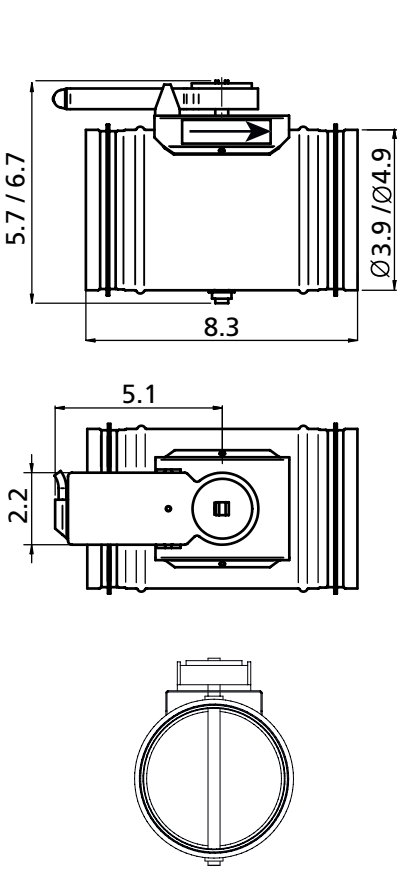



*Figure 35. Dimensions CRT motor-driven damper. Included in PARAGON T-SAK-VAV and PARAGON T-EAK-VAV.*

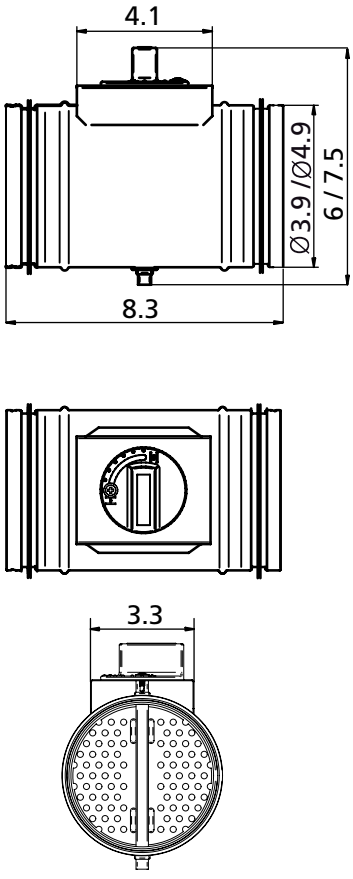



*Figure 36. Dimensions CRP commissioning damper. Included in PARAGON T-SAK-CAV and PARAGON T-EAK-CAV.*

# Ordering key

## Specification

Type PARAGON comfort module for cooling, heating and ventilation.

### Delivery demarcation

Swegon's limits of supply are at the connection points for water and air.

At these connection points, the plumbing contractor connects to plain pipe end and/or suitable connectors, fills the system, bleeds it and tests the pressure in the circuits.

The ventilation contractor connects to the duct connections with dimensions as specified on the basic size drawing in the section "Dimensions".

The building contractor cuts the openings in the corridor wall for the supply air duct, in the interior wall and suspended ceiling for the supply air and extract air grilles and in the bathroom ceiling for the extract air duct.

### The PARAGON ordering key

| **PARAGON** | a- | bbbb- | cc- | d- | e- | f- | gh |
|---|---|---|---|---|---|---|---|
| Version: | | | | | | | |
| Length (in.)<br>35, 43, 51 and 59 | | | | | | | |
| Capacity variant<br>NC – Normal version<br>HC – High capacity version | | | | | | | |
| Connection side<br>R - Right<br>L - Left | | | | | | | |
| Supply air grille<br>Y - Yes<br>N - No | | | | | | | |
| Recirculation air grille<br>Y - Yes<br>N - No | | | | | | | |
| Flow variant<br>Upper nozzle row:<br>L, M, H<br>Lower nozzle row:<br>L, M, H | | | | | | | |

**Example:**

PARAGON a-43-NC-R-Y-N-LM

## Available to order, kit and accessories

| | |
|---|---|
| Supply air kit | VAV: PARAGON CRTc motor-driven damper with tight damper blade with damper actuator and CLA sound attenuator |
| | CAV: PARAGON CRPc manually adjustable damper with perforated damper blade with damper actuator and CLA sound attenuator |
| Extract air kit | VAV: PARAGON CRTc motor-driven damper with tight damper blade with damper actuator, CLA sound attenuator and extract air register with mounting frame. |
| | CAV: PARAGON CRPc manually adjustable damper with perforated damper blade with damper actuator, CLA sound attenuator and extract air register with mounting frame. |
| Asssembly piece | Ceiling mounting bracket and threaded rod for mounting in ceiling. Double threaded rods with thread lock are also available. |

## Factory-fitted accessory kit

| | | | | |
|---|---|---|---|---|
| Supply air kit | PARAGON | a- | T-SAK-VAV- | bbb |
| Version: | | | | |
| Kit with motor-driven damper | | | | |
| OD 4 in.; OD 5 in. | | | | |

| | | | | |
|---|---|---|---|---|
| Supply air kit | PARAGON | a- | T-SAK-CAV- | bbb |
| Version: | | | | |
| Kit with manually adjustable damper | | | | |
| OD 4 in.; OD 5 in. | | | | |

| | | | | |
|---|---|---|---|---|
| Extract air kit | PARAGON | a- | T-EAK-VAV- | bbb |
| Version: | | | | |
| Kit with motor-driven damper | | | | |
| OD 4 in.; OD 5 in. | | | | |

| | | | | |
|---|---|---|---|---|
| Extract air kit | PARAGON | a- | T-EAK-CAV- | bbb |
| Version: | | | | |
| Kit with manually adjustable damper | | | | |
| OD 4 in.; OD 5 in. | | | | |

## Ordering Key, Accessories

| | | | |
|---|---|---|---|
| Assembly piece | SYST MS M6- | aaaa- | b |
| Length of threaded rod (in.):<br>7.9; 19.7; 39.4 | | | |
| Type:<br>1=One threaded rod<br>2=Two threaded rods and a thread lock | | | |