PARASOL EX

Suspended comfort modules

QUICK FACTS

- 4-way air distribution, where each side has readjustable airflow rate and adjustable direction of air discharge for maximum comfort.
- High capacity – occupies little ceiling surface
- Easily readjustable nozzles in combination with Swegon's ADC (Anti Draught Control) offer maximum flexibility both today and for future needs.
- Supply air, cooling and heating

Sizes (mm)					
PARASOL 690			PARASOL 1290		
Length	Width	Hight	Längd	Bredd	Hight
690	690	230	1290	690	230

Primary airflow:	Up to 55 l/s
Pressure range:	50 to 150 Pa
Total cooling capacity:	Up to 1930 W
Heating capacity: Water:	Up to 2450 W

Swegon

Contents

Technical description 3
Parasol EX Comfort modules 3
Supply air module 5
Nozzle adjustment 5
ADC^{II} 6
Room control 8
Installation and suspension 10
Technical data 11
Recommended limit values 11
Cooling 12
Nozzle setting 16
Heating 19
Acoustics 24
Dimensions 25
Ordering key 27
Contractor demarcation 27
Ordering key, Parasol EX 690 27
Ordering key, Parasol EX 1290 27
Available to order, Accessories 28
Ordering Key, Accessories 28
Specification text 29

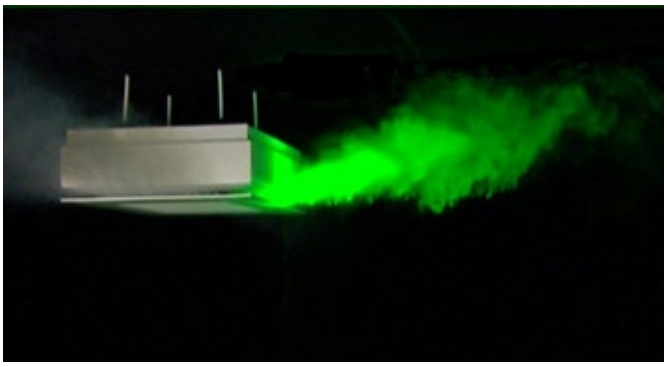
Technical description

Parasol EX Comfort modules

Parasol EX is the name of the product family of comfort modules for suspended installation. The modules are designed to supplement one another and provide optimal room comfort.

Modules & Installation

Modules:	Supply air
	Supply air and cooling
	Supply air, cooling and heating
Installation:	Suspended
	Ceiling surface mounted



Function

4-way air distribution in combination with Swegon ADC^{II} (Anti Draught Control), creates a maximized mixing zone and minimizes the risk of draught issues. The Parasol EX is designed for distributing air slightly upward. This gives the chilled air more space to mix with the room air before it reaches the occupied zone.

Flexibility

The easily adjustable nozzles in combination with Swegon ADC^{II} offer maximal flexibility if changes in the room layout become necessary. All the sides can be set independently of one another so that the comfort module can distribute more or less air and simultaneously discharge air in whatever direction desired in the room.

Design

By styling straight lines and sharp edges, Swegon architects have created a timeless design that fits in well in most room decor together with other installations in the room.

Draught-free indoor climate

Utilizing four directions for discharging chilled air into the room also maximizes the size of the mixing zone. In practice, this effectively mixes the chilled primary air with the room air before the air reaches the occupied zone. When the mixed air reaches the occupied zone, it has attained a temperature that reduces the risk of draught. The special design of the outlet discharges the distributed air slightly upward, which to a great extent contributes towards both reducing air velocity in the occupied zone and ensuring that the chilled air is mixed with room air before it reaches the occupied zone. This upward discharge provides a distribution that is not dependent on nearby surfaces to create a coanda effect. In a simple operation, the ADCII, included as standard, enables you to move the deflector groups to direct the airflow in whatever direction you desire.

Variants

The Parasol is available in three basic variants:

Variant A:	Ventilation and water-based cooling from a coil
Variant B:	Ventilation, water-based cooling and heating from a coil
Variant C:	Ventilation

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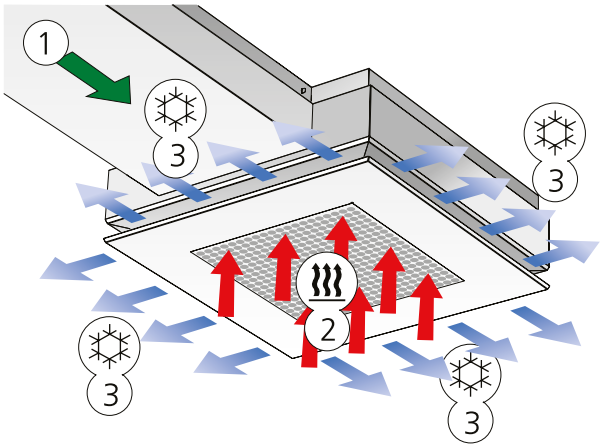


Figure 2. Variant A: Cooling function

1 = Primary air

2 = Induced room air

3 = Primary air mixed with cooled room air

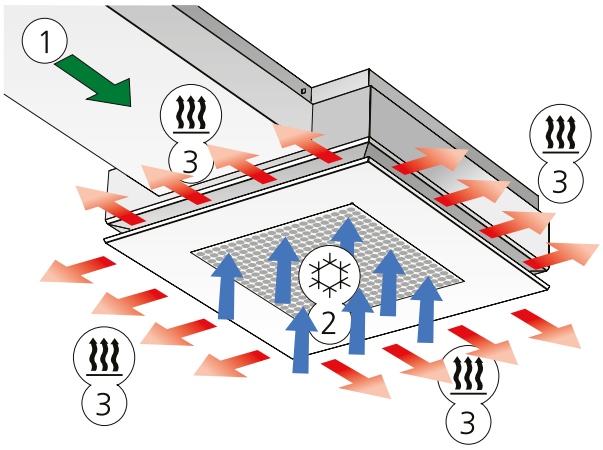


Figure 3. Variant B: Heating function (also includes cooling function)

1 = Primary air

2 = Induced room air

3 = Primary air mixed with heated room air

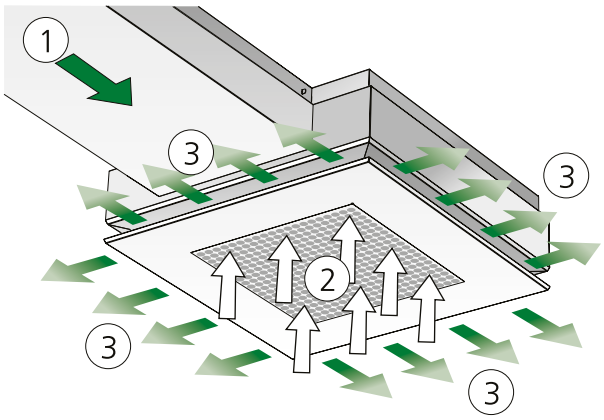


Figure 4. Variant C: Supply air function

1 = Primary air

2 = Induced room air

3 = Primary air mixed with room air

Supply air module

A comfort module for supply air only is available (variant C – without coil) to supplement certain types of rooms where the occupants need a great quantity of air, but only a smaller amount of water-based cooling energy. This applies, for instance, to certain conference rooms or the inner zones in large rooms. To avoid over-sizing, it is common to combine units with cooling function and units with supply air function only. Since the supply air variant is also designed according to the induction principle, it is possible to discharge supply air substantially below room temperature and yet not need to think about possible reheating, which may be required in combined systems with chilled beams and air diffusers. The rate of induction varies depending on pressure and flow conditions but lies generally in the range of 3-5 which means that if you add 30 l/s, 3 to 5 times as much warm room air (90–150 l/s) will be induced. The mixed air then has a substantially higher temperature than the temperature of the supply air, which reduces the risk of draught in the occupied zone.

Another advantage of the supply air module is, that it operates with the same duct pressure as the modules with coil. In other words, there is no need to throttle the pressure in any duct branch more than necessary. Instead of incorporating a coil into the supply air module, the module has an induction control with punched nozzles that is designed to provide the same rate of induction as the units with coil. This makes it possible to use Swegon ProSelect the dimensioning program for sizing throw lengths, even for supply air modules. If shorter throw lengths than standard are desirable, certain openings can be plugged to reduce the free area in the induction control, to reduce the percentage of induced room air. The capacity of the primary air is never affected by an increase or decrease in the rate of induction.

High capacity

The high performance and small overall dimensions of the Parasol EX units make them ideal for replacing awkwardly large products, without sacrificing comfort.

Nozzle adjustment

Simple to adjust

Built-in nozzle control makes the Parasol EX very flexible. The product can easily be adapted to current requirements by increasing or decreasing the airflow. A large room can be converted into separate office rooms without influencing the room climate. A partition wall can be installed in close proximity to any of the product's sides. The only measure required for preventing possible draught is to optimize the portion of air distributed from each side of the comfort module. The end result is a system that will provide excellent performance throughout its functional life.

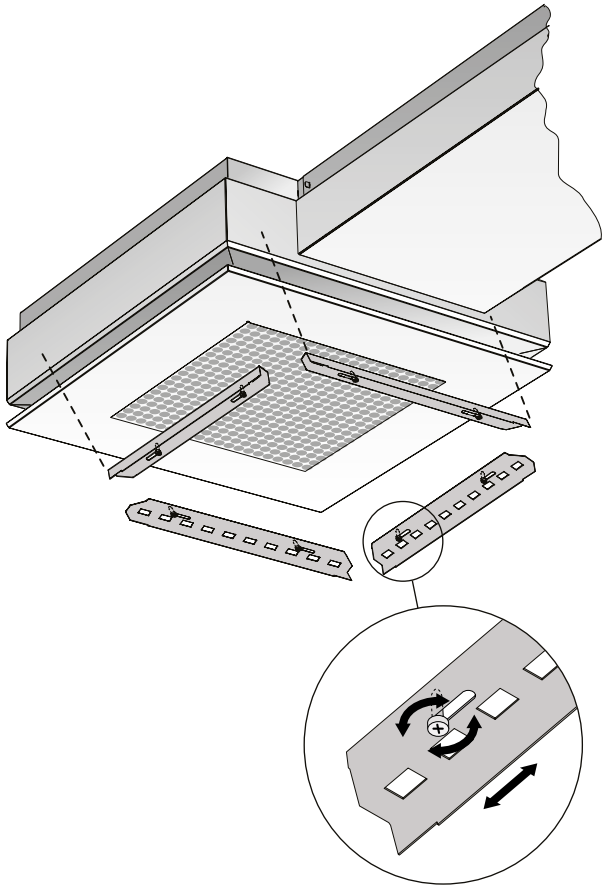


Figure 5. Nozzle adjustment

ADC[II]

All the comfort modules contain ADC[II] as standard. ADC stands for Anti Draught Control, which enables you to set the diffusion pattern of the air being distributed to avoid risk of draught. A number of ADC[II] sections with four air deflectors per section are arranged on each side of the unit. Each section is adjustable from a straight setting to 40° air deflection to the right or left in increments of 10° (see Figure 6). This provides great flexibility and can be easily adjusted without at all having to affect the system as a whole.

The sound level and the static pressure are not at all affected by the ADC[II]. The water capacity is reduced by 5 - 10% if the ADC[II] is adjusted to "fan-shape".

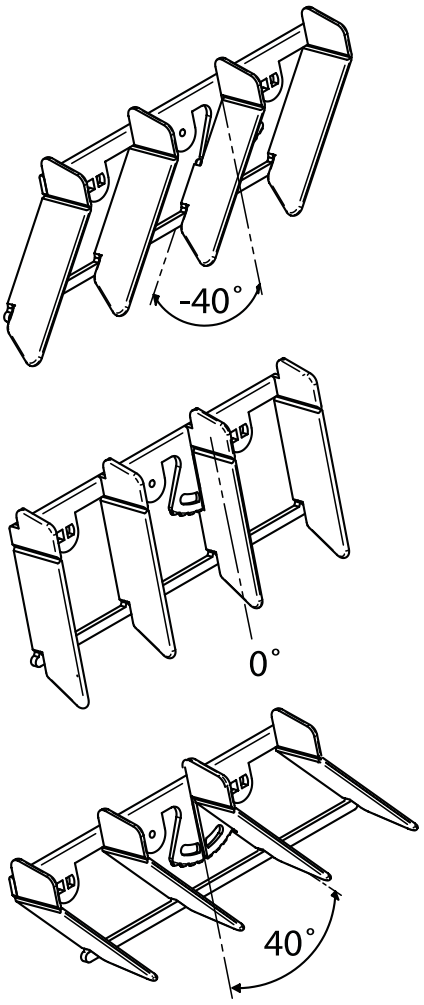


Figure 6. ADC[II], setting range from -40° to +40° in increments of 10°

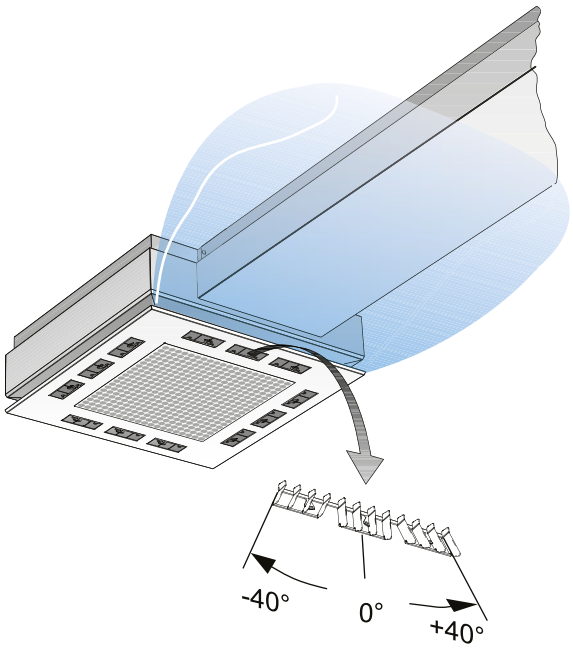


Figure 7. Possible settings for the ADC[II], Fan shape

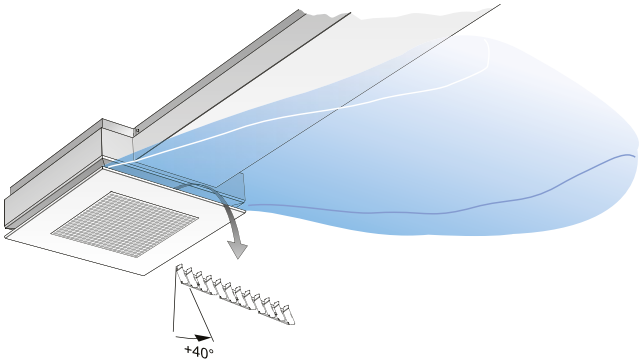


Figure 8. Possible settings for the ADC[II], X-shape

Range of Applications

The Parasol EX is ideal for use as a standard application in such premises as:

- Offices
- Conference rooms
- Hotels
- Restaurants
- Hospitals
- Shops
- Shopping centres

Location

Since each side of the Parasol EX is individually adjustable to provide the appropriate airflow, the comfort modules can be positioned anywhere in the room. Whether they are located at the front edge, centre, rear edge or symmetrically in the room is of no importance. In rear edge solutions for separate office rooms, for instance, the unit can be installed directly against the corridor wall. The only operation that needs to be done is to reduce the volume of air distributed towards the corridor wall and to open on the three other sides more (see Figure 9). This is of benefit in comparison with other rear-edge solutions, because you can make use of the partition walls to increase the air mixing zone. This provides low air velocities and a healthy room climate.

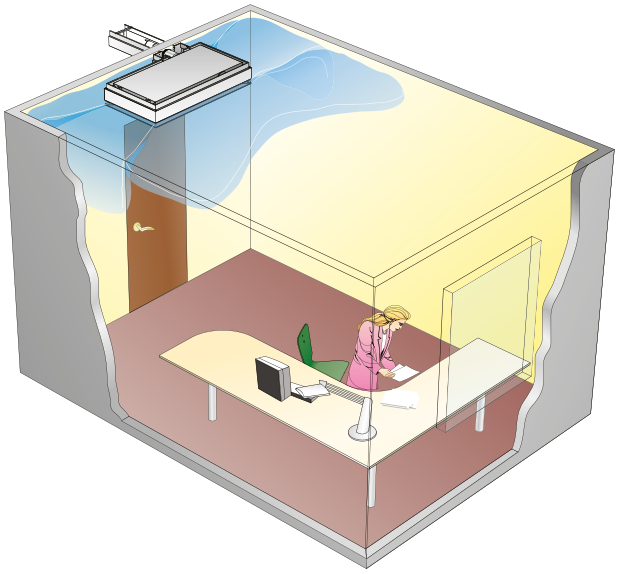


Figure 9. Parasol EX as a rear edge solution

Optional perforation patterns

The face of the unit is available with three different perforation patterns, so that it can be adapted to suit different kinds of ceiling components, e.g. light fittings and exhaust grilles. This avoids the clutter effect of mismatched components. Other patterns are of course available, on special order. For further details, get in touch with your nearest Swegon representative.

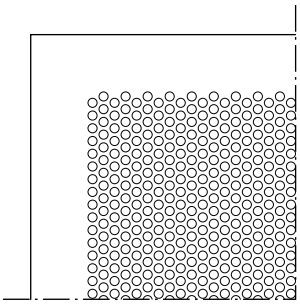


Figure 10. Standard face plate

Circular holes arranged in triangular pattern.

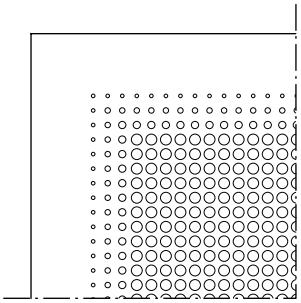


Figure 11. PD face plate

Circular holes arranged in a square pattern with a graduated border

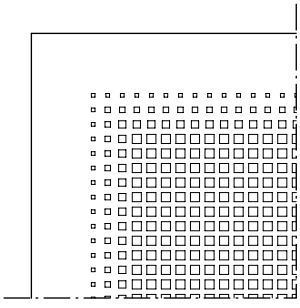


Figure 12. PE face plate

Square holes arranged in a square pattern with a graduated border.

Room control

Reliable, well-performing control equipment is required for maintaining uniform room temperature and ensuring a healthy room climate. Swegon LUNA room control equipment is designed to minimize temperature fluctuations in the room, by continuously modulating the pulse width of signals transmitted to the actuator. This function makes it possible to use a thermal actuator to quickly compensate possible sudden increases or decreases in heating loads in the room. The digital processor is easy to reconfigure and this offers great flexibility. The operations in a premises are likely to change over time. For example an open plan office can be split into small office rooms. In this case the settings in the controller can easily be changed to suit the new situation.

More detailed information about the room control equipment is available in a separate product datasheet on our website: www.swegon.com.

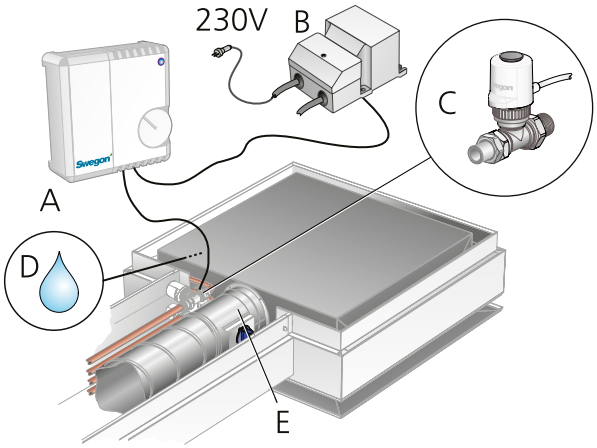


Figure 14. Installation with all components in the room

LUNA components for installation with Parasol EX

Valve kit:	SYST RK
Room controller:	LUNA RE-S
Transformer:	SYST TS-1

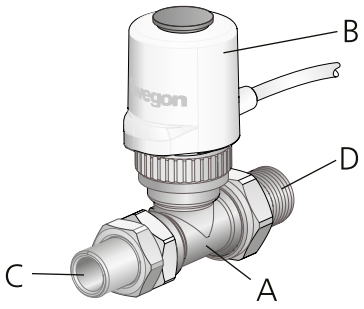


Figure 13. SYST RK

A = Valve

B = Actuator

C = Push-on ∅12mm

D = R male threads: ½'' B to ISO 7/1

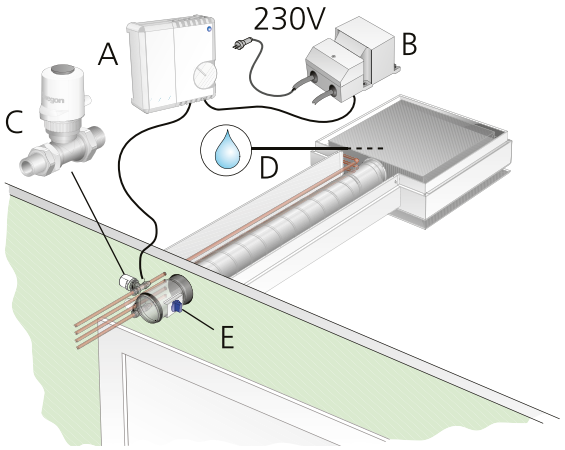


Figure 15. Installation with valve, actuator and damper in corridor

A = Room controller

B = Transformer

C = Valve kit with actuator

D = Condensation guard *

E = Damper, CRP 9-125

** Contact personnel at the factory*

To adjust the valve

On delivery, the valves are fully open (position N, k_v=0.89). Set the desired kv value when commissioning. The flow rate can be set by adjusting the valve cone setting. This is easily done using the protective housing (supplied with the unit) with a k_v scale having marks of different length (see Table 1). The lifting height is always the same regardless of setting.

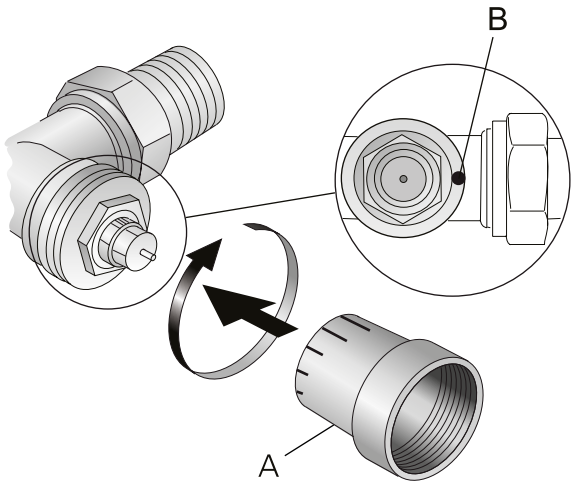


Figure 16. To adjust the k_v value.

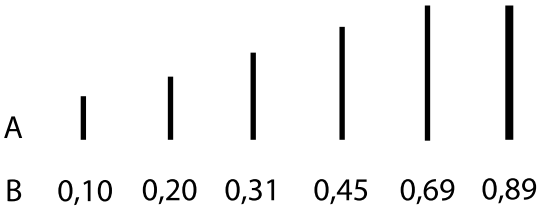
A = Protective housing, rotatable through 180°

B = Marking on the outlet side of the valve

Commissioning

1. Fit the protective housing A over the valve.
2. Turn the protective housing until the desired reference mark is centred with mark B on the valve.

Table 1. k_v value (m³/h) for different settings



A = Reference Mark

B = k_v value

Valve maintenance

The valves do not normally require any maintenance at all. If anything should damage the stuffing box, it can be replaced even while the system is under pressure. A special tool is required for this.

Technical Data, Valve

Funktionsdata

PN Class	PN 10
Permissible media:	Chilled and hot water with anti-freeze agent Recommendation: Water treatment according to VDI 2035
Media temperature:	1…120°C
Permissible operating pressure:	1000 kPa (10 bar)
Closing pressure:	60 kPa (0.6 bar)
Pressure drop for fully open valve (Δp_{v100}):	Recommended range: 5 … 20 kPa (0.05 … 0.2 bar)
Lifting height:	2 mm

Material

Valve body:	Brass, dull nickel plated
Connection nipple:	Brass, dull nickel plated
Protective housing:	Polypropylene
O-ring:	EPDM

Connection

R male threads:	½¨B to ISO 7/1

Inlet/Outlet

Rp female threads:	½" to ISO 7/1

Installation and suspension

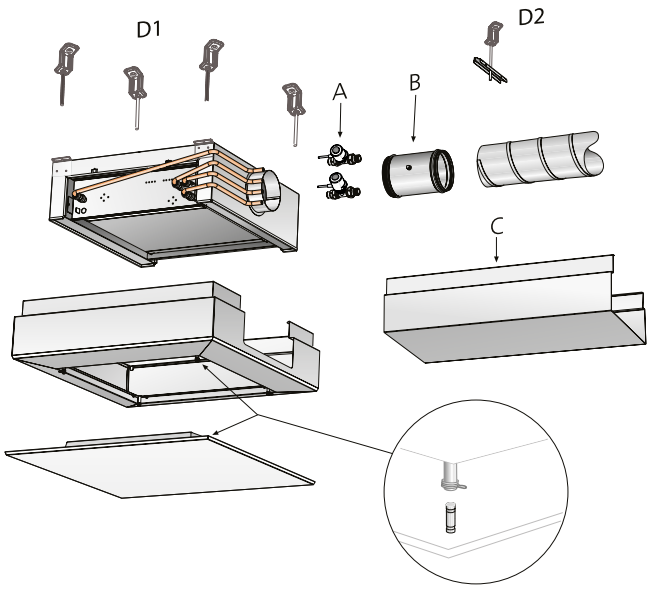


Figure 17. Diagrammatic sketch for suspending the Parasol EX and housing

A = Valve kit

B = Damper

C = Commissioning box

D1 = Assembly piece (see Figure 18)

D2 = SYST MS assembly piece for connection casing. One kit is sufficient for two connection casings.

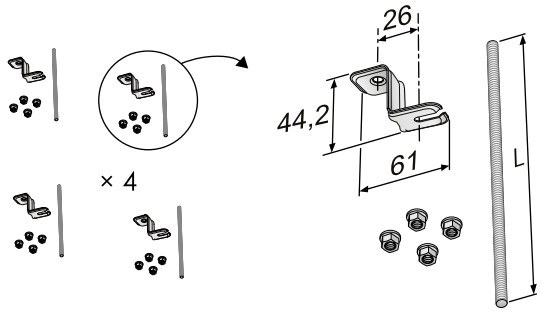


Figure 18. Assembly piece SYST MS M8-1, ceiling mount and threaded rod.

Connection dimensions

Water - cooling, plain pipe end (Cu)	Ø 12 x 1,0 mm
Water - heating, plain pipe end (Cu)	Ø 12 x 1,0 mm
Air, connecting piece	Ø 125 mm

To connect the air

The Parasol EX is supplied with the connecting piece on the same side as the water connections.

There is a cover on the opposite side, which on the Parasol EX can only be used as a cleaning door. The pipe kit and enclosures will not fit if you use the cleaning door as an air connection.

To connect the water

Connect the water pipes using push-on couplings, clamping ring couplings or sleeve nut. Note that clamp ring couplings require support sleeves inside the pipes.

Do not use a solder coupling to connect the water pipes. High temperatures can damage the unit's existing solders.

Flexible connection hoses for water may be ordered separately.

Condensation-free cooling

Since the comfort modules have to be dimensioned to operate without condensation, no drainage system is required.

Technical data

Cooling capacity, max.	1930 W
Heating capacity, water, max.	2450 W
Airflow:	
Parasol EX 690	7-34 l/s
Parasol EX 1290	9-55 l/s
Length:	
Parasol EX 690	690 mm
Parasol EX 1290	1290 mm
Width:	690 mm
Height:	230 mm

Dimensions of the units have a tolerance of (±2) mm.

Table 2. Weight

Size (mm)	Functional variant	Dry weight (kg)	Filled with water (kg)
690	A	19,6	20,8
690	B	19,7	21,2
690	C	16,9	-
1290	A	30,2	31,6
1290	B	33,8	36,2
1290	C	28	-

Recommended limit values

Pressure levels

Coil working pressure, max.	1000 kPa
Coil test pressure, max.	1300 kPa
Nozzle pressure	50-150 Pa
Recommended min. nozzle pressure if coil heat is used, p_i	70 Pa

Water flow

Ensures evacuation of any air pockets in the system.

Cooling water, min.	0.030 l/s
Heating water, min.	0.013 l/s

Temperature differentials

Cooling water, temperature increase	2-5 K
Heating water, drop in temperature	4-10 K

Temperature differences are always expressed in Kelvin (K).

Flow temperature

Cooling Water *	
Heating water, max.	60 °C

** Cooling water must always be kept at a level that ensures that no condensation is formed.*

Designations

P	Capacity (W)
t_l	Temperature of primary air (°C)
t_r	Temperature of room air (°C)
t_m	Mean water temperature (°C)
ΔT_m	Temperature difference t_r - t_m (K)
ΔT_l	Temperature difference t_l - t_r (K)
ΔT_k	Temperature difference of cooling water flow and return (K)
ΔT_v	Temperature difference of heating water flow and return (K)
v	Water velocity (m/s)
q	Airflow (l/s)
p	Pressure (Pa)
Δp	Pressure drop (Pa)

Supplementary index: k = cooling, v = heating, l = air, i = initial adjustment, corr = correction

Pressure drop in nozzle

$$\Delta p_l = (q_l / k_{pl})^2$$

Δp_l	Pressure drop in nozzle (pa)
q_l	Flow of primary air (l/s)
k_{pl}	Pressure drop constant for nozzle setting, see tables 3-5 and 7

Cooling

Standard

The cooling capacities have been measured in accordance with EN 15 116 and have been converted for constant water fl ow according to Diagram 2/3.

Calculating Formulae - Cooling

Below are some formulae that enable the user to calculate which comfort module selection is best-suited to the application. The values for the calculations can be taken from the tables.

Pressure drop in cooling circuit

$$\Delta p_k = (q_k / k_{pk})^2$$

Δp_k	Pressure drop in nozzle (pa)
q_k	Flow of primary air (l/s)
k_{pk}	Pressure drop constant for nozzle setting, see tables 3-5 and 7

Cooling capacity of the air

$$P_l = 1{,}2 \cdot q_l \cdot \Delta T_l$$

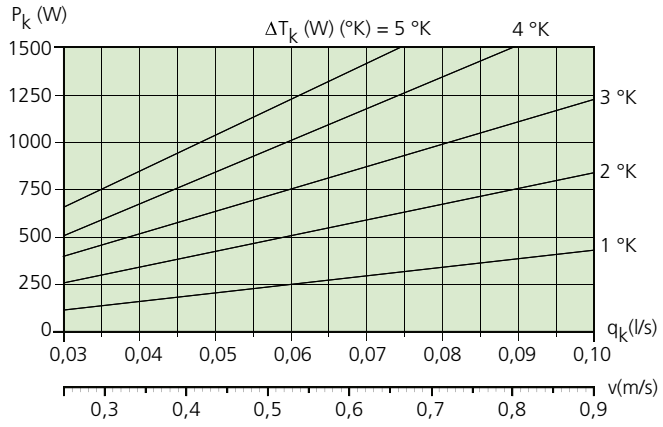
P_l	Primary air's cooling capacity (W)
q_l	Flow of primary air (l/s)
ΔT_l	Temperature difference between primary air (t_l) and room air (t_r) (K)

Cooling capacity of the water

$$P_k = 4186 \cdot q_k \cdot \Delta T_k$$

P_k	Cooling capacity of the water (W)
q_k	Cooling water flow (l/s)
ΔT_k	Temperature difference of cooling water flow and return (K)

Chart 1. Water Flow – Cooling Capacity



Corrected capacity – water flow

Different water flow rates to some extent have effects on the capacity output. By checking calculated water flow against Chart 2 or 3, the capacity indicated in Tables 3-5 may need to be slightly adjusted up or down.

$$P_{korr} = k \cdot P_k$$

P_{korr}	Corrected capacity (W)
k	Correction factor
P_k	Cooling capacity of the water

Chart 2. Corrected Capacity – Water Flow, Parasol EX 690

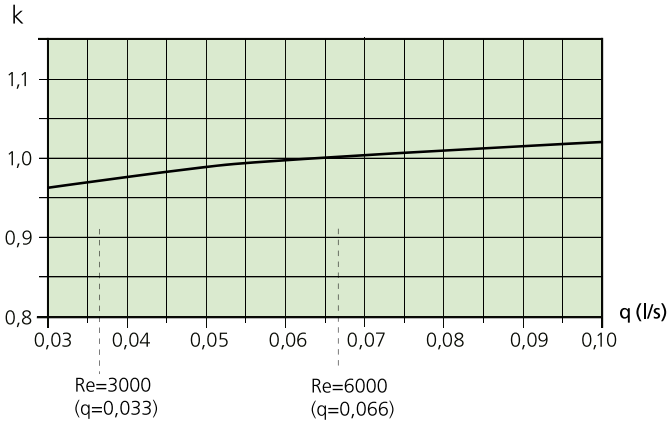


Chart 3. Corrected Capacity – Water Flow, Parasol EX 1290

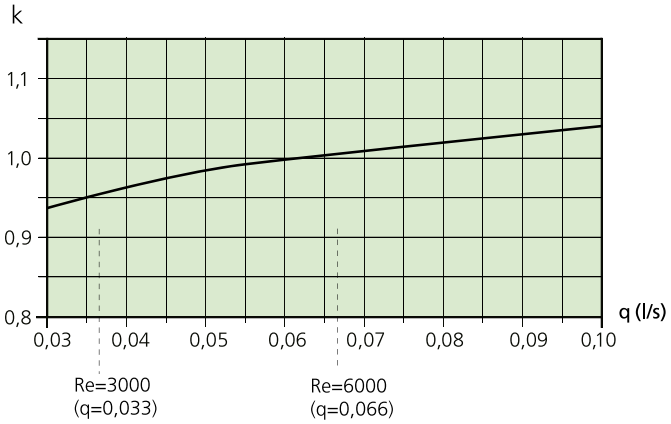


Chart 4. Pressure Drop – Cooling Water Flow

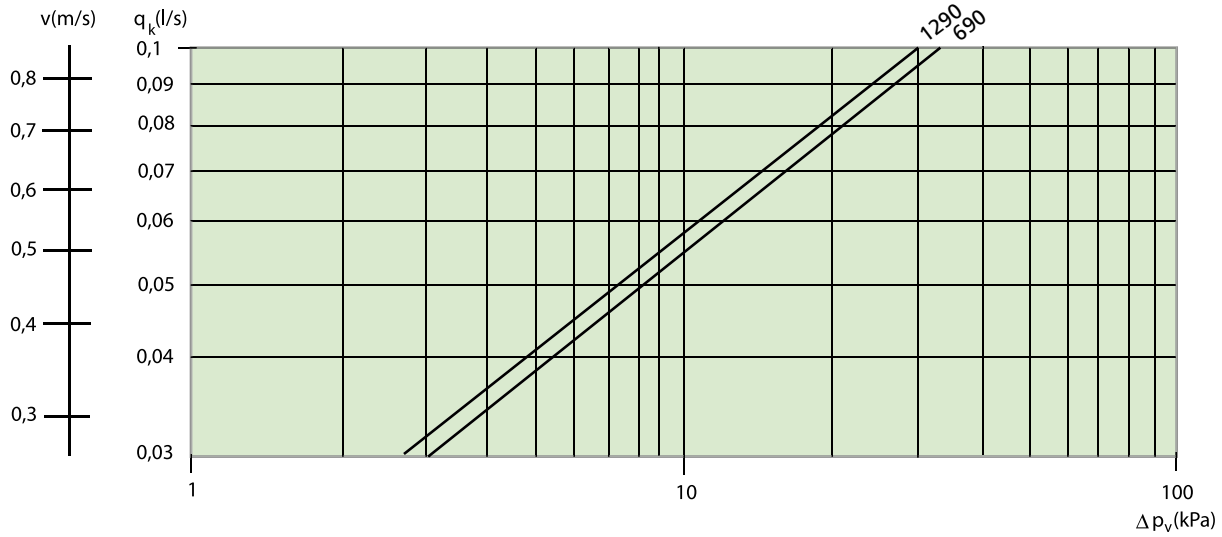


Table 3 – Data – Cooling. Sizing Guide for Parasol EX 690

Unit length (mm)	Nozzle setting 1)	Primary airflow (l/s)	Sound level in dB(A) 2)	Nozzle pressure p_i (Pa)	Cooling capacity Primary air (W) at ΔT_I				Cooling capacity water (W) at ΔT_{mk} 3)							Pressure drop constant air/water	
					6	8	10	12	6	7	8	9	10	11	12	k_{pl}	k_{pk}
690	LLLL	7	<20	48	50	67	84	101	172	199	226	252	279	306	333	1,01	0,0173
690	LLLL	8	<20	62	58	77	96	115	196	228	259	290	321	352	383	1,01	0,0173
690	LLLL	9	<20	79	65	86	108	130	218	252	288	323	357	393	427	1,01	0,0173
690	LLLL	10	22	98	72	96	120	144	237	276	314	352	390	428	467	1,01	0,0173
690	LLLL	12	27	140	86	115	144	173	271	315	359	402	446	491	534	1,01	0,0173
690	MMMM	12	<20	47	86	115	144	173	205	237	268	300	329	360	391	1,76	0,0173
690	MMMM	14	22	63	101	134	168	202	238	276	312	349	386	422	458	1,76	0,0173
690	MMMM	16	26	83	115	154	192	230	266	308	350	393	434	475	516	1,76	0,0173
690	MMMM	18	30	105	130	173	216	259	291	338	384	431	477	523	568	1,76	0,0173
690	MMMM	20	33	129	144	192	240	288	313	364	415	465	515	565	615	1,76	0,0173
690	HHHH	20	20	52	144	192	240	288	257	300	341	382	423	465	506	2,77	0,0173
690	HHHH	23	25	69	166	221	276	331	293	340	387	433	480	526	572	2,77	0,0173
690	HHHH	26	28	88	187	250	312	374	324	376	427	478	529	580	630	2,77	0,0173
690	HHHH	30	33	117	216	288	360	432	361	418	474	531	587	642	698	2,77	0,0173
690	HHHH	34	36	150	245	326	408	490	393	455	516	577	637	698	757	2,77	0,0173

Table 4 – Data – Cooling. Sizing Guide for Parasol EX 1290 MF

Unit length (mm)	Nozzle setting 1)	Primary airflow (l/s)	Sound level in dB(A) 2)	Nozzle pressure p_i (Pa)	Cooling capacity Primary air (W) at ΔT_I				Cooling capacity water (W) at ΔT_{mk} 3)							Pressure drop constant air/water	
					6	8	10	12	6	7	8	9	10	11	12	k_{pl}	k_{pk}
1290	LLLL	9	<20	49	65	86	108	130	271	315	360	405	450	494	540	1,28	0,0183
1290	LLLL	10	<20	61	72	96	120	144	298	348	397	446	496	546	595	1,28	0,0183
1290	LLLL	12	<20	88	86	115	144	173	346	403	462	519	577	635	693	1,28	0,0183
1290	LLLL	14	<20	120	101	134	168	202	386	450	516	580	645	710	775	1,28	0,0183
1290	LLLL	16	22	156	115	154	192	230	420	492	563	634	705	776	846	1,28	0,0183
1290	MMMM	13	<20	50	94	125	156	187	301	351	402	452	503	553	604	1,84	0,0183
1290	MMMM	15	<20	67	108	144	180	216	343	399	456	512	568	625	681	1,84	0,0183
1290	MMMM	17	<20	85	122	163	204	245	379	441	503	564	626	687	748	1,84	0,0183
1290	MMMM	20	23	118	144	192	240	288	426	495	564	632	700	768	835	1,84	0,0183
1290	MMMM	22	26	143	158	211	264	317	454	527	600	672	744	815	887	1,84	0,0183
1290	HHHH	22	<20	50	158	211	264	317	359	420	479	540	600	660	720	3,12	0,0183
1290	HHHH	25	<20	64	180	240	300	360	399	467	533	599	665	732	798	3,12	0,0183
1290	HHHH	28	22	81	202	269	336	403	436	508	580	652	723	795	867	3,12	0,0183
1290	HHHH	33	26	112	238	317	396	475	488	567	648	728	807	887	967	3,12	0,0183
1290	HHHH	38	30	148	274	365	456	547	532	619	707	793	879	967	1053	3,12	0,0183

1) For the sizing of alternative nozzle settings, use Swegon ProSelect the sizing program that is available at www.swegon.com

2) The specified sound data is applicable to connection without damper or with fully open damper. In other applications that call for throttling by means of a SYST CRPc 9–125 adjustment damper fitted directly to the unit, the required data can be read using the Swegon ProSelect sizing program.

Room attenuation = 4 dB

3) The capacity is reduced by around 5% when the ADC[II] is set to the Fan-shape setting. The primary air capacity is not affected.

Important! The total cooling capacity is the sum of the air-based and water-based cooling capacities.

Table 5 – Data – Cooling. Sizing Guide for Parasol EX 1290 HF

Unit length (mm)	Nozzle setting 1)	Primary airflow (l/s)	Sound level in dB(A) 2)	Nozzle pressure p_i (Pa)	Cooling capacity Primary air (W) at ΔT_l				Cooling capacity water (W) at ΔT_{mk} 3)							Pressure drop constant air/water	
					6	8	10	12	6	7	8	9	10	11	12	k_{pl}	k_{pk}
1290	LLLL	13	<20	50	94	125	156	187	331	384	438	491	542	595	647	1,84	0,0183
1290	LLLL	15	<20	67	108	144	180	216	367	426	485	543	602	660	718	1,84	0,0183
1290	LLLL	17	<20	85	122	163	204	245	398	463	526	589	653	716	780	1,84	0,0183
1290	LLLL	20	23	118	144	192	240	288	439	510	580	650	720	789	859	1,84	0,0183
1290	LLLL	22	26	143	158	211	264	317	463	538	612	685	759	832	905	1,84	0,0183
1290	MMMM	23	<20	52	166	221	276	331	390	452	514	575	636	697	757	3,2	0,0183
1290	MMMM	26	23	66	187	250	312	374	422	490	557	623	689	756	821	3,2	0,0183
1290	MMMM	30	27	88	216	288	360	432	461	535	608	680	752	824	895	3,2	0,0183
1290	MMMM	34	31	113	245	326	408	490	494	573	652	729	806	883	960	3,2	0,0183
1290	MMMM	39	35	149	281	374	468	562	532	616	700	783	866	948	1031	3,2	0,0183
1290	HHHH	36	26	51	259	346	432	518	450	519	588	655	722	789	854	5,04	0,0183
1290	HHHH	40	28	63	288	384	480	576	483	557	629	701	773	843	913	5,04	0,0183
1290	HHHH	45	31	80	324	432	540	648	519	598	676	753	828	903	978	5,04	0,0183
1290	HHHH	50	34	98	360	480	600	720	553	636	717	799	878	958	1037	5,04	0,0183
1290	HHHH	55	36	119	396	528	660	792	582	669	756	840	924	1007	1090	5,04	0,0183

1) For the sizing of alternative nozzle settings, use Swegon ProSelect the sizing program that is available at www.swegon.com

2) The specified sound data is applicable to connection without damper or with fully open damper. In other applications that call for throttling by means of a SYST CRPc 9–125 adjustment damper fitted directly to the unit, the required data can be read using the Swegon ProSelect sizing program.

Room attenuation = 4 dB

3) The capacity is reduced by around 5% when the ADC[II] is set to the Fan-shape setting. The primary air capacity is not affected.

Important! The total cooling capacity is the sum of the air-based and water-based cooling capacities.

Table 6. Cooling Capacity for Natural Convection

Unit (mm)	Cooling capacity (W) for temperature difference, room - water ΔT_{mk} (K)						
	6	7	8	9	10	11	12
Parasol 690	17	21	25	29	34	39	43
Parasol 1290	41	51	61	72	83	95	107

Nozzle setting

The unique built-in nozzle control in the Parasol EX means that each of the four sides can be set individually. Depending on the unit's location and the room's primary air requirement, the primary air can be guided in alldesired directions. The direction of the airflow can be easily optimized using the Swegon ProSelect sizing program available at www.swegon.com.

All the units held in stock are preset to the same nozzle setting on all four sides. The airflow direction can be easily adjusted when installing the unit, using the adjustment tools supplied with the unit. This provides logistic advantages since the fitter does not have to take specific room markings into account.

k-factor (C.O.P.)

Each nozzle setting has a specific k-factor. A total k-factor for the unit can be determined by adding together the k-factors for the nozzle settings on each side. The relevant k-factor (C.O.P.) for optimized nozzle setting can also be obtained in ProSelect.

Table 7. K-factor Guide per Side

Type of unit:	Primary Airflow	Side	Nozzle setting	k-factor (C.O.P.)
Parasol EX 690 MF	Low	Any	L	0,253
	Medium	Any	M	0,44
	High	Any	H	0,693
	None	Any	C	0
Parasol EX 1290 MF	Low	Short side	L	0,176
	Medium	Short side	M	0,253
	High	Short side	H	0,429
	None	Short side	C	0
	Low	Long side	L	0,464
	Medium	Long side	M	0,667
	High	Long side	H	1,131
	None	Long side	C	0
Parasol EX 1290 HF	Low	Short side	L	0,253
	Medium	Short side	M	0,44
	High	Short side	H	0,693
	None	Short side	C	0
	Low	Long side	L	0,667
	Medium	Long side	M	1,16
	High	Long side	H	1,827
	None	Long side	C	0

Specific nozzle settings

To specify optimized nozzle settings, always begin from the side nearest to the left of the water connections. From there, specify side after side in counter-clockwise order. See Figures 19-21. If you like, you can order the units preset from the factory (does not apply to units held in stock).

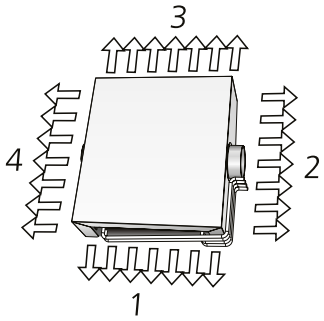


Figure 19. Top view of Parasol EX 690, pages 1-4

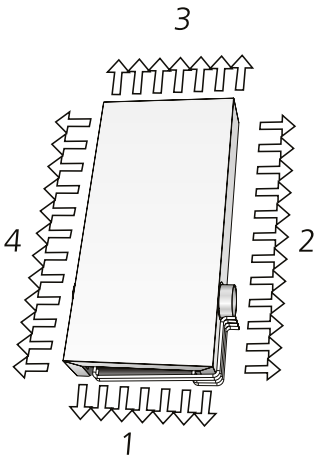


Figure 20. Top view of Parasol EX 1290, pages 1-4

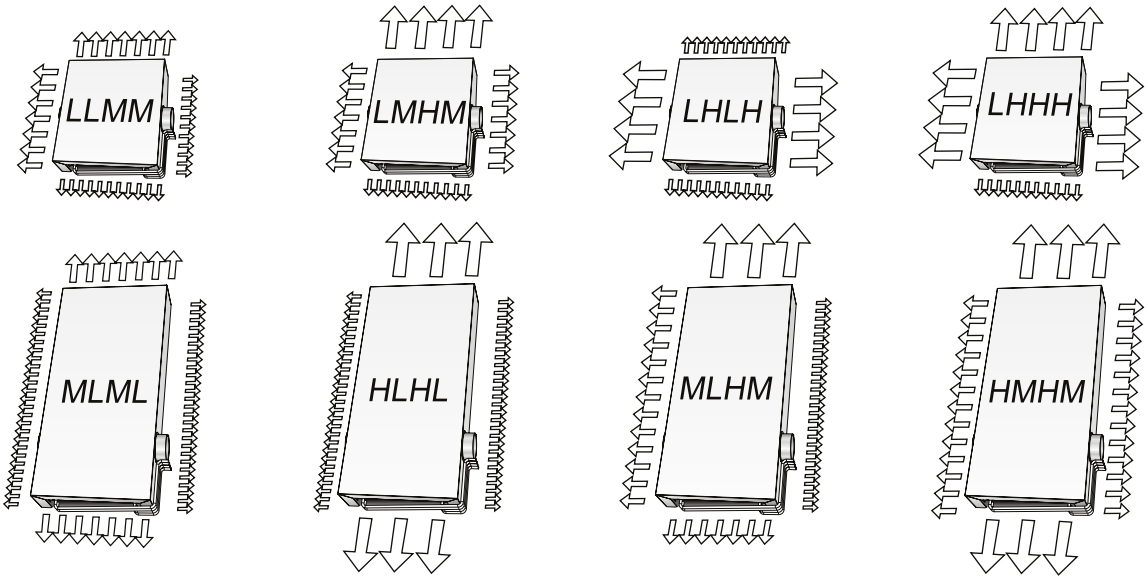


Figure 21. Examples of optimized nozzle setting.

Calculation Example - Cooling

To make sizing comfort modules as simple as possible, the Swegon ProSelect sizing program is available at www.swegon.com. Another excellent way of sizing units is to use the catalogue data, an example of which is given below.

Conditions

A large room with dimensions (w x d x h) 8.0 x 20.0 x 3.0 m without suspended ceiling is to be ventilated and temperature-controlled with a Parasol EX 1290 suspended comfort module. The total cooling load is estimated at 9.6 kW. Design room temperature (t_r) 24°C, cooling water temperature (flow/return) 14/17°C and the primary air temperature (t_l) 18°C produces:

ΔT_k= 3K

ΔT_{mk}= 8,5K

ΔT_l= 6K

The desired primary air flow to the room (q_l) has been fixed at 432 l/s. The noise generated by each comfort module must not exceed 27 dB(A).

Solution

Cooling

The cooling capacity of the primary air can be calculated using the following formula:

$P_l = 1.2 \times \Delta T_l \times q_l$

$P_l = 1.2 \times 6 \times 432 = 3110$ W

The remaining cooling capacity that must be provided by water-based cooling will then be 9600 – 3110 = 6490 W.

From Table 5 we find that a Parasol EX 1290 in the high flow version with nozzle setting HHHH can distribute 36 l/s and generates 26 dB(A) at a nozzle pressure of 51 Pa. The cooling capacity of the water can be read from the same table: 612 + 682 / 2 = 647 W per unit (interpolate between ΔT_{mk} 8K & 9K).

The following is required to meet the 27 dB(A) per unit acoustic requirement: 432 / 36 = 12 units. Parasol EX 1290. The total cooling capacity on the water side will be 647 x 12 = 7764 W which is 1274 W more than the cooling load. To avoid over-sizing, you can decide to replace two of the units with supply air modules that do not contain any coil. This will instead provide a total cooling capacity on the water side of 647 x 10 = 6470 W which is on a level with the cooling load.

Cooling Water

With a cooling capacity requirement of 6470 / 10 = 647 W for cooling water, the necessary water flow is obtained in Chart 1. With the temperature increase ΔT_k= 3K the water flow obtained is 0.052 l/s.

In Chart 3 we can read that a water flow of 0.052 l/s does not produce a fully turbulent outflow, but that the capacity must be corrected by a reduction factor of 0.98. The loss of capacity is compensated by calculating the comfort modules required cooling capacity as follows: P_k = 647 / 0.98 = 660 W.

New water flow from Chart 1, q_k = 0.053 l/s.

The pressure drop is calculated on the basis of a water flow of 0.053 l/s and the pressure drop constant k_{pk} = 0.0183, which is taken from Table 5. The pressure drop will then be: $\Delta p_v = (q_v/k_{pv})^2 = (0.053 / 0.0183)^2 = 8.4$ kPa.

Sound Level

In Table 5 we see that the sound level with a fully open damper (or without a damper) reaches 26 dB(A). To see the cut-off range and the current sound level after adjustment with separate type SYST CRPc 9-125 damper, Chart 7 or the Swegon ProSelect sizing program can be used, which is available at www.swegon.com.

Results

The following products are needed in the dimensioning example case described above:

Optimised solution:

10 units Parasol EX 1290-A-HF with nozzle setting HHHH (cooling and ventilation)

2 units Parasol EX 1290-C-HF with nozzle setting HHHH (ventilation only)

Alternative solution for maximal flexibility with regard to possible future room divisions:

12 units Parasol EX 1290-A-HF with nozzle setting HHHH (cooling and ventilation)

Heating

Heating function

Heating spaces, with air heated above room temperature, discharged from the ceiling, is a good alternative to conventional radiator heating solutions. The benefits achieved include lower installation costs, simpler installation and perimeter walls free from piping and radiators. Regardless of the type of heating system installed, it is important to consider the operative temperature in a room.

Most people are comfortable when the operative temperature in winter is in between 20–24°C, and for most quality requirements 22°C, is usually regarded as the optimal level. This means that for a room with a cold perimeter wall, the air temperature must be higher than 22°C to compensate for the chilling effect of the wall. In new buildings with normal insulated perimeter walls and normal standards of window glazing, the difference between the room air temperature and the operative temperature is small. But for older buildings with poor windows, it may be necessary to raise the air temperature to compensate for the chill from perimeter walls.

The Parasol EX is optimized for distributing supply air without help from the coanda effect and can discharge air in a variable diffusion pattern thanks to the built-in ADC[II], that also further increases the mixture of supply air into the room air. The Parasol EX therefore supplies heated air to the room with a turbulent jet that quickly mixes itself with the room air. This speeds up the process of cooling down the heated air so that it more easily can reach down to the occupied zone. Different operating scenarios can be simulated easily using the Swegon ProClim Web software to calculate the heat balance and determine the room air temperature and operative temperature. Supplying heated air from the ceiling results in some stratification of the air. With a maximum supply temperature of 40°C, the stratification is non-existent, while at 60°C it can be around 4 K in the occupied zone. This only applies during the warming-up phase, when the room is unused and there is no internal load. When the room is being used and lighting, computers and people are in present, the stratification is reduced or disappears depending on the heating load. Laboratory studies, computer simulations and reference projects all show that a good indoor climate will be achieved by means of the PARASOL EX comfort module whatever the time of year.

Calculating Formulae - Heating

Below are some formulae that enable the user to calculate which comfort module selection is best suited for the application. The values for the calculations are in Tables 8-10.

The cooling or heating capacity of the air

$$P_l = 1{,}2 \cdot q_l \cdot \Delta T_l$$

P_l	The cooling or heating capacity of the air (W)
q_l	Flow of primary air (l/s)
ΔT_l	Temperature difference between primary air (t_l) and room air (t_r) (K)

Heating capacity of the water:

$$P_v = 4186 \cdot q_v \cdot \Delta T_v$$

P_v	Heating capacity of the water (W)
q_v	Flow of heating water (l/s)
ΔT_v	Temperature difference between the heating water's flow and return flow (K)

Pressure drop for heating circuit (Pa)

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

Δp_v	Pressure drop in heating circuit (kPa)
q_v	Flow of heating water (l/s), see Chart 6
k_{pv}	Pressure drop constant for heating circuit, see Tables 8-10

Chart 5. Water Flow – Heating Capacity

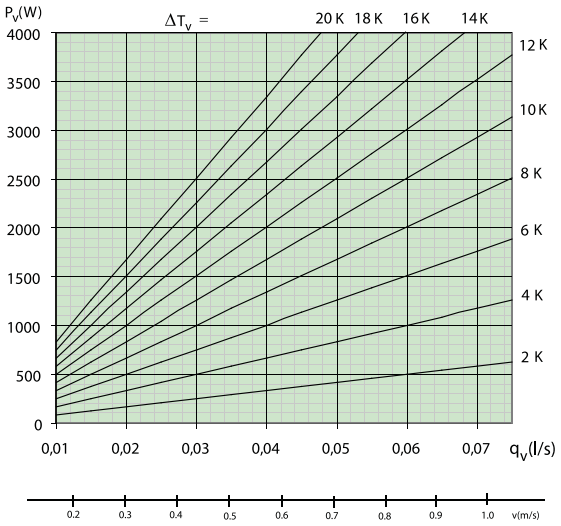


Chart 6. Pressure Drop – Heating Water Flow

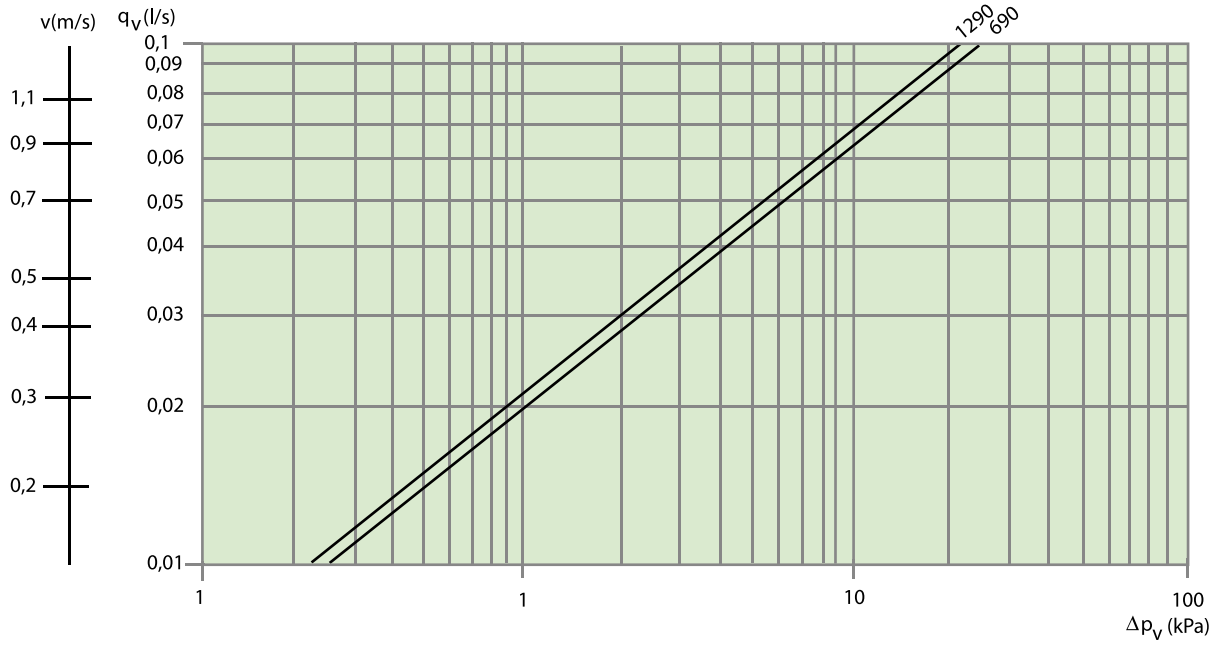


Table 8 – Data – Heating. Sizing Guide for Parasol EX 690

Unit length (mm)	Nozzle setting 1)	Primary airflow (l/s)	Sound Level dB(A) 2)	Nozzle pressure p_i (Pa)	Heating capacity of the water (W) for ΔT_{mv} 3)							Pressure drop constant air/water	
					5	10	15	20	25	30	35	k_{pl}	k_{pv}
690	LLLL	7	<20	48	93	187	280	372	465	557	649	1,01	0,02
690	LLLL	8	<20	62	106	212	317	422	526	631	735	1,01	0,02
690	LLLL	9	<20	79	117	233	349	465	581	696	812	1,01	0,02
690	LLLL	10	22	98	126	253	378	504	629	755	880	1,01	0,02
690	LLLL	12	27	140	143	287	429	571	714	856	998	1,01	0,02
690	MMMM	12	<20	47	123	247	359	472	581	690	796	1,76	0,02
690	MMMM	14	22	63	134	267	394	520	644	768	890	1,76	0,02
690	MMMM	16	26	83	143	285	424	562	699	835	971	1,76	0,02
690	MMMM	18	30	105	151	301	450	599	747	895	1043	1,76	0,02
690	MMMM	20	33	129	158	315	473	632	790	948	1107	1,76	0,02
690	HHHH	20	20	52	138	276	406	537	665	792	918	2,77	0,02
690	HHHH	23	25	69	152	303	448	592	734	876	1016	2,77	0,02
690	HHHH	26	28	88	164	327	484	641	795	949	1102	2,77	0,02
690	HHHH	30	33	117	178	356	527	698	866	1035	1201	2,77	0,02
690	HHHH	34	36	150	190	380	564	747	928	1109	1289	2,77	0,02

Table 9 – Data – Heating. Sizing Guide for Parasol EX 1290 MF with straight ADC[II]

Unit length (mm)	Nozzle setting 1)	Primary airflow (l/s)	Sound Level dB(A) 2)	Nozzle pressure p_i (Pa)	Heating capacity of the water (W) for ΔT_{mv} 3)							Pressure drop constant air/water	
					5	10	15	20	25	30	35	k_{pl}	k_{pv}
1290	LLLL	9	<20	49	184	369	538	708	872	1036	1197	1,28	0,0213
1290	LLLL	10	<20	61	197	394	580	766	948	1130	1310	1,28	0,0213
1290	LLLL	12	<20	88	219	438	653	867	1081	1294	1506	1,28	0,0213
1290	LLLL	14	<20	120	238	475	714	953	1193	1432	1672	1,28	0,0213
1290	LLLL	16	22	156	254	508	767	1027	1289	1552	1815	1,28	0,0213
1290	MMMM	13	<20	50	177	353	543	732	926	1120	1318	1,84	0,0213
1290	MMMM	15	<20	67	206	412	625	838	1053	1269	1486	1,84	0,0213
1290	MMMM	17	<20	85	232	464	697	930	1165	1399	1633	1,84	0,0213
1290	MMMM	20	23	118	265	531	791	1051	1309	1567	1824	1,84	0,0213
1290	MMMM	22	26	143	285	570	846	1121	1394	1666	1936	1,84	0,0213
1290	HHHH	22	<20	50	227	454	677	901	1124	1346	1568	3,12	0,0213
1290	HHHH	25	<20	64	251	503	751	999	1246	1492	1738	3,12	0,0213
1290	HHHH	28	22	81	273	547	816	1086	1354	1622	1890	3,12	0,0213
1290	HHHH	33	26	112	305	610	911	1212	1511	1810	2109	3,12	0,0213
1290	HHHH	38	30	148	332	665	992	1320	1646	1972	2297	3,12	0,0213

1) For the sizing of alternative nozzle settings, use Swegon ProSelect, the sizing program that is available at www.swegon.com

2) The specified sound data is applicable to connection without damper or with fully open damper. In other applications that call for throttling by means of a SYST CRPc 9–125 adjustment damper fitted directly to the unit, the required data can be read using the Swegon ProSelect sizing program.

Room attenuation = 4 dB

3) The capacity is reduced by around 5% when the ADC[II] is set to the Fan-shape setting. The primary air capacity is not affected.

The total heating capacity is the sum of the air-based and water-based heating capacities. If the primary air temperature is lower than the room temperature, it causes a negative impact on the total heating capacity.

Table 10 – Data – Heating. Sizing Guide for Parasol EX 1290 HF

Unit length (mm)	Nozzle setting 1)	Primary airflow (l/s)	Sound Level dB(A) 2)	Nozzle pressure p_i (Pa)	Heating capacity of the water (W) for ΔT_{mv} 3)							Pressure drop constant air/water	
					5	10	15	20	25	30	35	k_{pl}	k_{pv}
1290	LLLL	13	<20	50	158	315	586	857	1015	1172	1441	1,84	0,0213
1290	LLLL	15	<20	67	175	349	650	951	1125	1299	1597	1,84	0,0213
1290	LLLL	17	<20	85	190	379	705	1032	1221	1410	1734	1,84	0,0213
1290	LLLL	20	23	118	209	418	778	1137	1346	1554	1911	1,84	0,0213
1290	LLLL	22	26	143	220	441	820	1199	1419	1639	2015	1,84	0,0213
1290	MMMM	23	<20	52	185	369	687	1005	1189	1373	1689	3,2	0,0213
1290	MMMM	26	23	66	200	400	745	1089	1289	1489	1830	3,2	0,0213
1290	MMMM	30	27	88	218	436	812	1188	1405	1623	1995	3,2	0,0213
1290	MMMM	34	31	113	234	468	871	1274	1507	1741	2140	3,2	0,0213
1290	MMMM	39	35	149	251	503	935	1368	1619	1870	2299	3,2	0,0213
1290	HHHH	36	26	51	210	419	780	1141	1350	1559	1917	5,04	0,0213
1290	HHHH	40	28	63	224	448	834	1220	1444	1667	2050	5,04	0,0213
1290	HHHH	45	31	80	240	481	895	1309	1549	1789	2199	5,04	0,0213
1290	HHHH	50	34	98	255	510	949	1388	1643	1897	2332	5,04	0,0213
1290	HHHH	55	36	119	268	536	998	1460	1728	1995	2453	5,04	0,0213

1) For the sizing of alternative nozzle settings, use Swegon ProSelect, the sizing program that is available at www.swegon.com

2) The specified sound data is applicable to connection without damper or with fully open damper. In other applications that call for throttling by means of a SYST CRPc 9–125 adjustment damper fitted directly to the unit, the required data can be read using the Swegon ProSelect sizing program.

Room attenuation = 4 dB

3) The capacity is reduced by around 5% when the ADC^{II} is set to the Fan-shape setting. The primary air capacity is not affected.

The total heating capacity is the sum of the air-based and water-based heating capacities. If the primary air temperature is lower than the room temperature, it causes a negative impact on the total heating capacity.

Calculation Example - Heating

In the same room as in the example for cooling, there is a also a heating load of 50 W/m^2. This produces a heating capacity load of 50 x 8.0 x 20.0 = 8.0 kW. The primary air flow must be the same as in the summer scenario, 432 l/s which result in 36 l/s and unit.

Design room temperature (t_r) 22°C, heating water temperature (flow/return) 50/40°C and the primary air temperature (t_l) 20°C produces:

ΔT_v= 10°K

ΔT_{mv}= 23°K

ΔT_l= -2°K

Solution

Heating

The primary airflow of 36 l/s in combination with the primary air temperature of 20°C produces a negative impact on the heating capacity: 1.2 x 432 x (-2) = -1037 W. The heating capacity requirement from the heating water is thus increased to 8000 + 1037 = 9037 W. From Tabell 10 at ΔT_{mv}= 23°K and primary air flow 36 l/s we produce a heating capacity of P_v = 1266 W. To meet the total heating load we need 9037 / 1266 = 7.1 units which then can be rounded upward to 8 units. Parasol EX 1290 with heating function.

Heating Water

With a heating requirement of 9037 / 8 = 1130 W per unit and ΔT_v = 10K, we obtain the required water flow from Chart 5: 0.027 l/s. The pressure drop for the heating water is calculated on the basis of a water flow of 0.027 l/s and pressure drop constant k_{pv} = 0.0213, which is taken from Table 10. The pressure drop will then be: $\Delta p_v = (q_v/k_{pv})^2 = (0.027 / 0.0213)^2$ = 1.6 kPa.

Results

Dimensioning case with ventilation, cooling and heating.

Optimised solution:

2 units Parasol EX 1290-A-HF with nozzle setting HHHH (cooling and ventilation)

8 units Parasol EX 1290-B-HF with nozzle setting HHHH (cooling, heating and ventilation)

2 units Parasol EX 1290-C-HF with nozzle setting HHHH (ventilation only)

Alternative solution for maximal flexibility with regard to possible future room divisions:

12 units Parasol EX 1290-B-HF with nozzle setting HHHH (cooling, heating and ventilation)

Acoustics

Chart 7 show the total generated sound power (L_{Wtot} dB), as a function of the airflow and pressure drop across the damper. By correcting L_{Wtot} with the correction factors from Table 14, the sound power levels for the corresponding octave bands can be obtained ($L_W = L_{wtot} + K_{ok}$)

Initial Adjustment Range

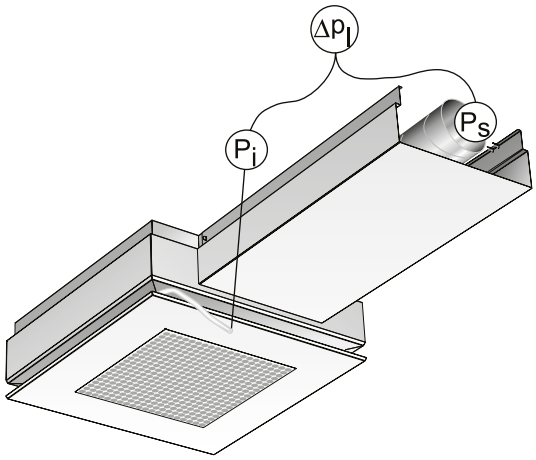


Figure 22. Pressure Conditions - Air

Damper throttling range

$\Delta p_l = p_s - p_i$

Δp_l	Throttling range of fitted damper p_s - p_i, see Chart 7
p_i	Nozzle pressure (easily measured with a manometer connected to measurement hoses).
p_s	Static pressure upstream of unit and damper

Chart 7. Adjustment range, CRPc 9-125 damper

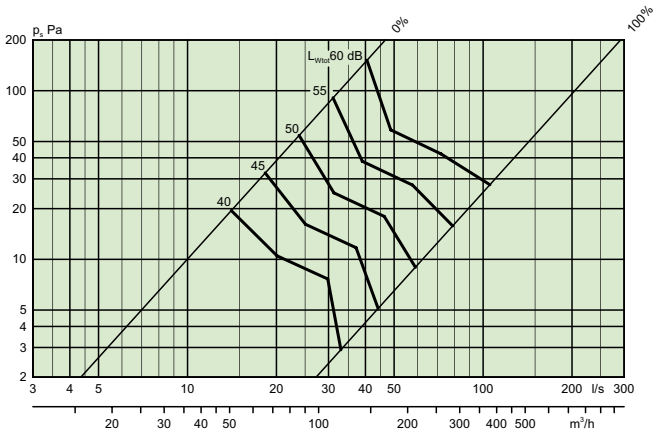


Table 11. Orifice Attenuation ΔL (dB) Parasol EX 690

Nozzle setting	Octave band (Hz)							
	63	125	250	500	1k	2k	4k	8k
LLLL	19	20	17	16	17	16	15	15
MMMM	17	18	15	14	15	14	13	13
HHHH	15	16	13	12	13	12	11	11

Table 12. Orifice Attenuation ΔL (dB) Parasol EX 1290 MF

Nozzle setting	Octave band (Hz)							
	63	125	250	500	1k	2k	4k	8k
LLLL	18	19	16	15	16	15	14	14
MMMM	16	17	14	13	14	13	12	12
HHHH	14	15	12	11	12	11	10	10

Table 13. Orifice Attenuation ΔL (dB) Parasol EX 1290 HF

Nozzle setting	Octave band (Hz)							
	63	125	250	500	1k	2k	4k	8k
LLLL	16	17	14	13	14	13	12	12
MMMM	14	15	12	11	12	11	10	10
HHHH	12	13	10	9	10	9	8	8

Table 14. Sound power level for CRPc 9-125 damper, Correction factor, K_{ok}

Size	Mid-frequency (Octave band) Hz							
CRPc 9	63	125	250	500	1000	2000	4000	8000
125	0	-2	-9	-15	-20	-25	-29	-35
Tol. ±	2	2	2	2	2	2	2	2

Dimensions

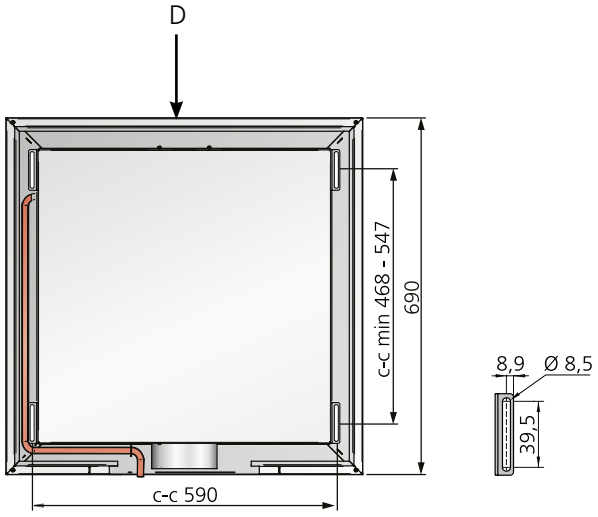


Figure 23. Parasol EX 690 top view with connection bracket

D = Cleaning door (not intended for use as an optional air connection).

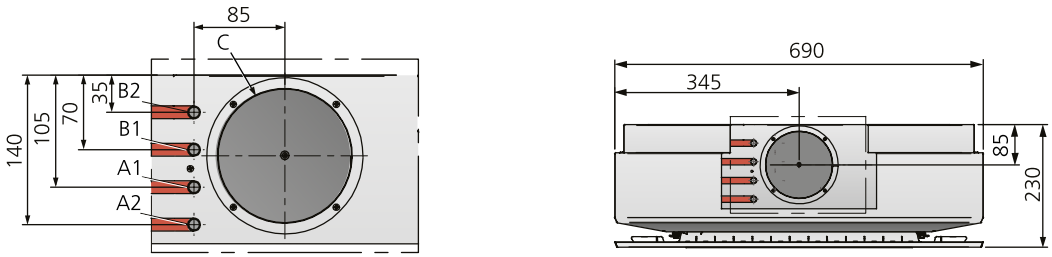


Figure 24. Parasol EX 690, top view with connections

A1 = Inlet, cooling water ∅12 x 1.0 mm
A2 = Return, cooling water ∅12 x 1.0 mm
B1 = Inlet, heating water ∅12 x 1.0 mm
B2 = Return, heating water ∅12 x 1.0 mm
C = Air connecting piece ∅125 mm

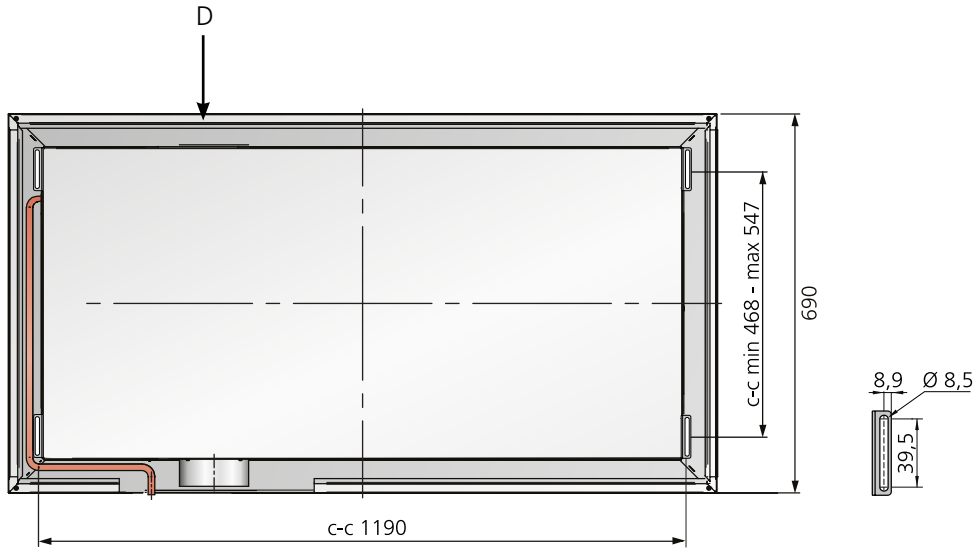


Figure 25. Parasol EX 1290 top view with connection bracket

D = Cleaning door (not intended for use as an optional air connection).

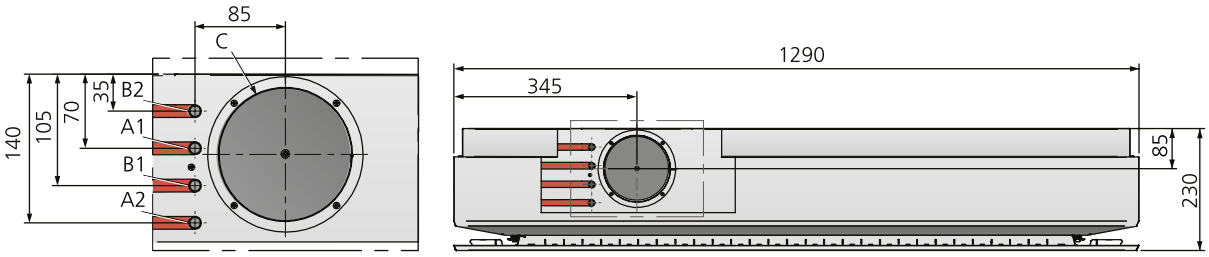


Figure 26. Parasol EX 1290, top view with connections

A1 = Inlet, cooling water ∅12 x 1.0 mm
A2 = Return, cooling water ∅12 x 1.0 mm
B1 = Inlet, heating water ∅12 x 1.0 mm
B2 = Return, heating water ∅12 x 1.0 mm
C = Air connecting piece ∅125 mm

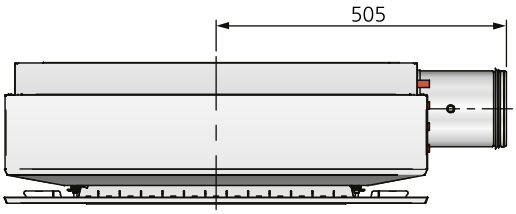


Figure 27. Connection with damper, end view

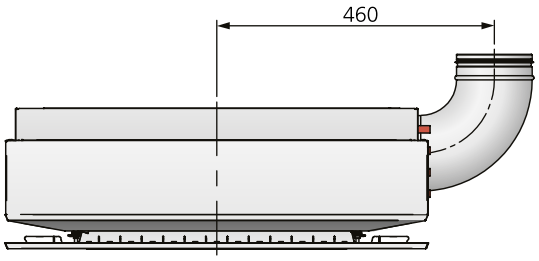


Figure 28. Connection with duct bend, end view

Ordering key

Contractor demarcation

Swegon's delivery ends at the connection points for water and air, and the connection of indoor climate control equipment. (see Figures 24 and 26).

- The pipe contractor connects the connections points for water to the plain pipe end and fills the system, bleeds it and tests the pressure.
- The ventilation contractor connects ducting to the air connecting piece.

Ordering Range, Parasol EX

Size	Parasol EX 690:
	690 x 690 mm
	Parasol EX 1290:
	1290 x 690 mm
	The tolerance is ±2 mm
Function	The units can be ordered in three different functional versions:
	A = Cooling and supply air
	B = Cooling, heating and supply air
	C = Supply air only
ADC[II]	Factory-fitted ADC[II]
	supplied as standard
Airflow	Parasol EX 690 can be ordered in the medium flow variant (MF) only
variant	Parasol EX 1290 can be ordered in the medium flow variant (MF) and the high flow variant (HF)
Nozzle setting	Each side can be set in four different ways: L, M, H, or C
	L = Low airflow
	M = Medium airflow
	H = High airflow
	C = No airflow
Colour	The units are supplied in Swegon standard shade of white, RAL 9003, gloss ratio 30 ± 6%

Ordering key, Parasol EX 690

Parasol	Parasol EX c 690-	a-	MF-	bcde
Version:				
Function:				
A = Cooling and supply air				
B = Cooling, heating and supply air				
C = Supply air only				
Nozzle setting:				
Side 1: L; M; H; C				
Side 2: L; M; H; C				
Side 3: L; M; H; C				
Side 4: L; M; H; C				

Ordering key, Parasol EX 1290

Parasol	Parasol EX c 1290-	a-	bb-	cdef
Version:				
Function:				
A = Cooling and supply air				
B = Cooling, heating and supply air				
C = Supply air only				
Airflow variant:				
MF = Medium flow				
HF = High flow				
Nozzle setting:				
Side 1: L; M; H; C				
Side 2: L; M; H; C				
Side 3: L; M; H; C				
Side 4: L; M; H; C				

Available to order, Accessories

Perforation pattern	Perforation patterns are available in three different versions: Standard: Circular holes arranged in a triangular pattern. PD: Circular holes arranged in a square pattern. PE: Square holes arranged in a square pattern.
Connection casing	Telescopic casing for concealing ducts and pipe work Width: 380 mm Length interval: 175 - 250 mm 250 - 400 mm 400 - 700 mm 700 - 1,200 mm 1200 - 2,000 mm Assembly piece SYST MS M8 is required for suspended installation from hangers. (to be ordered separately) One kit is sufficient for two connection casings. No extra mounting parts are needed if the module is installed directly against the ceiling.
Cover plate	Cover plate to conceal the connection opening when no connection cover is used.
Room control kit	Plug and play kit with valve, actuator and push-on coupling for quick connection (supplied separately)
Flexible connection hose	The connection hose is supplied with clamping ring coupling, push-on coupling or sleeve nut.
Assembly piece	Ceiling mount, threaded rod and plastic sleeve for covering the threaded rod.
Connection piece (90° bend), air	90° duct bend.
Initial adjustment damper	Damper for adjusting the air volume
Tool for nozzle adjustment	One tool for nozzle adjustment is supplied with each order free of charge.
Venting nipple	Venting nipple with push-on coupling for connection to return pipe for water.

Ordering Key, Accessories

Perforation pattern	Parasol EX c T- PP-	a-	bb
Version:			
Type: 1 = Parasol EX 690 2 = Parasol EX 1290			
Perforation variant: PD PE			

Connection casing	Parasol EX c T- CC-	aaaa
Version:		
Max. length (mm): 250; 400; 700; 1200; 2000		

Cover plate	Parasol EX c T- ICP

Room control kit	SYST RK -	aa
(Supplied separately)		
Variant: C = Cooling CH = Cooling and heating		

Flexible connection hose (1 pc) Clamping ring against pipe on both ends	SYST FH F1-	aaa-	12
Length (mm): 300; 500 or 700			

Flexible connection hose (1 pc) Push-on coupling against pipe on both ends	SYST FH F20-	aaa-	12
Length (mm): 275; 475 or 675			

Flexible connection hose (1 pc) Push-on coupling against pipe on one end, G20ID sleeve nut on the other end	SYST FH F30-	aaa-	12
Length (mm): 200; 400 or 600			

Asssembly piece SYST MS M8-	aaaa-	b-	RAL9003
Length of threaded rod (mm): 200; 500; 1000			
Type: 1=One threaded rod 2=Two threaded rods and one thread lock			

Connection piece (90° bend), air	SYST CA 125-90
Initial adjustment damper	SYST CRPc 9-125
Tool for nozzle adjustment	SYST TORX 6-200
Venting nipple	SYST AR-12

Specification text

Example of a specification text conforming to VVS AMA Standard.

KB XX

Swegon Parasol EX comfort module for suspended installation,with the following functions:

- Cooling (optional)
- Heating (optional)
- Ventilation
- Adjustable air direction
- ADC^{II} Indoor climate comfort control
- Upward directed air distribution without need of any coanda effect.
- Integrated circulating air opening in face plate
- Enclosed version for circulating air
- Cleanable air duct
- Fixed measurement tapping with hose
- Painted in standard shade of white (RAL 9003)
- Contractor demarcation at connection point for water and air as in outline drawing.
- At connection points the pipe contractor connects to 12 mm plain pipe end (cooling) or 12 mm plain pipe end (heating)
- Pipe contractor fills, bleeds, tests the pressure and assumes responsibility for the design water flows reaching each branch of the system and the index unit
- Ventilation contractor conducts initial adjustment of the airflows

Accessories:

- Alternative perforation pattern Parasol EX c T-PP-a-bb, xx qty
- Kit for room control SYST RK-aa, xx qty
- Connection casing Parasol EX c T-CC-aaaa
- Flexible connection hose SYST FH aaa–bbb-12, xx qty
- Assembly piece SYST MS M8 aaaa–b-RAL 9003, xx qty
- Connection piece (90°duct bend), SYST CA 125-90 xx qty
- Adjustment damper SYST CRPc 9-125, xx qty.
- Size:
  KB XX-1 Parasol EX c 690 a-MF-bcde xx qty
  KB XX-2 Parasol EX c 1290 a-bb-cdef, xx qty., etc
- Control equipment, see separate section in catalogue on water-based indoor climate systems, or our website www.swegon.com