PARASOL VAV

Energy saving comfort module for demand-controlled ventilation

QUICK FACTS

- The comfort module, which together with the control equipment CONDUCTOR W4.1 VAV, gives demand-controlled ventilation.
- Energy-efficient operation since the room is ventilated, heated and cooled exactly as called for by the load, neither more or less.
- Highest possible comfort with control on a room level.
- Waterborne cooling and waterborne heating.
- Draught-free indoor climate, 4-way air distribution and Swegon's ADC (Anti Draught Control) provide maximum comfort and flexibility, both today and for future needs.
- Easy installation, commissioning and maintenance. Complete product with all components and accessories fitted at the factory.

QUICK GUIDE

Primary airflow:	Up to 85 l/s, (305 m³/h)
Pressure range:	50 to 150 Pa
Total cooling capacity:	Up to 2055 W
Heating capacity:	Water up to 2700 W
Size:	600 mm and 1200 mm (with adaptations for several ceiling system)

Swegon

Contents

Technical description

Comfort module PARASOL VAV

PARASOL VAV is based on PARASOL but is equipped with functions for demand-control of the indoor climate. Available as single and double module units:

Sizes:	600x600 mm; 600x1200 mm
Modules:	Supply air and cooling Supply air, cooling and heating (water)
Installation:	Flush mounting for suspended ceilings

Function

The basic principle of the comfort modules is closely related to that of chilled beams. The principal difference is that comfort modules distribute air in four directions instead of two. This maximizes the area for the mixture of supply air with the existing room air, which gives a high capacity without occupying more ceiling space. The comfort modules are also optimised to quickly mix the supply air with the existing room air, which gives better comfort in the room. In heating applications, this technique can be utilised advantageously to convey heat along the ceiling in a better way.

Demand-controlled indoor climate

Demand-controlled ventilation involves ventilating and conditioning the air in a room precisely to meet our needs – no more and no less. The potential for savings is substantial, especially in premises where there is considerable variation between low and high load conditions in rooms and during times when there are few or no occupants - which is the case in many premises. Offices, for example, often have a degree of occupancy below 50 %!

PARASOL VAV combines the best of both worlds – demand-controlled ventilation with all its potential for savings combined with the power and performance of the comfort module for air conditioning the room. All this packaged in a compact unit that is easy to install.

Flexibility

The easily adjustable nozzles in combination with Swegon's ADC (Anti Draught Control) offer maximum flexibility if changes in the room layout become necessary. All sides can be set independently of one another so that the air volume and air direction in the room can be adjusted as needed and desired.

Design

The face plate of PARASOL VAV has three different perforation patterns. As standard equipped with circular holes in a triangular pattern, but can also be supplied in a square pattern with circular or square holes.

Figure 1. PARASOL VAV Slave

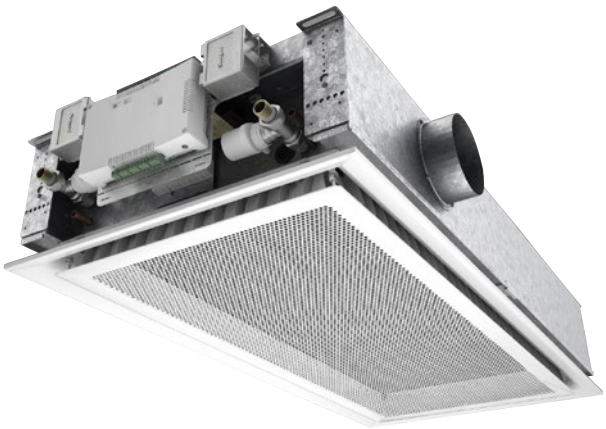


Figure 2. PARASOL VAV Master

Draught-fee indoor climate

Parasol VAV distributes air in four directions at low air velocity. Distributing the cooled air over a large area creates the low air velocity. The special design of the outlet creates a turbulent flow enabling the air to be quickly mixed in the room air. The comfort module's closed design with a circulation opening for return air in the face plate of the module also contributes to its advantageous mixing performance.

PARAGON VAV is available in the following variants:

Variant A:	Supply air and waterborne cooling from a coil.
Variant B:	Supply air, waterborne cooling and heating from a coil.

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

www.eurovent-certification.com
www.certiflash.com

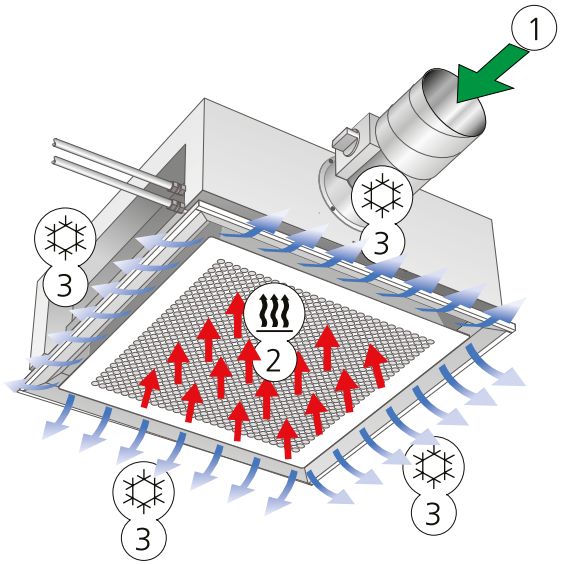


Figure 3. Variant A: Cooling and supply air function

1 Primary air
2 Induced room air
3 Primary air mixed with chilled room air

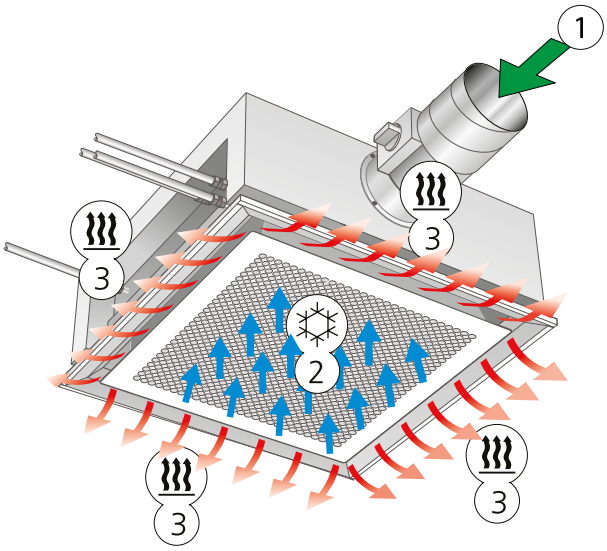


Figure 4. Variant B: Heating and supply air function (also includes cooling function)

1 Primary air
2 Induced room air
3 Primary air mixed with heated room air

Compact unit
- prepared for demand control

PARASOL VAV is a compact comfort module, prepared for demand control of airflows. It is supplied with built-in air dampers, air damper motor and terminal block. The air damper motor, cooling actuator (option) and heating actuator (option) require internal electrical connections to the terminal block, these are made at the factory. The terminal block is also used when you have several products in one room and connect these in a *Master - Slave connection*.

Accordingly, a standard PARASOL VAV product is equipped to be the *Slave* in the room, see figure 5. PARASOL VAV *Slave* is not equipped with built-in control equipment and to obtain a good function, temperature control and continuous demand control of the air low means one of the products in the room must be fitted with control equipment to become a *Master*, see figure 6.

The control equipment is ordered as an option, and is designated "Control kit". This control kit contains a regulator (CONDUCTOR W4.1 VAV) with associated room controller RU, occupancy sensor and 2 pressure sensors. Up to eight Parasol VAV units can be connected to the same control kit.

In order to simplify installation as much as possible, the control kit can be ordered factory fitted, but it can also be supplied as a separate kit for mounting on the product during installation.

A number of parameters in the control kit can be pre-programmed as desired at no extra charge, for example, room temperature, airflow for absence, occupancy and maximum flow.

PARASOL VAV and the control kit can also be connected to a superordinate BMS/WISE system for monitoring or for easy modification of operating parameters.

PARASOL VAV PlusFlow

When there is a need of both high cooling capacity and high
airflows PARASOL VAV 600/1200 PF is the right choice. This variant can manage large airflows and at the same time has the same high cooling and heating capacity as a regular PARASOL VAV, of course, while retaining a level of high comfort in the room.

Parasol VAV PF, which is installed in e.g. conference rooms, can reduce the number of installed units by 50%.

High capacity

PARASOL VAV, with its high capacity, occupies 40-50% less roof space to handle the cooling requirement in a normal office, compared with a traditional chilled beam.

Simple to adjust

PARASOL VAV provides optimal comfort through the built-in nozzle adjustment and with numerous setting options it can be easily be adjusted if the size of the premises or business changes. The comfort module can be set so that the air volume and air direction is different on each side and for both high and low airflow. See further information in the "Nozzle setting" section.

Range of Application

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

- Offices and conference rooms
- Classrooms
- Hotels
- Restaurants
- Hospitals
- Shops
- Shopping centres

With its many installation options, Parasol VAV can easily be adapted to new businesses or changes in the layout of the premises.

Easy to install

PARASOL VAV is compact and adapted to the most common module measurements, which also makes the unit easy to install. The small dimensions offer many advantages, especially when handling the products on site. This gives fewer handling injuries and a better working environment.

Market-based module dimensions

The order range includes module dimensions to fit the standardised ceiling measurement c-c 600, 625 and 675 mm. In addition, there is a mounting frame for drywall ceilings and ceiling solutions of the clip-in-type.

Always in stock

To ensure short delivery times, the standard versions of PARASOL VAV, with the most common functions, are held in stock.

PARASOL VAV Master and Slave

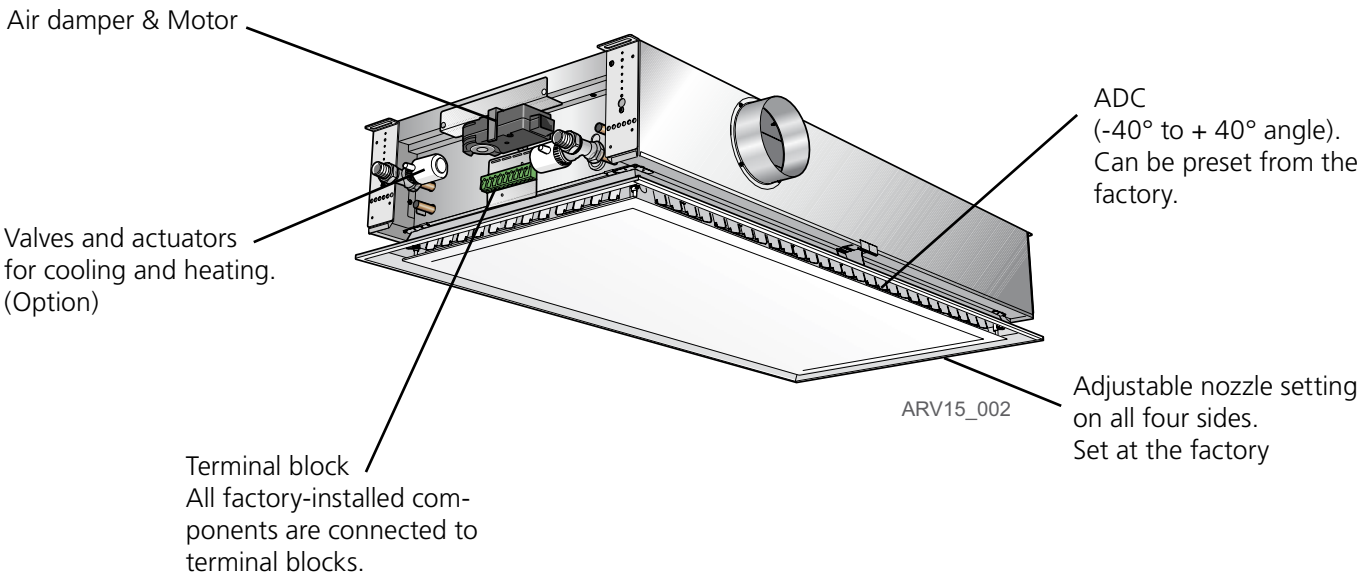


Figure 5. PARASOL VAV Slave
Each Slave unit is connected to a Master with a control kit.
Everything in the product can be installed directly from the factory.

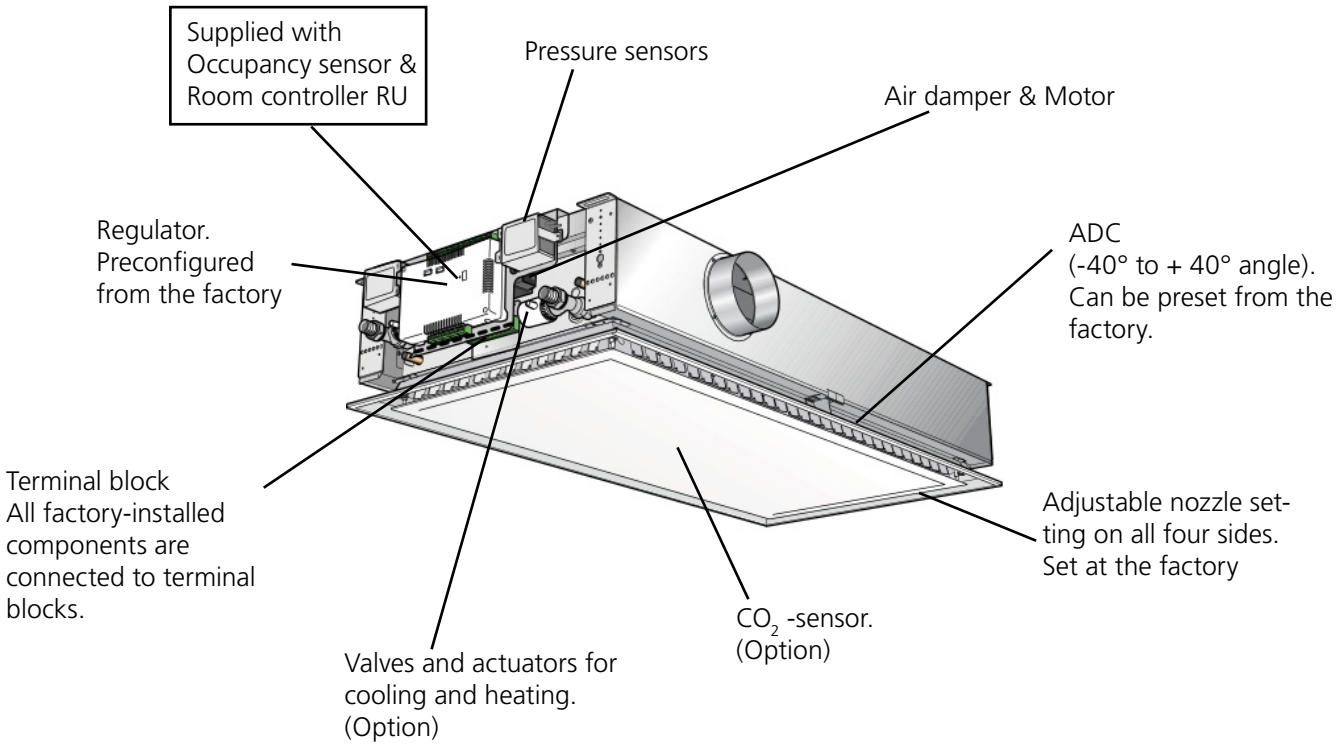


Figure 6. PARASOL VAV Master
Each room, irrespective of the number of comfort modules, requires 1 unit that is the Master and is equipped with a control kit.
Everything in the product can be installed directly from the factory.

PARASOL VAV

Master - Slave connection

For example on *Master - Slave connection*, figure 7.

Connection of occupancy sensors and forwarding to slave products are performed in connection with installation.

Room controller RU is placed in an appropriate place in the room. Battery operation and wireless communication to the regulator are used to produce a mobile room controller. A permanent room controller communicates and is powered via a cable connection

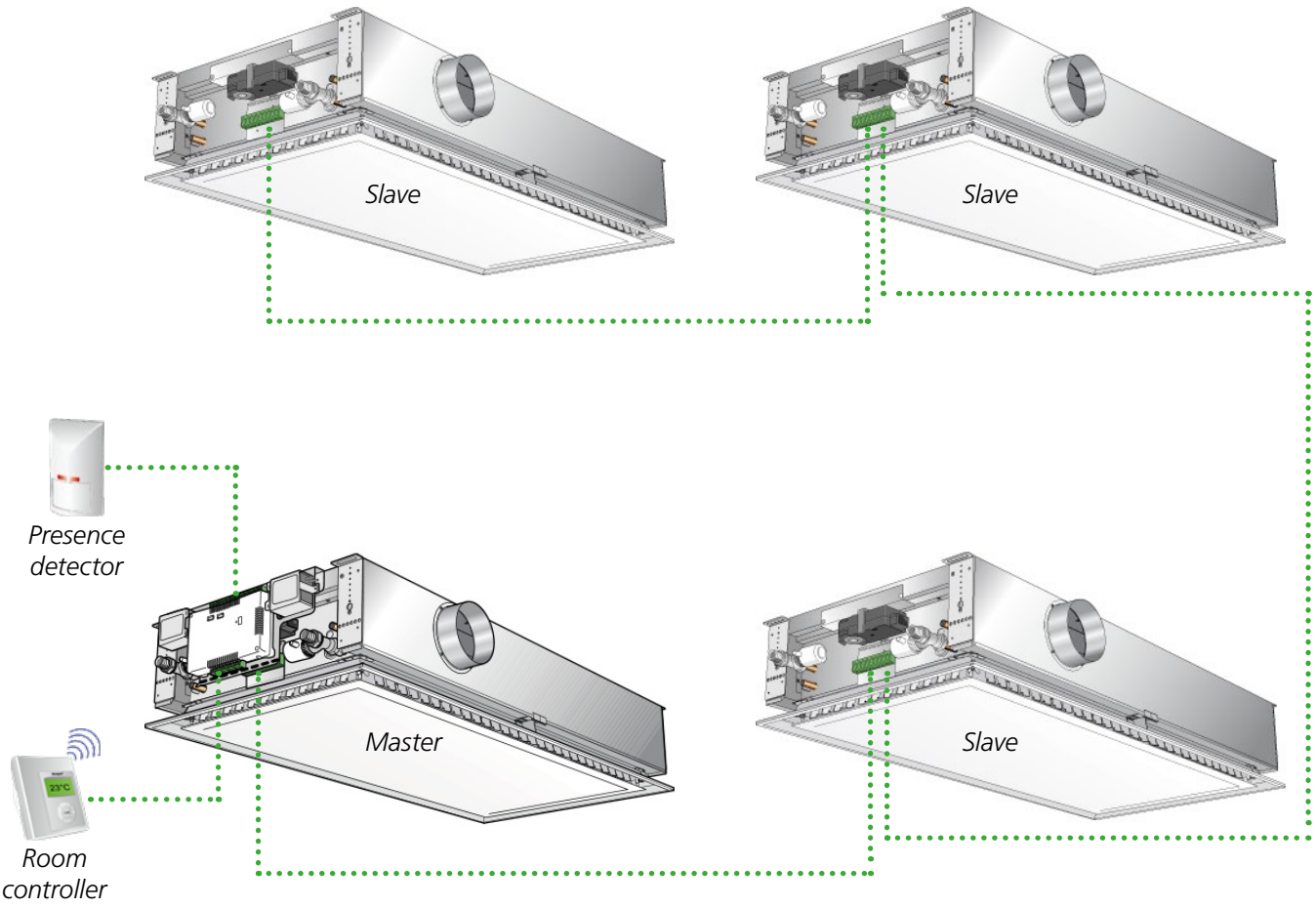
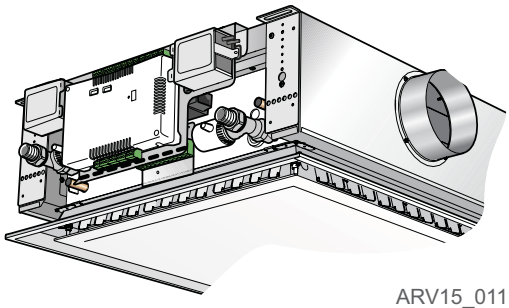


Figure 7. For example on PARASOL VAV Master - Slave connection

Demand-controlled climate in the room

CONDUCTOR W4.1 VAV

Our in-house developed room control equipment, CONDUCTOR, is used to achieve demand control of waterborne climate systems to meet prevailing conditions in offices, hotels, hospitals and conference rooms. CONDUCTOR W4.1 VAV is an optimised application for controlling cooling and heating in combination with demand-controlled supply air and includes a number of adaptable energy-saving functions.



ARV15_011b

Energy-saving regulation

Optimise CONDUCTOR W4.1 VAV for the current room by configuring the desired airflows for the absence flow, occupancy flow and maximum flow. These settings are the basis for the room's climate and energy use.

- **Absence flow** is adjusted to the desired airflow when no one is present in the room. PARASOL VAV can never have a fully closed airflow, the minimum air flow depends on the nozzle adjustment and the current duct pressure. The minimum airflow possible is usually 5-15% of the product's maximum airflow.
- **Occupancy flow** is adjusted to the output required when occupancy is detected. For a good function in the room and on the product this flow must be set so it corresponds to at least 40% of the product/products maximum airflow.
- **Maximum flow** is adjusted to a maximum of 100% of the maximum airflow of the product/products.

Situation matching

- Occupancy sensors continuously check whether someone is in the room and adjusts the airflow between the set absence flow and occupancy flow.
- CO_2 sensor (option) continuously measures the room's air quality. In the event of occupancy, the airflow is variably adapted between the set occupancy flow and the maximum flow to supply a sufficient airflow for the current occupancy.
- Pressure sensors measure the static air pressure on the supply and extract side. To-read pressure is used both for balancing the supply and extract air and for regulation of the air damper.
- Condensation sensor (option) placed in the *Master* detects any actual outcome condensation. If condensation outcome comes into question, all, cooling actuators connected to the regulator are closed to stop the precipitation of condensation. In conjunction with this, the supply flow is increased to the set maximum flow until the precipitation of condensation ceases. The product then returns to the set occupancy flow and the cooling actuators are permitted to open again if there is a cooling requirement.
- Window contact can be connected to the system to detect when a window is open or closed. If a window should be open the regulation adapts so that cooling, heating and ventilation are turned off to avoid unnecessary energy losses. If a window is left open, for example on a cold winter night, there is a built-in frost protection function that means the heating starts up when the room temperature is below 10 °C.

The regulating principle for CONDUCTOR W4.1 VAV is that when no one is present only a small amount of supply air is supplied so that the air will feel fresh when initially entering the room. When the system detects occupancy the airflow increases to the set occupancy flow. If the CO_2 sensor is installed the air quality is continuously measured. If the CO_2 level remains below the set maximum value (standard 800 ppm) the airflow is held constant at the occupancy airflow. Should the occupancy flow not be sufficient to keep the CO_2 level below the maximum value, the airflow is variably increased and is adapted to a flow that is sufficient to ensure the air quality. As a conference room is rarely full, the maximum flow is seldom reached. This regulating principle saves energy both for occupancy and absence.

Selectable sequences

As the need differs from case to case, CONDUCTOR W4.1 VAV is developed with selectable sequences for the cooling step order.

Water first/then air

For occupancy the room temperature is controlled first and foremost by means of water cooling. If water cooling is not sufficient, the air volume is increased variably until the desired room temperature is reached. The air volume is regulated simultaneously according to the CO_2 level. If the CO_2 level exceeds the preset maximum value, the airflow is increased to ensure the air quality, irrespective of whether this is required to regulate the room temperature. If the desired room temperature has been achieved, water cooling is switched off until there is a new cooling requirement.

Air first/then water

For occupancy the room temperature is controlled first and foremost by means of increased airflow. The airflow is increased variably until the desired room temperature is reached. If the maximum flow is reached and the room temperature still cannot reach the desired level, water cooling is started to increase cooling capacity. When the desired room temperature is reached, water cooling is shut off and the supply air regulates the temperature again. The air volume is regulated simultaneously according to the CO_2 level. If the CO_2 level exceeds the preset maximum value, the airflow is increased to ensure the air quality, irrespective of whether this is required to regulate the room temperature.

Manual control

Although CONDUCTOR W4.1 VAV is an intelligent and largely automated room control device it is still possible to control the room climate manually. This is performed using the Room controller RU, which communicates with the regulator wirelessly (or via a cable connection). The clear display, in combination with a clear and user-friendly keypad, means you can easily change the room temperature and airflow.

Adaptive regulation

CONDUCTOR W4.1 VAV can be pre-programmed at the factory as required with no further adjustment during installation. However, if you choose to pre-program some parameter adjustment is necessary and this is done using the hand-held unit.

The adaptive control is made possible with the help of the pressure sensors included in the system. Measuring the static pressure at appropriate reference points means that the regulator is constantly updated with the current pressures in the *Master* and the duct pressure after the extract air diffuser (if a room solution with balanced extract has been selected). Only the current pressure drop constants specified via the room controller to the regulator are needed in order to know which airflow is being distributed to the room. The regulator calculates which pressure represents the correct airflow and then adjusts the air damper/dampers until the correct pressure and thus the correct airflow to the room is reached.

The ease of adjustment is obvious, but there are also other advantages. A major one being that any pressure variations in the duct system do not affect the set airflows, as the damper angles are independent and are only controlled via the read pressure sensor values.

Data communication

The regulator has a built-in communication port that enables connection to an RS 485 network with Modbus RTU for supervising and overriding via a building management system.

For more information about CONDUCTOR W4.1 VAV, see the separate product sheet at www.swegon.com.

Nozzle setting

The unique built-in nozzle control in the Parasol VAV 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 all desired directions. The direction of the airflow can be easily optimized using the Swegon ProSelect sizing program available at www.swegon.com.

The required nozzle setting is made at the factory, but can if necessary be easily changed on site.

K-factor (COP)

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 for optimized nozzle setting can also be obtained in ProSelect.

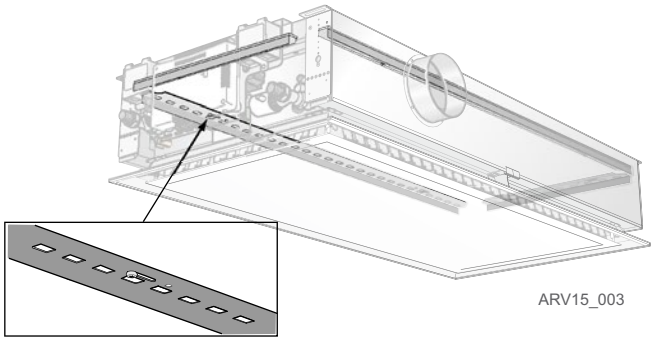


Figure 8. Nozzle setting

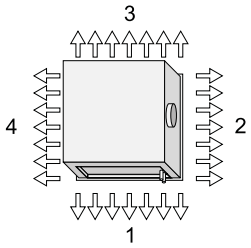


Figure 9. Top view, page 1-4 Parasol VAV 600

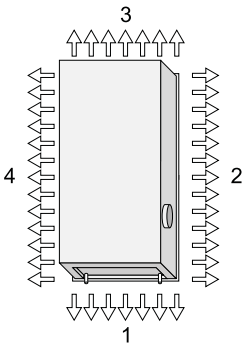


Figure 10. Top view, page 1-4 Parasol VAV 1200

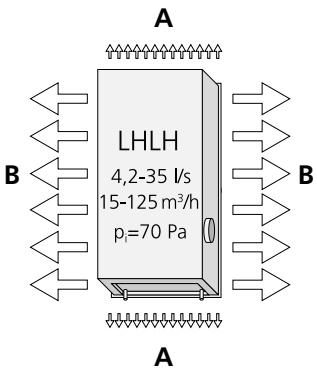


Figure 11. Example 1:
A = 2.1 l/s, (7.5 m³/h)
B = 15.4 l/s, (55.5 m³/h)

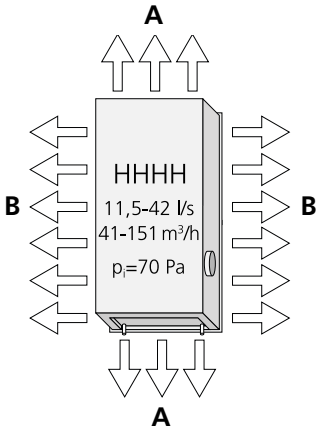


Figure 12. Example 2:
A = 5.7 l/s, (20.5 m³/h)
B = 15.25 l/s, (54.9 m³/h)

Specific nozzle settings

To specify optimized nozzle settings, always begin from the side with the water connection. From there, specify side after side in anticlockwise order,
see figure 9-10.

If you like, you can order the units preset from the factory (does not apply to units held in stock).

Example 1:
Nozzle setting LHLH gives the lowest possible absences flow (side 1 + 3 open). This provides a minimum flow/absence flow of 4.2 l/s (15 m³/h) and a maximum flow of 35 l/s (125 m³/h) at p_i = 70 Pa

Example 2:
If it instead is more important to get the highest possible maximum flow/output, the nozzles are set to position HHHH, i.e. fully open all around. A higher maximum flow is then obtained, but
with the consequence of a slightly higher absence flow.

These adjustments are only different settings on the same physical product, which means a very flexible and adaptable unit, in particular, together with the integrated software.

K-factors for each side can be obtained from the installation instructions on www.swegon.se, but even easier in ProSelect where you can quickly test different variants.

ADC

All the comfort modules are supplied with the ADC air deflector.
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 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°. This provides great flexibility and can be easily adjusted without having to affect the system as a whole.

The ADC does not affect the noise level or static pressure at all. The water capacity is reduced by 5 - 10% if the ADCII is adjusted to "fan-shape" (see C in figure 13).

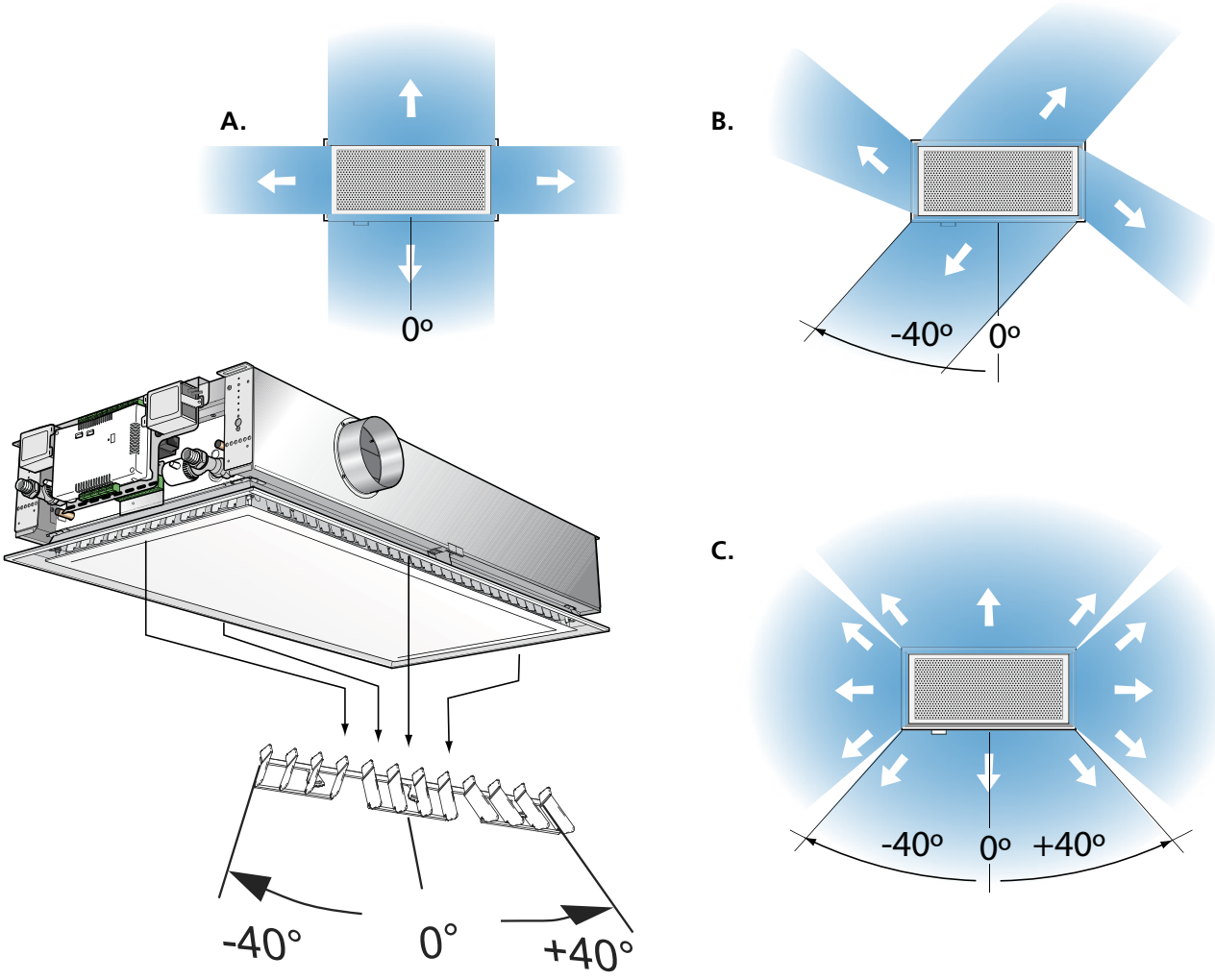


Figure 13. Setting options ADC. Setting range from -40° to +40° in increments of 10°.

A. Straight setting

B. X-shape

C. Fan shape

WISE system

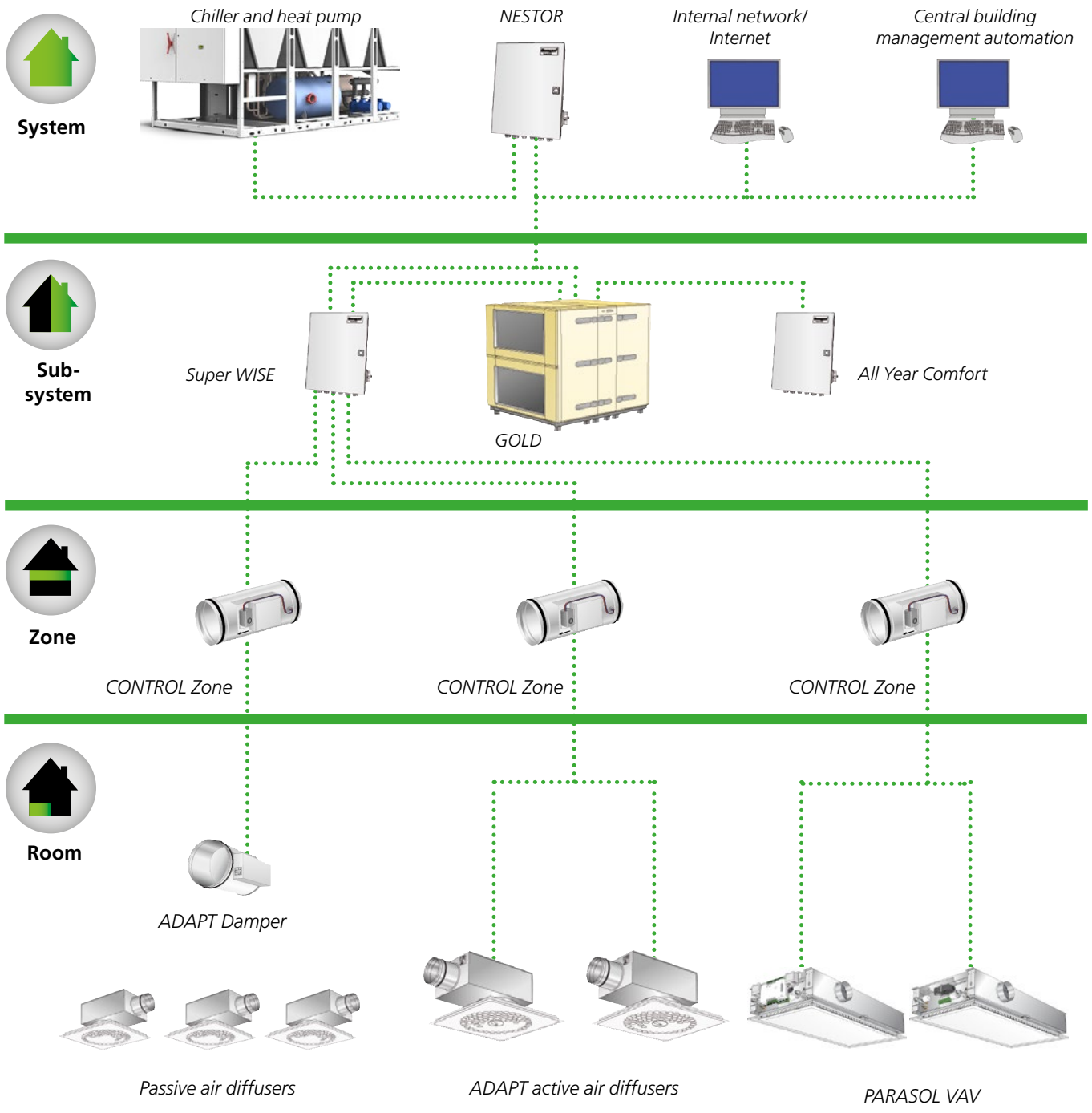


Figure 14. Examples of how the PARASOL VAV can be connected to a WISE system

Part of the WISE system

If the need exists, PARSOL VAV can be part of the WISE Swegon system for demand-controlled ventilation. This is then done at room level.

PARASOL VAV communicates, via SuperWise a communication unit, which via Modbus RTU connects all parts of the WISE system, with other WISE Products in the system and all the way up to the GOLD air handling unit.

Zones must have a constant pressure in order for PARASOL VAV to work in the WISE system. This is achieved by using Swegon's zone damper, CONTROL Zone.

Typical room drawings

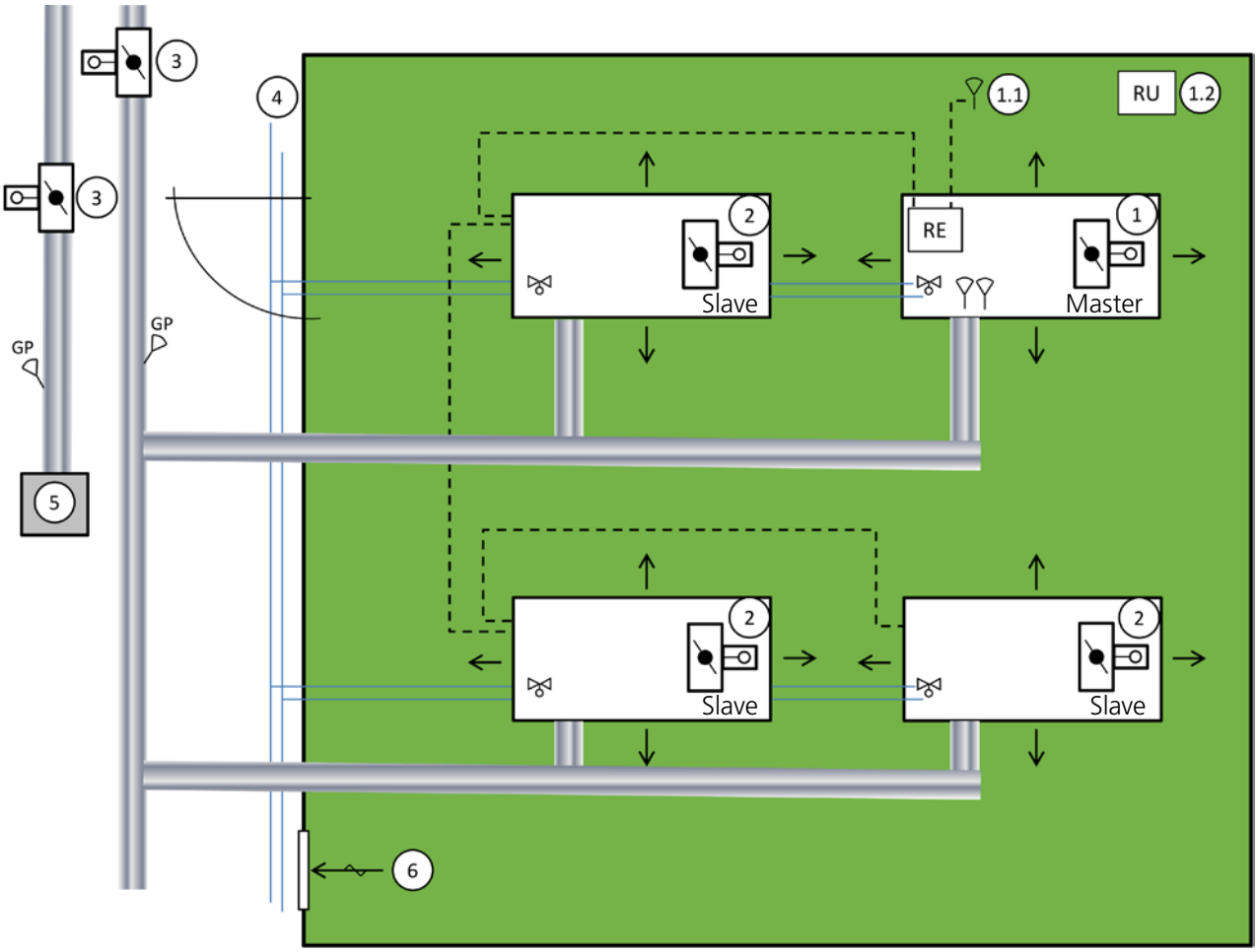


Figure 15. Typical room 1 shows Parasol VAV master with 3 Parasol VAV slaves in an office. Extract air via the air transfer grille (balance on zone level).

1. *Comfort module Parasol VAV master with supply and cooling incl.*
   - *2 pressure sensors (installed on the product)*
   - *Presence detector (installed in the room), ref. 1.1*
   - *Wireless room terminal incl. temperature sensor (placed in the room), ref. 1.2*
   - *RE, controller Conductor (installed on the product)*
   - *Air damper with motor (installed on the product)*
2. *Comfort module Parasol VAV slave with supply and cooling incl.*
   - *Air damper with motor*
3. *Zone dampers for constant pressure, for example, CONTROL Zone*
4. *Cooling water*
5. *Extract air diffuser*
6. *Extract air via air transfer grille to the corridor*

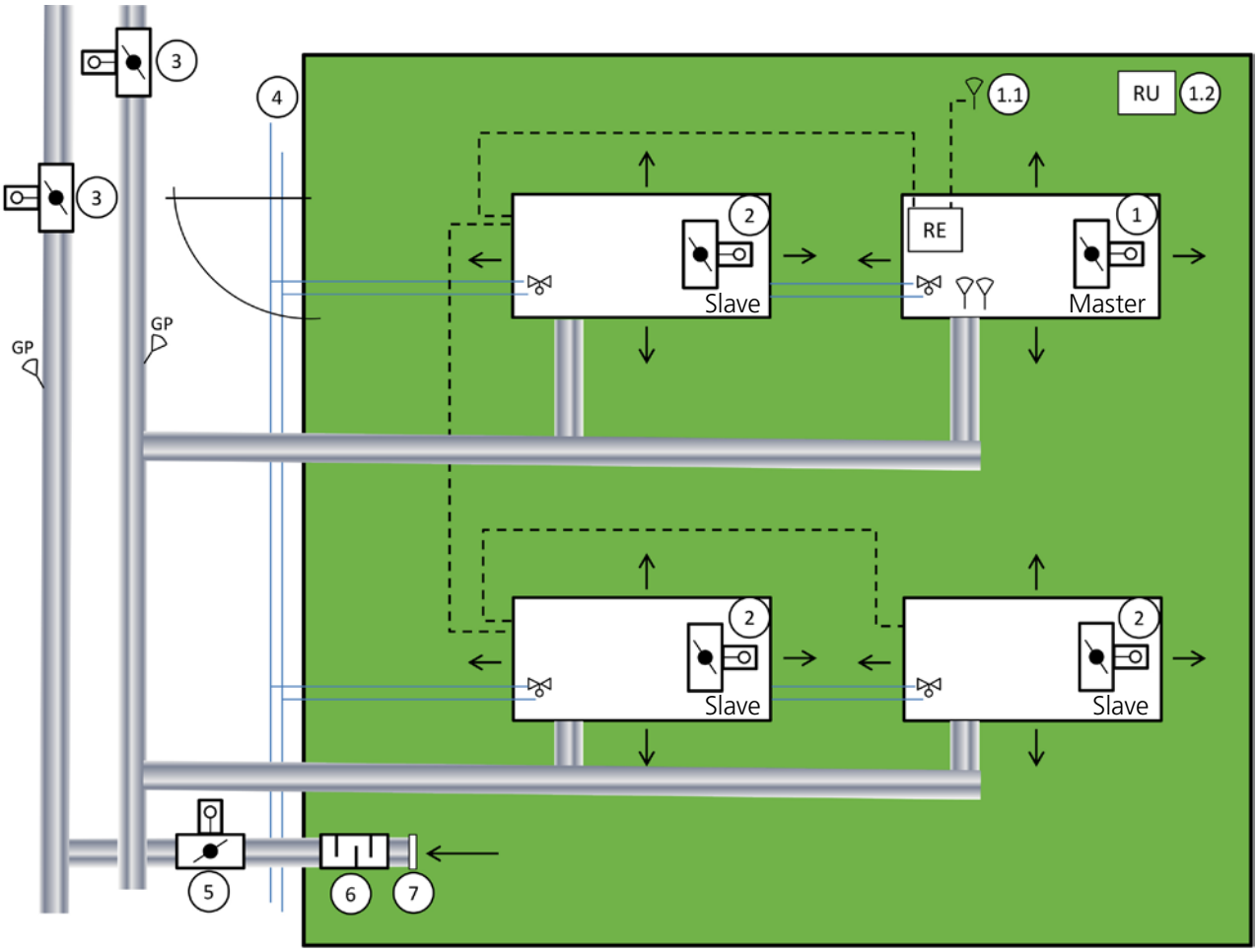


Figure 16. Typical room 2 shows Parasol VAV master with 3 Parasol VAV slaves in an office. Supply and extract air in balance.

1. *Comfort module Parasol VAV master with supply and cooling incl.*
   - *2 pressure sensors (installed on the product)*
   - *Presence detector (installed in the room), ref. 1.1*
   - *Wireless room terminal incl. temperature sensor (placed in the room), ref. 1.2*
   - *RE, controller Conductor (installed on the product)*
   - *Air damper with motor (installed on the product)*
2. *Comfort module Parasol VAV slave with supply and cooling incl.*
   - *air damper with motor*
3. *Zone dampers for constant pressure, for example, CONTROL Zone*
4. *Cooling water*
5. *Extract air damper, "SLAVE Room" which is controlled from Conductor or ADAPT Damper which is balanced by via SuperWise*
6. *Sound attenuator, for example, CLA or Sordo*
7. *Grille or fully open extract air diffuser type EXC*

Installation

Recommended ceiling types

The PARASOL VAV is designed for use in most T-bar and clip-in ceiling systems both in terms of length and width. In order to guarantee a good fit in T-bar systems, we recommend T sections with a width of 24 mm.

Suspension:

PARASOL VAV has four mounting brackets for their suspension, and are installed using one threaded rod in each mounting bracket (Figure 20). A double threaded rod with a thread lock should be used if there is substantial distance between the overhead slab and the unit.

The threaded rods and assembly pieces SYST MS M8 (Figure 21) are ordered separately.

Connection dimensions

Water:

Without valves:

Supply cooling water	Plain pipe ends (Cu) Ø 12 x 1.0 mm
Return cooling water	Plain pipe ends (Cu) Ø 12 x 1.0 mm
Supply heating water	Plain pipe ends (Cu) Ø 12 x 1.0 mm
Return heating water	Plain pipe ends (Cu) Ø 12 x 1.0 mm

With factory fitted valves:

Supply cooling water	Plain pipe ends (Cu) Ø 12 x 1.0 mm
Return cooling water	Male thread DN15 (1/2")
Supply heating water	Plain pipe ends (Cu) Ø 12 x 1.0 mm
Return heating water	Male thread DN15 (1/2")

Air:

Connecting fitting	Ø 125 mm
Connecting fitting, variant PF	Ø 160 mm

To connect the air

PARASOL VAV is supplied as standard with an open air connection on the right-hand side (viewed from the end where the water is connected).

The air connection piece is mounted on delivery so that it later can be connected to the primary air duct (see Figure 17). A cover is factory-fitted to the left-hand air connection, however it can be easily moved to the other side if the air connection piece is to be fitted to the left.

To connect the water pipes

Connect the water pipes using push-on couplings or compression ring couplings when the product is ordered without valves. Note that compression ring couplings require support sleeves inside the pipes.

Soldered couplings must be used for the connection of the water pipes. High temperatures can damage the unit's existing soldered joints.

Flexible connection hoses for water are available for plain pipe ends and valves and are ordered separately.

Condensation-free cooling

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

CE marking

PARASOL VAV is CE marked according to applicable provisions.
The CE Declaration of Conformity is available at our website:
www.swegon.com.

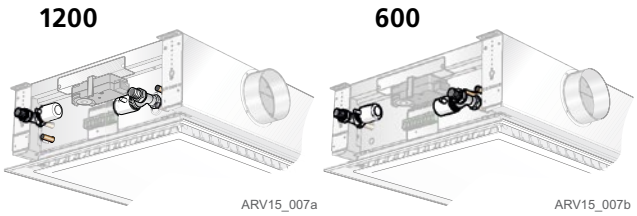


Figure 17. Water connection with factory fitted valves

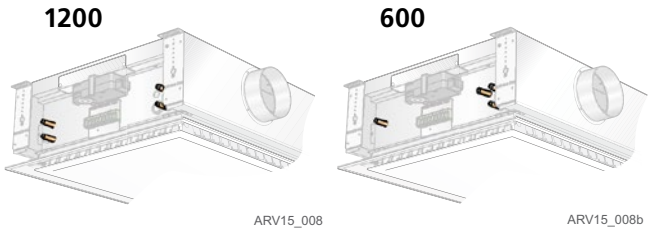


Figure 18. Water connection without factory fitted valves

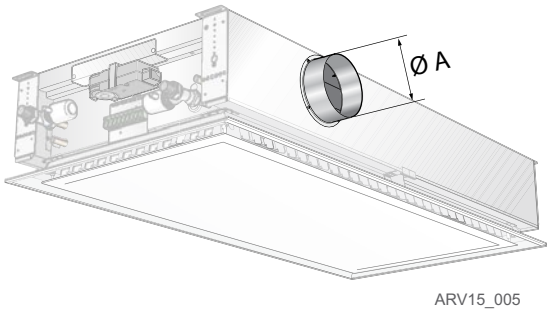


Figure 19. Air connection piece

Variants**:**

PARASOL VAV 600	*A = Ø 125 mm*
PARASOL VAV 600 PF	*A = Ø 160 mm*
PARASOL VAV 1200	*A = Ø 125 mm*
PARASOL VAV 1200 PF	*A = Ø 160 mm*

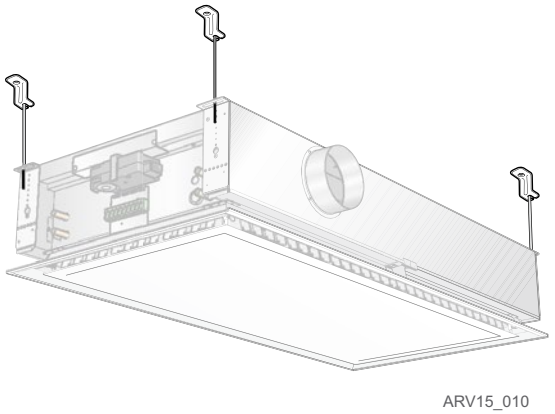


Figure 20. Suspension double-module units

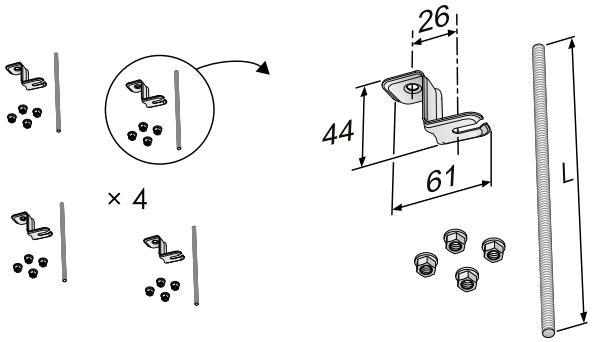


Figure 21. Assembly piece SYST MS M8-1, ceiling mount and threaded rod

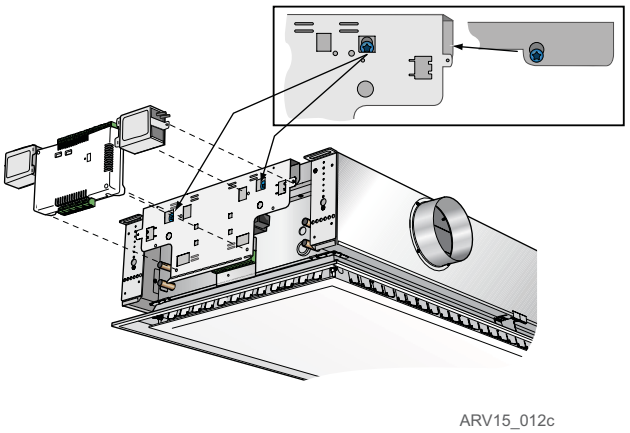


Figure 22. All control equipment is collected on the same short side to facilitate work during installation and service.

Regulator and pressure sensors are mounted on a plate, which can be removed if necessary by loosening two screws.

Technical data

Total cooling capacity, max.	2055 W
Heating capacity, water, max.	2700 W
Airflow:	
Single-module unit	7-34 l/s, (25-122 m^3/h)
Double module unit	7-85 l/s, (25-305 m^3/h)
Length:	
Single-module unit	584; 592; 598; 617; 623; 642; 667 mm
Double module unit	1184; 1192; 1198; 1242; 1248; 1292; 1342 mm
Width:	
Single and double-module units	584; 592; 598; 617; 623; 642; 667 mm
Height:	
PARASOL VAV 600	220 mm
PARASOL VAV 600 PF	250 mm
PARASOL VAV 1200	220 mm
PARASOL VAV 1200 PF	250 mm

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

Power consumption

Power consumption for transformer rating:

Actuator	6 VA
Damper motor	2.5 VA*
CONDUCTOR	1 VA
Presence detector	1 VA

** Always included in the product*

Recommended limit values

Pressure levels

Coil working pressure, max.	1600 kPa *
Coil test pressure, max.	2400 kPa *

** Applicable without control equipment mounted*

Nozzle pressure	50-150 Pa
– Recommended min. nozzle pressure if coil heating is used, p_i	70 Pa
Recommended minimum nozzle pressure with face plate in the high output mode, 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

Temperature differences are always expressed in Kelvin (K).

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

Flow temperature

Cooling water	**
Heating water, max.	60 °C

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	Flow (l/s)
p	Pressure (Pa)
Δp	Pressure drop (Pa)

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

Nozzle pressure (commissioning pressure)

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

p_l	Nozzle pressure (pa)
q_l	Flow of primary air (l/s)
k_{pl}	Pressure drop constant for nozzle setting, see Tables 1-4

Cooling

Default

The cooling capacities have been measured in conformance with EN 15116 Standard and have been recalculated for a constant water flow 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 for the application. The values for the calculations can be taken from the tables.

Pressure drop in cooling coil

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

- Δp_k Pressure drop in cooling coil (kPa)
- q_k Flow of cooling water (l/s), see Diagram 1
- k_{pk} Pressure drop constant for cooling coil, see Tables 1-4

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)

Corrected capacity – water flow

Different water flow rates to some extent have effects on the capacity output. By checking calculated water flow against Diagrams 2 or 3, the capacity indicated in Tables 1-4 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

Calculation example - cooling

A cellular office with dimensions w × d × h = 2.4 × 4 × 2.7 m is to be equipped with a comfort module. The total cooling requirement is estimated to 50 W/m^2. In order to meet this cooling requirement one Parasol VAV is needed that gives 50 x 2.4 x 4 = 480 W.
Design room temperature (t_r) 24°C, cooling water temperature (flow/return) 14/16°C and the primary air temperature(t_l) 16°C produces:

ΔT_k= 2 K

ΔT_{mk}= 9 K

ΔT_l= 8 K

The desired primary supply air flow for the room (q_l) has been fixed at 16 l/s. A zone damper ensures that the pressure in the duct is held constant at 70 Pa.
The sound from the unit must not exceed 30 dB (A).

Solution

Cooling

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

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

$P_l = 1.2 \cdot 16 \cdot 8 = 154$ W

Accordingly, the comfort module Parasol VAV must be able too give 480 – 154 = 326 W in cooling capacity on the water side.

From Table 1 we can read that a Parasol VAV 592 × 592 mm with a nozzle setting LHLH for a primary airflow of 16 l/s gives 444 W in cooling capacity on the water side. Thus this is sufficient to meet the cooling requirement.

At the same time, this nozzle configuration means that a large amount of air can be saved for absence mode, which in this case gives 4.6 l/s.

Alternatively, nozzle HHHH can be set, it then gives more air for absence (minor saving), but an overcapacity in airflow and cooling is available if, for example, you visit the office often.

Cooling water

With a cooling capacity requirement of 326 W for cooling water, the necessary water flow can be obtained in Diagram 1. With the temperature increase ΔT_k= 2K the water flow will be 0.039 l/s.

In Diagram 2 we can read that a water flow of 0.039 l/s does not produce a fully turbulent outflow, but the capacity must be corrected by a reduction factor of 0.97.

The loss of capacity is compensated by calculating the comfort module's required cooling capacity as follows:
P_k = 326 / 0.97 = 336 W.

New water flow is obtained from Diagram 1, q_k = 0.040 l/s. The pressure drop is calculated on the basis of a water flow of 0.040 l/s and the pressure drop constant k_{pk} = 0.020, which is taken from Table 1.
The pressure drop can now be read at 4.0 kPa from Diagram 4.

Diagram 1. Water flow - cooling capacity

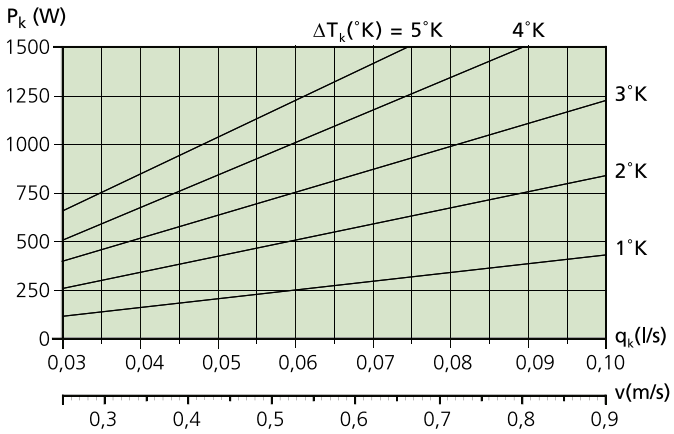


Diagram 2. Corrected capacity – water flow, PARASOL VAV 600

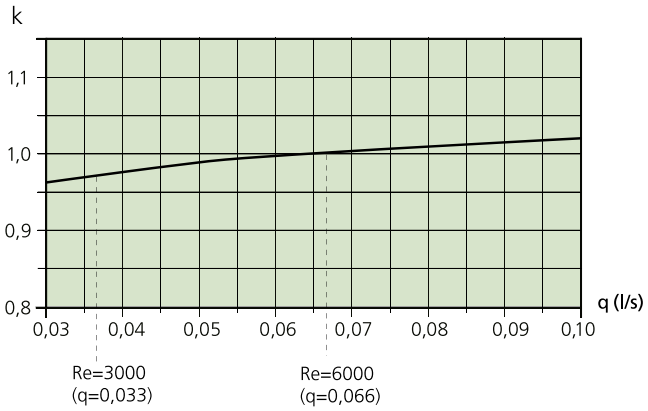


Diagram 3. Corrected capacity – water flow, PARASOL VAV 1200

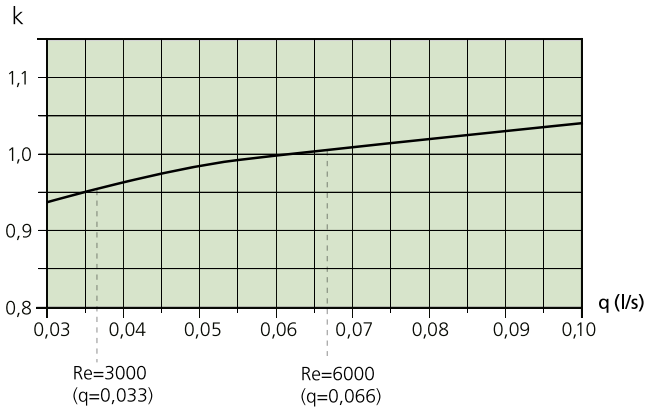


Diagram 4. Pressure drop – water flow, cooling

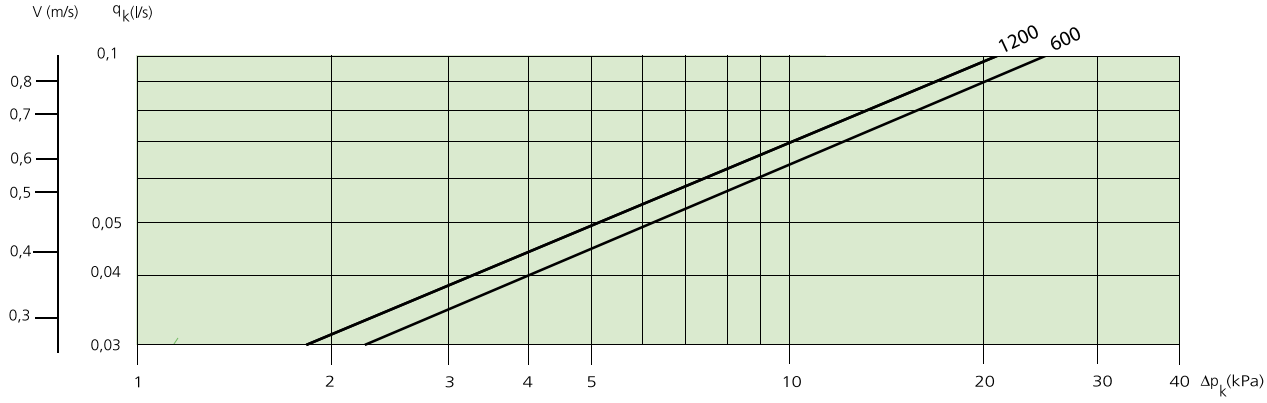


Table 1. Cooling capacity PARASOL VAV 600

Nozzle pressure	Nozzle setting 1)	Primary airflow		Sound level 2)	Cooling capacity of primary air (W) for ΔT_l				Cooling capacity of water (W) for ΔT_{mk} 3)						Pressure drop constant air/water	
		(l/s)	(m^3/h)	dB(A)	6	8	10	12	6	7	8	9	10	11	k_{pl}	k_{pk}
50 Pa	LLLL	7.2	25.9	<20	52	69	86	104	196	226	258	287	319	348	1.01	0.0200
	LHLH	13.4	48.2	<20	96	129	161	193	258	300	338	380	422	464	1.89	0.0200
	HHHH	19.6	70.6	20	141	188	235	282	278	324	370	415	461	502	2.77	0.0200
70 Pa	LLLL	8.5	30.6	<20	61	82	102	122	228	266	304	338	376	413	1.01	0.0200
	LHLH	15.9	57.2	24	114	153	191	229	303	352	396	444	492	540	1.89	0.0200
	HHHH	23.2	83.5	25	167	223	278	334	326	379	431	483	534	581	2.77	0.0200
90 pa	LLLL	9.6	34.6	20	69	92	115	138	255	297	335	377	418	460	1.01	0.0200
	LHLH	18,0	64.8	28	130	173	216	259	333	386	439	492	544	592	1.89	0.0200
	HHHH	26.3	94.7	29	189	252	316	379	363	420	477	534	590	636	2.77	0.0200

Table 2. Cooling capacity PARASOL VAV 600 PF

Nozzle pressure	Nozzle setting 1)	Primary airflow		Sound level 2)	Cooling capacity of primary air (W) for ΔT_l				Cooling capacity of water (W) for ΔT_{mk} 3)						Pressure drop constant air/water	
		(l/s)	(m^3/h)	dB(A)	6	8	10	12	6	7	8	9	10	11	k_{pl}	k_{pk}
50 Pa	LLLL	22.1	79.6	23	212	265	318	159	214	251	285	323	360	395	3.13	0.023
	LHLH	27.9	100.4	27	268	335	402	201	243	281	323	366	408	447	3.95	0.023
	HHHH	33.7	121.3	27	324	404	485	243	261	306	352	393	439	485	4.76	0.023
70 Pa	LLLL	26.2	94.3	28	252	314	377	189	263	308	352	392	437	481	3.13	0.023
	LHLH	33	118.8	31	317	396	475	238	288	337	386	436	485	534	3.95	0.023
	HHHH	39.8	143.3	32	382	478	573	287	310	362	415	467	520	573	4.76	0.023
90 pa	LLLL	29.7	106.9	31	285	356	428	214	301	351	395	445	494	543	3.13	0.023
	LHLH	37.5	135.0	35	360	450	540	270	325	380	434	488	543	597	3.95	0.023
	HHHH	45.2	162.7	36	434	542	651	325	342	400	462	520	578	636	4.76	0.023

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

2) Room attenuation = 4 dB

3) The specified capacities are based on a high output mode. Operation with the face plate set to the normal position reduces the water capacity of PARASOL VAV 600 by about 5% and that of the PARASOL VAV 1200 by about 10 %.
The water capacity can vary depending on the installation and how the air deflectors are set. The primary air capacity is not affected.
Note! The total cooling capacity is the sum of the airborne and waterborne cooling capacities.

Table 3. Cooling capacity PARASOL VAV 1200

Nozzle pressure	Nozzle setting 1)	Primary airflow		Sound level 2)	Cooling capacity of primary air (W) for ΔT_l				Cooling capacity of water (W) for ΔT_{mk} 3)					Pressure drop constant air/water	
		(l/s)	(m^3/h)	dB(A)	6	8	10	12	6	7	8	9	10	k_{pl}	k_{pk}
50 Pa	LLLL	13.0	46.8	<20	94	125	156	187	383	444	504	570	630	1.84	0.0220
	LHLH	29.4	105.8	22	212	282	353	423	499	580	653	733	806	4.16	0.0220
	HHHH	35.6	128.2	26	256	342	427	513	520	596	678	753	827	5.04	0.0220
70 Pa	LLLL	15.4	55.4	20	111	148	185	222	432	500	574	641	708	1.84	0.0220
	LHLH	34.8	125.3	26	251	334	418	501	557	646	733	813	899	4.16	0.0220
	HHHH	42.2	151.9	29	304	405	506	608	580	663	753	842	922	5.04	0.0220
90 pa	LLLL	17.5	63.0	<20	126	168	210	252	471	544	624	696	768	1.84	0.0220
	LHLH	39.5	142.2	29	284	379	474	569	603	697	790	875	966	4.16	0.0220
	HHHH	47.8	172.1	32	344	459	574	688	627	715	810	904	989	5.04	0.0220

Table 4. Cooling capacity PARASOL VAV 1200 PF

Nozzle pressure	Nozzle setting 1)	Primary airflow		Sound level 2)	Cooling capacity of primary air (W) for ΔT_l				Cooling capacity of water (W) for ΔT_{mk} 3)					Pressure drop constant air/water	
		(l/s)	(m^3/h)	dB(A)	6	8	10	12	6	7	8	9	10	k_{pl}	k_{pk}
50 pa	LLLL	40.6	146.2	25	292	390	487	585	353	409	465	520	576	5.74	0.022
	LHLH	53.8	193.7	25	387	516	646	775	393	460	522	583	644	7.61	0.022
	HHHH	59.6	214.6	26	429	572	715	858	411	475	538	601	664	8.42	0.022
70 pa	LLLL	48.0	172.8	30	346	461	576	691	418	484	548	613	683	5.74	0.022
	LHLH	63.7	229.3	30	459	612	764	917	468	539	611	688	759	7.61	0.022
	HHHH	70.4	253.4	32	507	676	845	1014	481	554	634	707	787	8.42	0.022
90 pa	LLLL	54.5	196.2	33	392	523	654	785	469	541	612	690	760	5.74	0.022
	LHLH	72.2	259.9	34	520	693	866	1040	521	600	685	763	848	7.61	0.022
	HHHH	79.9	287.6	36	575	767	959	1151	535	615	703	791	870	8.42	0.022

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

2) Room attenuation = 4 dB

3) The specified capacities are based on a high output mode. Operation with the face plate set to the normal position reduces the water capacity of PARASOL VAV 600 by about 5% and that of the PARASOL VAV 1200 by about 10 %.
The water capacity can vary depending on the installation and how the air deflectors are set. The primary air capacity is not affected.
Note! The total cooling capacity is the sum of the airborne and waterborne cooling capacities.

Table 5. 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 VAV 600	17	21	25	29	34	39	43
PARASOL VAV 1200	41	51	61	72	83	95	107

Heating

Heating function

As the comfort module is able to quickly mix the primary air with room the air, PARASOL VAV is ideal to manage both cooling and heating. Heating spaces with air heated above room temperature discharged from the ceiling is a good alternative to conventional radiator heating solutions.

Some of the benefits achieved include:
- Low installation cost
- Simple Installation
- Perimeter walls are kept free of installations.

When PARASOL VAV maintains a high nozzle pressure even at low flow rates, there is a specific heating output even, for example, for weekend operations when the flow is reduced over a longer period.

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 the optimal comfort requirements are normally met when the room temperature is 22°C. 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 worse windows, it may be necessary to raise the air temperature to compensate for the chilling effect. Different operating scenarios can be simulated easily using the Swegon ProClim Web software where both the room air temperature and operative temperature are specified.

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 present, the stratification is reduced or disappears depending on the heating load.

When heating with PARASOL VAV, use of an external temperature sensor or additional sensor module in the room is recommended.

Calculation formulae - water-based 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 6-9.

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)

Pressure drop for heating coil

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

Δp_v	Pressure drop in cooling coil (kPa)
q_v	Flow of heating water (l/s), see Diagram 6
k_{pv}	Pressure drop constant for heating coil, see Tables 6-9

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)

Calculation Example - Heating

In a cellular office with dimensions w × d × h = 2.4 × 4 × 2.7 m (same room as in the example for cooling) there is also heating requirement during the winter of 450 W. The primary airflow must be
the same as in the summer case, 16 l/s. The duct pressure is now also held constant.
Design room temperature (t_r) 22°C, the hot water temperature (flow/return) 45/39°C and the primary air temperature (t_l) 20°C gives:
ΔT_v = 6 K
ΔT_{mv} = 20 K
ΔT_l = -2 K

Solution

Heating

The primary airflow of 16 l/s in combination with the primary air temperature of 20°C produces a negative impact on the
heating capacity:
1.2 × 16 × (-2) = -38 W.

The heating capacity requirement from the heating water is thus increased:
450 + 38 = 488 W.

Table 6 gives at ΔT_{mv} = 20 K and primary air flow 16 l/s, a heat capacity P_v = 585 W from a single-module unit with nozzle setting LHLH, which is enough to meet the heating requirement.

Heating water

With a heating requirement of 488 W and ΔT_v = 6 K the requisite
water flow is then obtained from Diagram 5:
0.019 l/s.

The pressure drop for the heating water is calculated on the basis of a water flow of 0.019 l/s and pressure drop constant k_{pv} = 0.0241, which is taken from Table 6. The pressure drop will then be:
$\Delta p_v = (q_v/k_{pv})^2 = (0.019 / 0.0241)^2 = 0.62$ kPa.

Alternatively, the pressure drop can be read from Diagram 6.

Diagram 5. Water flow - heating capacity

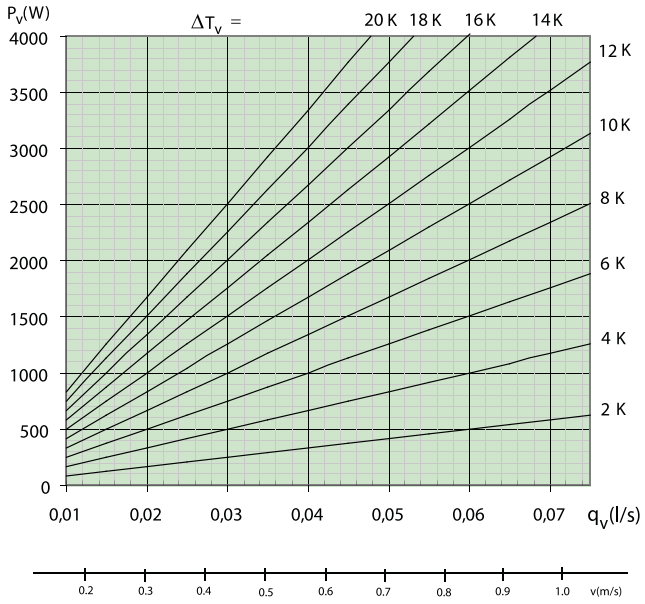


Diagram 6. Pressure drop – heating water flow

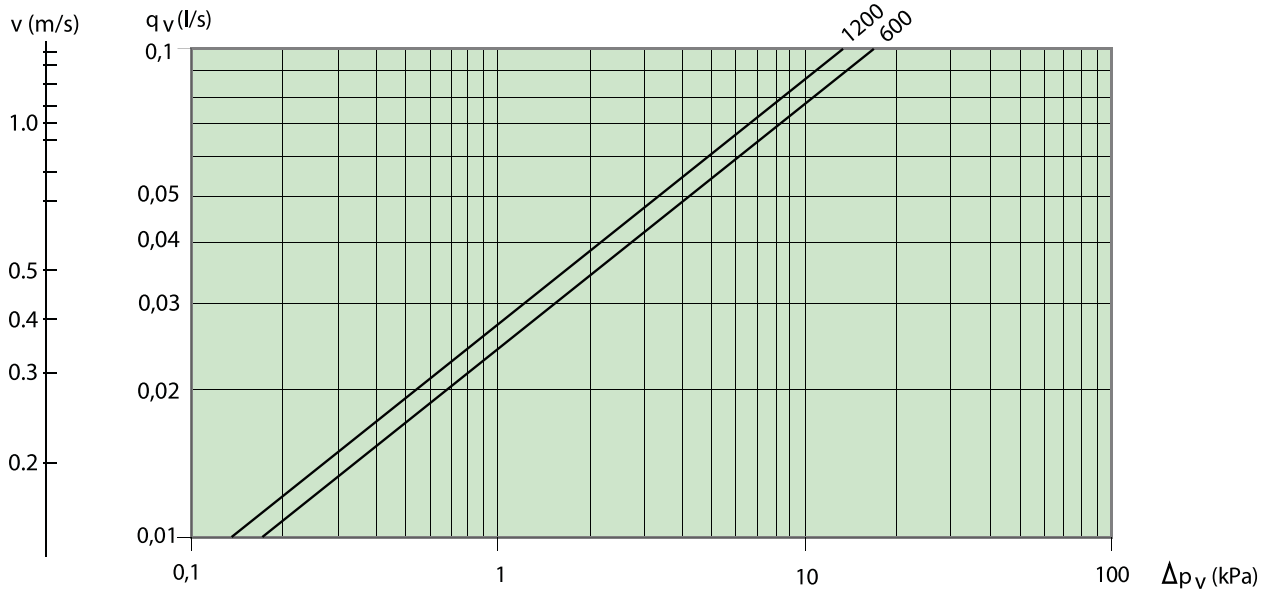


Table 6 - Heating capacity PARASOL VAV 600

Nozzle pressure	Nozzle setting 1)	Primary air flow		Sound level 2)	Heating capacity, water (W) for ΔT_{mv} 3)						Pressure drop constant air/water	
		(l/s)	(m^3/h)	dB(A)	5	10	15	20	25	30	k_{pl}	k_{pv}
50 Pa	LLLL	7.2	25.9	<20	101	202	303	401	501	601	1.01	0.0241
	LHLH	13.4	48.2	<20	132	264	388	515	637	762	1.89	0.0241
	HHHH	19.6	70.6	20	142	285	420	556	688	819	2.77	0.0241
70 Pa	LLLL	8.5	30.6	<20	116	235	350	466	583	698	1.01	0.0241
	LHLH	15.9	57.2	24	148	297	439	585	726	867	1.89	0.0241
	HHHH	23.2	83.5	25	161	320	471	626	775	924	2.77	0.0241
90 pa	LLLL	9.6	34.6	20	130	257	386	514	641	769	1.01	0.0241
	LHLH	18,0	64.8	28	163	323	480	635	788	943	1.89	0.0241
	HHHH	26.3	94.7	29	173	347	513	677	841	1002	2.77	0.0241

Table 7 - Heating capacity PARASOL VAV 600 PF

Nozzle pressure	Nozzle setting 1)	Primary air flow		Sound level 2)	Heating capacity, water (W) for ΔT_{mv} 3)						Pressure drop constant air/water	
		(l/s)	(m^3/h)	dB(A)	5	10	15	20	25	30	k_{pl}	k_{pv}
50 Pa	LLLL	22.1	79.6	23	108	221	339	456	575	696	3.13	0.018
	LHLH	27.9	100.4	27	109	233	360	494	631	770	3.95	0.018
	HHHH	33.7	121.3	27	109	239	378	521	669	820	4.76	0.018
70 Pa	LLLL	26.2	94.3	28	126	255	390	527	665	804	3.13	0.018
	LHLH	33	118.8	31	129	269	414	562	713	867	3.95	0.018
	HHHH	39.8	143.3	32	131	277	429	588	747	911	4.76	0.018
90 pa	LLLL	29.7	106.9	31	137	282	429	581	731	882	3.13	0.018
	LHLH	37.5	135.0	35	142	294	453	611	775	939	3.95	0.018
	HHHH	45.2	162.7	36	146	306	468	635	805	977	4.76	0.018

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

2) Room attenuation = 4 dB

3) The specified capacities are based on a high output mode. Operation with the face plate set to the normal position reduces the water capacity of the PARASOL VAV 600 by about 5% and that of the PARASOL VAV 1200 by about 10 %.
The water capacity can vary depending on the installation and how the air deflectors are set. The primary air capacity is not affected.
Note! The total heating capacity is the sum of the airborne and waterborne heating capacities. If the primary air temperature is lower than the room temperature, it causes a negative impact on the total heating capacity.

Table 8 - Heating capacity PARASOL VAV 1200

Nozzle pressure	Nozzle setting 1)	Primary air flow		Sound level 2)	Heating capacity, water (W) for ΔT_{mv} 3)						Pressure drop constant air/water	
		(l/s)	m³/h	dB(A)	5	10	15	20	25	30	k_{pl}	k_{pv}
50 Pa	LLLL	13.0	46.8	<20	173	348	643	944	1117	1291	1.84	0.0273
	LHLH	29.4	105.8	22	221	446	823	1207	1432	1653	4.16	0.0273
	HHHH	35.6	128.2	26	227	457	850	1243	1475	1706	5.04	0.0273
70 Pa	LLLL	15.4	55.4	20	197	391	729	1063	1260	1453	1.84	0.0273
	LHLH	34.8	125.3	26	247	494	919	1345	1592	1826	4.16	0.0273
	HHHH	42.2	151.9	29	253	507	948	1384	1642	1873	5.04	0.0273
90 pa	LLLL	17.5	63.0	<20	212	424	787	1156	1368	1580	1.84	0.0273
	LHLH	39.5	142.2	29	263	532	990	1448	1717	1947	4.16	0.0273
	HHHH	47.8	172.1	32	274	544	1019	1487	1762	1994	5.04	0.0273

Table 9 - Heating capacity PARASOL VAV 1200 PF

Nozzle pressure	Nozzle setting 1)	Primary air flow		Sound level 2)	Heating capacity, water (W) for ΔT_{mv} 3)						Pressure drop constant air/water	
		(l/s)	m³/h	dB(A)	5	10	15	20	25	30	k_{pl}	k_{pv}
50 pa	LLLL	40.6	146.2	25	268	511	743	975	1200	1422	5.74	0.027
	LHLH	52.0	193.7	25	305	576	843	1100	1358	1608	7.61	0.027
	HHHH	59.6	214.6	26	315	599	874	1140	1406	1664	8.42	0.027
70 pa	LLLL	48.0	172.8	30	315	602	882	1157	1423	1691	5.74	0.027
	LHLH	63.7	229.3	30	354	677	992	1302	1607	1879	7.61	0.027
	HHHH	70.4	253.4	32	369	702	1026	1344	1659	1933	8.42	0.027
90 pa	LLLL	54.5	196.2	33	351	673	986	1294	1593	1868	5.74	0.027
	LHLH	72.2	259.9	34	392	758	1109	1450	1792	2063	7.61	0.027
	HHHH	79.9	287.6	36	402	778	1139	1501	1852	2119	8.42	0.027

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

2) Room attenuation = 4 dB

3) The specified capacities are based on a high output mode. The water capacity for PARASOL VAV 1200 PF is reduced by between 5% and 12% for operations with the face plate set to the normal position.
The water capacity can vary depending on the installation and how the air deflectors are set. The primary air capacity is not affected.
Note! The total heating capacity is the sum of the airborne and waterborne heating capacities. If the primary air temperature is lower than the room temperature, it causes a negative impact on the total heating capacity.

Acoustics

Typical R_w values in an office with PARASOL VAV where the partition wall finishes against the suspended ceiling (with good sealing properties). Assumes that the partition wall has at least the same R_w value as in the table.

Table 10. Cross-talk

Design	Suspended ceiling R_w(dB)	With Parasol VAV R_w(dB)
Light acoustic suspended ceiling. Mineral wool or perforated steel/aluminium cassettes or screen.	28	28
Light acoustic suspended ceiling. Mineral wool or perforated steel/aluminium cassettes or screen. The suspended ceiling is covered with 50 mm mineral wool*.	36	36
Light acoustic suspended ceiling. Mineral wool or perforated steel/aluminium cassettes or screen. Upright 100 mm mineral wool slab used as acoustic insulation between the offices*.	36	36
Perforated plaster panels in T-bar system Acoustic insulation on the top side (25 mm).	36	36
Sealed plaster suspended ceiling with insulation on top side.	45	44
*Overview: Rockwool 70 kg/m, Gullfiber 50 kg/m.		

Natural attenuation

Natural attenuation ΔL (dB) including end reflection.

Table 11. Natural attenuation ΔL (dB)
PARASOL VAV 600

	Octave band (Hz)							
Nozzle setting	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. Natural attenuation ΔL (dB)
PARASOL VAV 600 PF

	Octave band (Hz)							
Nozzle setting	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 13. Natural attenuation ΔL (dB)
PARASOL VAV 1200

	Octave band (Hz)							
Nozzle setting	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. Natural attenuation ΔL (dB)
PARASOL VAV 1200 PF

	Octave band (Hz)							
Nozzle setting	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

Dimensions and weights

PARASOL VAV 600

Table 15. Dimensions, PARASOL VAV 600

Length L (mm)	Width W (mm)
584; 592; 598; 617; 623; 642; 667	584; 592; 598; 617; 623; 642; 667

Table 16. Weight, PARASOL VAV 600

PARASOL VAV	Dry weight	Water volume	
		cooling	heating
592-A	16	1.1	X
592-B	16,5	1.1	0.2
592-A-PF	17.5	1.1	X
592-B-PF	18	1.1	0.2
These are examples of the most common sizes of PARASOL VAV. For the other variants, refer to ProSelect at www.swegon.com. Excl. sensor module 0.1 kg.			

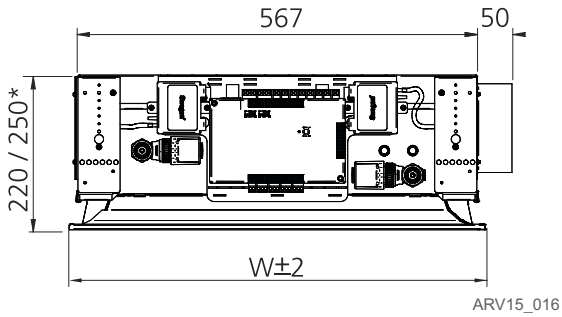


Figure 23. PARASOL VAV 600, short end view
** = PARASOL VAV 600 PF*

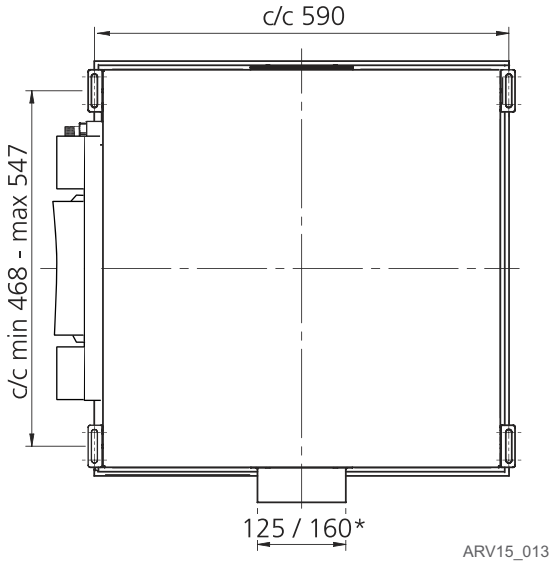


Figure 24. PARASOL VAV 600, top view

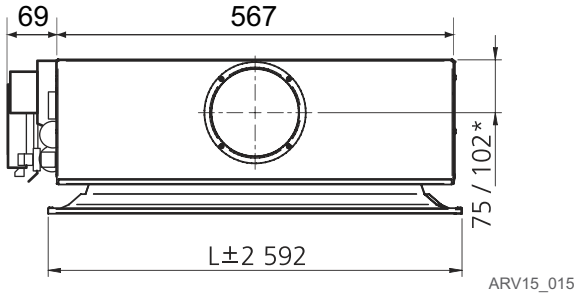


Figure 25. PARASOL VAV 600, side view
** = PARASOL VAV 600 PF*

Water connection PARASOL VAV 600

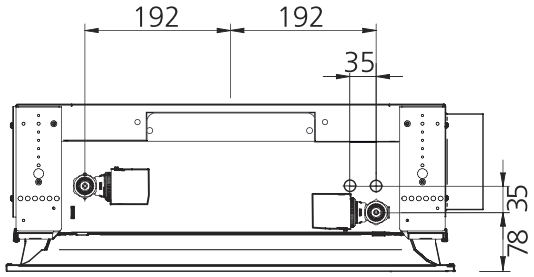


Figure 26. PARASOL VAV 600, water connection

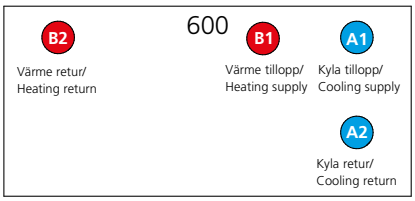


Figure 27. Label PARASOL VAV 600

Connection dimensions

Water connection with factory fitted valves

A1	*Supply cooling water*	*ø 12 × 1.0 mm (Cu)*
A2	*Return cooling water*	*Male thread DN15 (1/2")*
B1	*Supply heating water*	*ø 12 × 1.0 mm (Cu)*
B2	*Return heating water*	*Male thread DN15 (1/2")*

Water connection without factory fitted valves

A1	*Supply cooling water*	*ø 12 × 1.0 mm (Cu)*
A2	*Return cooling water*	*ø 12 × 1.0 mm (Cu)*
B1	*Supply heating water*	*ø 12 × 1.0 mm (Cu)*
B2	*Return heating water*	*ø 12 × 1.0 mm (Cu)*

Observe the following:
For the single-module unit, it is important that the cooling water is connected correctly to the right connection pipes. The direction of flow is essential to obtain full capacity. The water's flow direction is marked on the short end of the unit with directional arrows.

PARASOL VAV 1200

Table 17. Dimensions, PARASOL VAV 1200

Length L (mm)	Width W (mm)
1184; 1192; 1198; 1242; 1248; 1292; 1342	584; 592; 598; 617; 623; 642; 667

Table 18. Weight, PARASOL VAV 1200

PARASOL VAV	Dry weight	Water volume	
		cooling	heating
1192-A	25.8	1.4	x
1192-B	29.8	1.4	0.9
1192-A-PF	28.1	1.4	x
1192-B-PF	32.1	1.4	0.9
1192-X1	30.2	1.4	X
1192-X2	30.5	1.4	X
These are examples of the most common sizes of PARASOL VAV. For the other variants, refer to ProSelect at www.swegon.com. Excl. sensor module 0.1 kg.			

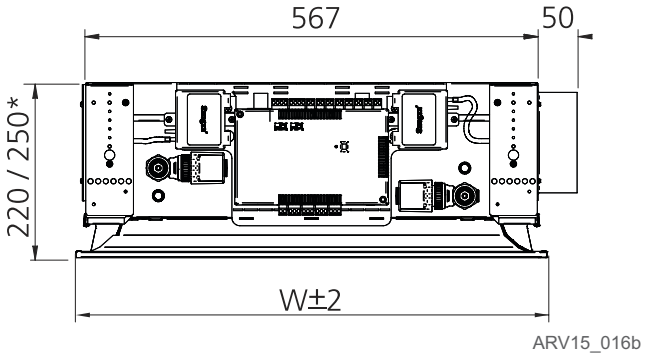


Figure 30. PARASOL VAV 1200, short-end view
** = PARASOL VAV 1200 PF*

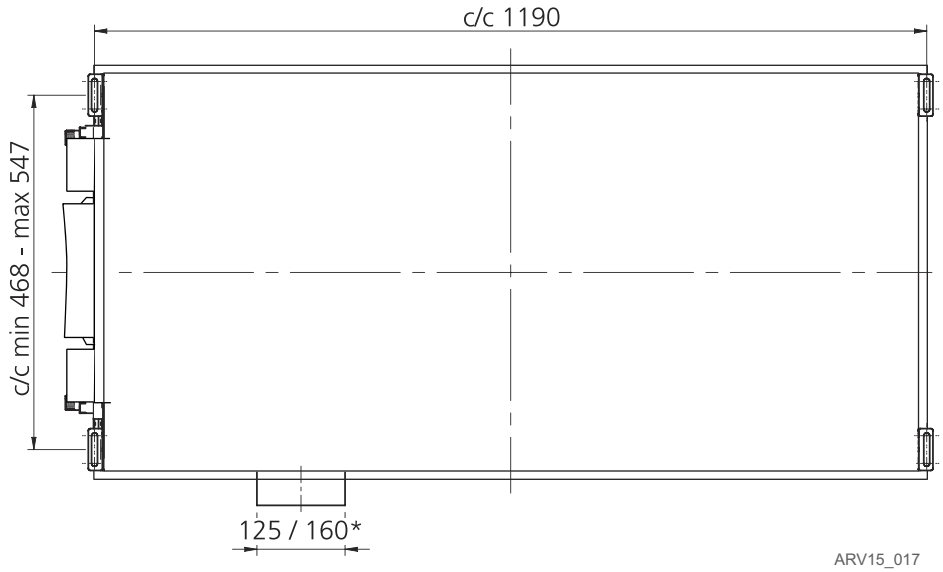


Figure 28. PARASOL VAV 1200, top view
** = PARASOL VAV 1200 PF*

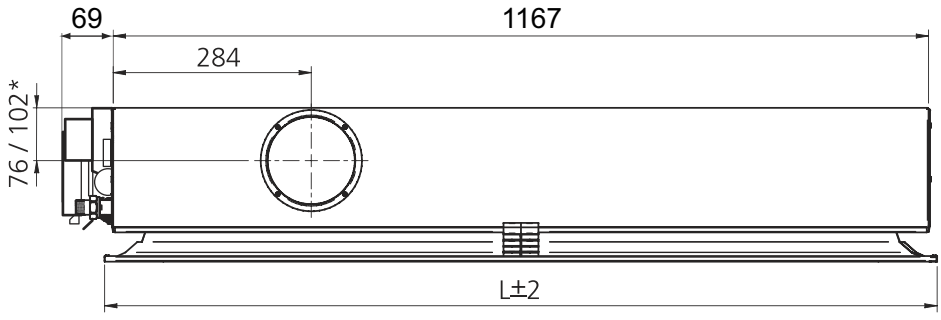


Figure 29. PARASOL VAV 1200, side view
** = PARASOL VAV 1200 PF*

Water connection PARASOL VAV 1200

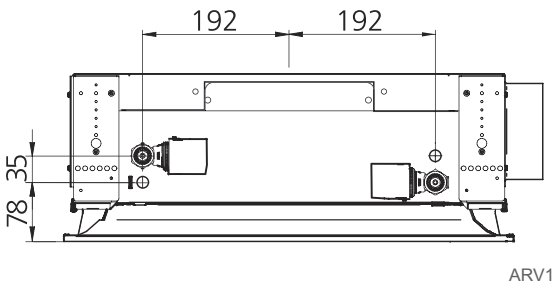


Figure 31. PARASOL VAV 1200, water connection

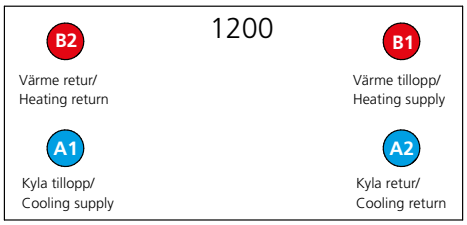


Figure 32. Label PARASOL VAV 1200

Connection dimensions

Water connection with factory fitted valves

A1	*Supply cooling water*	*ø 12 × 1.0 mm (Cu)*
A2	*Return cooling water*	*Male thread DN15 (1/2")*
B1	*Supply heating water*	*ø 12 × 1.0 mm (Cu)*
B2	*Return heating water*	*Male thread DN15 (1/2")*

Water connection without factory fitted valves

A1	*Supply cooling water*	*ø 12 × 1.0 mm (Cu)*
A2	*Return cooling water*	*ø 12 × 1.0 mm (Cu)*
B1	*Supply heating water*	*ø 12 × 1.0 mm (Cu)*
B2	*Return heating water*	*ø 12 × 1.0 mm (Cu)*

Air connection PARASOL VAV 600/1200

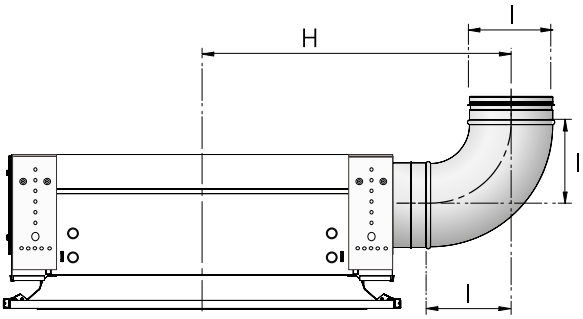


Figure 33. Connection with elbow, short end view
Mounted connection fittings SYST CA xxx-90

PARASOL VAV 600	*H = 460*	*l = 125*
PARASOL VAV 600 PF	*H = 495*	*l = 160*
PARASOL VAV 1200	*H = 460*	*l = 125*
PARASOL VAV 1200 PF	*H = 495*	*l = 160*

Accessories

Accessories, factory-fitted

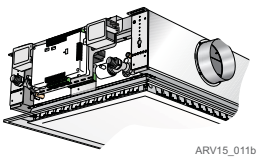
The following factory fitted accessories can also be ordered as separate accessories.

Valve with actuator, SYST VDN215
with **ACTUATOR b 24V NC** for cooling and heating**.**
Mounted and connected to the regulator.
See separate product datasheet at www.swegon.com.

CO_2 sensor. Detect Qa
Analogue carbon dioxide sensor that is mounted concealed, above the face plate.
See separate product datasheet at www.swegon.com.

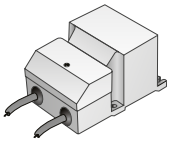
Transformer Power Adapt 20 VA
Input voltage 230 V, 50-60 Hz
Output voltage 24 V AC
Power 20 VA
Enclosure IP33

Control kit
Regulator, CONDUCTOR W4.1 VAV
Occupancy sensor
Room controller RU
2 Pressure sensors

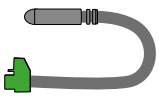


Accessories

Transformer SYST TS-1 72 VA
Double-insulated protective transformer 230 V AC/24 V AC
See separate product datasheet at www.swegon.com.



Temperature sensor, CONDUCTOR T-TG
External temperature sensor.
Used for example if the room temperature must be measured elsewhere than at the sensor module, or to measure the temperature of the main pipe in change-over systems.



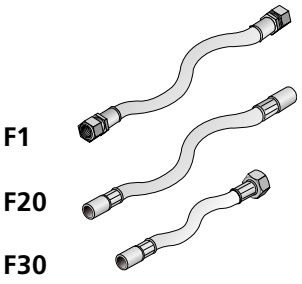
LINK Wise
Network cable for Modbus communication in the WISE system.
The cable conforms to EIA 485 standard. Shielded four conductor AWG 24, external diameter Ø 9.6 mm, grey PVC.
The cable is only supplied in reels of 500 m.

Card switch, SYST SENSO
Key card holder for hotel rooms.

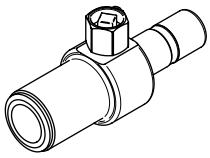
Assembly fitting, SYST MS M8
For installation use the assembly fitting containing threaded rods, ceiling brackets and nuts to all four mounting brackets.

Flexible connection hoses, SYST FH
Flexible hoses are available with quick-fit, push-on couplings as well as compression ring couplings for quick and simply connection. The hoses are also available in various lengths. Note that compression ring couplings require support sleeves inside the pipes.

F1	*Flexible hoses with compression ring couplings.*
F20	*Flexible hoses with quick-fit couplings (push-on)*
F30	*Flexible hose with quick-fit, push-on coupling in one end and G20ID sleeve nut in the other end.*



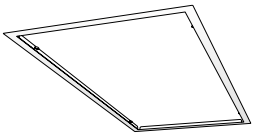
Venting nipple, SYST AR-12
A venting nipple is available as a complement to the flexible hoses with push-on couplings
The nipple fits directly on the hose's push-on coupling and is fitted in just a few minutes.



Connection piece, air – insertion joint, SYST AD1
SYST AD1 is used as an insertion joint between the PARASOL VAV and the
duct system.
Available in to sizes: Ø125 and Ø160 mm.

Connection piece, air, SYST CA
Duct elbow 90°
Available in two sizes: Ø125 and Ø160 mm.

Drywall ceiling frame Parasol c T-FPB
Frame to create a neat transition between PARASOL VAV and holes in drywall ceilings.

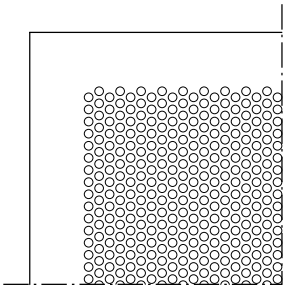


Tool for nozzle adjustment, SYST TORX
Tools to facilitate adjustment of nozzle strips.

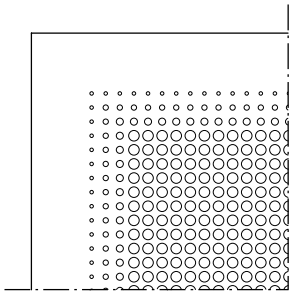
Design - Face plate

The face plate of the unit is available with three different perforation patterns that make it easily adaptable to suit different types of ceiling components, e.g. light fittings and exhaust grilles that share the surface of a suspended ceiling. A ceiling containing different types of perforation patterns can be experienced as disturbing to the eye.
Other patterns are of course available on special order. For further details, get in touch with your nearest Swegon representative.

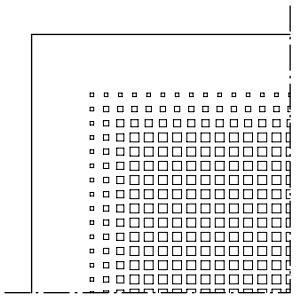
A. Face plate standard PB
Circular holes arranged in a triangular pattern.



B. Face plate PD
Circular holes arranged in a square pattern with a graduated border.



C. Face plate PE
Square holes arranged in a square pattern with a graduated border.



Ordering key

Ceiling type	Dimensions of the face plate (mm)	
T-bar system	**600 module**	**1200 module**
c-c 600	592x592	1192x592
c-c 600 SAS130/15	584x584	1184x584
c-c 625	617x617	1242x617
c-c 650	642x642	1292x642
c-c 675	667x667	1342x667

Clip in/metal cassette	600 module	1200 module
c-c 600	598x598	1198x598
c-c 625	623x623	1248x623

The tolerance is ±2 mm.

Function	The units can be ordered in various functional versions:
	A = Cooling and supply air
	B = Cooling, heating and supply air
ADC	Factory-fitted ADC supplied as standard
Airflow variant	Single-module unit:
	PARASOL VAV 600
	PARASOL VAV 600 PF
	Double module unit:
	PARASOL VAV 1200
	PARASOL VAV 1200 PF
	(PF = Plus flow, extra high airflow)
Software configuration	The product can be supplied pre-configured with customer adapted software settings.
Nozzle setting	Each side can be set in three different ways L, M or H
	L = Low airflow
	M = Medium airflow
	H = High airflow
Colour	The units are supplied painted in Swegon's standard shade of white, RAL 9003, gloss ratio 30 ±6%
Communication	Modbus RTU

Contractor demarcation

Swegon's delivery ends at the connection points for water and air and the connection of the room control equipment (see Figures 23-27 and 28-33).

- The pipe contractor connects the connections points for water to the plain pipe ends and fills the system, bleeds it and tests the pressure. When the room control equipment is installed at the factory, the cooling and heating water's return line is connected to the valve. (Male thread, DN ½").
- The ventilation contractor connects to the air connecting piece.
- The electrical contractor connects the power (24V) and signal cables to the connection terminals with spring-loaded snap-in connections. Maximum cable cross section 2.5 mm^2. For safe operation, we recommend cable ends with ferrules.

Specification text

Example of a specification text according to VVS AMA.

KB XX

Swegon's comfort module PARASOL VAV for integrated installation in suspended ceilings, with the following functions:

- Cooling
- Heating, water (optional)
- Heating, electric (optional)
- Ventilation
- Integrated functionality for demand-controlled ventilation
- Adjustable air direction
- Comfort guarantee ADC[II]
- 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
- Suitable for T-bar system with modular dimensions: 600; 625; and 675 mm; T-profile 24 mm (optional)
- Contractor demarcation at the connection points for water and air according to dimensional drawings
- The contractor demarcation for electric connection point according to dimension print
- At connection points the pipe contractor connects to ø 12 mm plain pipe ends (cooling supply & return) or to ø 12 mm plain pipe ends (heating supply & return). As the unit is equipped with in-built room control equipment the pipe contractor connects to male threads on DN 1/2" cooling and or heating return, on the cooling and or heating supply the pipe contractor connects to plain pipe ends ø 12 mm. The ventilation contractor connects to connection spigots ø125 mm (Parasol VAV PF = ø160 mm)
- The pipe contractor fills, vents, tests the pressure and assumes responsibility for the design water flows reaching each branch of the system and the index unit
- The ventilation contractor conducts initial commissioning of the airflows

Factory fitted room control:

- The air damper and motor for demand-controlled ventilation (standard in the master & slave products)
- Terminal block for onward connection of control signals between master and slave products (standard on the master and slave products)
- Control kit (optional on the master product)
  - Controller, Conductor W4.1 VAV
  - Room unit, Conductor RU
  - Presence detector, Detect Oa
  - 2 x pressure sensors SYST PS
- Sensors (optional on the master product)
  - CO2 sensor, Detect Qa
- Transformers (optional on the master product)
  - Power ADAPT 20 VA
- Valves and actuators for cooling and heating (optional on the master & slave products)
  - SYST VDN215 straight valve with ACTUATOR b 24V NC
  - SYST VDN215 straight valve
  - ACTUATOR b 24V NC actuator

Accessories (loose, not fitted at the factory):

- Transformer SYST TS-1 72 VA, xx items
- Transformer POWER Adapt 20 VA, xx items
- Temperature sensor, CONDUCTOR T-TG, xx items
- Valve actuator ACTUATOR b 24V NC, xx items
- Valve SYST VDN215, xx items
- CO2 sensor DETECT Qa, xx items
- Network cable, LINK Wise, xx items
- Card switch SYST SENSO, xx items
- Connection piece air, SYST AD1-aaa, xx items
- Connection piece (90°duct bend), SYST CA-aaa-90, xx items
- Assembly fitting, SYST MS M8 aaaa–b-ccccc, xx items
- Flexible connection hose, SYST FH aaa- bbb-12, xx items
- Venting nipple SYST AR-12, xx items
- Mounting frame for plaster ceilings PARASOL c T-FPB-aaaa xx items
- Adjustment tool SYST TORX 6-200, xx items
- Alternative perforation pattern PARASOL c T-PP-a-bb, xx items