

Demand-controlled Ventilation

Leading edge products for demand-controlled ventilation

Demand-controlled ventilation offers great comfort and low operating costs



When the room is in use, ventilation and air conditioning is controlled to meet the needs of the occupants.



An empty room requires minimum ventilation and air-conditioning.

Demand-controlled ventilation involves ventilating and conditioning the air in a room or premises precisely to meet our needs – no more and no less. The potential for savings is substantial, especially in premises such as offices, classrooms and hotel rooms where there is considerable variation between high and low load conditions in rooms and during times when there are few or no occupants.

Using demand-controlled ventilation, it is possible to meet the ever-increasing requirements on energy efficiency. As much as 80% fan electricity and 40% of heating and cooling energy can be saved with demand-controlled ventilation compared with constant airflow and temperature.

At the same time, it gives the opportunity for maximum comfort for the people occupying the premises through demand-controlled heating and cooling regulation.

Other positive effects are that smaller units and dimensions can frequently be used for ventilation, heating and cooling as the maximum airflow and air conditioning can be reduced compared with constant flows and temperatures. Flexibility will also be greater if walls are moved or conversions are made in the future.

The slightly higher investment cost is quickly recovered through significantly lower operating costs.

CAV

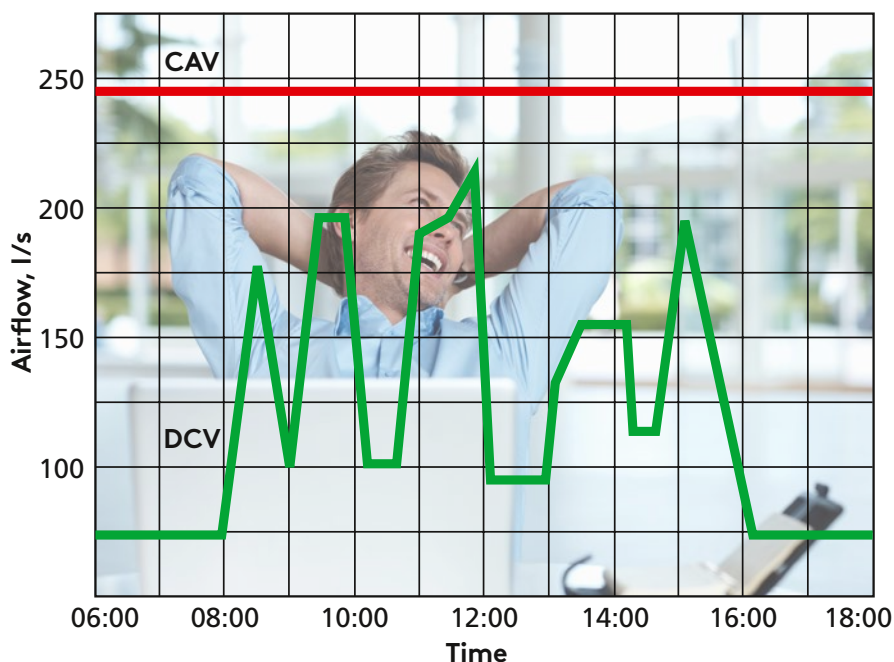
Constant airflow based on full occupancy

DCV

Demand-controlled airflow based on actual occupancy

- Up to 80% saving on fan electricity
- Up to 40% saving on heating and cooling electricity
- Increased comfort through demand-controlled cooling and heating regulation
- Increased flexibility in the building
- Smaller units for ventilation, heating and cooling
- Smaller technical room

Example of an office floor



Swegon has solutions on all levels

Swegon can offer specific products in most product areas that deal with air handling. However, the end user will get the most benefit from our products if they are supplied in the form of system solutions. The products are designed for straightforward interconnection to work in harmony to provide the highest possible degree of comfort when using the least possible amount of energy.

The illustration below shows schematic examples of products and solutions for a demand-controlled system and on the following pages you will find inspiration and practical proposals for different levels. However, Swegon's products offer great potential for object-specific solutions and variations.

Specific product information can be found at www.swegon.com.



System
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Chiller & Heat pump

NESTOR



*Internal network/
Internet*

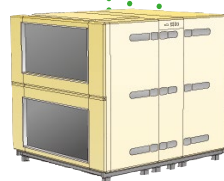


*Building management
system*



Sub-system
Page 12

Super WISE



GOLD



All Year Comfort



Zone
Page 10

CONTROL Zone



CONTROL Zone



CONTROL Zone

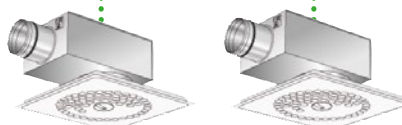


Room
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ADAPT Damper



Passive air diffusers

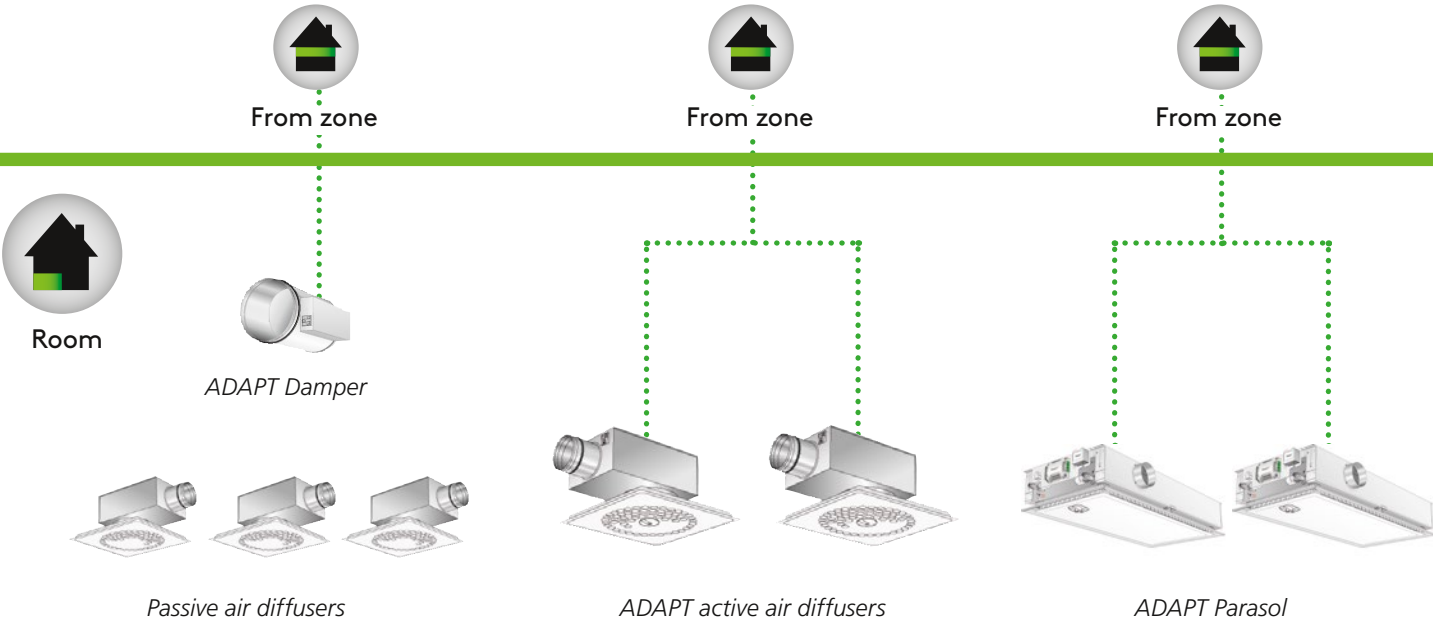


ADAPT active air diffusers



ADAPT Parasol

Room level



Intelligent damper for variable airflow



ADAPT Damper

Selection of passive air diffuser for use together with ADAPT Damper



LOCKZONE



EAGLE



HAWK



PELICAN

Active air diffusers for variable airflow



ADAPT Colibri



ADAPT Sphere

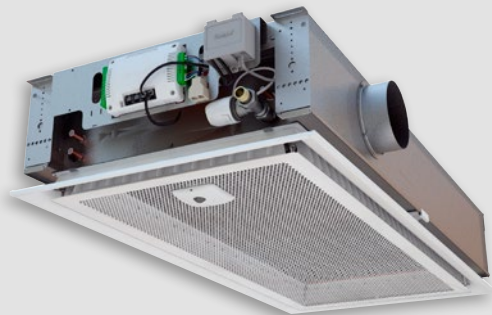


ADAPT Free



ADAPT Extract

Comfort module for variable airflow with integrated intelligence and dampers



ADAPT Parasol

Examples for offices

Low to normal cooling load



Conditions

Room with normal heat load from lighting, computer equipment, persons and solar radiation from windows.

Varying number of occupants present.

Solution

Demand-controlled ventilation and cooling via active supply air diffuser. Control of valves for radiators.



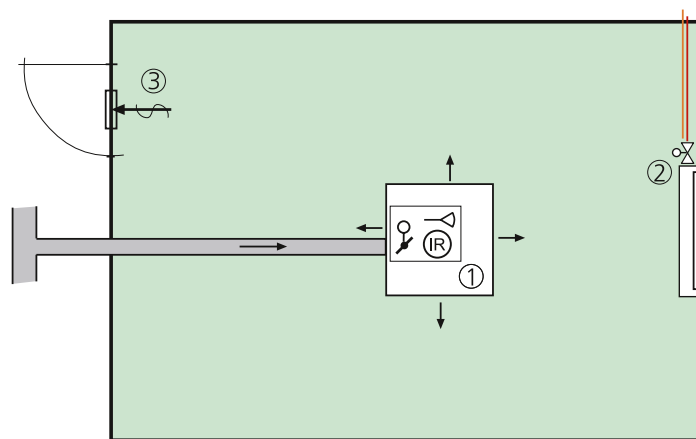
Components

1. Active ADAPT Colibri supply air diffuser with integrated temperature sensor, presence detector, flow measurement and flow control via motor-driven damper
2. Radiator valve
3. Extract air via transfer air grille to the corridor, CGV/RGV for instance

Other options

Active supply air diffuser ADAPT Sphere or ADAPT Free instead of ADAPT Colibri. Air quality sensor as a supplement to the integrated presence detector in ADAPT Colibri. Extract air via passive extract air register and ADAPT Damper, or via active extract air register ADAPT Extract.

Flow diagram



Function

The presence detector integrated in the supply air diffuser gives signals for opening or closing the motor-driven damper to the occupancy flow when the room is occupied and to the minimum flow setting when the room is unoccupied.

The temperature sensor integrated in the supply air diffuser gives signals for variable flow increase from occupancy flow to maximum flow in the event of a cooling requirement and for regulation of radiator valves in the event of a heating requirement. When the room is unoccupied, the system allows the room temperature to rise or drop more than it would if the room was occupied, to save energy.

Benefits

- Energy-efficient operation since the room is ventilated, heated and cooled exactly as called for by the load, neither more or less.
- Free cooling can be utilised during a large part of the year.
- High comfort and draught-free environment.
- Fast and simple connection.

Examples for offices

Normal to high cooling load



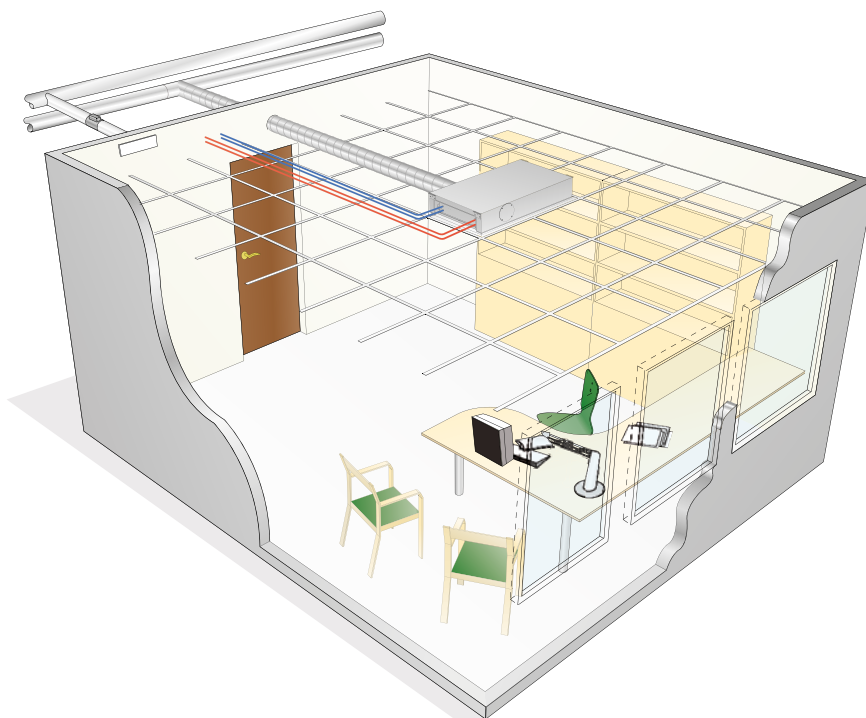
Conditions

Room with high heat load from lighting, computer equipment, persons and solar radiation from windows.

Varying number of occupants present.

Solution

Demand-controlled ventilation with cooling and heating via hydronic climate solution with variable airflow.



Components

1. Comfort module ADAPT Parasol with supply air, cooling and heating including valves and valve actuators, as well as integrated presence detector, temperature sensor, condensation sensor, flow measurement and flow control via the motorised damper
2. Cooling and heating water
3. Extract air via ADAPT Damper is slave controlled from ADAPT Parasol
4. Extract air grille, e.g. ALG

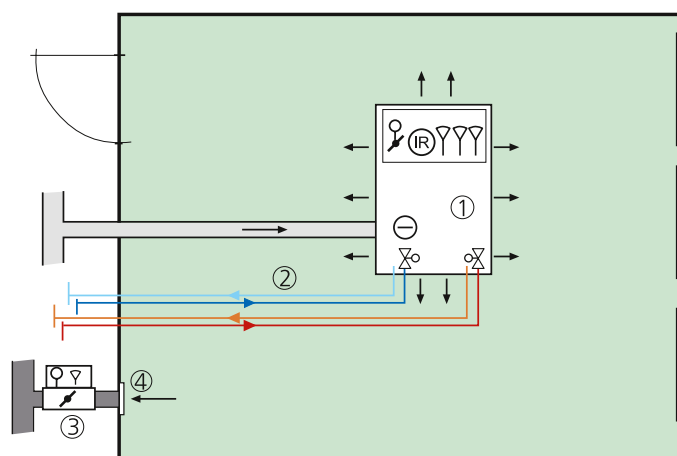
Other options

Sensor module placed on the wall instead of integrated in ADAPT Parasol. Air quality sensor as a supplement to the integrated presence detector in the sensor module for ADAPT Parasol. Extract air via transfer air to the corridor. Window contact for adapted control of the airflow and temperature when the window is open.

Benefits

- Energy-efficient operation since the room is ventilated, cooling and heated exactly as called for by the load, neither more or less.
- High comfort with provision for individual control.
- Unique operating and comfort advantages together with Super WISE and the All Year Comfort GOLD function.
- Fast and simple connection.

Flow diagram



Function

The presence detector in the control module gives signals for opening or closing the motor-driven damper to the occupancy flow when the room is occupied and to the minimum flow setting when the room is unoccupied. The temperature sensor gives signals to control the comfort module water valves. Dampers for extract air are slave controlled from ADAPT Parasol.

When the room is unoccupied, the system allows the airflow to drop to the minimum flow and the room temperature to increase more than it would if the room was occupied, to save energy.

Individual adjustment of the temperature set point value can occur directly on the sensor module, or the wall-mounted sensor module.

Examples for classrooms/conference rooms

Varied air requirement and low to normal cooling load



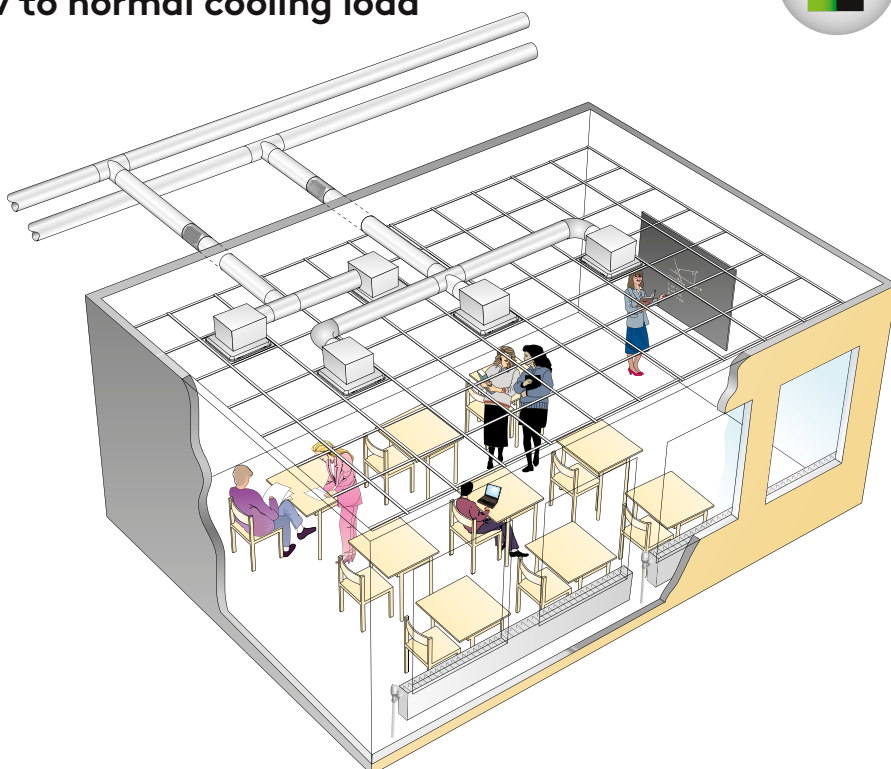
Conditions

Classroom/conference room with varying load. High demands on air volume and air quality.

Varying number of occupants present and load.

Solution

Demand-controlled ventilation via room control damper. Control of valves for radiators.



Components

1. ADAPT Damper (master) room control damper for extract air with integrated temperature sensor, air quality sensor (VOC), flow measurement and flow control via motor-driven damper
2. ADAPT Damper (slave) room control damper for supply air with integrated temperature sensor, flow measurement and flow control via motor-driven damper
3. Radiator valves
4. Presence detector
5. Supply air diffuser that manages variable flows and high sub-temperature, LOCKZONE, COLIBRI and EAGLE Ceiling for instance
6. Extract air register, PELICAN Ceiling for instance

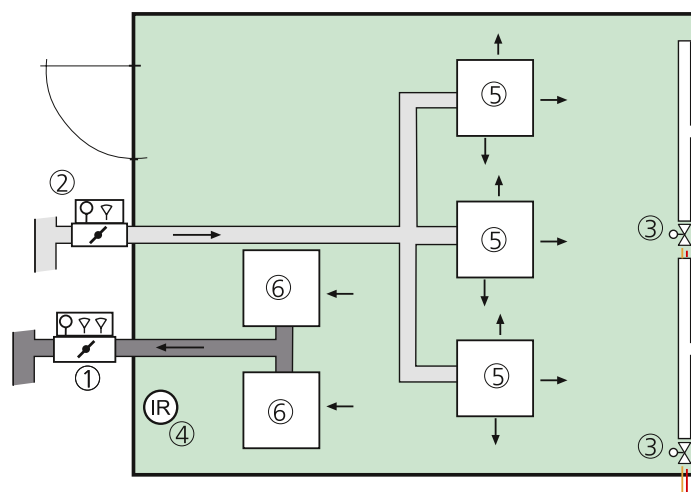
Other options

Extract air via active extract air register ADAPT Extract instead of passive air diffuser and ADAPT Damper.

Benefits

- Energy-efficient operation since the room is ventilated and heated exactly as called for by the load, neither more or less.
- Free cooling can be utilised during a large part of the year.
- Ensured air quality via air quality sensor (VOC) that detects volatile organic substances.
- If you are renovating a building, the room control damper can be installed in a corridor, only the presence detector is needed inside the room.
- Fast and simple connection.

Flow diagram



Function

The presence detector gives signals for opening or closing the motor-driven room control damper to the occupancy flow when the room is occupied and to the minimum flow setting when the room is unoccupied. The extract air damper acts as the master damper and it slave-controls the supply air damper.

The temperature sensor in the extract air damper gives signals to regulate radiator valves for a heating requirement and for cooling by variably increasing the airflow from the occupancy flow to max. flow. When the room is unoccupied, the system allows the room temperature to rise or drop more than it would if the room was occupied, to save energy. The air quality sensor (VOC) increases the airflow if the content of impurities in the air exceeds the preset limit value.

Examples for conference rooms

Varied air requirement and normal to high cooling load



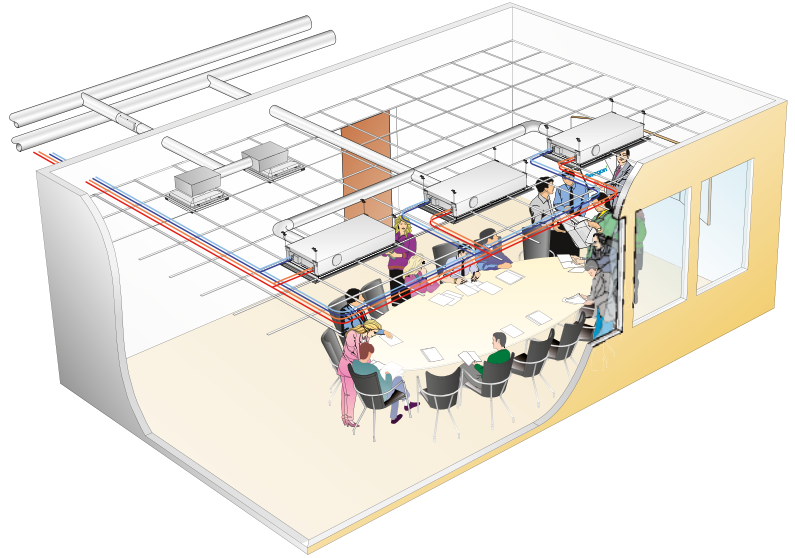
Conditions

Conference room irregularly occupied.
High demands on air volume and temperature regulation under maximum load conditions.

Varying number of occupants present and load.

Solution

Demand-controlled ventilation, cooling and heating via hydronic climate solution and damper.



Components

1. Comfort module ADAPT Parasol with supply air, cooling and heating including valves and valve actuators, as well as integrated presence detector, temperature sensor, condensation sensor, flow measurement and flow control via the motorised damper
2. Sensor module for ADAPT Parasol with integrated presence detector and temperature sensor, placed on the wall
3. Cooling water and heating water
4. Extract air register, PELICAN Ceiling for instance
5. Extract air via ADAPT Damper is slave controlled from ADAPT Parasol
6. Window contact

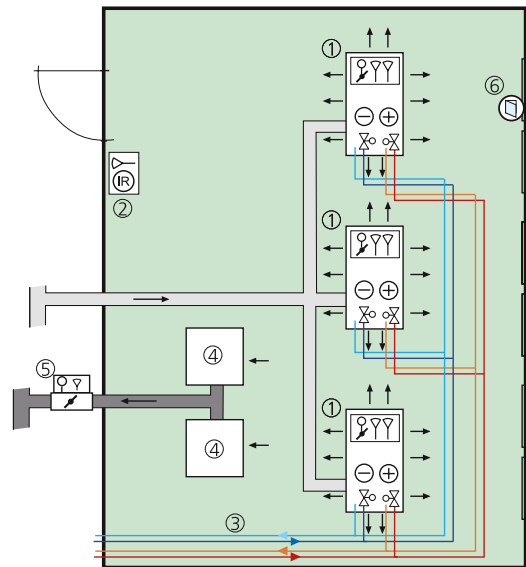
Other options

Only cooling water in PARASOL and control of radiator valves for heating. Air quality sensor as a supplement to the integrated presence detector in the sensor module for ADAPT Parasol. Extract air via transfer air to the corridor. If a greater air quantity is needed, supplement with active air diffusers or ADAPT Damper and passive air diffusers.

Benefits

- Energy-efficient operation since the room is ventilated, heated and cooled exactly as called for by the load, neither more or less.
- The cooling sequence can be chosen for the best comfort or for the best economy.
- Very high comfort and air quality with provision for individual control.
- Fast and simple connection.

Flow diagram



Function

The sensor module presence detector gives signals for opening or closing the motor-driven damper to the occupancy flow when the room is occupied and to the minimum flow setting when the room is unoccupied. The temperature sensor gives signals to control the comfort module water valves. Dampers for extract air are slave controlled from ADAPT Parasol.

When the room is unoccupied, the system allows the airflow to drop to the minimum flow and the room temperature to increase or decrease more than it would if the room was occupied, to save energy. The window switch gives, with an open window, signals to shut off heating, cooling and ventilation and with a risk of frost for increased heating.

The cooling sequence can be chosen for the best comfort (water cooling first, then increased airflow) or for the best economy (increased airflow first, then water cooling).

Individual adjustment of the temperature set point value can occur on the sensor module.

Demand-controlled ventilation is already here



PWC, offices, Oslo, Norway



Elit Grand Palas, hotel, Istanbul, Turkey



Debenhams, department store, Llandudno, UK



AMC Hospital - Beddenhuis, hospital, Amsterdam, The Netherlands

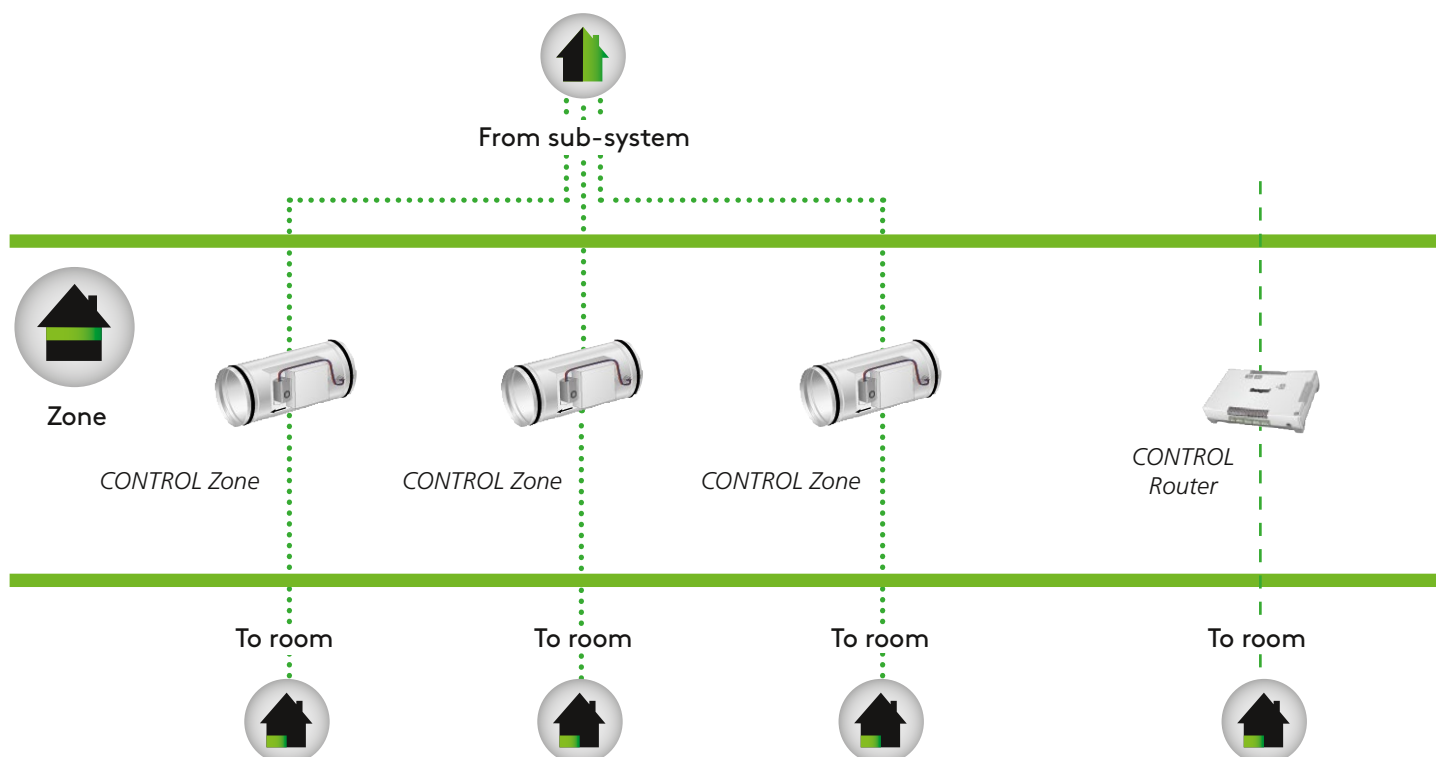


Best Western, hotel, Årjäng, Sweden



Roissy Parc Mail, office, Paris, France

Zone level



CONTROL Zone



Zone damper CONTROL Zone is used to manage flow changes faster in large systems. CONTROL Zone can be used both as a master and slave damper for both supply and extract air. CONTROL ZONE can also be used during renovation through smart pressure and flow control.

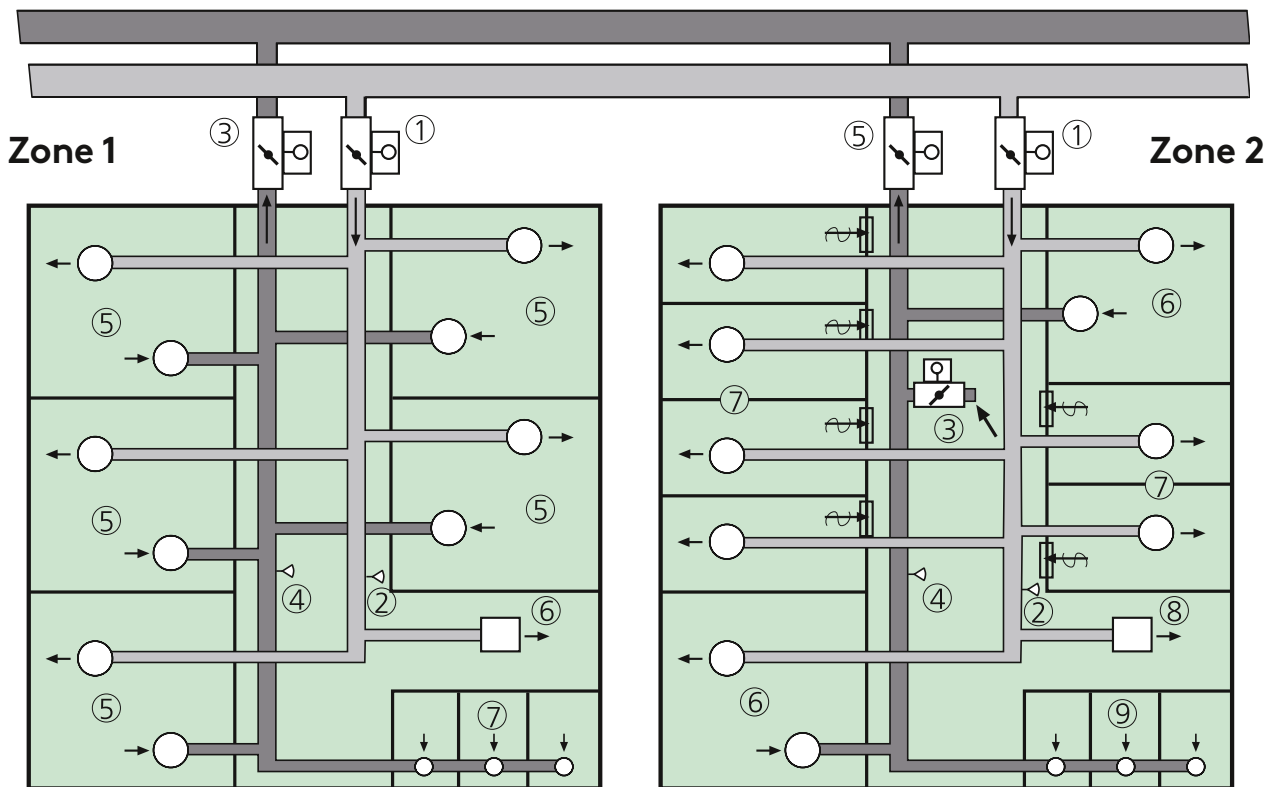
CONTROL Router



CONTROL Router is an intelligent communication unit that can be used at the zone level when a constant air flow is wanted but with demand-control of heat or cooling energy for waterborne room products, e.g. PARASOL, PACIFIC or PARAGON.

Examples for zone control

Provides stable and economical operation



Balanced ventilation at room level

1. CONTROL Zone damper with integrated damper actuator for supply air (pressure controlled)
2. Pressure sensor for CONTROL Zone damper, supply air
3. CONTROL Zone damper with integrated damper actuator for extract air (pressure controlled)
4. Pressure sensor for CONTROL Zone damper, extract air
5. Office room with active supply air diffuser/damper and extract air register/damper for balanced ventilation
6. Passive supply air diffuser in cloakroom for constant supply airflow
7. Passive extract air register in toilet group for constant extract airflow

Function

In a smaller ventilation system, the GOLD air handling unit manages the necessary pressure control. Zone dampers that divide the system into smaller zones are used in larger systems. The zone dampers react quicker to flow changes than they would if the air handling unit was located centrally and in this way provides a stable ventilation system with fewer motor movements in the system.

No duct pressure is throttled away unnecessarily and the duct pressure can be kept as low as 40–60 Pa in the zone, with provides economical operation.

In the zone example above, we see that the zone dampers in the WISE system manage both a balanced solution (zone 1) and mixed solution (zone 2).

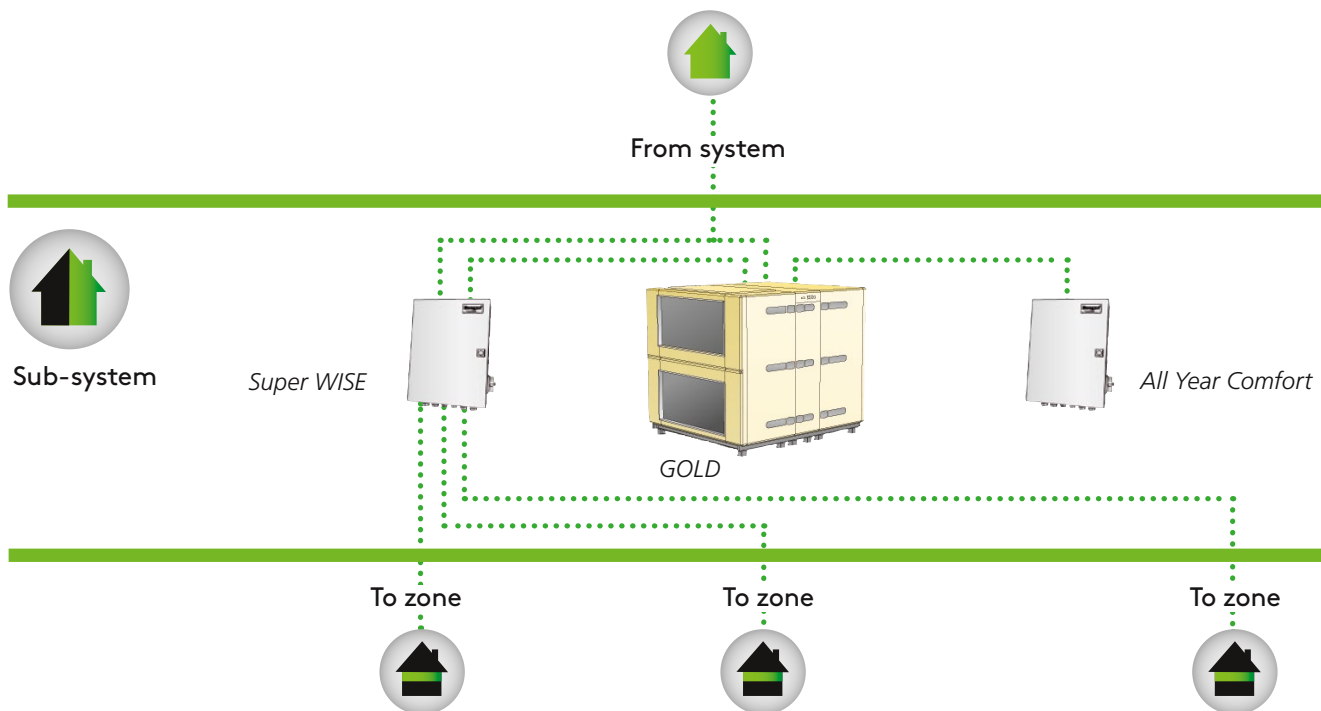
Central extract air and balanced ventilation on a room level

1. CONTROL Zone damper with integrated damper actuator for supply air (pressure controlled)
2. Pressure sensor for CONTROL Zone damper, supply air
3. CONTROL Zone damper with integrated damper actuator central extract air in the corridor (pressure controlled)
4. Pressure sensor for CONTROL Zone damper, central extract air
5. SLAVE Zone damper with integrated damper actuator extract air (slave-controlled by zone damper 1)
6. Office room with active supply air diffuser/damper and extract air register/damper for balanced ventilation
7. Office room with active supply air diffuser and extract air register for outflow to the corridor
8. Passive supply air diffuser in cloakroom for constant supply airflow
9. Passive extract air register in toilet group for constant extract airflow

Benefits

- Quickly adjusts to pressure fluctuations due to the variable airflows in the rooms.
- No unnecessary throttling of duct pressure.
- Low duct pressure in the zone; provides a quiet ventilation system and economical operation.

Subsystem level



Air handling unit GOLD



Complete and compact air handling units in several sizes and designs and with built-in control equipment.

All Year Comfort



Control unit for primary circuits with cooling and/or heating water.

Super WISE



Communication unit with building management system, GOLD air handling units and underlying products included in the WISE system and CONDUCTOR.

Sub-system example

Air handling unit GOLD

GOLD is the name of a series of complete air handling units for comfort ventilation in several sizes for airflows up to approximately 14 m³/s (50,400 m³/h). GOLD is available with a rotary heat exchanger, cross-flow plate heat exchanger or coil heat exchanger.

The unit has low energy fans with newly developed EC technology that manage large flow ranges with maintained efficiency.

The integrated control equipment has a large number of control functions of which the following are well-suited for demand-controlled ventilation:

- Pressure regulation of fans
- Slave control of fans
- Compensation for outdoor air temperature
- Summer night cooling
- Demand-control of cooling and heating water production via the SMART Link function
- Demand-control of the supply flow temperature for cooling water and heating water via the All Year Comfort control unit

All Year Comfort

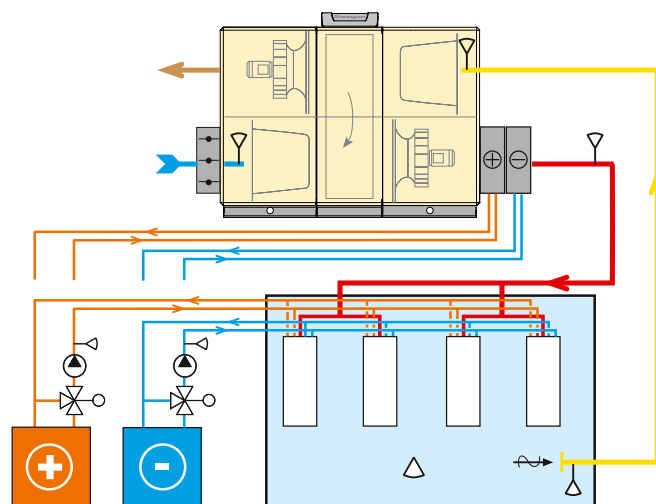
All Year Comfort is a supplementary control unit for GOLD in order to demand-control cooling and heating water to the unit's cooling and heating coils or to hydronic room products.

All Year Comfort controls valves and/or pumps so that the required supply flow temperature is always obtained. Settings are available for outdoor compensation, room compensation, night compensation and dew point compensation to optimise adaptation to the system's needs.

Pumps and valves can be alarm monitored and exercised during seasonal downtime.



GOLD is controlled via a user-friendly touch screen, but can also be controlled via mobile phone, computer or Building management system.



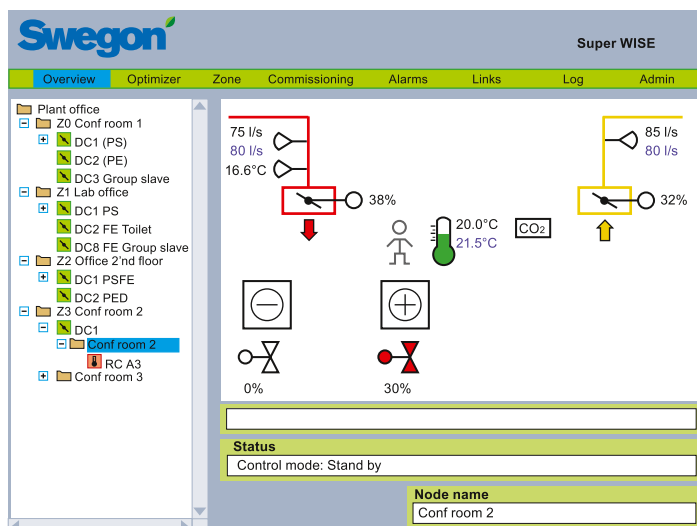
All Year Comfort can control the primary water circuit to the unit's cooling and heating coils or to waterborne room products.

Super WISE

The Super WISE communication unit has contact with all intelligent dampers and room products. Super WISE communicates with the GOLD air handling unit in order to minimise the pressure required in main ducts.

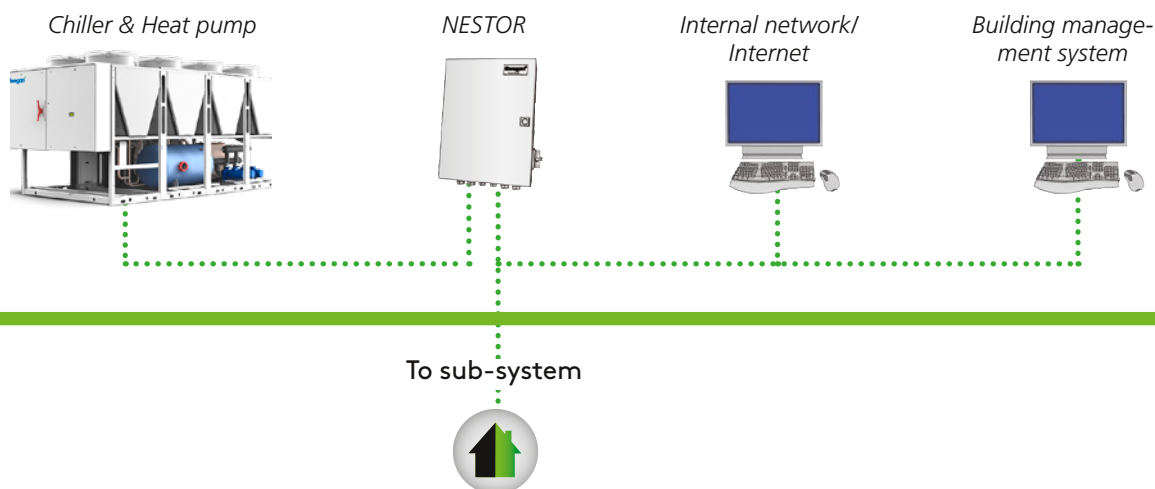
The webpage built into Super WISE is automatically configured based on connected products and shows the system in a clear tree structure. Actual values and set points can be viewed and changed all the way down to the room level. Only requires an ordinary web browser (Internet Explorer, for instance).

Communication with Building management system takes place via Modbus RTU/TCP or BACnet TCP and EXOLine.



Example of the webpage in Super WISE.

System level



Chillers and Heat pumps

Swegon can offer a comprehensive range of Chillers and Heat pumps for comfort ventilation.

Two examples:



TETRIS

Air-cooled water Chillers in several sizes and configurations with a cooling capacity up to 700 kW. Also available in a reversible model.



TETRIS W

Water-cooled water Chillers in several sizes and configurations with a cooling capacity up to 615 kW. Also available in a reversible model and as a Heat pump only.

NESTOR



Central communication unit acting as the connection point for all intelligent Swegon products in the building.

System example

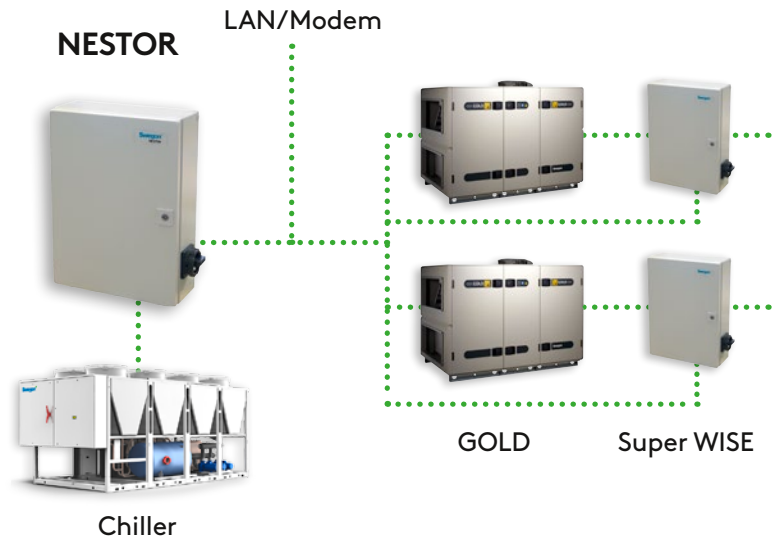


NESTOR and Chiller

NESTOR is a system level communication unit. NESTOR interconnects all intelligent Swegon products in the building to a single point.

NESTOR utilises the intelligence of all connected products, creates common alarm lists, establishes priority for heating and cooling and helps to optimise temperatures for heating and cooling for up to 8 sub-systems in the building.

NESTOR can also be used in virtual internal networks between up to 8 buildings for central control of ventilation and the indoor climate.



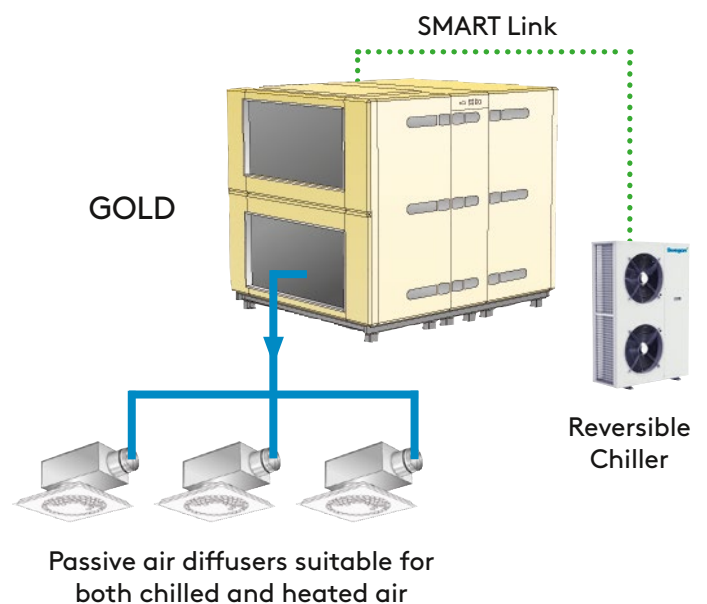
GOLD as a system product

The GOLD air handling unit has an advanced control system that provides demand-controlled ventilation in smaller systems without dampers or communication units. Applications include assembly halls, stores, production premises and suchlike.

For example, the installation could consist of GOLD air handling units with a combi-type water coil, a reversible cooling unit, duct system, diffusers, temperature sensors and air quality sensors.

Via the SMART Link function, the reversible cooling unit produces demand-controlled cooling water, when there is a cooling load, and heating water, when there is a heating load.

On indication from the air quality sensor, the air flow is regulated variably based on the demand and, on indication from the temperature sensor, the temperature is regulated with the help of the Heating & Cooling Boost control functions.



We make every breath count.

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