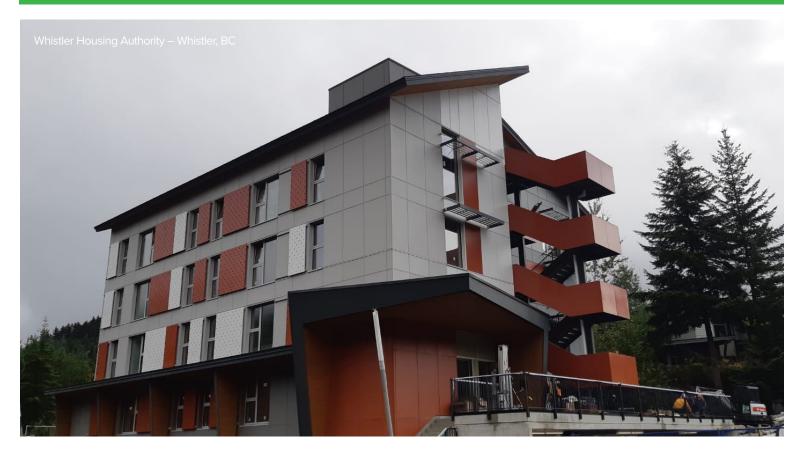
## Active Airflow Control Using React Dampers











#### **EFFECT OF AIRFLOW CONTROL** IN HIGH PERFORMANCE BUILDINGS

Active airflow control is a piece of the puzzle that helps deliver truly high performance in the built environment. High performance can mean thermal comfort, indoor air quality (IAQ), energy savings, low carbon emissions and protecting the building envelope.

Active airflow control is a system of controls and components that can vary the airflow in response to dynamic changes in the occupied space. The major components of an active airflow control system include variable airflow fans, independent airflow control dampers with actuators, airflow monitoring and controls.

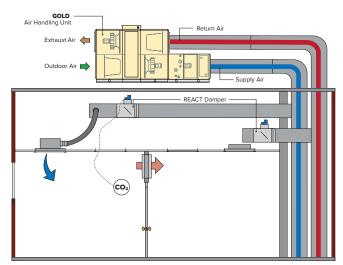


Fig. 1 Active Airflow set up for demand control ventilation



#### DEMAND CONTROL VENTILATION

To achieve indoor air quality (IAQ) the right amount of ventilation air must be delivered and the exhaust removed from the occupied space. A constant flow ventilation system will deliver the ventilation air once properly balanced by a professional test and balance contractor. While IAQ may be achieved with a constant flow system the energy use, carbon impact and operating cost will be high.

The solution is to advance to a demand control ventilation (DCV) system. By adding active airflow control to the design, it is now possible to deliver just the right amount of ventilation air to achieve IAQ based on real time space use. The rest of the time, the reduced airflow will deliver improved energy usage, low carbon emissions and reduced cost. To deliver DCV, an active airflow control system is used where each zone is controlled either by an occupancy, VOC, or CO<sub>2</sub> sensor (See Fig. 1).

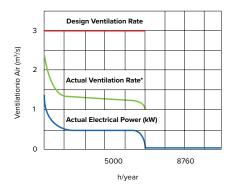


FIG. 2 shows actual ventilation airflow data and energy usage for an office building in Sweden. The system delivered the necessary IAQ while reducing the airflow on average to 42% of the design ventilation requirement resulting greatly reduced energy use, carbon impact and operating cost. Real world experience supports the demand control opportunity.

Fig. 2 Measured Airflow Log with DCV for 1 year

\* The DCV system was sampled every hour for a year and never exceeded 76% of design airflow. For 80% of the time it averaged less than 45% of design airflow.

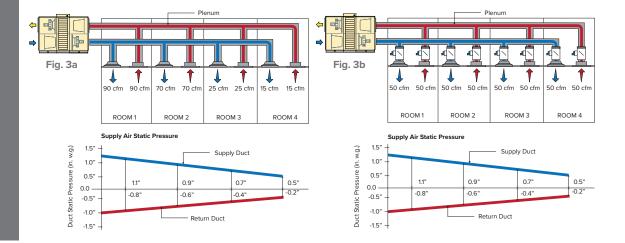
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Fig. 3a Space closest to air handling unit receives more air than other rooms

Fig. 3b Active airflow control is applied: the right amount of air is delivered and extracted.

#### DYNAMIC BUILDING AIR BALANCE

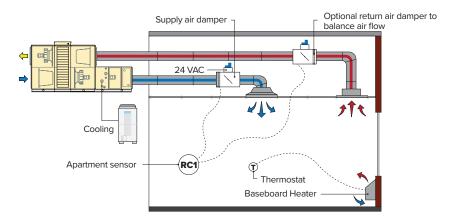
Whether the goal is temperature, humidity or IAQ control, the result is only as good as the system's ability to get the right amount of air to the space. Fig. 3a shows how the space closest to the air handling unit will get more air than the room furthest away unless airflow control is applied. If the system is constant volume airflow, then manual balancing dampers can be used. For variable airflow, adding active airflow control the right amount of air can be delivered and extracted from each space (see Fig. 3b). Not only will this deliver the intended result (IAQ or thermal comfort) it will avoid over pressurizing the space, driving air into the building envelope and risking serious damage to the building.





rig. 4 Ventilation system and controls layout for an apartment ventilation control

## **CENTRALIZED VENTILATION**IN MULTIFAMILY RESIDENTIAL BUILDINGS

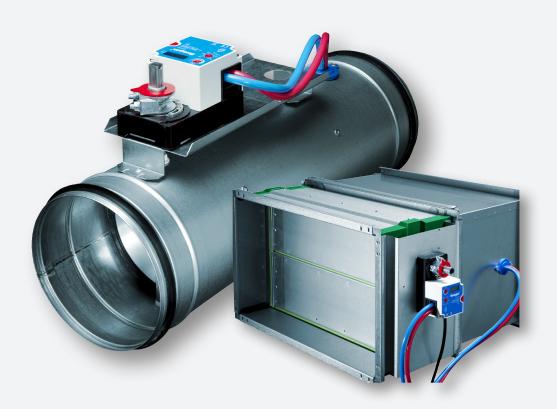


Using central ventilation in multifamily residential buildings offers a more efficient system, lower maintenance/operating cost, and fewer exterior wall penetrations compared to decentralized ventilation systems. Adding active airflow control to the design approach allows:

- > Set back, Normal, Boost airflow levels (20-50% above normal airflow) by apartment to enhance IAQ
- > Free cooling (economizer) to reduce energy usage and improve carbon footprint by avoidance of running mechanical cooling in shoulder seasons
- > Balanced airflows to manage infiltration/exfiltration
- > Humidity control with a Boost Plus option with up to 100% above normal airflow



#### **SWEGON REACT DAMPER**



#### The Swegon React Damper is a critical component of an active airflow control system. It offers;

- > Pressure independent airflow control
- > An easy-to-configure unit mounted controller (no need for tools or additional software)
- > Airflow monitoring
- > Taps for initial airflow balancing/commissioning for airflows as low as 11 cfm at 0.15 in. w.c.
- > Very low air pressure drop while maintaining high turn-down for added energy savings and reduced sound levels
- > 5% airflow measurement accuracy to deliver the required airflow and meet IAQ goals

#### The React Damper can be used for;

- > Temperature control
- > Humidity control
- > Demand Control ventilation (CO<sub>2</sub>, VOC or occupancy)
- Multifamily apartment airflow control including Passive House setback-normal Boost requirement

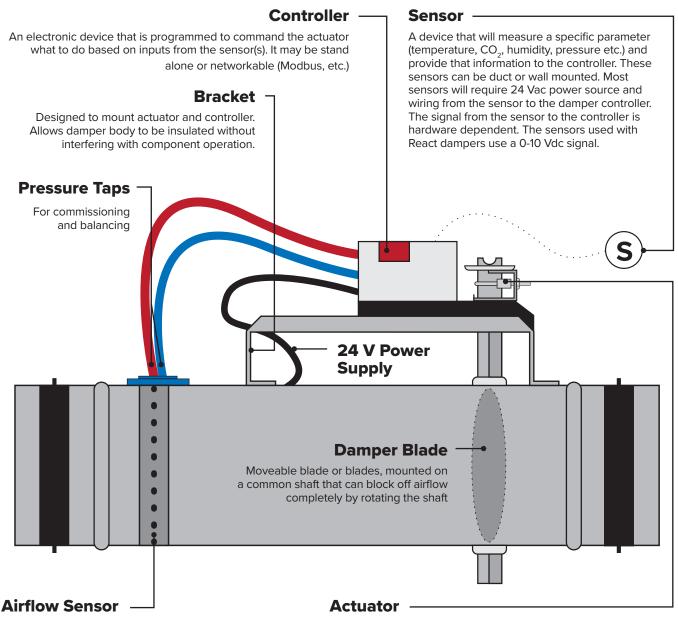
   Also offers the option of free cooling/economizer and winter humidity spike control in air tight buildings.
- > Constant airflow (in a VAV duct system)
- > Constant pressure (in a VAV duct system)

#### The React Damper is available in;

- > Round Ø4 24 in. (11 6,120 cfm)
- > Rectangular  $6 \times 6 48 \times 28$  in. × in. (50 16,800 cfm)

For more information on Active Airflow Design and Swegon products, visit swegonnorthamerica.com

### **CONTROL DAMPER BASICS**



Dampers come in two main types, dependent control and independent control. For independent control dampers some form of air measuring device is required. They are typically pitot tube style so pneumatic tubing is connected to the controller which then calculates airflow.

Electric actuator that can rotate the damper blade shaft thus opening and closing the damper. The motor must have enough torque to be able to close the damper against air pressure. The larger the damper, the larger the actuator. Dampers are typically 24 Vac but other voltages are available. In addition to power, the damper will also receive a signal to tell it how much to move. Common signals include 0-10 Vdc, 4-20 mA, 0-135 Ohm and floating setpoint control. React Dampers use 0-10 Vdc signal. As an option, actuators can include a spring which will drive the damper closed if power is interrupted.

