

Active Airflow Control Using React Dampers

Whistler Housing Authority – Whistler, BC



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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.

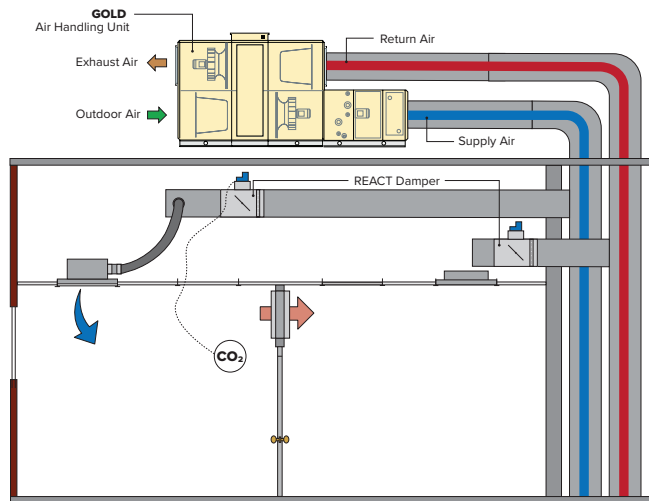


Fig. 1 Active Airflow Control System set up for demand control ventilation

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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 CO₂ sensor (See Fig. 1).

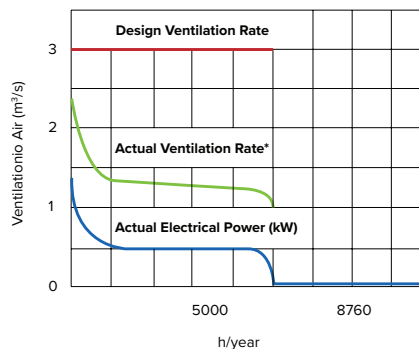


FIG. 2 shows actual ventilation airflow data and energy usage for an office building in Sweden. The system delivered the necessary IAQ while reducing the airflow on average to 42% of the design ventilation requirement resulting greatly reduced energy use, carbon impact and operating cost. Real world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

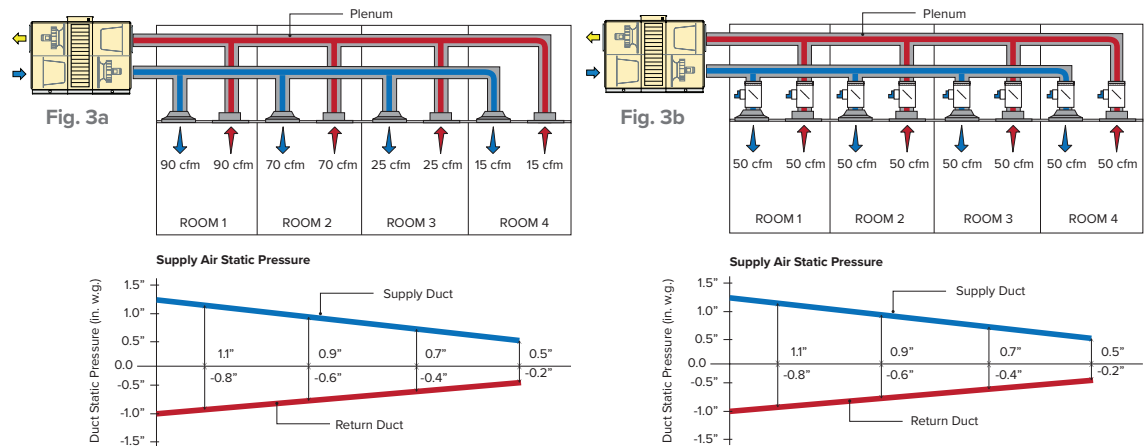
Fig. 2 Measured Airflow Log with DCV for 1 year

* 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

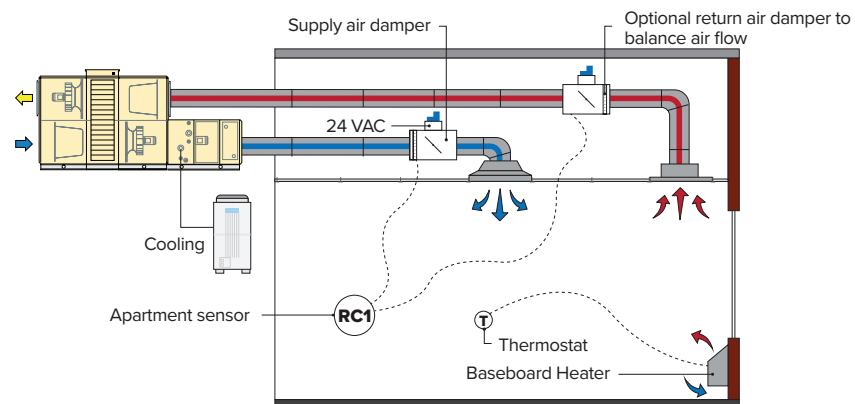
Fig. 3b Active airflow control is applied: the right amount of air is delivered and extracted.



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

CENTRALIZED VENTILATION IN MULTIFAMILY RESIDENTIAL BUILDINGS

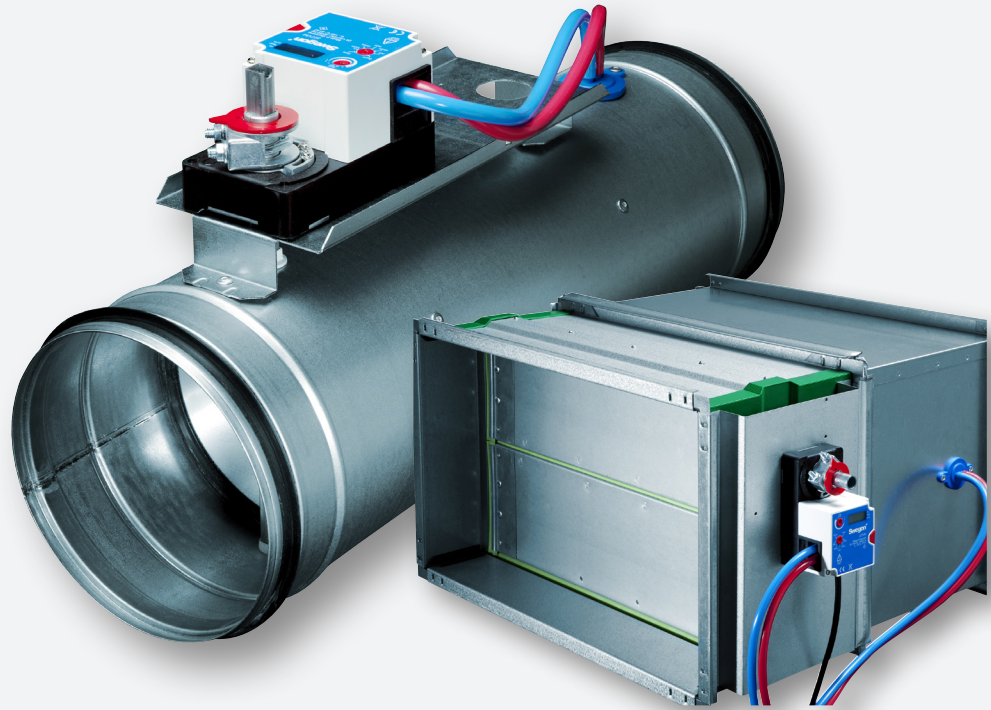


Using central ventilation in multifamily residential buildings offers a more efficient system, lower maintenance/operating cost, and fewer exterior wall penetrations compared to decentralized ventilation systems. Adding active airflow control to the design approach allows:

- > 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;

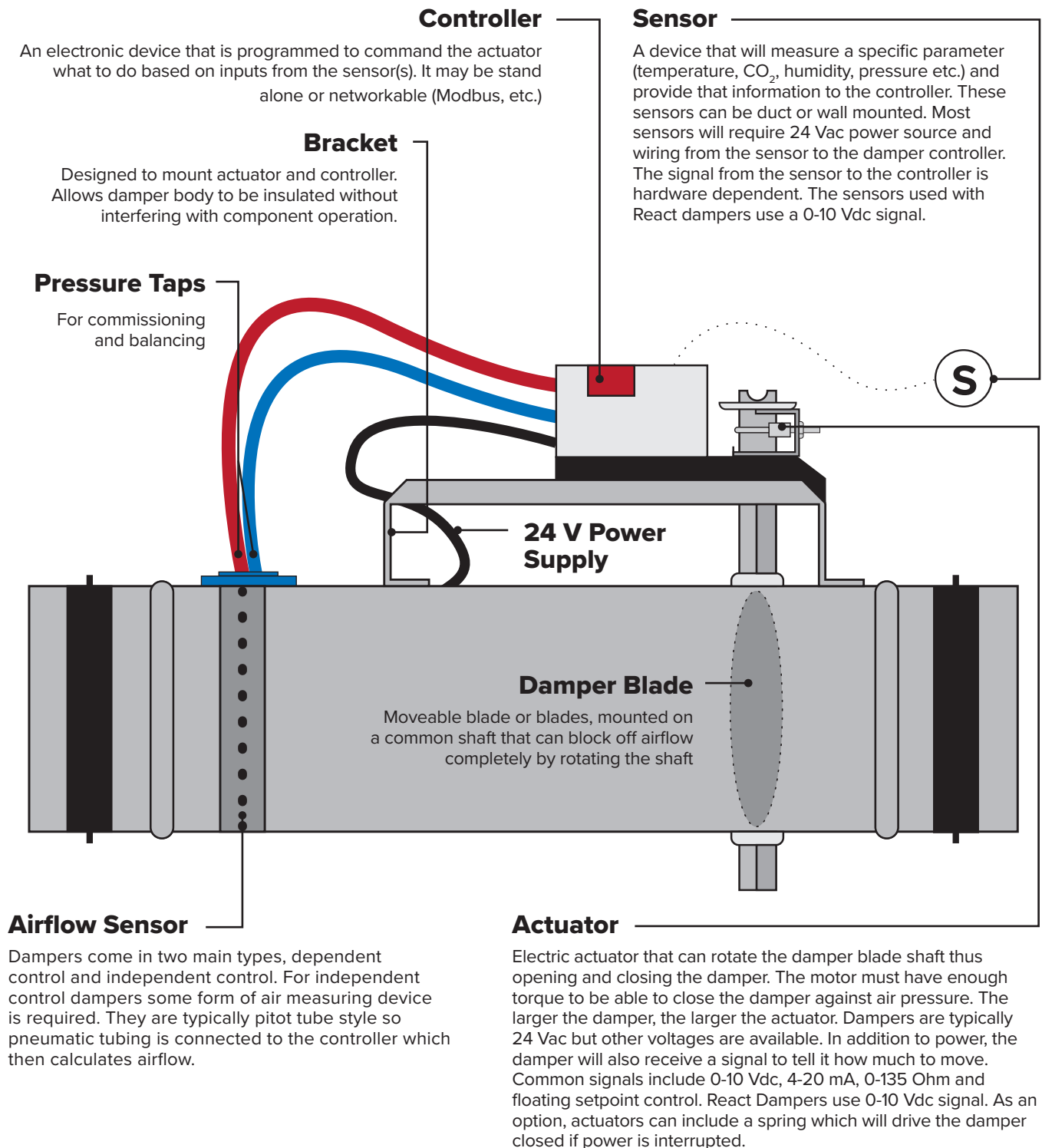
- > Temperature control
- > Humidity control
- > Demand Control ventilation (CO₂, VOC or occupancy)
- > Multifamily apartment airflow control including Passive House setback-normal – Boost requirement
 - Also offers the option of free cooling/economizer and winter humidity spike control in air tight 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 × 6 – 48 × 28 in. × in. (50 – 16,800 cfm)

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

CONTROL DAMPER BASICS



Typical airflow control damper and its components. They can be round (shown) or rectangular in just about any size or shape.



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