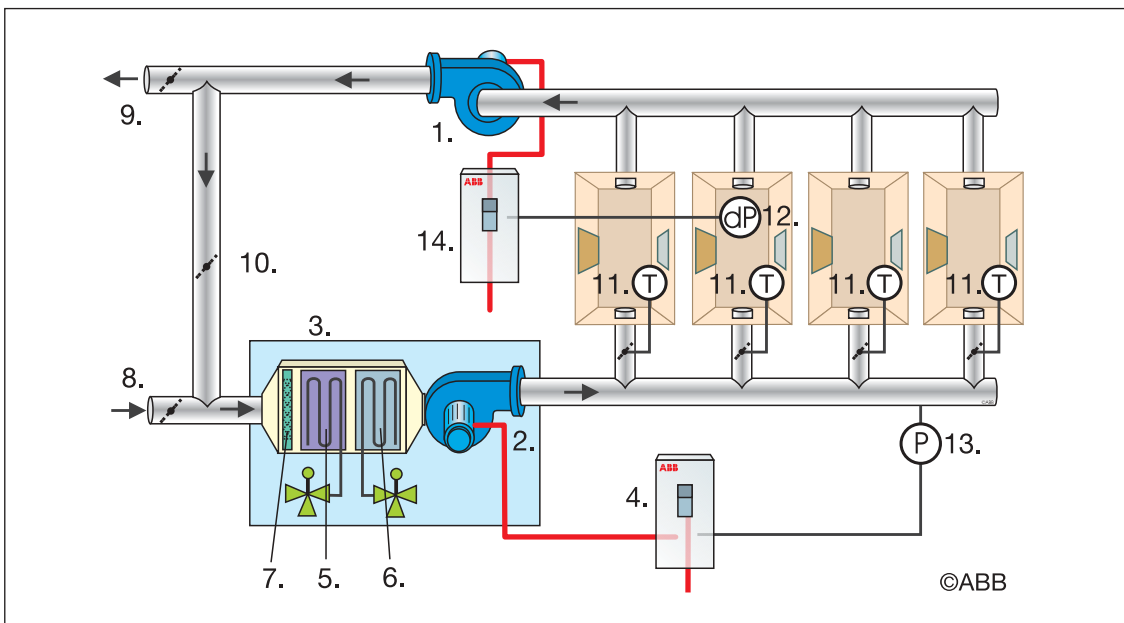


Variable air volume system with VSD fan control



Variable air volume system with variable speed control fans.

Application principle

Variable Air Volume or VAV systems have some kind of system to control the air volume. Damper control is a common solution, but variable speed control of fans is the most economic method to control the air volume. The system is usually designed to maintain constant static pressure in the supply duct. The supply fan keeps duct pressure constant and terminal devices or VAV boxes supply the conditioned space with a variable airflow of constant temperature air. The return fan in turn keeps the static pressure in the room constant. Plant maintenance is centralized. The system may be designed so that outside air can be utilized for cooling, eliminating the need to operate the refrigeration plant, this is also called the economizer cycle.

Room temperature can be achieved by:

- Air volume control.
- Bypass damper control.
- Control of refrigeration capacity.

Detailed description

This variable air volume system brings outside air and return air to the Air Handling Unit (AHU) (3.), where the temperature and humidity of the incoming air (8.) can be controlled. The main AHU components are the supply fan (2.), heating coil (5.), cooling coil (6.), filter (7.) and humidity control equipment (not shown). The temperature in the individual rooms is measured by thermostats (11.), which directly control the dampers or VAV boxes in each room. The supply air fan is speed controlled by an AC drive (4.) and it delivers the air to individual rooms throughout the building through supply air ducts. The AC drive controls the air volume by keeping the static pressure constant. The pressure is measured by the sensor (13.). The return air fan (1.) blows the exhaust air (9.) out of the building, or returns some of the air (10.) back to the AHU. The return fan is controlled by an AC drive (14.), which keeps the differential pressure (12.) to outside pressure constant.



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Application Notes

Performance in creating the Comfort Zone

Constant volume - Variable temperature systems have in the past dominated HVAC applications. Variable volume control has been implemented with dampers or other mechanical control methods, such as throttling control or pitch control.

The advantages of a variable air volume system using variable speed control are:

- Reduced maintenance of mechanical equipment such as belts and bearings due to reduced operating speeds and VSD soft starting and stopping.
- Power supply phase loss protection achieved with VSD.
- Fast control for maintaining the Comfort Zone limits.
- Low consumption of electrical energy.
- Lower consumption of heating and cooling energy than in constant air volume systems.
- Easier to maintain low noise levels.



Air handling units (AHUs) of an office building.

HVAC



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