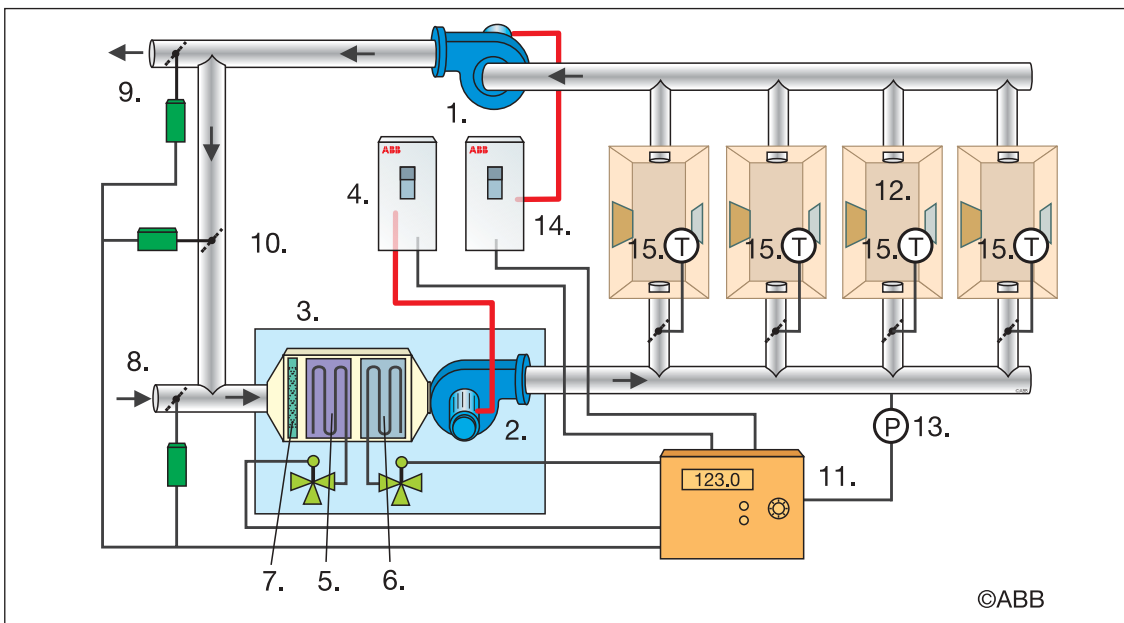


VAV with fan tracking positive pressure



Air conditioning system with variable speed drives.

Application principle

This Variable Air Volume system is a slightly simplified version of the Variable Air Volume system with VSD Fan Control (See Application Notes D3). Instead of having constant static pressure or airflow control of the return air fan, it tracks the positive pressure by following the "master" supply fan speed. The idea is to keep the return fan airflow slightly smaller than the supply air flow in order to have a slight over-pressure in the building. It may be easier to maintain stability using this method than in systems with static pressure controls (See Application Notes D3). This system for multiple zone air conditioning usually has thermostat and damper controlled terminal units for each zone. The system may be designed to enable room cooling using outside air without the need to operate the refrigeration plant, this is also called the economizer cycle.

Correct room temperature can be achieved by:

- Air volume control.
- Bypass damper control.
- Control of heating or 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 air fan (2.), heating coil (5.), cooling coil (6.), filter (7.) and humidity control equipment (not shown). The system is remotely operated by the control panel (11.). The temperature in the individual rooms is measured by thermostats (15.), which directly control the dampers in the room terminal units. 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 supply air volume by keeping the duct 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.) to the AHU. The return fan is controlled by an AC drive (14.), which follows the speed of the supply fan with a correction factor in order to have a slightly



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smaller air flow than in the supply fan. The correction factor for the return fan speed can be provided by the control panel.

Performance in creating the Comfort Zone

The use of variable speed AC drives improves the controllability of the whole heating, cooling and air conditioning system, making it easy to maintain the Comfort Zone. The use of variable speed drives usually increases the initial investment costs, but the electrical energy savings for the motors alone mean that an investment in VSD has a pay-back time of 0.2 - 3 years.

In addition to savings in electrical energy, VSD provide several important customer benefits:

- 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 Comfort Zone conditions.
- Accurate control to keep the desired air quality.
- Reduced consumption of heating and cooling energy.
- Reduced consumption of electrical energy.
- Easy to maintain low noise levels.



Air handling units (AHUs) and the duct work in a factory.

HVAC

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