



Introduction to an Air Handling Unit (AHU)

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Welcome to this Introduction to an Air Handling Unit, AHU. Over the course of the following pages you will learn:

1. [What is an AHU?](#)
2. [Where is an AHU Located?](#)
3. [What are the Main Components of an AHU?](#)

1. What is an AHU?

An AHU (Air Handling Unit) is a device that conditions and distributes air throughout a building. It takes fresh air from outside and then has the ability to treat it in a number of ways:

- Clean it
- Heat it
- Cool it
- Humidify it
- Dehumidify it

The treated air is then forced from the AHU, through ductwork to designated areas of the building, known as 'zones'.

The decision whether to heat or cool the air depends on the temperature of the air drawn into the AHU and the desired temperature(s) of the air in the zones of the building.

The same applies to humidifying/dehumidifying. Many buildings in the western hemisphere may not require this functionality but exceptions may include document archives whose role it is to protect paperwork etc.

Once the treated air has been delivered to the zones, the 'dirty' air is then removed from each zone, fed back through the ductwork to the AHU. It is then either ejected into the atmosphere, or in some cases, fed back into the system, to improve efficiency.



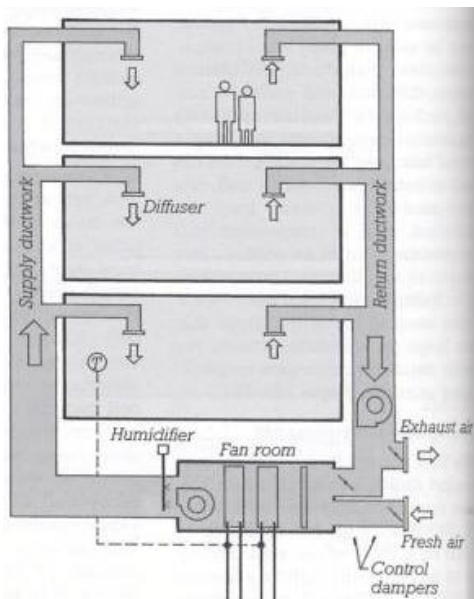
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2. Where is an AHU Located?

Most medium to large sized commercial and industrial buildings require an AHU. They are most often found in the basement, on the roof or on the individual floors of the building. Larger buildings will have multiple AHUs located in a mixture of these locations.

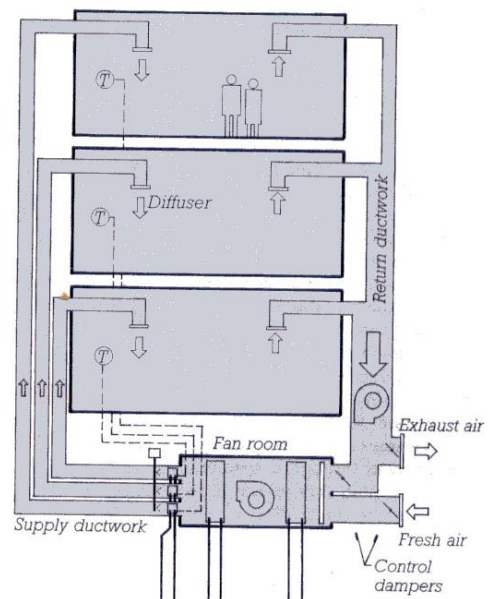
Historically older buildings had one AHU serving the whole building but nowadays it is more likely to have multiple, smaller AHUs serving different zones. This is more efficient and gives better control of the temperature/humidity of the air.

There are two different types of AHU systems: Single Zone Systems and Multi Zone Systems.



Single Zone System – a single duct, feeding from the AHU, supplies the whole building. The duct branches out to feed each individual zone as it passes through the building. Whilst it may be easier to run a single duct through the building it has limitations in that every zone/room within that building must be the same temperature.

Multi Zone System – individual ducts run from the AHU and feed each zone/room. In order to install this system more work is required on-site, however, it brings the benefit of being able to control the temperature of each zone individually.

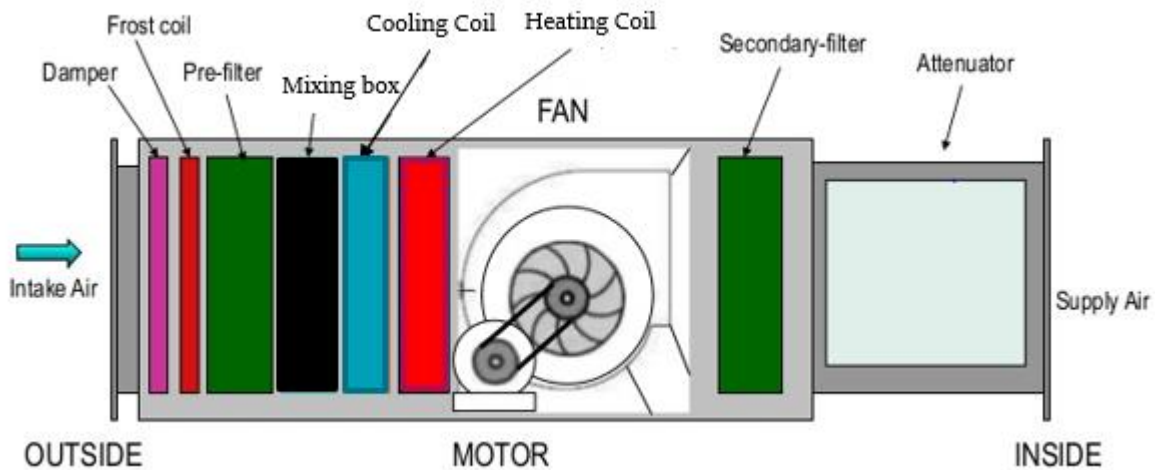


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3. What are the Main Components of an AHU?

An AHU is essentially a large metal box, containing multiple components, each serving its own specific purpose. This 'metal box' connects directly to the ductwork that takes the conditioned air to specified zones within a building.

The cross-section diagram below shows most of the primary components of an AHU, each of which is described in more detail, later in this section.



- **Grille / Air Intake Screen**



On the front of every AHU is a grille (or Air Intake Screen) to prevent large, unwanted objects from entering the system and potentially causing damage or a blockage.

- **Damper**

The first internal component of any AHU is the damper. This is multiple sheets of rotating metal that are used to adjust the volume of air entering the AHU. They can open and close fully and also open partially.

As well as controlling the volume of air, dampers are important when it comes to preventing the spread of fire, closing to act as a fireproof break two sides.



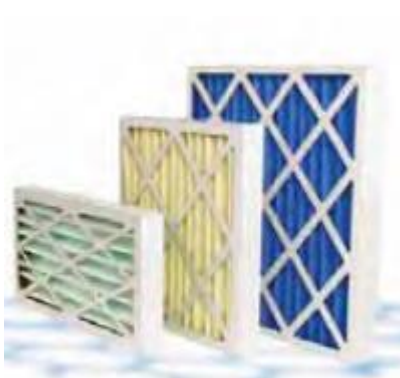
- **Frost Protection (Pre-Heating) Coil**



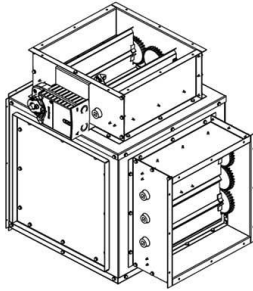
In cold parts of the world, many AHUs contain frost protection coils that heat-up the freezing cold air entering the system. This prevents the heating and cooling coils from freezing and bursting.

- **Filters**

Having passed through the frost protection coil, the air then passes through a filter. This removes any small dust and dirt particles that, if allowed to enter the system further, would damage the components and would also result in people breathing in contaminated air. There are two types of filter – panel filter (left below) and bag filter (right below).



- **Mixing Box**



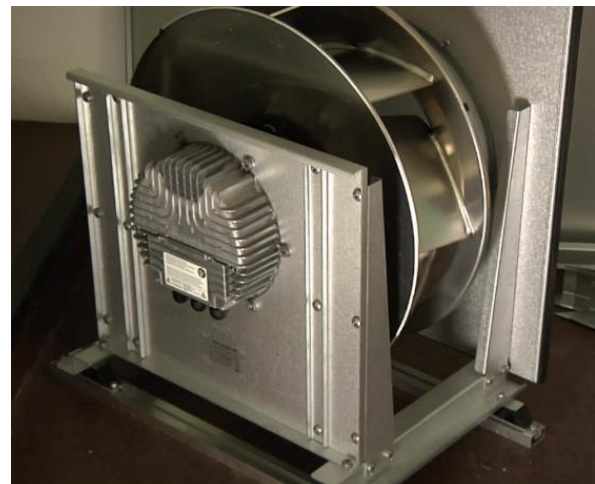
A mixing box helps increase the energy efficiency of an AHU by recirculating returning air from the ductwork (from the zones/rooms) and mixing it with fresh air being introduced from outside. The heat from the returning air is used to heat the outside air, thereby reducing the energy output required from the AHU itself.

- **Cooling & Heating Coils**

These set the temperature that leaves the AHU. A thermostat is used to ascertain the temperature of the air in the AHU. If the air is deemed too hot, the heating coil will be activated and vice versa. This desired temperature is known as the Set Point.

- **Supply Fan**

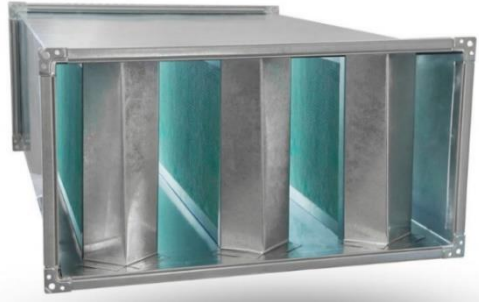
The fan circulates the air from the AHU, into the ductwork, along to the various zones. It pulls the air into itself and then propels it out. The speed at which the air leaves the fan can be controlled. Historically these were centrifugal fans but for increased efficiency they are now EC (Electronically Communicated) fans (see image below). Fans have a pressure sensor to ensure they are running and functioning correctly.



- **Secondary Filter**

A secondary filter further filters the air in the AHU before it leaves and continues its journey through the ductwork.

- **Attenuator**



An attenuator is a silencer that reduces the noise produced by an AHU. It ensures a specific noise criterion is achieved within the zones served.

- **Humidifier**

Depending on the geographic location and requirements of the building, some AHUs also have a humidifier (and humidity sensor). The sensor measures the level of moisture in the air, should the level need to be controlled. A humidifier is usually one of the last components in an AHU and if deemed unnecessary, they may be turned off to increase efficiency.

- **Control Panel**

Every AHU will have a control panel, featuring individual switches and run and trip indicators for the fan and heater. There are three different types of control panel: single stage control panel, 3 step control panel and 6 step control panel, referring to the number of steps of heater control.



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