Introduction to a Fan Coil Unit (FCU)

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Welcome to this Introduction to a Fan Coil Unit, FCU. Over the course of the following pages you will learn:

1. What is an FCU?
2. Where is an FCU Located?
3. What are the Main Components of an FCU?

1. What is an FCU?

An FCU (Fan Coil Unit) is a device that conditions local air to suit the temperature requirements of a specific room / area.

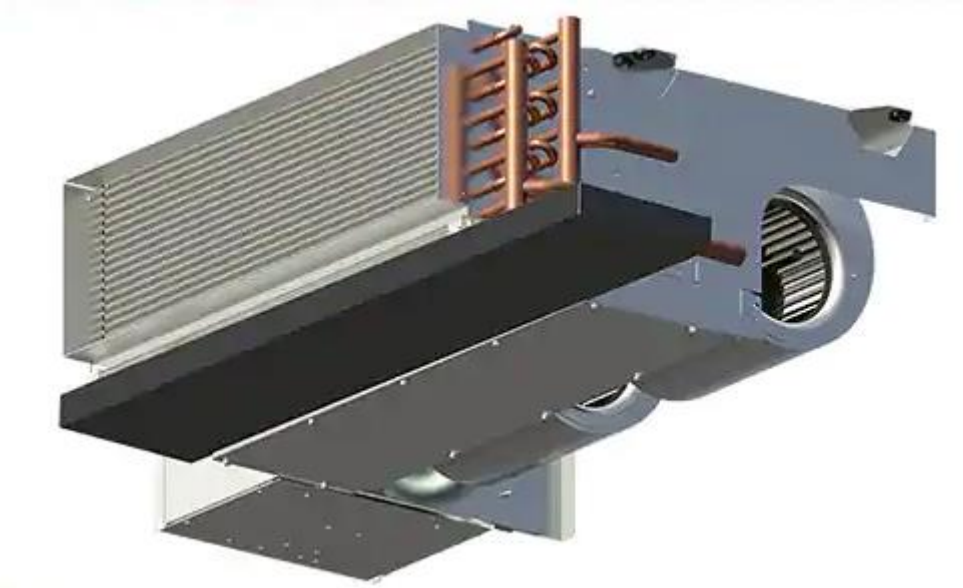
It takes fresh air that has already been treated (by an AHU) and either raises or lowers the temperature before passing it through ductwork and out through air diffusers.

An FCU uses water in heating or cooling coils to adjust the air temperature.

Some FCUs are designed only to heat or cool the air, these are known as two-pipe fan coil units and will have one supply pipe and one return pipe (for either hot or cold water).

More common are four-pipe fan coil units. These have two supply pipes (for hot and cold water) and also two return pipes. These FCUs allows buildings to be both heated and cooled.

There are two different types of FCU – a Direct Expansion FCU and a Chilled Water FCU. The former uses a refrigerant for cooling, whilst the latter uses water for cooling, fed from a chiller.



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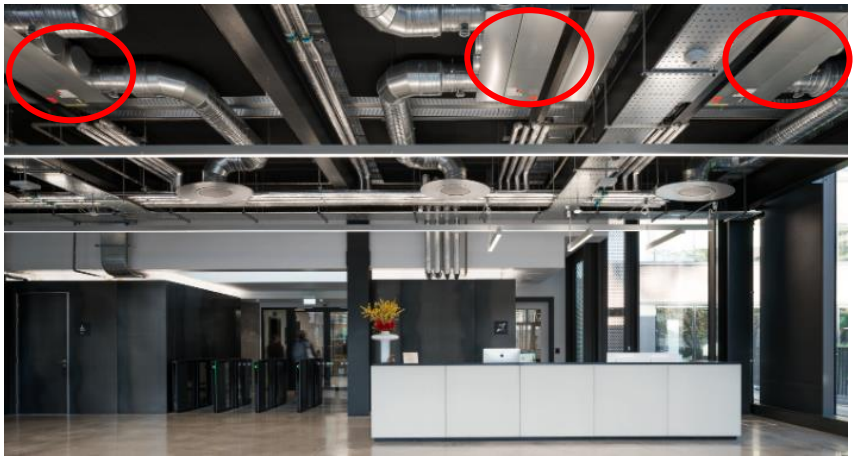
2. Where is an FCU Located?

Each FCU is located in the ceiling of the room / area whose air temperature is to be controlled. Many are hidden behind false ceilings, but it is becoming increasingly popular, particularly in industrial-style office buildings, to leave FCUs and the connecting ductwork exposed.



The image to the left shows several exposed FCUs, providing this office foyer with heated/cooled air.

The image below is a close-up of an FCU, again sending heated/cooled air through several diffusers into an office space.

Whilst the FCU itself is found in the room that is to be heated or cooled, the boiler and/or chiller that heats or cools the water that feeds the FCU coils are located elsewhere in the building. Flow and return pipes take the water to and then from the FCU.

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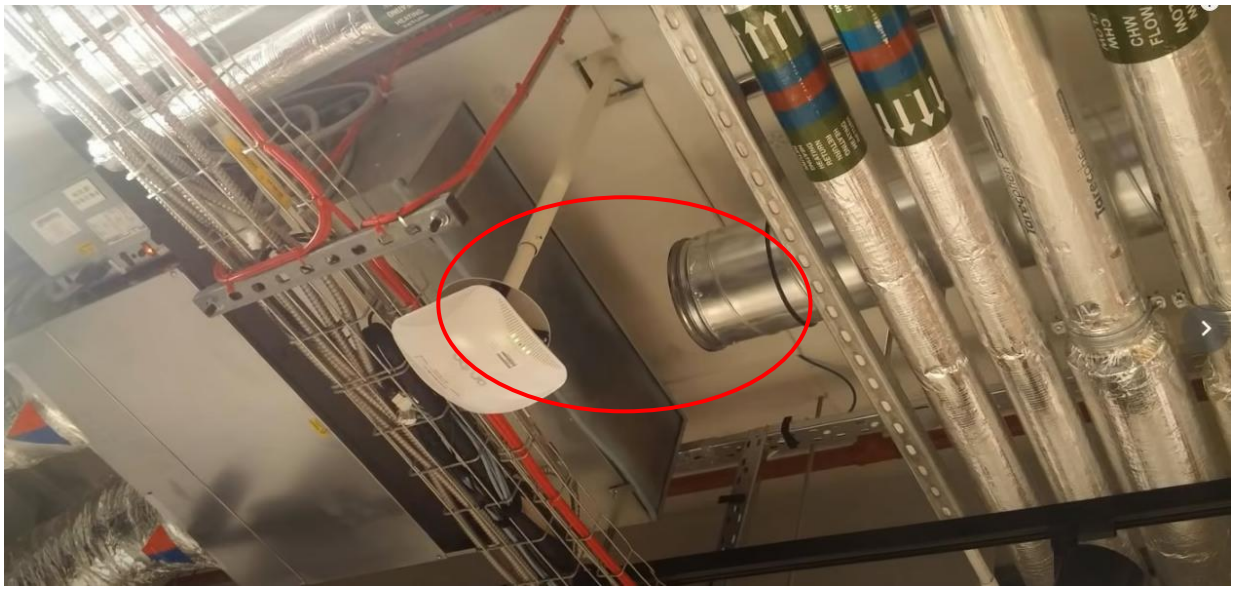
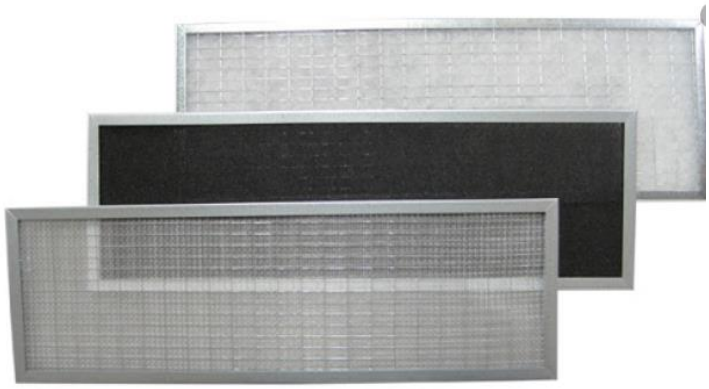
3. What are the Main Components of an FCU?

Air Inlet & Removable Filter

- Fresh air is first fed through the air inlet and passes through a filter. The image below shows fresh air being passed from the main ductwork (from the AHU) and into the air inlet. These two are not connected. Here the air is passing from right to left:



The filter covering the air inlet is a removeable filter that can be easily cleaned or replaced. Its purpose is to prevent any dust or other dirt from entering the FCU. Filters come in several different formats, as seen opposite.



- **Heating & Cooling Coils**

Heating and cooling coils either heat the air or cool it, depending on the requirements of the local environment. The heating coil will be fed hot water from the boiler, whilst the cooling coil will be fed cold water from the chiller.

As the water passes through the coil it loses some of its thermal energy and passes it onto the air being fed through the FCU. It is this process that changes the temperature of the air.

As mentioned in section one, some FCUs will have only one coil (for heating or cooling).

- **Flow & Return Pipes**

The heating and cooling coils need to be supplied with hot and cold water. This water will be fed to and from the FCU via a network of flow and return pipes respectively.

The hot water will be delivered to the FCU, from the boiler, via the heating flow pipe and taken away via the heating return pipe, whilst the cold water will be delivered, from the chiller, via the chill flow pipe and taken away via the chill return pipe.

Each pipe will be colour coded (depending on whether it is heating (red & blue) or chill (green)) and will also have arrows indicating the direction of the water.

- **Drip Tray / Drain Pan**

When air is being cooled, using the cooling coil, it will begin to be condensed and therefore a significant amount of condensation will be created.

It will run off and be collected in the drip tray / drain pan at the bottom and taken away through the pipework.

- **Fan(s)**

Once the air has been tempered (heated/cooled), it enters the fan(s). There may be only one fan or several. Fans will have a small motor to power them and force the air through the FCU and into the heating and/or cooling coils.

In the image to the left the motor is located between the fans and connects to the fan blades inside the two fans.

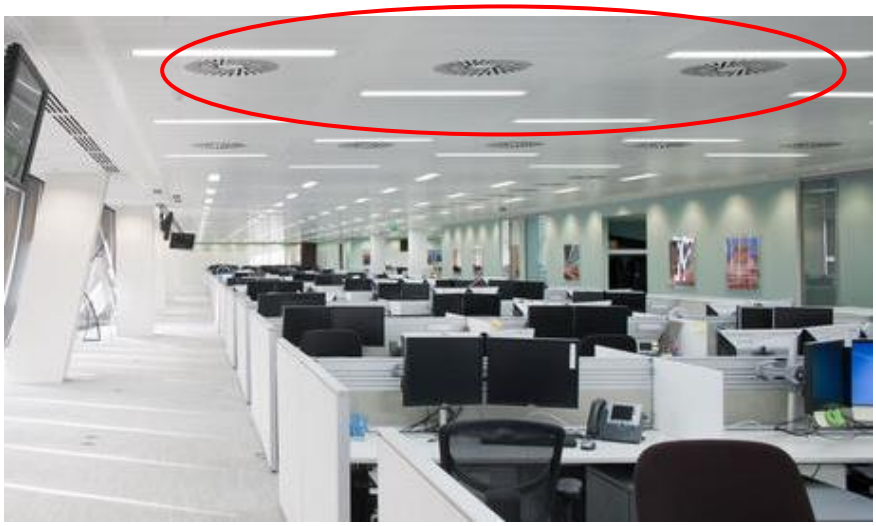
- **Discharge Plenum**

The discharge plenum (here the three large holes located to the right of the fans) connect to the local ductwork and send the tempered air towards the diffusers in each room.

- **Tempered Air Ducts**

The ducts (ductwork) taking the tempered air from the FCU and to the diffusers will have coloured arrows on it, indicating the direction of the air flow and also, in the case below, that the air may be hot or cold.

- **Diffusers**



Diffusers are the final component of an FCU system. They connect to the end of the ductwork taking the tempered air from the FCU and diffuse it into the room. The image to the left shows an office with diffusers forming part of a false ceiling.

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