

Filter Fan Unit (FFU / FVE)

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A Filter Fan Unit (FFU) is a module of filter, heating, cooling and fan, which is used in a clean room. In the broader sense the term describes a certain layout of several Filter Fan Units in a clean room and its control. Filter Fan Units are basically found in ceiling systems of clean rooms for example in the microelectronics, microsystems technology or in the pharma industry.

Basics

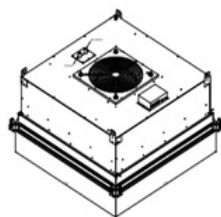
In clean rooms, the temperature is as constant as possible, in addition to the lowest possible concentration of airborne particles. This is achieved by ventilation systems, which maintain a horizontally or vertically circulation of airstream. After leaving the clean room, the air is passing a filter and obtains its desired temperature before it is introduced into the room again.

Previous systems of airflow control had a central fan, by which the filtered and tempered airflow was distributed via openings in the ceiling of the clean room. This method adheres several disadvantages:

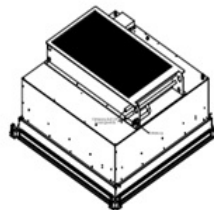
- High energy consumption, because a single fan has to supply all outlets
- Non-uniformly distributed airflow, because the pressure decreases with increasing distance from the fan

- Unsteady temperatures in particular areas, because on the one hand the desired temperature changes over longer intervals and on the other hand different requirements for the temperature control prevail in the clean room itself, for example caused by heat generating equipment.

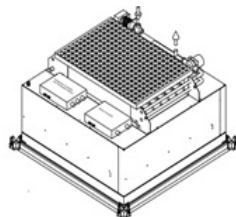
The use of Filter Fan Units solves these problems.



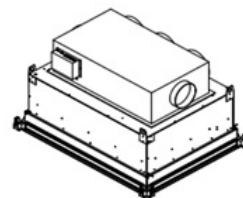
FFU basic type
- filter
- ventilator
- speed control unit



FFU basic type
including in addition
- cooler unit



FFU basic type
including in addition
- cooler unit
- pump
- temperature control unit



FFU basic type
including in addition
- fresh air
- circulating air connection

Principle of operation

A larger number of Filter Fan Units (FFU) is installed in the ceiling of a clean room. Each FFU is responsible for a specific section of the clean room. One FFU consists of a fan, a temperature sensor, a cooling unit, a heating probe and a filter. Air leaving the clean room at the bottom is taken in by the FFU, tempered to the desired set point and introduced into the clean room with the desired pressure.

Each FFU can be controlled separately via a central computer. This principle enables individual values of set points for temperature and airflow (speed of the fan) to be defined for each section of a clean room supplied by FFUs. For example, a FFU located above a heat generating equipment, will insert more chilled air. This principle guarantees a constant temperature gradient and a constant airflow throughout the whole clean room. At the same time the energy consumption is reduced.

History

The FFU technology has become the standard in clean rooms. To Europe it was introduced in the late 1980s by the company CRC Clean Room Consulting GmbH.