



PROCLEANROOM

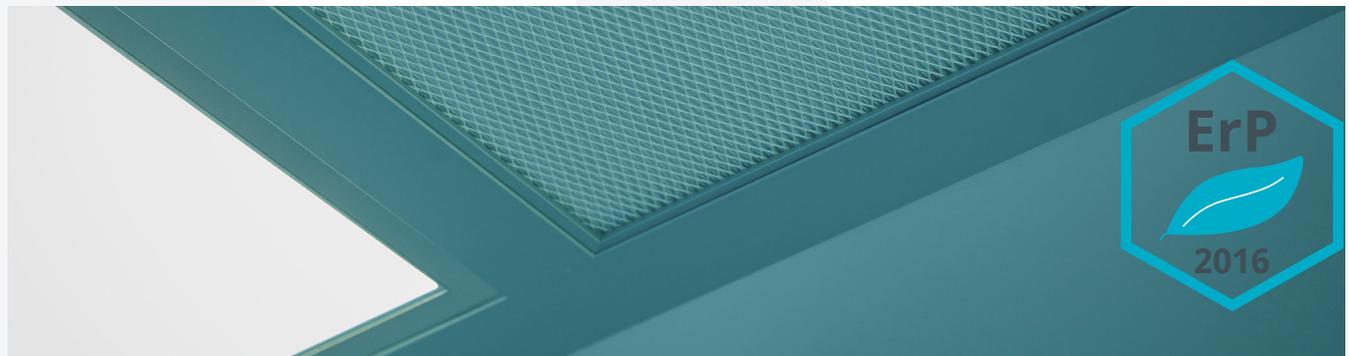
BUILD YOUR EXPERTISE

EXCEEDING THE NORM: DC (EC) MOTOR TECHNOLOGY IN CLEANROOMS AND FLOW UNITS

In order to protect our climate, the European Union has, by means of the Kyoto protocol, committed itself to reducing CO2 emissions. The goal is a reduction of at least 20 percent by 2020. On that basis, the Energy directive (EuP) was established in 2005. This was renamed the ErP directive in 2009, which stands for Energy related Products. Many people won't have heard of it, but we are confronted with it on a daily basis. Think of the light bulb ban, for example, or the introduction of LED lighting and energy labels on domestic appliances.

THE ERP DIRECTIVE: WHAT DOES THIS MEAN FOR ME AS A USER OF CLEANROOMS AND FLOW UNITS?

The directive applies to all countries within the EU, and especially for manufacturers and operators of ventilation and air-conditioning components and installations. The directive applies to products that were manufactured within the European Union or have been imported from other countries. The ErP directive will be introduced in stages with an end date of 2020, and applies to a wide range of electric motors and fans. For us as manufacturers of modular cleanrooms and flow units, and for buyers or users of these products, it is important to know what this means specifically for these products and their purposes.



AC VS. DC (EC) FAN MOTORS

Fans of all types are included in the directive; axial and centrifugal fans with both forward and backward curved blades with capabilities between 125W and 500kW. It is applicable to 'stand-alone' components and integrated solutions. Such fans are applied in fan filter units, cleanrooms and flow units.

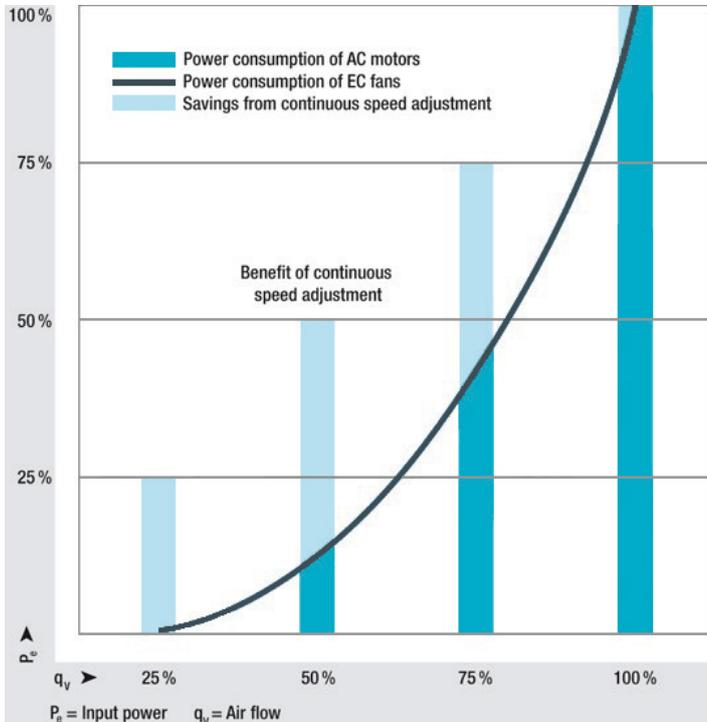
In order to meet the goals, the EU has imposed directives concerning the efficiency of electrical fans. In order to realise this efficiency, a rigorous transition was needed in the used fan technique. This transition can be compared with LED versus classic light bulb transition.

The answer: applying efficient DC (EC) electric motors in cleanrooms and flow units instead of the classic AC electric motors.

Because of legal loopholes, some companies still offer and deploy AC electric motors because of the lower initial purchase price. However, this will no longer be possible within a few years and will be illegal. Apart from the lower initial purchase price, AC motors are inferior when compared to the advanced DC (EC) motors. Potential users, who are aware of the disadvantages of AC motor technique, will always prefer the DC (EC) based motors for their application.

ENERGY EFFICIENT... SO COST-SAVING

Compared to AC motors, quality DC (EC) motors obtain an efficiency of 90% and an energy saving of up to 70%. Except from the fact that these motors are ahead of the ErP standards, the user also tremendously saves on the use of energy and therefore costs.



Source: EBM Papst

A ProCleanroom flow unit or modular cleanroom, runs typically at 50% of the maximum speed in order to realise the recommended 0.45 m/s air velocity at the filter surface (ISO14644-1). Check the chart to see a visualisation of this saving.

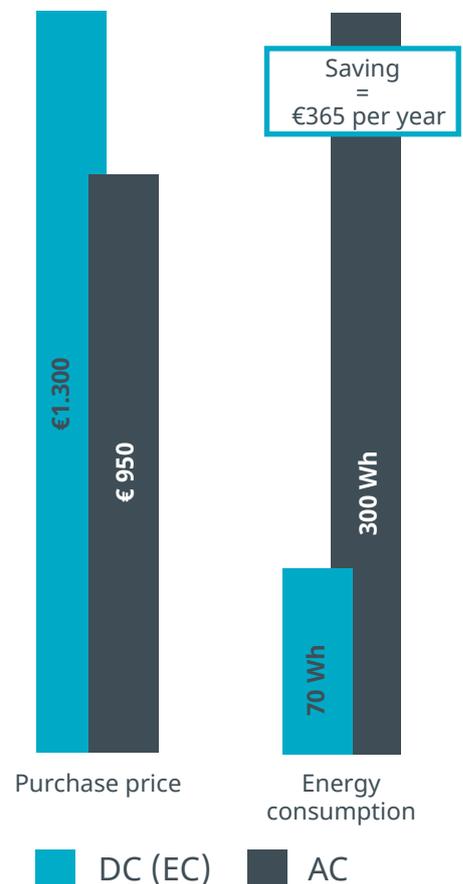
EXAMPLE OF SAVINGS IN EUROS

The average purchase price of a fan filter unit (FFU) with AC motor is around €950. A fan filter unit with quality DC (EC) motor costs around €1.300. The difference in price of €350 is to the detriment of the DC (EC) motor. The difference in price is due to the more advanced and therefore more expensive technique of the DC motor technology. However, the price difference is quickly compensated by a huge saving of energy.

With new absolute filters (HEPA/ULPA) and a recommended air velocity of 0.45 m/s at the filter surface (ISO14644-1), the average FFU with AC motor uses around 300W and the FFU with DC (EC) motor, motor uses only 70W. A difference of 230W! That is a saving of 5520 Wh per 24 hour.

What does this mean in Euros? Based on an average kWh price of €0,18 for businesses in the Netherlands, this means a saving of €1 per day. That is €365 per year! So, you could say that the difference in purchase price is recouped in 1 year. After that it is simply earning money for the remaining long lifespan of 15 years. Not really a hard choice.

Besides saving energy, the DC (EC) motor technique has many other benefits, such as: perfect speed adjustability, low-noise and low-vibration operation and close to zero thermal loads.

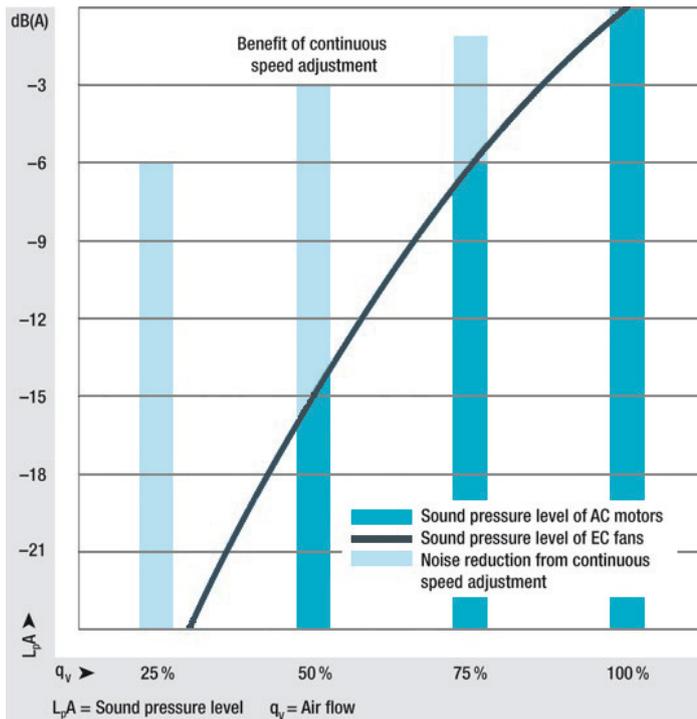


PERFECTLY ADJUSTABLE

Besides the enormous energy savings, the fan motors with the DC (EC) motors offer maximum adjustability of speed so that they can be perfectly adjusted to situation and use. And this facilitates even further energy saving. In contrast to AC motors, the DC (EC) motors can be perfectly adjusted across the entire range from 0 - 100%.

SOUND LEVEL

Because of the excellent interaction between motor, controls and aerodynamics, the DC (EC) motors offer an extremely low-noise experience and low-vibration operation. The ergonomics of the user will maximally benefit from this.



Source: EBM Papst

Check the chart for a comparison of the noise levels with various speeds. Typical speed setting of a ProCleanroom flow cabinet or cleanroom is 50% (@ 0.45 m/s at the filter surface)

CLOSE TO ZERO THERMAL LOAD

The use of DC (EC) fan motors has a very positive effect on the thermal control in a room where the flow unit or cleanroom is located and on the cleanroom, itself. In contrast to the fans with AC motor (high thermal load because of low efficiency) the thermal load of DC (EC) fans is close to zero. Because of this, investing in a cooling system is not necessary or limited. This leads to an immediate saving of costs and this is beneficial to the operator comfort.

As manufacturer of modular cleanrooms and laminar flow units, ProCleanroom commits itself fully to the use of the best DC (EC) fans. Not only because of the ErP directives but simply because it is the best possible choice for the user. It is a classical win-win situation: beneficial to the user and the climate!

If you would like more information about the technique or our products and services, then please contact us.

Niels Ferguson – Director ProCleanroom.