BRUSHLESS

THE BLDC MOTORS IN THE FAN COILS

(managed by the Product Management Office)

Brushless motors, literally "brushless", are synchronous electric motors with permanent magnets.

BLDC motors (Brushless Direct Current) operate with a direct current, but are typically powered with an alternating current in the context of low powers. The control electronics is concerned with "straightening" the incoming current to deliver continuous current to the inverter.

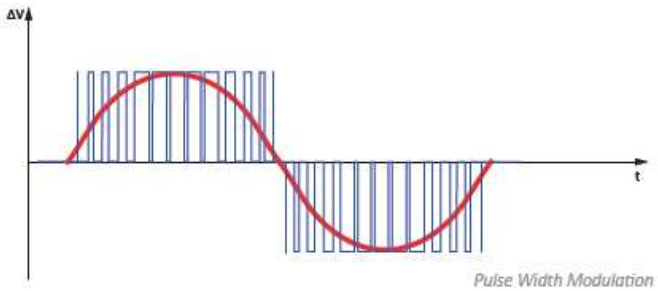
In this type of motor, the permanent magnets on the rotor produce a magnetic field and the rotation of the shaft is through a further magnetic field appropriately generated on the stator windings.

The performance of the magnetic field with the stator is dictated by the control electronics associated with the machine. In particular, the microcontroller called "inverter" is concerned with modelling through square waves a sinusoidal wave of desired frequency and amplitude: a technique frequently used is called PWM (Pulse Width Modulation).

Another function of the electronics concerns the continuous control of the rotor position (Hall or Back EMF sensors).

In particular the Back EMF (Electromotive Force) method is based on the principle that an electric current induces an electromagnetic force which is opposed to it. This force is proportional to the magnetic field that created it and to the rotor speed.

The reading of the "counter-electromotive" force is performed the instant the generated voltage is zero (i.e. in the midpoint of the period of the sinusoid) so to be able to refer directly back to the rotation speed.



Pulse Width Modulation

This control allows you to operate with greater precision and efficiency by allowing, in the more extreme cases (fans with high inertia), to "re-engage" a moving fan by varying the speed according to your adjustment requirements.

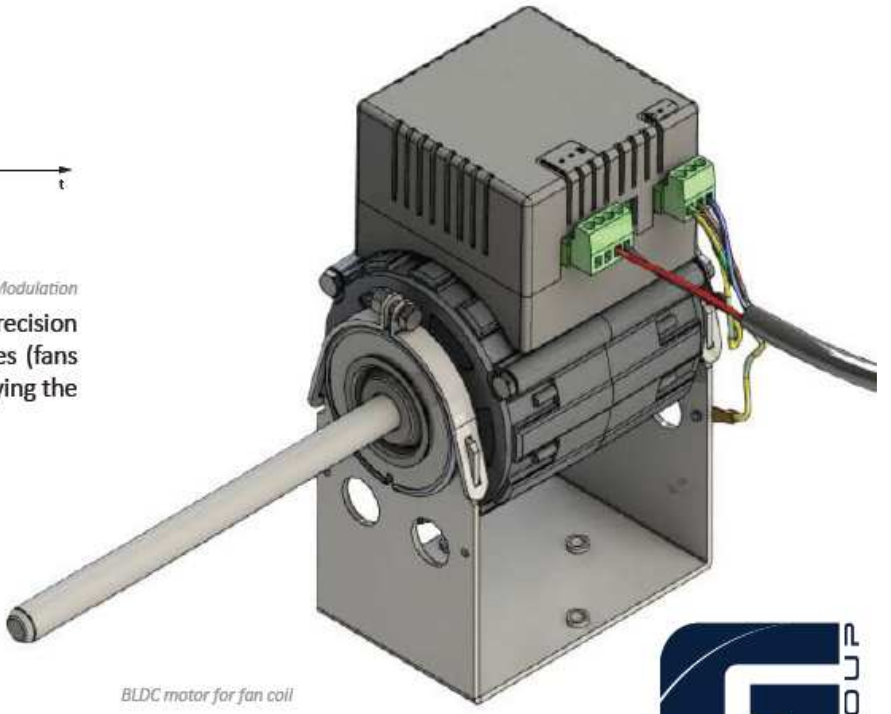
The characteristics described above allow this technology to perfectly replace the single-phase asynchronous motors historically used in the HVAC field on fan coils, which will be the focus of this newslettter.

In the single-phase asynchronous motors, in fact, the magnetic field on the rotor is induced by the stator field and is phase-shifted with respect to it. The so-called "sliding" between the two magnetic fields makes these motors inherently less efficient than BLDC motors, especially because the reduction of fan speed (terminals operating at partial loads) is obtained in the asynchronous motors by increasing the phenomenon of the sliding and highlighting therefore the inefficiencies related to the induction of current on the rotor (including the overheating of the same).

The brushless technology on the other hand enables you to modulate the rotor speed while maintaining high electrical efficiencies.

In particular, the permanent magnet motors of the "molded" type, represent the latest evolution in terms of reducing the electrical inputs and control of the ventilation speed. The presence of the inverter board (responsible for the modelling of the sinusoidal wave) directly wired on the motor ensures greater compactness, reduction of electromagnetic interference and electrical efficiencies that can reach peaks of 98%.

All the factors shown make this technology particularly attractive in low power applications.



BLDC motor for fan coil