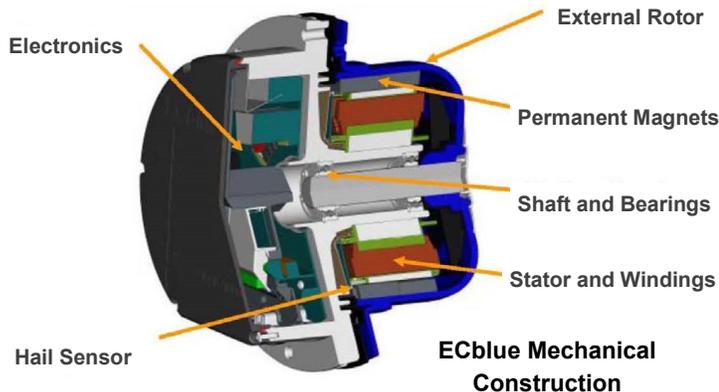
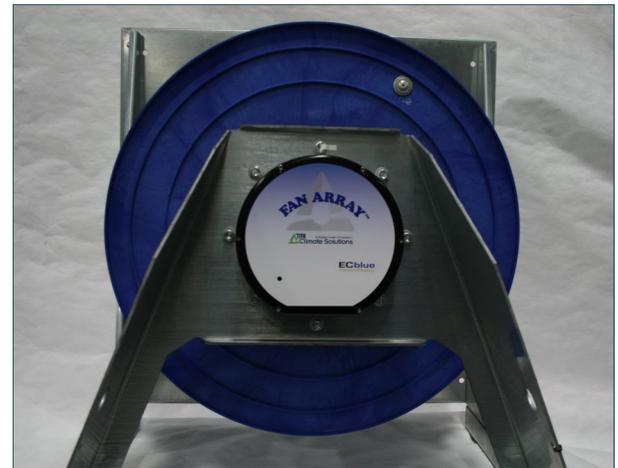


ECblue Motor Technology

TMI Climate Solutions Inc. understands the need of having energy efficiency, redundancy, and flexibility within the fan system of an air handling or condensing unit. TMI can incorporate the ECblue motor technology in our Fan Array™ design to best meet those needs for our customers.

Advantages of ECblue Fans

- **Lower Initial Cost**—with the simple open design, fan units with this style of fan will have a lower first cost compared to large housed fans.
- **Energy Savings**—Using the high effect DC motors, fans will use significantly less energy conventional fans even when compared at full



volume operation. With the ability to control the flow by varying the fan speed without the need for a separate variable frequency drive, fans can be turned down for significant additional energy savings.

- **Redundancy**—Fans are supplied in a TMI Fan Array™ consisting of a bank of multiple fans, so if there is ever a problem with one of the fans the unit can maintain airflow with other fans speeding up to compensate.
- **Interchangeability**—Since the fans are in a multiple fan array, a single fan size can be used to cover a wide range of different units allowing the facility to stock only one fan and motor assembly. Fan assemblies are extremely light weight, with one entire assembly weighing less a standard 15 horse power motor.
- **Space Savings**—The use of the ECblue Fan Array™ can drastically reduce the housing required for the units while improving the air velocity profile at the same time.
- **Reduced Noise**—Fans are mounted in acoustically lined modules and the total assembly will be much more quiet than a conventional fan. Typically at least 10% less noise is generated by the entire Fan Array™ than even the noise from just the bare housed fan without even considering the added sound from the motors and drives.
- **Reduced Maintenance**—Since the fans are direct drive, there are no belts to change out, no fan bearings that need to be lubricated, and the motors include maintenance free “lifetime lubrication.”

What Is an EC Motor?

Electronically commutated (EC) motors are highly efficient, programmable, brushless DC motors utilizing a permanent magnet rotor and a built-in inverter. Basically, it is a DC motor (in a DC motor the mechanical commutation switches the direction of the current) with a built-in VFD and a DC to AC transformer. However in EC motors, the

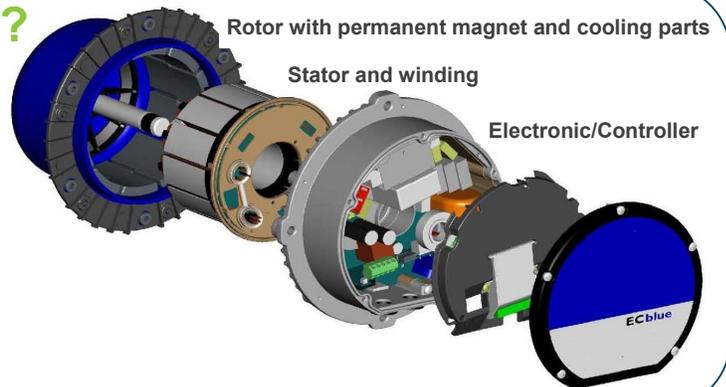
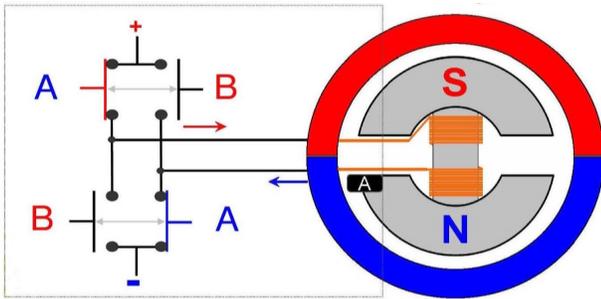
mechanical commutation and the brushes are replaced by an electrical commutation. The major advantages are that they are extremely efficient, especially at reduced speeds compared to traditional motors. Also, they have a built-in speed controller eliminating the need for a separate VFD. (At this time they are only available up to about 6.5 hp.)



How Does an EC Motor Work?

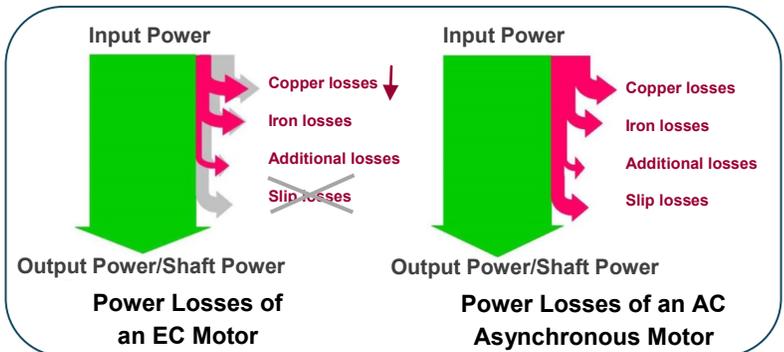
Control electronics

Permanent magnet motor



Why are EC Motors more efficient than AC Motors?

- EC motors are electronically commutated synchronous motors. No slip between electrical rotating fields (stator) and mechanical speed on shaft (rotor) due to the permanent magnets. (Slip means that the speed of the electrical rotating fields is higher than the mechanical speed on shaft.)
- Insignificant rotor losses, rotor magnet field is created by the permanent magnets.
- With an asynchronous AC motor, the rotor magnet field is caused by an induced current in the short circuited rotor windings → Losses.



- All TMI external rotor motors are asynchronous AC motors (Slip)
- Most of these are voltage controllable, so we say the motors are “soft” → Higher Slip (Higher Losses)



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