



Fan Cube & Fan Array Design Guide





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Aircore EC motor attributes for fan cubes & fan arrays

Utilizing our revolutionary PCB stator technology, Aircore EC motors offer class-leading efficiency with a compact form factor that is 50 percent smaller and lighter than traditional iron core motors.

Aircore EC motors offer indispensable attributes in fan cube and fan array applications.



Simplified installation due to reduced weight

The lightweight nature of Aircore EC motors requires less structural support during installation, leading to significant cost and time savings during manufacturing and assembly



Space optimization through shorter motor design

Aircore EC motors' shorter length than conventional motors reduces the overall length of the plenum — saving valuable space where volume is a concern, such as filters, dehumidifiers, or UV units. A shorter plenum footprint minimizes curb space on rooftops.



Enhanced airflow with larger diameter

The diameter of Aircore EC motors contribute to optimal airflow within the plenum, particularly when it closely aligns with the diameter of the fan wheel. This alignment minimizes air turbulence throughout the fan array, ensuring smoother and more efficient flow.



Whisper-quiet operation for noise-sensitive environments

The exceptionally low noise output of Aircore EC motors makes them suitable for libraries and other settings where noise reduction is paramount.



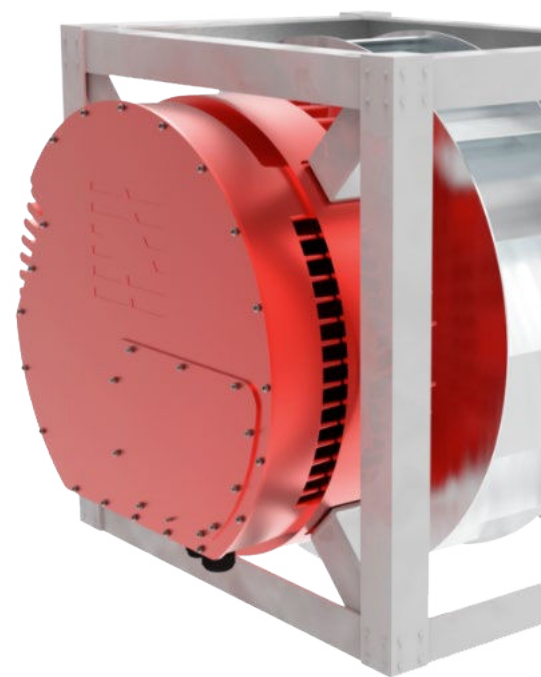
Inherent redundancy with multiple drives

Each Aircore EC motor is equipped with integrated variable frequency drives (VFDs), with built-in redundancy. The redundancy stems from the presence of multiple motors as well as multiple drives, a notable advantage for arrays that typically rely on a single drive, and a single point of failure.



Modular design for easy maintenance

Infinitum VFDs can be serviced (or swapped) at the board level without removing the motor from the supporting structure.

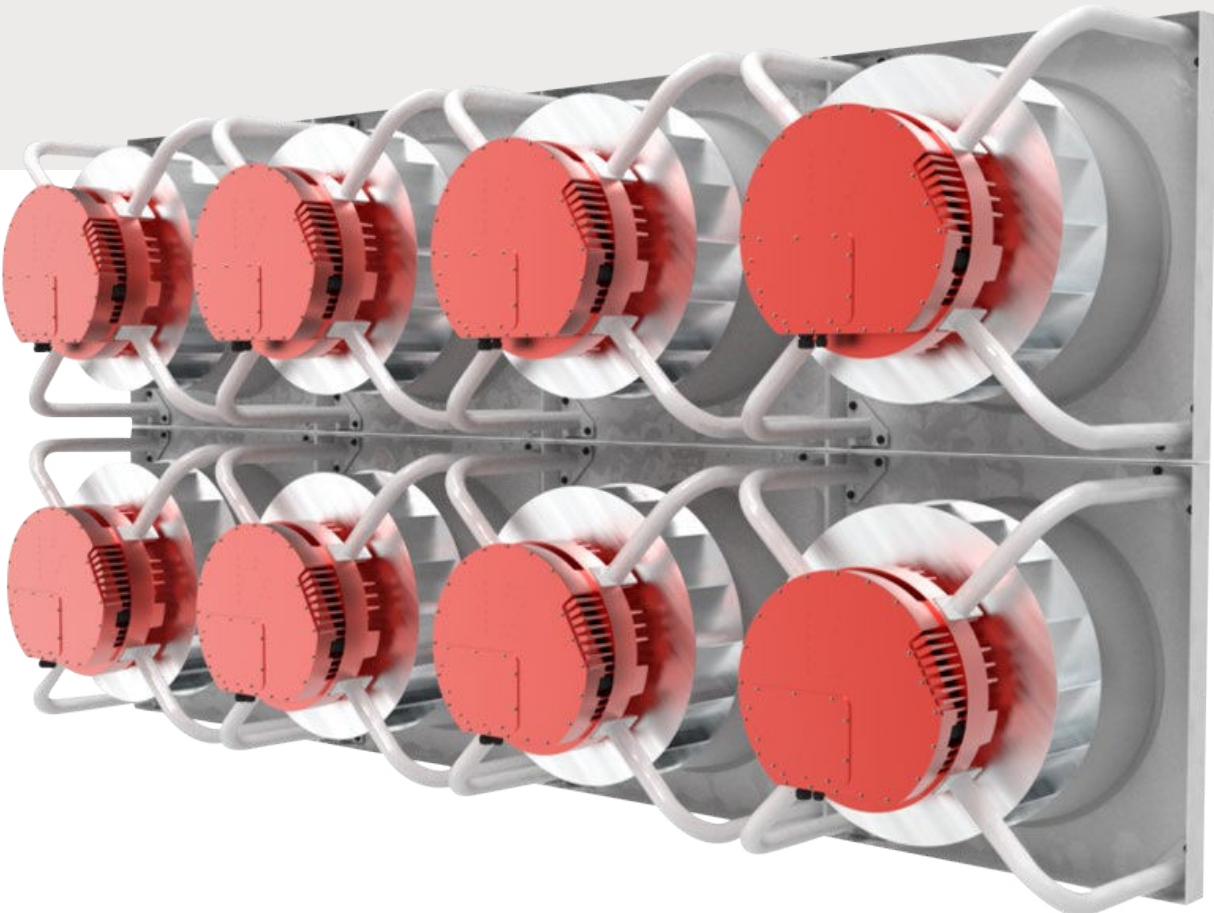


Fan arrays & fan walls

Overview

Fan arrays, commonly known as fan walls, provide redundancy to minimize system failure. All Aircore EC motors come equipped with integrated Variable Frequency Drives (VFDs), further enhancing their reliability. By leveraging multiple motors and drives, a multi-motor array inherently provides built-in redundancy. In contrast, a large single-motor system carries the risk of complete air handler downtime during motor maintenance, resulting in potential loss of operational time.

The compact and lightweight nature of fan arrays sets them apart from traditional single-motor air handlers. Additionally, the design of cube assemblies allows for convenient stacking or direct wall mounting of the motors. These features contribute to space optimization and ease of installation.

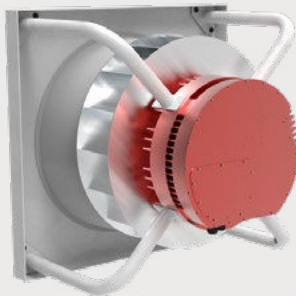


Aircore EC motor overview

Integrated motor and drive

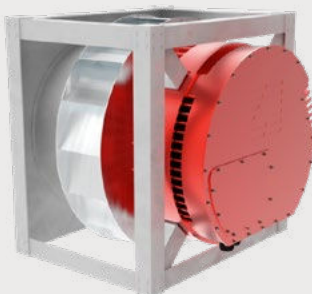
Infinitum Aircore EC motors are axial flux, EC motors (electronically commutated (EC) motors). Our innovative design replaces the heavy iron and copper components of conventional motors, resulting in a smaller, lighter, more reliable, and more efficient motor.

Aircore EC motors are particularly well-suited for new design applications rather than retrofitting existing systems. They offer exceptional performance while significantly reducing energy consumption. It's important to note that Aircore EC motors do not feature a standard NEMA foot mount.



Aircore EC motors use C-Face mounting points (front) or “star” mounting points around the outside edge.

By design, Aircore EC motors accommodate several different mounting schemes depending on the amount and type of space available for installation. The most common schemes include welded angle steel, bent metal, and tubular mount.



Visit our video library and learn more about motor mounting >

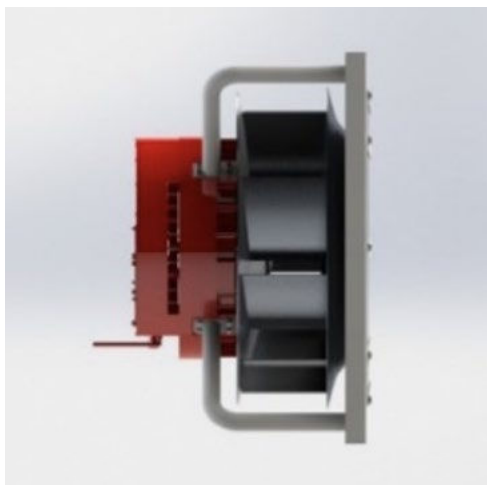
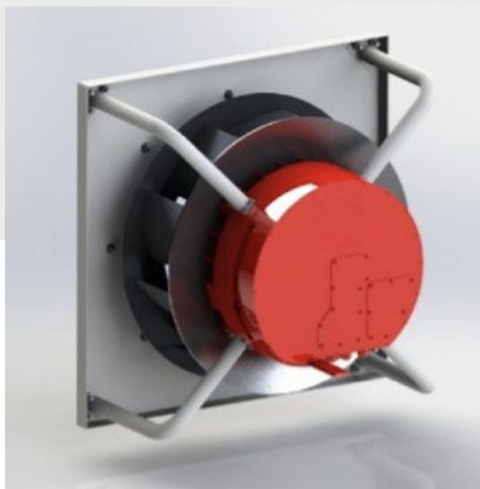


Tubular mount

Fan array only

The tubular mounting scheme incorporates curved tubing to directly attach the Aircore EC motor to the wall, utilizing the existing mounting points. (A tubular mounting scheme does not leverage cube assemblies.) This method offers a significant advantage in terms of weight reduction compared to bent metal or welded steel cubes. However, it is important to note that the tubular mounting scheme does not support stacking of motors.

To ensure the successful implementation of the tubular mounting scheme, the wall must possess adequate structural support to accommodate the weight of the motors, fan wheels, and frames. The ability of the wall to handle these components is crucial to maintain the stability and integrity of the overall system.



Please note that the tubular mount works only for wall arrays.

Welded angle steel

Fan cube

In a welded angle steel construction, cube assemblies can be stacked and securely bolted together to form an array of $N \times N$ motors. This arrangement provides flexibility and scalability in motor deployment.

One of the advantages of Aircore EC motors, as axial flux machines, is their ability to generate less turbulence compared to NEMA foot-mounted motors. This is primarily due to their larger size, which allows for a closer alignment with the fan wheel. As a result, airflow is smoother and more uniform, facilitating efficient and effective ventilation through the rear of the air handler.

Aircore EC motors do not have a foot or base that could potentially obstruct airflow. This absence of a foot design minimizes inefficiencies and restrictions, ensuring unimpeded airflow within the system.



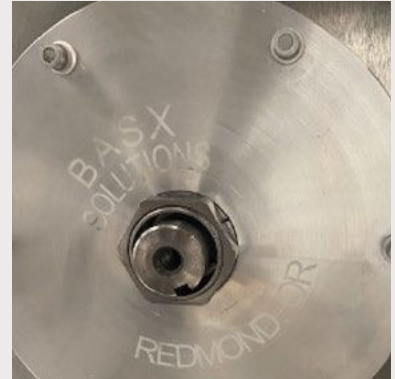
Aircore EC motor mounting secures all four sides of the motor. Front-to-back spacing must accommodate the size (i.e., depth) of the wheel.

Welded cube motor mounting

For welded angle steel construction, order of assembly is crucial. To begin mounting, the motor is positioned shaft-side-down on a table, and then the legs are attached. The cube assembly is placed on the floor with the motor mounting-end-up. A crane picks up the motor, holding the legs horizontally, and lowers it into the cube assembly with all four mounting points aligned. Mounting screws are installed loosely at first, so they can be tightened in sync. Once the motor is mounted into the cube assembly, it is reoriented until motor shaft is horizontal to ground.

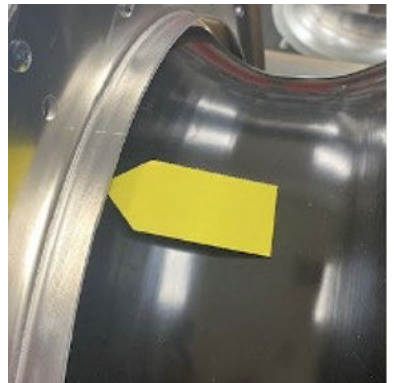
Wheel

Once the motor is mounted in the cube, the wheel is attached to the motor shaft. This partner opted to use a Trantorque™ keyless bushing for a high-capacity, zero-backlash coupling connection rather than the available slot and key attachment.



Alignment

Slots are positioned on the brackets connecting the motor to the cube assembly for slight positioning adjustments during installation.



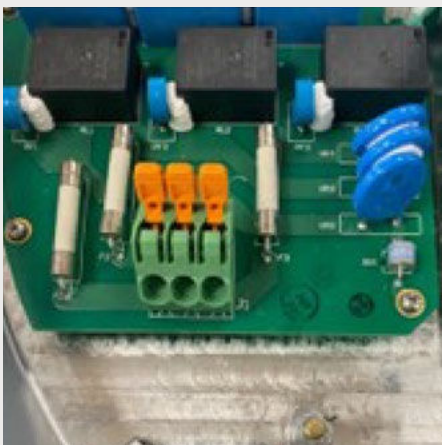
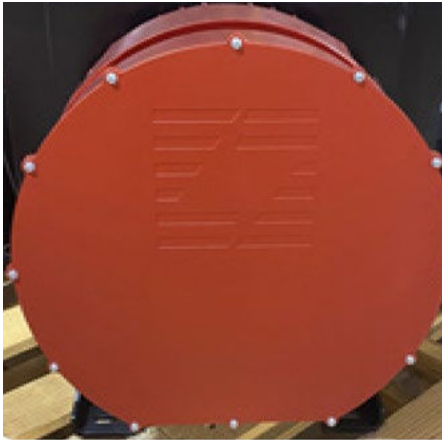
Cube front

The last assembly task is to attach the cube front plate to the cube assembly.



Wiring

VFD case needs to be opened for 460V wiring and a control attachment.
Different generations have different access plates.



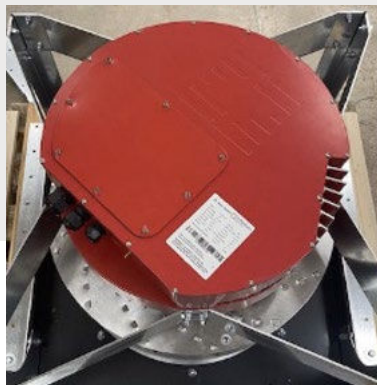
Bent metal

Fan cube

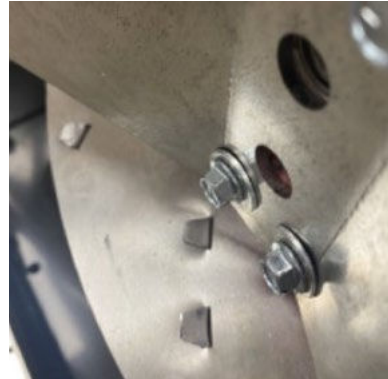
In bent metal frames, the fabricator forms (i.e., “bends”) the stainless-steel assembly to align with Aircore EC motor mounting points. These assemblies are lighter than welded frames but require wall mounting (rather than stacking) - an important installation consideration.

Assembly

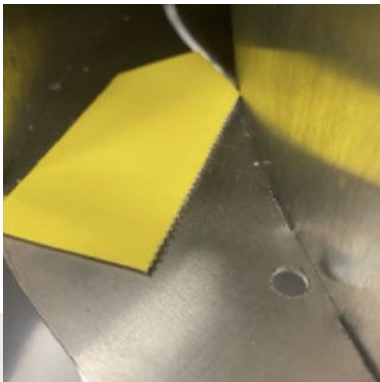
To begin, the motor is placed on its VFD, shaft up. The entire cube is assembled with the motor at the bottom; all other pieces are installed above it. The four “bent” brackets are installed on the Aircore EC motor star mounts; two bolts secure each bracket to the motor mount. Next, the wheel is attached to the shaft. Then, legs are installed; four legs, secured with bolts, connect the ends of the bent brackets. After the legs, the black front plate is installed. The front plate has a four-inch wrapped edge that attaches to the legs with four bolts at each corner. Finally, a cone is mounted to the front of the black plate; it should not touch the wheel.



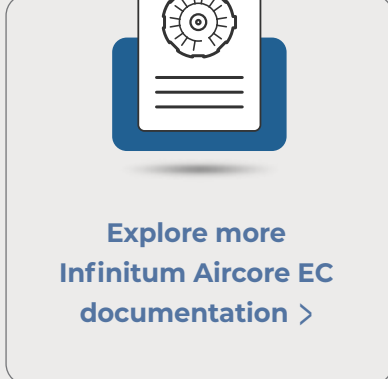
Each bent metal supporting piece has four holes that align with the Aircore EC motor mounting points.



There are no adjustment slots on bent metal cube assemblies.



There are no adjustment slots on bent metal cube assemblies.



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Infinitum Aircore EC
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