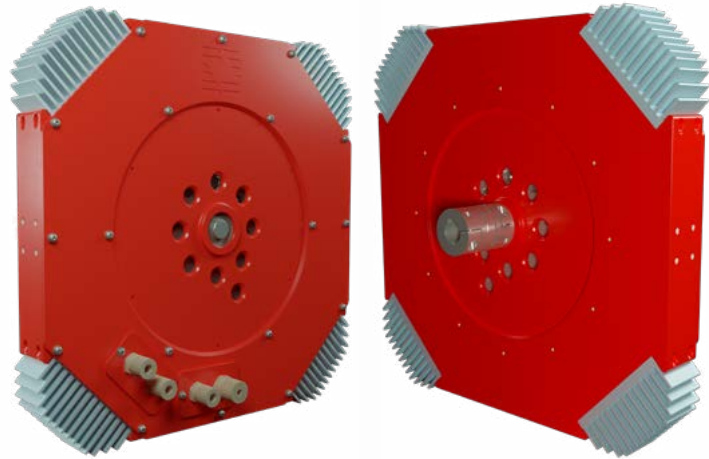


MOTOR SOLUTIONS

FOR FAN EQUIPMENT



By Twin City Fan Companies

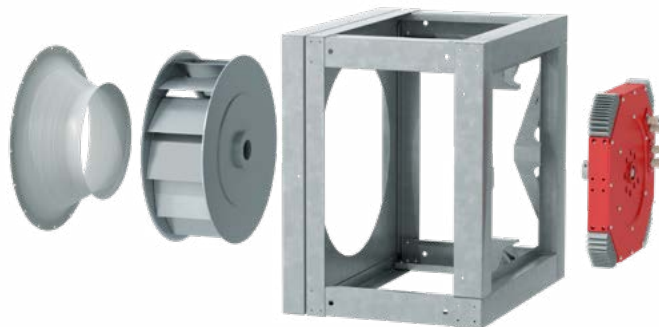
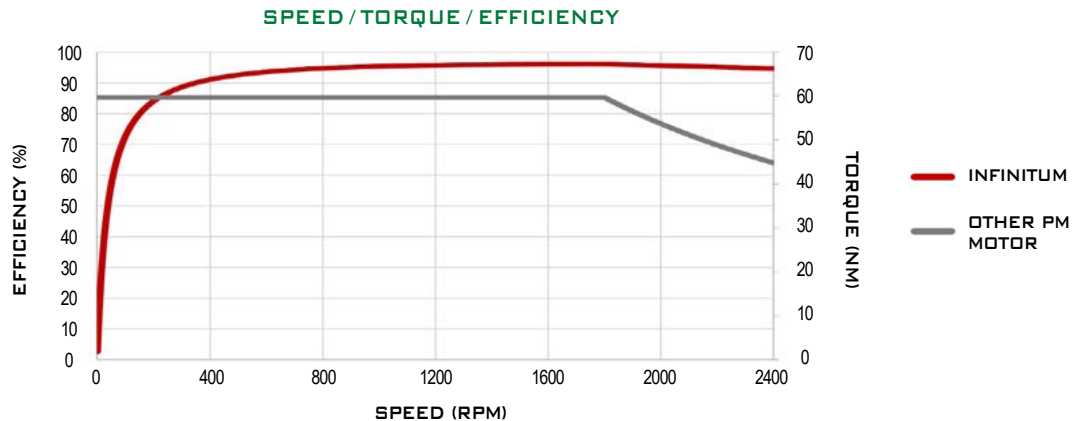


A GREEN INITIATIVE

- > HIGH EFFICIENCY
- > LIGHT WEIGHT
- > COMPACT
- > QUIET PERFORMANCE
- > INTEGRATED VARIABLE FREQUENCY DRIVE
- > LOW COST
- > HAZARD PROOF
- > INCREASED DURABILITY
- > MODULAR FORM FACTOR
- > DATA AND ANALYTICS

Next-Generation Electric Motors

The new GridSmart IEx Integrated Motor from Infnitum Electric is an **All-In-One Solution**. From motor to drive, the versatility and size makes it ideal for a variety of applications. The ironless, printed circuit board (PCB) stator has the ability to optimize the stator winding design, thus minimizing eddy current losses and/or I²R losses without the limitations imposed by stator slot geometry and distribution. This consistently produces identical coils through precise and repeatable PCB manufacturing processes.



Real Advantage, Real Results

- **EFFICIENT** – Removal of the conventional laminated stator core significantly reduces core losses, decreases cogging and torque ripple and increases efficiency.
- **LIGHTWEIGHT** – Wire windings and iron laminations are eliminated by etching copper conductors into a printed circuit board.
- **DURABLE** – Copper conductors are fully insulated and provide the entire coil with an equal coefficient of thermal expansion. Our continuous coil design limits internal connections and increases life expectancy.
- **EASY TO MANUFACTURE** – Infnitum Electric utilizes fully-automated, 21st century manufacturing techniques to reduce material cost, increase production output and increase quality.



Features	Benefits	Value to the Customer
Replaced the laminated iron and copper wire windings with a Printed Circuit Board (PCB) stator.	Lightweight – 70 lbs.	A conventional 15 hp motor weighing 330 lbs. requires two people and specialized equipment to install or replace. Infinitem's equivalent IEx weighs 70 lbs. and requires one person with no specialized equipment, due to reduced motor support structure required on fan.
Zero cogging and reduced torque ripple	Quieter than conventional induction motors	Cuts noise and vibration in half, reducing the need for noise control. Noise levels are 3 to 6 dB lower than conventional induction motors.
Printed circuit board stator – no stator windings or winding insulation	Improved reliability of the stator	Conventional motor capacity and life is limited by failure risk of the stator end-turns and insulation due to poor heat dissipation and mechanical wear from flexing of the wiring bundle. By eliminating wired windings and this common failure mode of the motor, the motor will have better long-term reliability, even at higher stator temperatures.
Embedded reliability sensors	Internal temperature & vibration monitoring	Motor output is limited by monitoring critical temperatures of the stator, rotor and drive, as well as vibration. If safe limits are exceeded, the motor may be programmed to slow down to prevent failure and issue alarms are to the owner.
Permanent magnet machine	High efficiency	IEx can be selected to operate at >90% efficiency, well above the market's IE2 and IE3 motors, reducing the end-user's long-term operating costs.
Matched drive/motor design	Higher efficiency at slower speeds	Motor efficiency curve is flat. It does not decline at reduced load like other permanent magnet and induction motors. Most motors spend 90% of their operating time at reduced load.
Internal fan on the rotor	No additional external fans or active cooling required	One less potential failure point, improving the long-term reliability.
Fan impeller discharge turning vanes	External cooling of motor from driven fan	Air over cooling has no moving parts, therefore no reduction of fan efficiency. It increases motor and drive reliability and increases capacity.
Disc motor axial flux design	Smaller disc form factor: 22" x 22" x 3"	Reduced wind shadow enables a shorter fan section, improves air distribution across coils, improves refrigeration efficiency, lowers cabinet cost. The HVAC system takes up less space.
Integrated drive	Variable speed operation	Allows a user to dynamically control the speed to match the system demands.
	Simplifies installation	A conventional drive start-up requires a technician trained on drives. By integrating the drive, Infinitem's IEx motor requires no mounting or wiring of the drive.
Built-in I/O	Simplifies integration; tracks performance, efficiency and reliability metrics	Simply connect the 0-10 vDC or 4-20 mA to your control system and run the motor. Upgrade is available to monitor fan flow, pressure rise, rotating speed, bearing temperatures, air temperature and humidity, motor and drive temperatures, external vibration sensors, and to control external dampers.
Built-in serial, ethernet and Wi-Fi, bluetooth and mod-bus communications	Communicate to a wide range of building automation systems	Industry standard network connections and protocols. Motor speed can be controlled over serial link from external system or based on internally loaded control algorithm. Commissioning and control can be loaded from cell phone application.
Cell modem, LORA or "Sneaker-net" options to transfer data to the cloud	Assured internet connectivity, recovery of data	Warranty includes 12 months of internet-based diagnostics, using a variety of different ways to connect for real time or occasional transfer of data to the internet via a cell phone application. Monitoring, diagnostic, continuous commissioning and alarm services available thereafter.
Two years of non-volatile memory	Serves as a "black box" for maintenance, warranty investigations	Internet connection can be non-existent and data is still present at fan.
Cloud and web-based reporting	Monitor the operation and health of your equipment including temperature, vibration and power	Troubleshoot issues faster and optimize operation to reduce energy consumption.