



Aircore EC motor

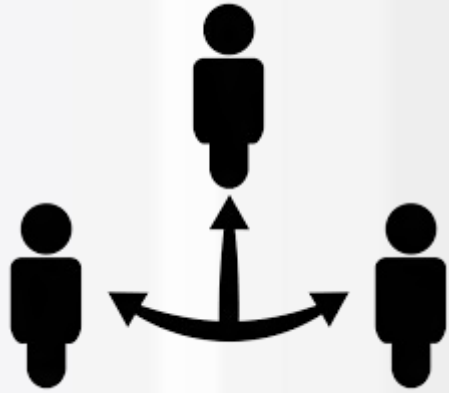


JASON MCCOY • PRODUCT MANAGER





← Partnership →



Aircore EC is a patented motor technology from Infinitum that combines air-core and electronically commutated (EC) motor features.

Motor with Integrated VFD

Sprecher+Schuh

✓ Pricing



✓ Order Mgmt.



✓ Inventory*



* shipping from Infinitum warehouses
(in the beginning)



Infinitum – Document Collateral



E-Catalog

<https://www.sprecher+schuh.com/ecatalog.html>

Industrial Control and Protection Catalog

2024 eCatalog

Table Of Contents

I — Infinitum Motor + Drive

[Complete Section I](#)

[Technical Information & Data Sheets](#)

LIBRARY
Literature

sprecher+schuh



Catalog number	Power (HP/kW)	Speed (RPM)	Torque (Nm)
AE Series (Standard), 460VAC, IP54			
AE20-1500-3600-AAA*-AA40	15 / 11.19	3600	30
AE20-1500-2400-AAA*-AA40	15 / 11.19	2400	45
AE20-1500-1800-AAA*-AA40	15 / 11.19	1800	60
AE20-1000-1800-AAA*-AA40	10 / 7.46	1800	40
AE18-1000-3600-AAA*-AA40	10 / 7.46	3600	20
AE18-1000-2400-AAA*-AA40	10 / 7.46	2400	30
AE18-0750-1800-AAA*-AA40	7.5 / 5.59	1800	30
AE15-0750-3600-AAA*-AA40	7.5 / 5.59	3600	15
AE15-0750-2400-AAA*-AA40	7.5 / 5.59	2400	22.5
AE15-0500-2400-AAA*-AA40	5 / 3.73	2400	25
AE15-0500-1800-AAA*-AA40	5 / 3.73	1800	20
AE13-0500-4200-AAA*-AA40	5 / 3.73	4200	8.5
AE13-0500-3600-AAA*-AA40	5 / 3.73	3600	10
AH Series (Heavy Duty), 460 VAC, IP65			
AH18-1000-3600-AAA*-AA40	10 / 7.46	3600	20
AH18-0750-1800-AAA*-AA40	7.5 / 5.59	1800	30
AH15-0750-3600-AAA*-AA40	7.5 / 5.59	3600	15
AH15-0500-1800-AAA*-AA40	5 / 3.73	1800	20
AH13-0500-3600-AAA*-AA40	5 / 3.73	3600	10

Replace * with desired bearing types. S = Steel Bearings, H = Hybrid Bearings

AE series / IP54

Line voltage: **460V**

HP range: **5HP...15HP**

AH series / IP65

Line voltage: **460V**

HP range: **5HP...10HP**

Guest presenters → Infinitem



Infinitem team:

available for –

- **technical assistance**
- **joint sales calls**

(coordinate through S+S)

Ted Danhauser

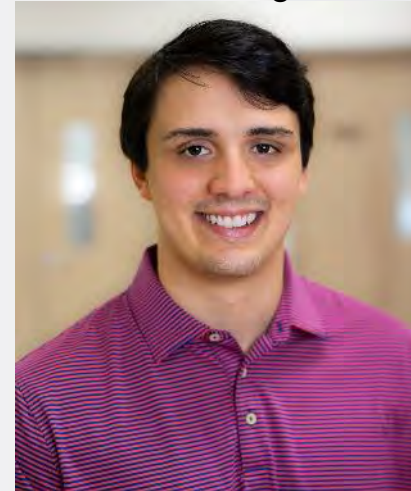
Sales Director



GUEST SPEAKER

Luke Wilkin

Sr. Sales Engineer



GUEST SPEAKER



Aircore EC Motor

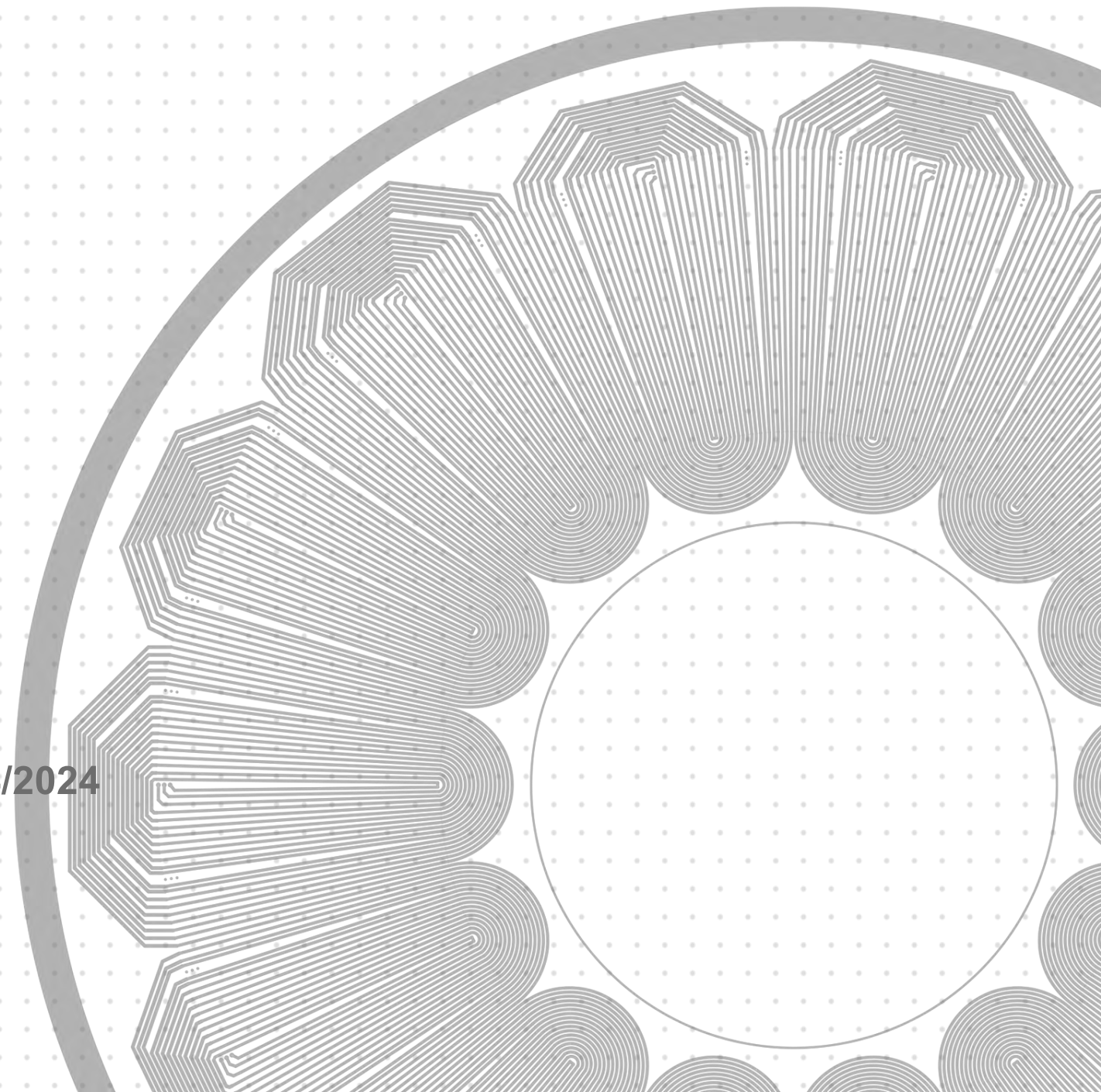
Designed to Go Beyond

Sprecher & Schuh

Infinitum Motor Product Launch 9/4/2024

Ted Danhauser – Sales Director

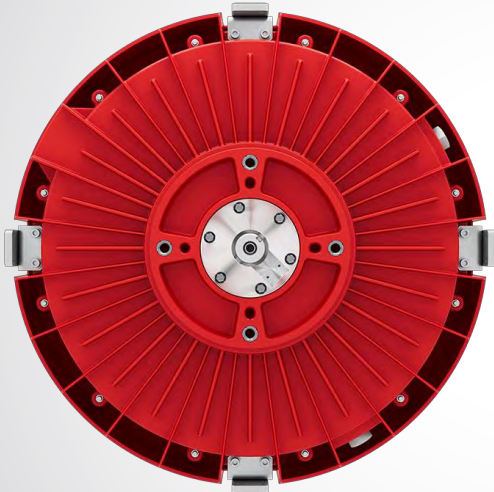
Luke Wilkin – Sr. Sales Engineer



Infinitum [in-fuh-nahy-tuhm]: to infinity; endless; without limit



Our vision is to go beyond expectations by creating a more efficient motor with less resources that is better for people and the planet.



A next generation motor


66% Less Copper

50% Smaller/Lighter

10% Less Energy

No Iron Core | Circular Design

Headquartered
in Round Rock,
TX



Patents


108

Employees

200+

Established
in 2016


Founder & CEO,
Ben Schuler





Sustainable modular design
for serviceability and
remanufacturing




Over **\$388m raised** to design, develop and scale production of a revolutionary integrated motor and inverter.







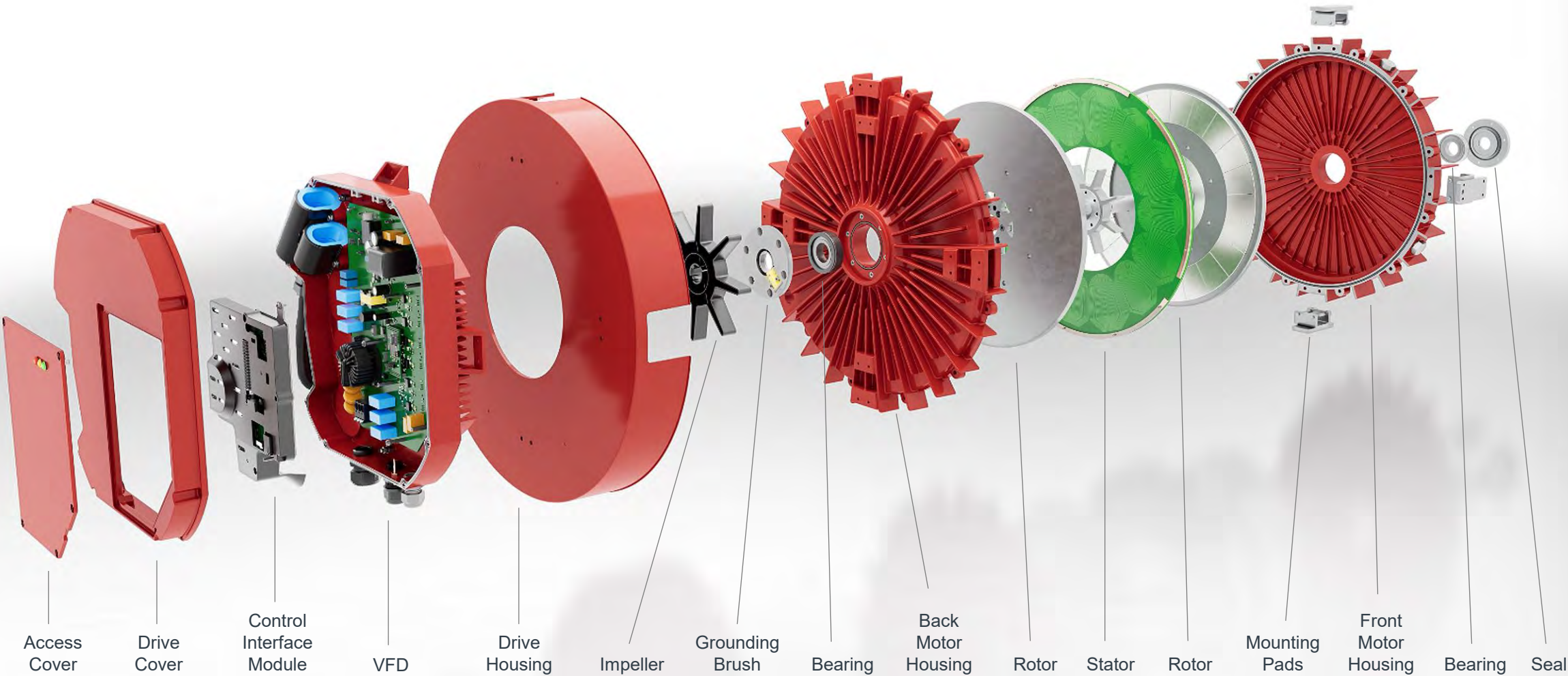


Manufacturing Operations

- **PCB stator manufacturing**
Nashua, NH
- **Motor manufacturing**
Texas, Tijuana and Saltillo, MX
- **High-capacity semi-automated motor assembly**
- **In-process and final motor testing**
 - Cogging, HiPot, Dynamometer
- **Ramping run-rate capacity of approx. 200,000+ units annually**

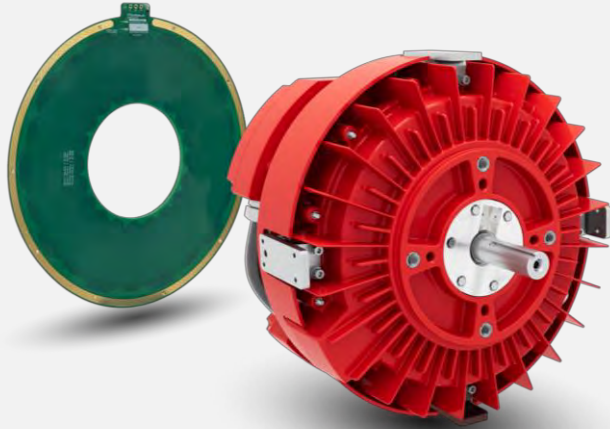


Aircore EC Motor Design



Infinitum EC Motors vs AC Induction Motors

Aircore EC Motor



Power, Intelligence & Controls All in One

- No iron
- 66% less copper
- Lightweight PCB stator lasts 10x longer
- 10% More efficient (at partial load)
- Embedded connectivity
- Recyclable and sustainable

VS.

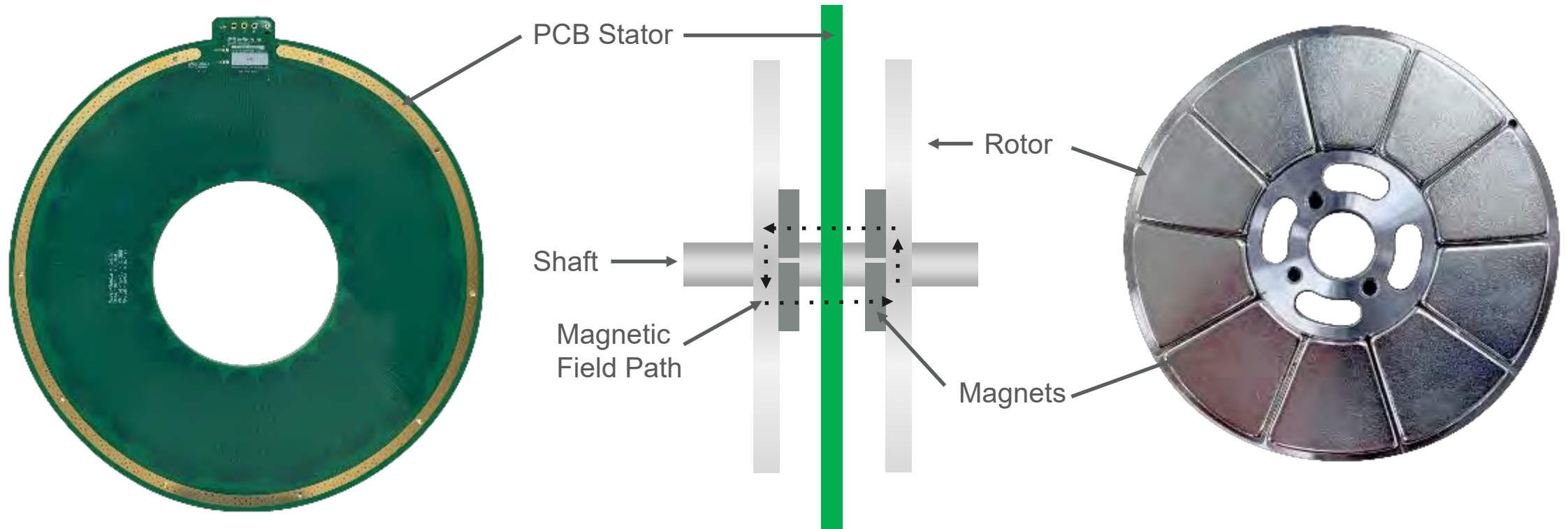
AC Induction Motor



AC Induction Motor and External VFD

- Heavy iron core
- Copper winding failures are common
- High noise level
- Low efficiency
- Easily damaged by overheating
- Additional VFD pairing required
- Not recyclable

Permanent Magnet Synchronous Axial-Flux Motor Topology



VFD energizes PCB Stator and creates a magnetic field that generates torque to turn Rotors and Shaft

Class-leading Efficiency

Flat motor efficiency curve

- **Similar or better system efficiency**

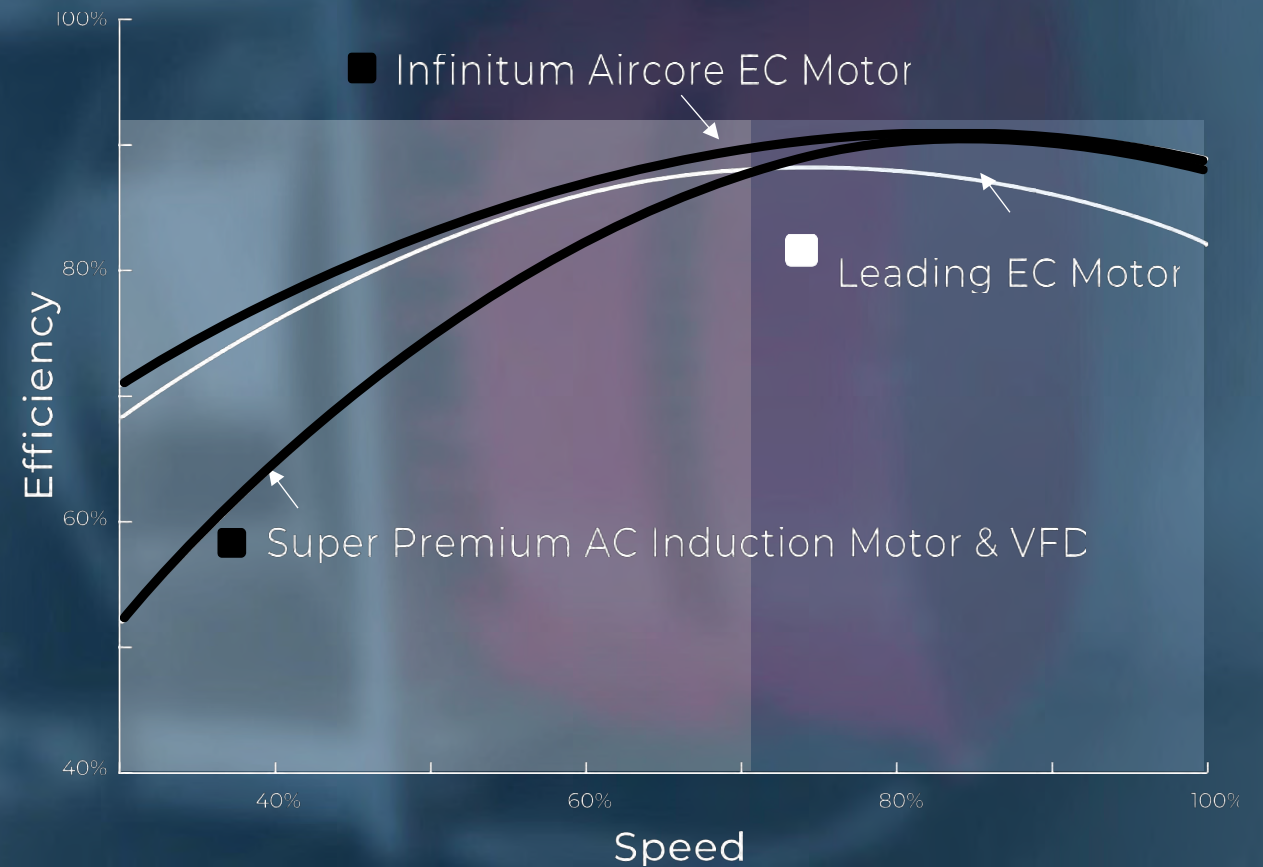
Better than AC Induction Motor/VFD below 70% load

Better than EC Fan motor above 70% load

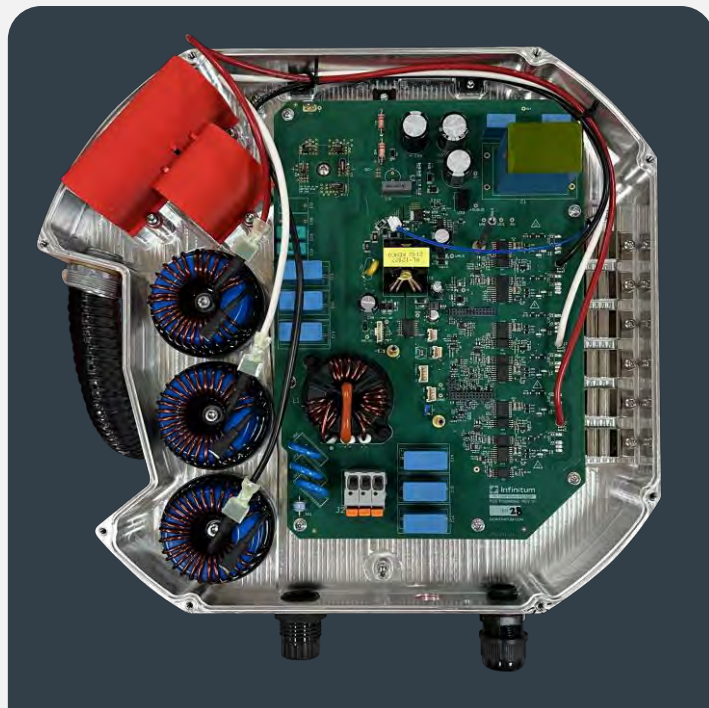


Wire-to-air efficiency (motor + VFD + fan)...

- **AMCA Standard 207-17** used to calculate the overall efficiency of a fan system
- The **Fan Energy Index (FEI)** used to calculate the input power against the actual electrical power of a fan

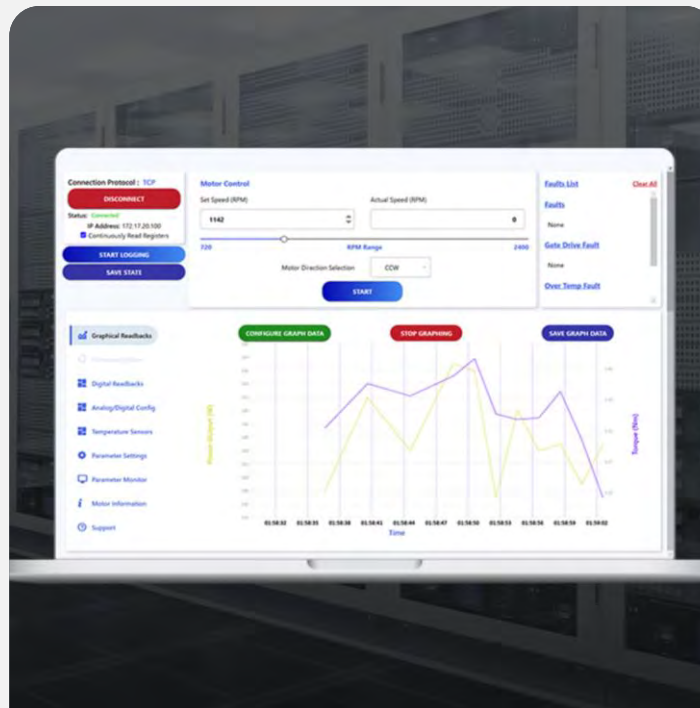


Positioned for Intelligence



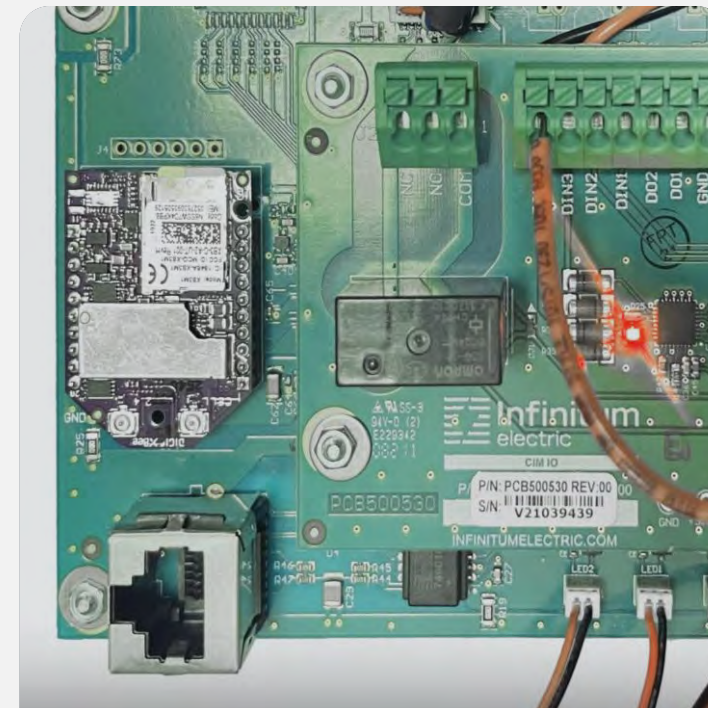
VFD

- State-of-the-Art Design
- MODBUS-RTU and BACnet MS/TP
- 0-10V DC or 4-20mA available for variable speed control
- Pre-configured Settings



CONTROL SOFTWARE

- Wired Connection
- Modbus TCP (RJ45 Ethernet) or Modbus RTU available
- Motor Monitoring
- Motor Performance



USER CONFIGURABLE

- Min and Max Operating Speed
- Motor Control Options
- Fine Tune Motor Operation
- Fail-over Operations

Power, intelligence, and controls all in one

Q / A

Motor Selection Tool

Custom nameplating

A comprehensive range of power and frame sizes.


Our motors can be ordered with pre-defined conventional ratings or we can customize name plates to meet your specifications.

- Download datasheets & drawings
- Customize parts
- Calculate energy savings

Aircore EC Motor Selection Tool

MST Version 5.0.1

[Config Options](#)[Ambient Operating Conditions](#)



Desired Power*

5.9 HP

Desired Speed*

1225 RPM

Voltage

460 V

Shaft length

3.3"

Bearing Type

Steel

Submit

Clear

Selected Motor: AE20-0590-1225-AAAS-AA40

Compute energy costs, view performance at different operating points, and compare with other motors.

AE20-0590-1225-AAAS-AA40

Compatible [Custom](#) Aircore EC Motor

Frame Size	AE20
Rated Power	5.9 HP 4.4 kW
Rated Speed	1225 RPM
System Efficiency*	91.3%
Rated Amps*	6.5 A
Rated Torque	25.3 lb-ft 34.3 Nm
Supply Voltage	460 V
Bearing Type	Steel
Shaft Length	3.3" 8.4 cm
Availability	Production

*Efficiency and amp values for custom motors are calculated.

[← Back to Results](#)

[Energy & CO₂](#)[Operating Points](#)[Efficiency Curve](#)[More Info](#)

Compute Energy Savings

Find out how much you could save using Aircore EC motors.

Energy Cost (USD)	Hours / Day	Days / Week
0.09	20	7

Advanced Options

Energy calculations are based on 100% load for 20 hours per day and 7 days per week.

Baseline Comparison

IE2 + VFD

Motor Lifetime

10 Years

Location


United States

CO₂ / KWh

.000433 mt (t)

Clear


Submit

 Infinitem


Infinitum Standard and Custom Name Plates

Our motors can be ordered with pre-defined conventional ratings or we can **customize** name plates to meet your specifications.

10HP-1800RPM



AIRCORE EC			
AE20-1000-1800-AAAS-AA41			
SN 4037UNX010144		REV A	
INPUT 460Y/267VAC 3ϕ 60Hz			
OUTPUT 10 HP / 7.4 kW		RPM 1800	
IP54	SF 1.0	AMPS 12	INS B
ENC TEFC	CONT	EFF AMCA 207	E.P.




WARNING: The Infinitum motor is only intended for operation with the integrated drive. Do not operate this motor with any other VFD.
AVERTISSEMENT: Le moteur Infinitum est uniquement conçu pour fonctionner avec le variateur intégré. N'utilisez pas ce moteur avec un autre VFD.

Round Rock, TX, USA


www.support.goinfinitum.com
www.goinfinitum.com
info@goinfinitum.com

Manufactured in USA




Conforms to UL STD 1004-1, 1004-7 & 61800-5-1
Certified to CSA STD C22.2#77, 100 & 274
MODEL# AE4B13D1

5.9HP-1225RPM



AIRCORE EC			
AE20-0590-1225-AAAS-BA41			
SN 5037UNX040743		REV A	
INPUT 460Y/267VAC 3ϕ 60Hz			
OUTPUT 5.9 HP / 4.4 kW		RPM 1225	
IP54	SF 1.0	AMPS 8.1	INS B
ENC TEFC	CONT	EFF AMCA 207	E.P.




WARNING: The Infinitum motor is only intended for operation with the integrated drive. Do not operate this motor with any other VFD.
AVERTISSEMENT: Le moteur Infinitum est uniquement conçu pour fonctionner avec le variateur intégré. N'utilisez pas ce moteur avec un autre VFD.

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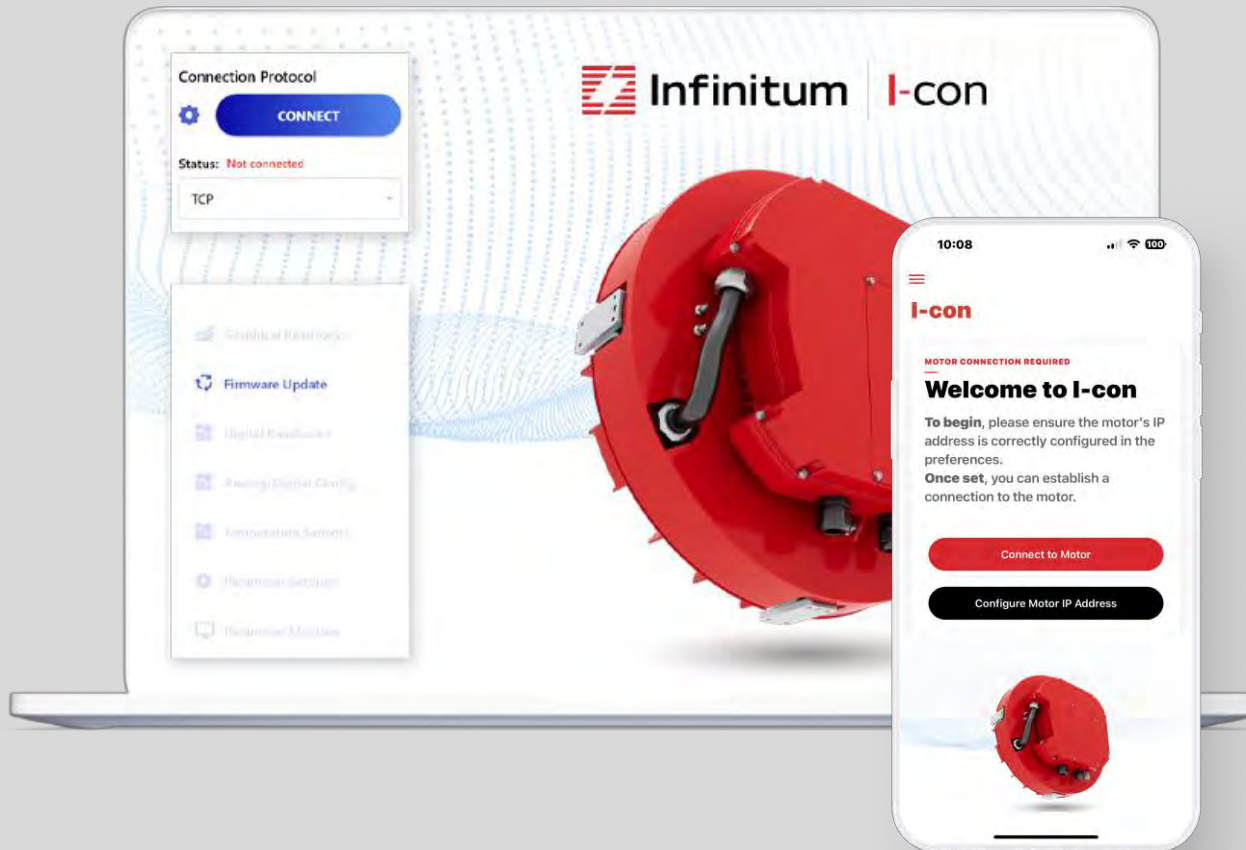


Conforms to UL STD 1004-1, 1004-7 & 61800-5-1
Certified to CSA STD C22.2#77, 100 & 274
MODEL# AE4B13D1

"Infinitum's custom nameplating capability is an extremely powerful offering as it can drastically lower overall capital investment associated with large motor-driven systems."

Blake Griffin, **Interact Analysis**

Infinitum Motor Control Software



Provides motor configuration, monitoring, and firmware control

- Download the Infinitum Software Manual
- Download the Infinitum Communication & Control Software
- Connect with Ethernet or Serial link
 - Pre-configure the laptop/PC Ethernet card with a static IP address
 - Connect an Ethernet cable from laptop to the motor control board or use serial connection
 - Apply power to the motor
- Videos for power and control wiring are also available on our website

Reliability by Design

- **PCB provides a 10x longer life** than a conventional copper wire wound stator
- **MTBF steel and hybrid ceramic bearings**
 - **6206 Steel Bearings** – Bearing life L10 of 200k hours with grease life L10 / 80k hours
 - 6206 Hybrid ceramic bearings L10 life is **2x of regular bearings**
- **VFD MTBF is 28 years**
- **Accelerated Lifetime Testing (ALT)** conducted by 3rd party labs
- **Rigorous/continuous performance and environmental testing** conducted at Infinitum R&D lab



Serviceable and Recyclable

Lifecycle Services

Comprehensive, scalable maintenance and parts service to keep motors running smoothly

- Maintain availability
- Tailored service plans
- Repair and maintenance

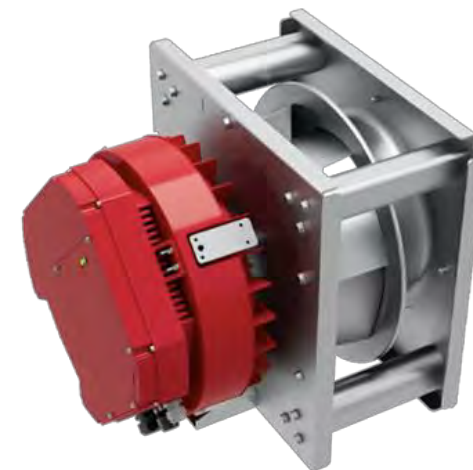
Sustainability by design

We reuse what we can, recycle what we can't and remanufacture motors to give them a second life.



Motor Mounting

Infinitem motors accommodate several different mounting schemes depending on the amount and type of space available for installation.



Infinitem Fan Cube Design Guide available on go.infinitem.com/document-library

Infinitem Aircore EC Motor Operating Range



Aircore EC Frame 13

Power:	1-5 HP (.75-3.73 kW)
RPM Range:	100–5040 RPM
Weight:	62.8 lbs (28.5 kg)
Rated Torque:	6.3–7.4 lb-ft (8.5– 10.0 Nm)
IP Rating:	IP54
Dimensions:	14.5" x 9.1" (36.7 x 23.1 cm) w/o shaft



Aircore EC Frame 15

Power:	5-7.5 HP (3.73-5.6 kW)
RPM Range:	100–4320 RPM
Weight:	81.4 lbs (36.9 kg)
Rated Torque:	11.1–14.8 lb-ft (15– 20 Nm)
IP Rating:	IP54
Dimensions:	16.4" x 8.7" (41.17 x 22.1 cm) w/o shaft



Aircore EC Frame 18

Power:	7.5-10 HP (5.6-7.46 kW)
RPM Range:	100–4320 RPM
Weight:	96.1 lbs, 43.6 kg
Rated Torque:	14.6–22.1 lb-ft (20.0-30.0 Nm)
IP Rating:	IP54
Dimensions:	18.6" x 8.7" (47.2 x 22.1 cm) w/o shaft

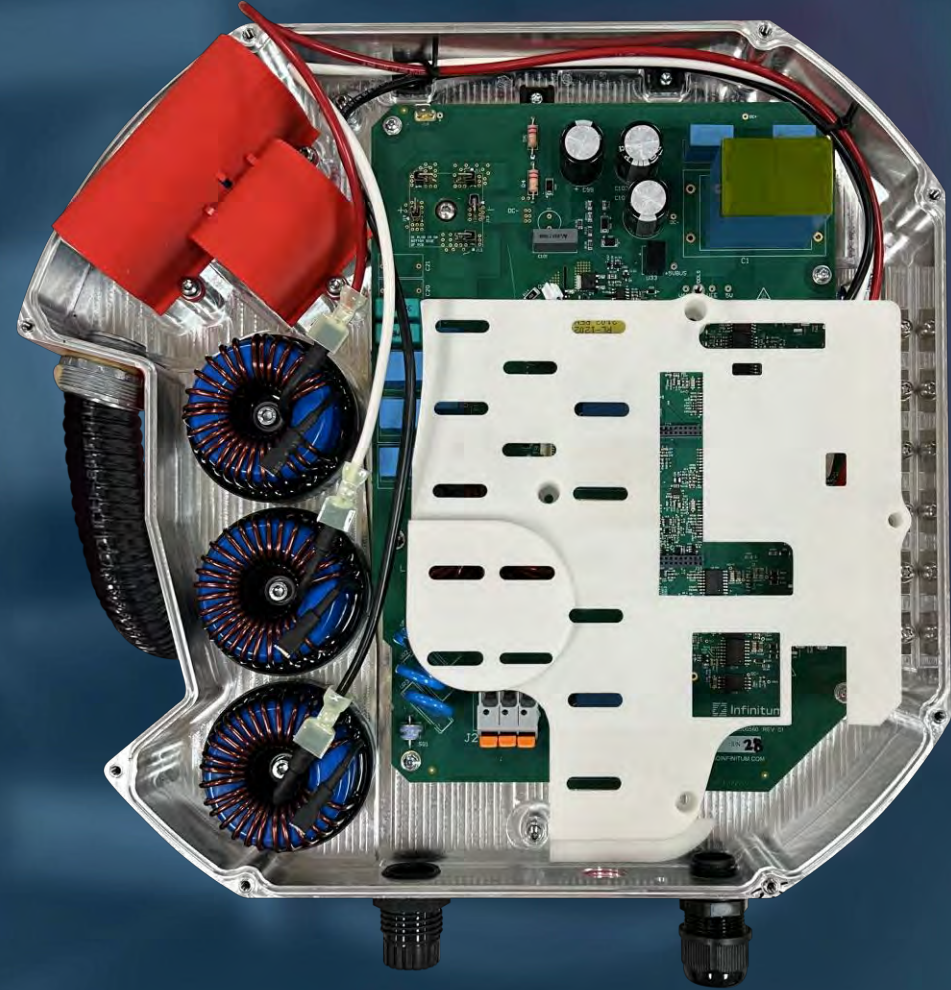


Aircore EC Frame 20

Power:	10-15 HP (7.46-11.19 kW)
RPM Range:	100–4320 RPM
Weight:	128.1 lbs, 58.1kg
Rated Torque:	22.1-44.3 lb-ft (30.-60.0 Nm)
IP Rating:	IP54
Dimensions:	21.1" x 8.9" (53.7 x 22.5 cm) w/o shaft

Future development

- 575V, 415V, 230V
- Fractional Horsepower 1/2-3HP
- High Resistance Ground
- Active Front End VFD
- Heavy Duty Line Expansion



Aircore EC Heavy Duty

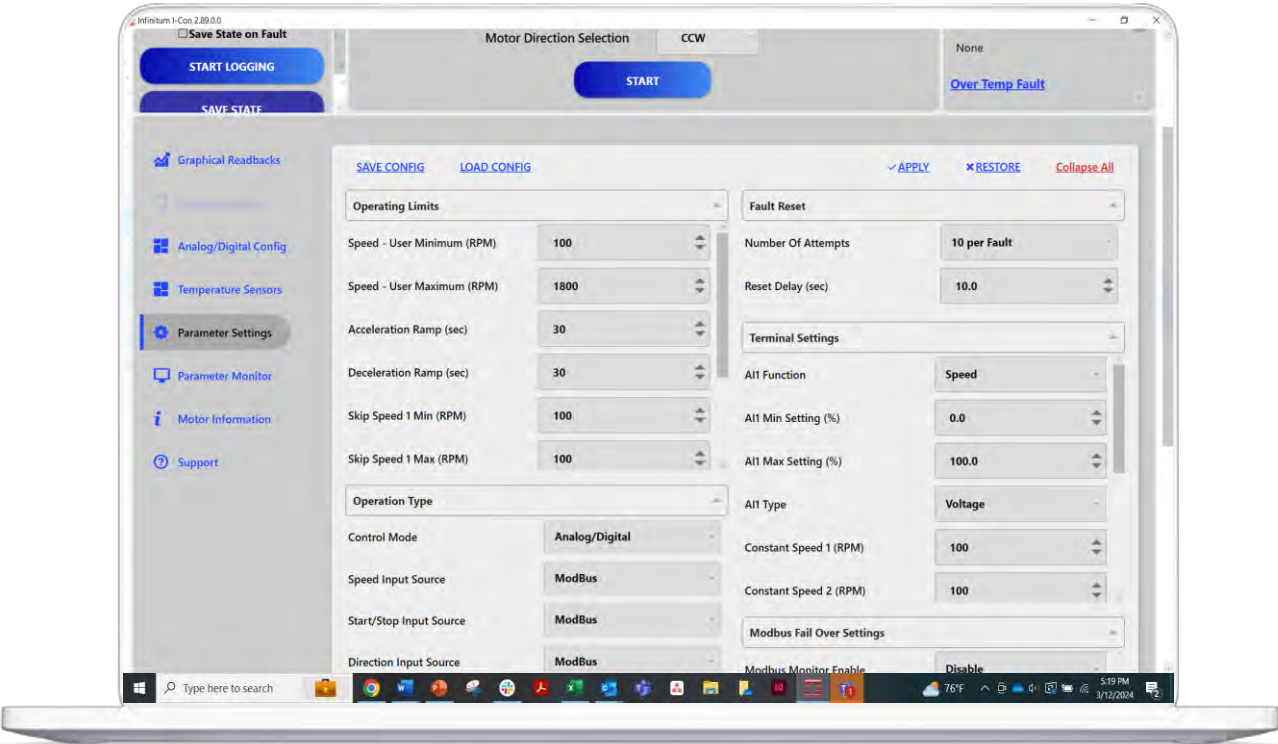
- **Range:** 5HP-1800RPM to 15HP-1800RPM
- **Enclosure:** TEFC/IP65
- **Mounting:** Frame, 182TC-254TC C-face
- **Relative humidity:** 95% non-condensing
- **Maximum elevation:** Up to 1000m, de-rate above 1000m
- **Bearing:** Sealed, Shielded, Steel, Hybrid
- **Shaft diameter:** 1.375in / 4.492cm
- **Repairable components** and lifecycle services available



I-con Motor Control Software Live Demo

Luke Wilkin, Senior Sales Engineer

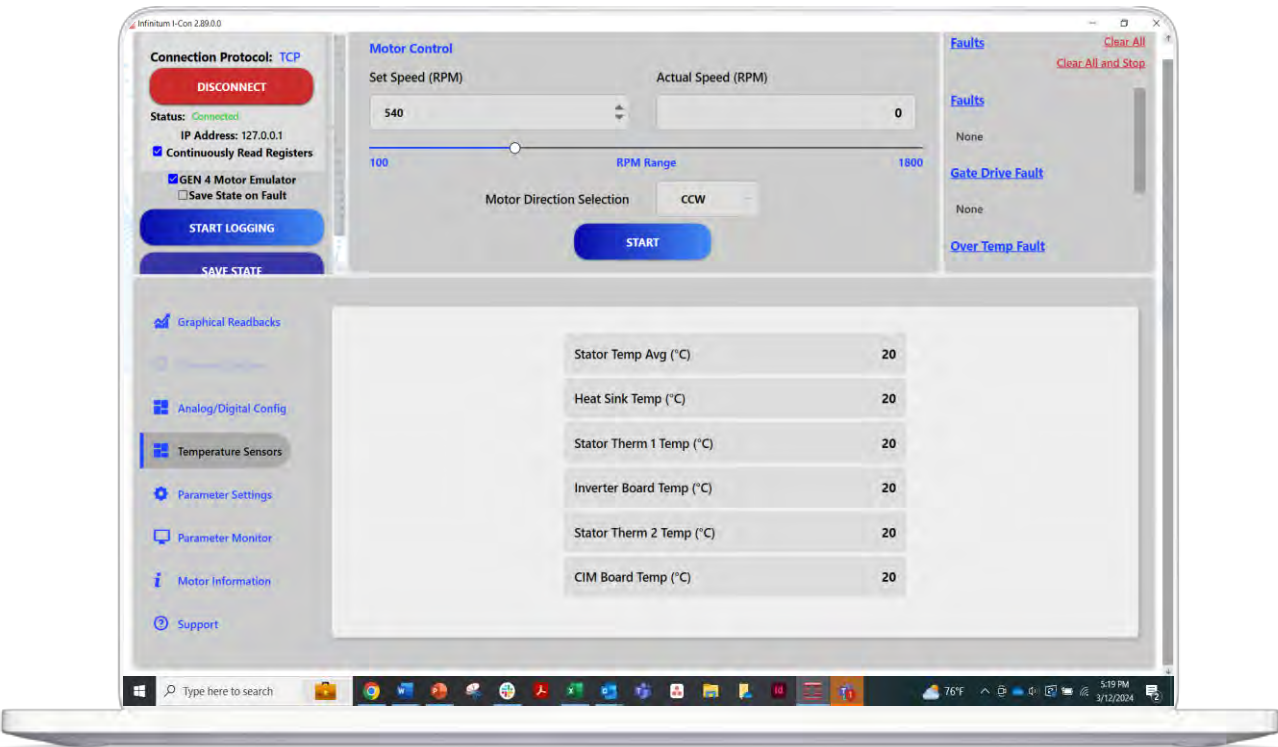
Infinitem Motor Control Software



Operation Type

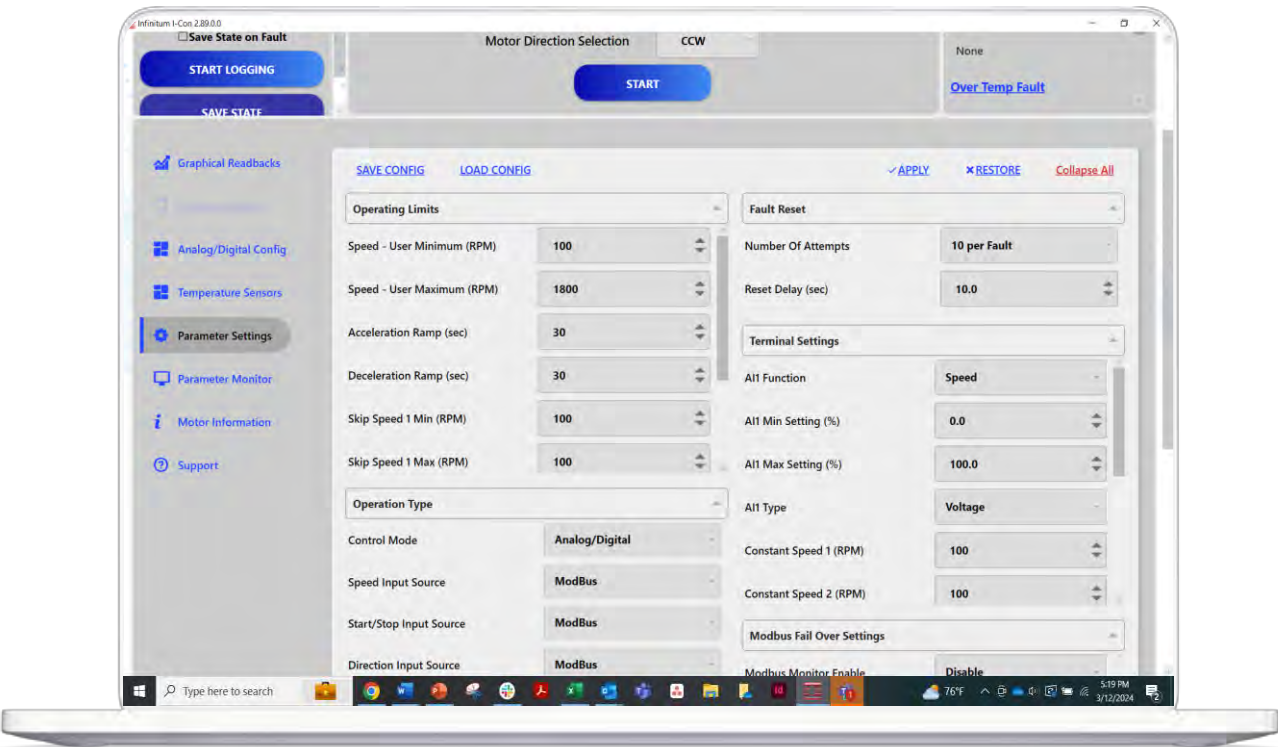
Modbus set as default but can be changed to analog for 0-10V control.

Infinitum Motor Control Software



Temperature Sensors provide real time information.

Infinitem Motor Control Software



Operating Limits allows customized configuration such as minimum and maximum speed.



Datasheet

Aircore EC Frame 15, 5 HP, 1800 RPM

Motor and drive all in one

Integrated variable frequency drive (VFD) facilitates variable speed applications, reducing overall energy usage.

Power more with less

50% lighter, 30% quieter and 10% more efficient than traditional AC induction motors.



Powerful intelligence

- State-of-the-art VFD allows precise speed control, reduces energy usage, and operates at a frequency to minimize audible noise.
- I-con (motor control software) enables users to fine tune operational parameters to their specific applications.
- Maximum power density in a 50% smaller and lighter package.

Optimized efficiency

- Meets highest efficiency standards at a wide range of load conditions.
- Increased operational efficiency by eliminating torque ripple, cogging, stator hysteresis and eddy current losses.
- Compact form factor reduces wiring and facilitates direct mounting to fan applications, increasing efficiency by 10-15%.

Sustainable solution

- PCB stator uses 66% less copper and has proven to be 10x more reliable than traditional iron-core, copper-wound stators.
- Smaller and lighter housing reduces transportation emissions by 30%.
- Easy serviceability through our modular design enables the reuse and extended lifespan of components, keeping them out of the landfill.

Applications

 Commercial HVAC

 Pumps

 Material handling



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Performance



Note: Infinitem does not recommend using the motor below 60% of rated speed except when coasting or ramping up. It is also essential to restrict power and FLA within the nameplate rating when operating the motor above 100% of its rated speed. To operate the motor outside the recommended operating range, please contact the factory and our Application Engineers will provide a customized solution.

Motor Information

Rated power	5 HP, 3.73 kW
Rated torque	14.8 lb-ft, 20 Nm
Rated speed	1800 RPM
Max speed	2200 RPM (see above)
Min speed	540 RPM (see above)
Weight (motor & drive)	81.4 lbs, 36.9 kg
Frame diameter	16.4", 41.8 cm
Length (motor & drive)	8.7", 22.2 cm
System efficiency	90.7%
Duty cycle	Continuous
Variable speed	Yes, integrated VFD
Service factor	1.0
Motor thermal protection	Electronically protected L
Motor type	TEFC
Enclosure rating	IP54

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Electrical

Supply voltage	460 VAC ± 10%
Supply phase	3 Phase
Supply voltage frequency	60 Hz ± 5%
Voltage imbalance	± 3% Phase to phase voltage
Short circuit current rating (SCCR)	Input – 5 kA, 500 V maximum
Rated amps	6.0 A (460 VAC)
Motor insulation class	B

Mechanical

Direction of rotation	CW/CCW
Motor frame material	Aluminum
Rotor inertia	0.49 kg/m ²
Bearing type – DE	Standard: steel, 6206 sealed, permanently lubricated Optional: hybrid ceramic (see catalog number)
Bearing type – NDE	Standard: steel, 6206 sealed, permanently lubricated Optional: hybrid ceramic (see catalog number)
Grease specification	Mobil polyrex EM
Regreasable	No
Grounding brushes	Included – DE
Shaft design	Keyed
Motor mounting position	Horizontal or vertical
Motor mounting type	C-face (182TC) and body mount

Ambient operating conditions

Condition	Operation	Storage & transportation
Altitude	0 to 3300 ft. (1,000 m) above sea level 9% power derate per 1,000 m up to 4,000 m	NA
Ambient temperature	-13 to 104 °F (-25 to 40 °C) 2% power derate per 1 °C up to 50 °C	-40 to 185 °F (-40 to 85 °C)
Relative humidity	95%, No condensation allowed	95%, No condensation allowed
Contamination levels	No conductive dust allowed	No conductive dust allowed



infinitem.com/2024/02/19/

Control connections

Refer to [IOM Manual](#) for more details.
Note: not all VOs are supported in every motor. (See catalog number)

Description	Quantity	Type
Analog input Software selectable for voltage or current input	1	Voltage signal – 0 to 10 VDC, RIN = 20 kΩ Current signal – 0 to 20 mA, RIN = 500 Ω Resolution – 0.1% Accuracy – ± 5%
Analog output (see above) Software selectable for voltage or current output	1	Voltage – 0 to 10 VDC with 10 mA maximum Current – 0 to 20 mA with load < 500 Ω
Auxiliary voltage	1	24 VDC user supply with ± 5% with 1 A maximum
Digital input	4	24 VDC with internal or external supply Input impedance – 1 kΩ
Digital output	2	Open drain output Maximum switching voltage 40 VDC Maximum switching current 350 mA
Relay output	1	Normally open (NO), normally closed (NC) contact arrangements Maximum switching voltage of 125 VAC / 30 VDC Maximum switching current of: NO – 10 A (VAC) / 5 A (VDC) NC – 3 A (VAC) / 3 A (VDC)
EIA-485 (Interface for Modbus RTU)	1	Shielded twisted pair cable with impedance of 120 Ω Transfer rate of 19200 baud Half duplex Modbus communication protocol
Modbus TCP	1	Ethernet

Certifications

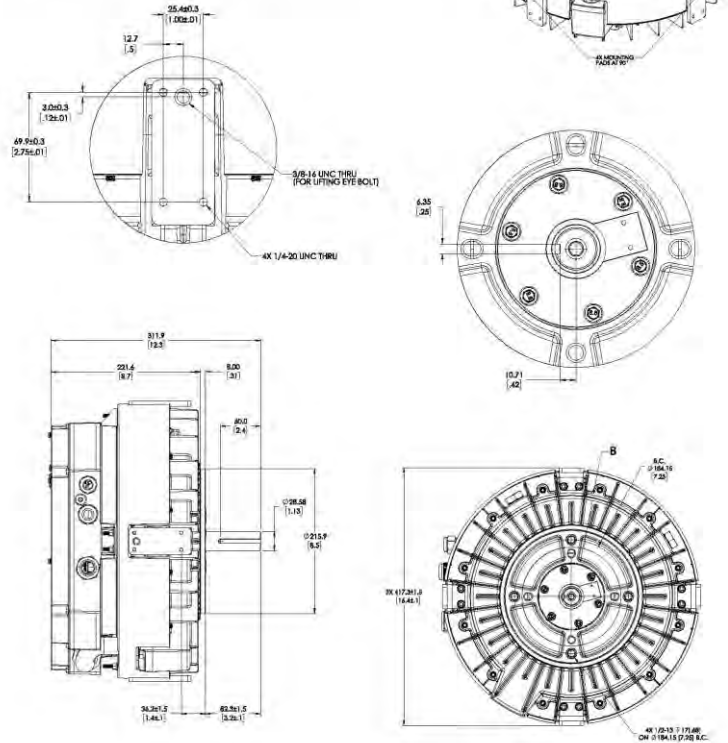
Regulatory	
UL 1004-7	Standard for electronically protected motors
UL 1004-1	Rotating electrical machines – general requirements
CSA C22.2 No.77	Motors with inherent overheating protection
UL 61800-5-1	Standard for adjustable speed electrical power drive systems, Part 5-1: safety requirements & electrical, thermal & energy



Mounting & dimensions

Below are the measurements needed for installation tasks:

- There are four mounting pad locations.
- Each pad is spaced 90° apart, containing 4 mounting holes and one lifting eye hole.
- The DE face of the mounting block has threaded holes for four bolts (1/2"-13).
- All bolt holes should be used for secure mounting of the motor to equipment.



Catalog number decoder

Family	Frame	Rated power	Rated speed	Volts	VFD & I/O	Comm module	Bearings	Shaft length	Xbee module	IP rating	Misc
XX	XX	XXXX	XXXX	X	X	X	X	X	X	X	X
AE	15	0500	1800	A*460 V/60 Hz	A* Modbus analog input	A* none	I* steel H* hybrid	A* 3.3" B* 4.0"	A* none	A* IP54	G* EPL

*Standard

Example catalog number

AE15-0500-1800-AAAS-AA40

Family	_____
Frame	_____
Rated power	_____
Rated speed	_____
Volts	_____
VFD & I/O	_____
Comm module	_____
Bearings	_____
Shaft length	_____
Base module	_____
IP rating	_____
Misc	_____

Example decoded

AE15 = Aircore EC, 15 frame

0500 = 5 HP
1000 = 10 HP

1800 = 1800 RPM
4.45 = 450 L/M

AA40 = 3.3" shaft length / No IoT module / IP54 rating / Electronically Protected-I

© 2000 Blackwell Science Ltd, *Journal of Internal Medicine* 247: 399–406

Ordering information

Catalog number	Description
AE15-0500-1800-AAAS-AA40	Aircore EC, frame 15, 5 HP, 1800 RPM, 460 V / 60 Hz, Modbus RTU, analog input, no comm module, steel bearing, standard shaft, no Xbee module, IP54, electronically protected for locked rotor
AE15-0500-1800-AAAH-AA40	Aircore EC, frame 15, 5 HP, 1800 RPM, 460 V / 60 Hz, Modbus RTU, analog input, no comm module, hybrid bearing, standard shaft, no Xbee module, IP54, electronically protected for locked rotor
AE15-0500-1800-AAAS-BA40	Aircore EC, frame 15, 5 HP, 1800 RPM, 460 V / 60 Hz, Modbus RTU, analog input, no comm module, steel bearing, standard shaft, no Xbee module, IP54, electronically protected for locked rotor
AE15-0500-1800-AAAH-BA40	Aircore EC, frame 15, 5 HP, 1800 RPM, 460 V / 60 Hz, Modbus RTU, analog input, no comm module, hybrid bearing, standard shaft, no Xbee module, IP54, electronically protected for locked rotor



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Questions?



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