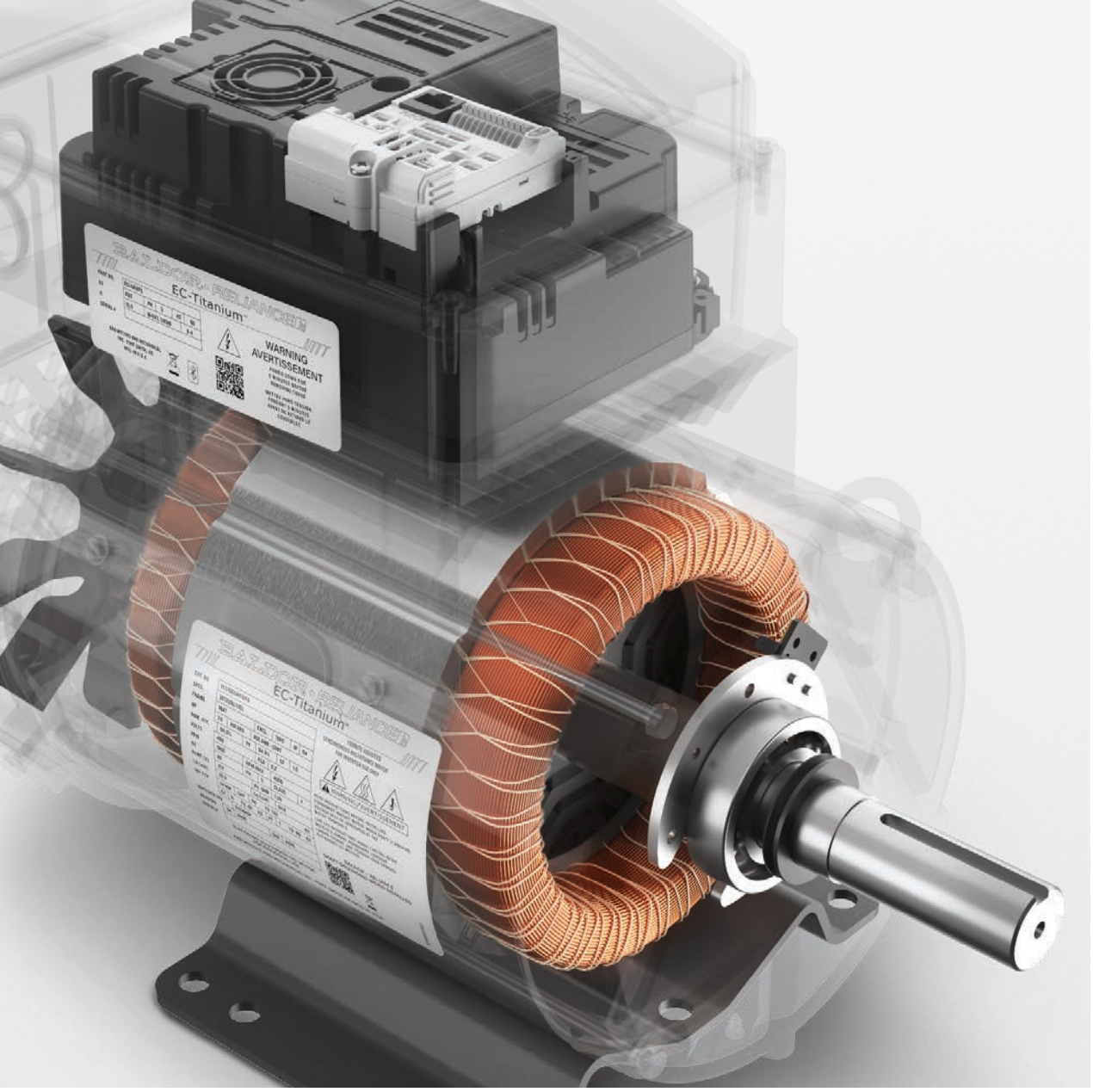


EC Titanium

Next generation efficiency and performance

BALDOR • RELIANCE

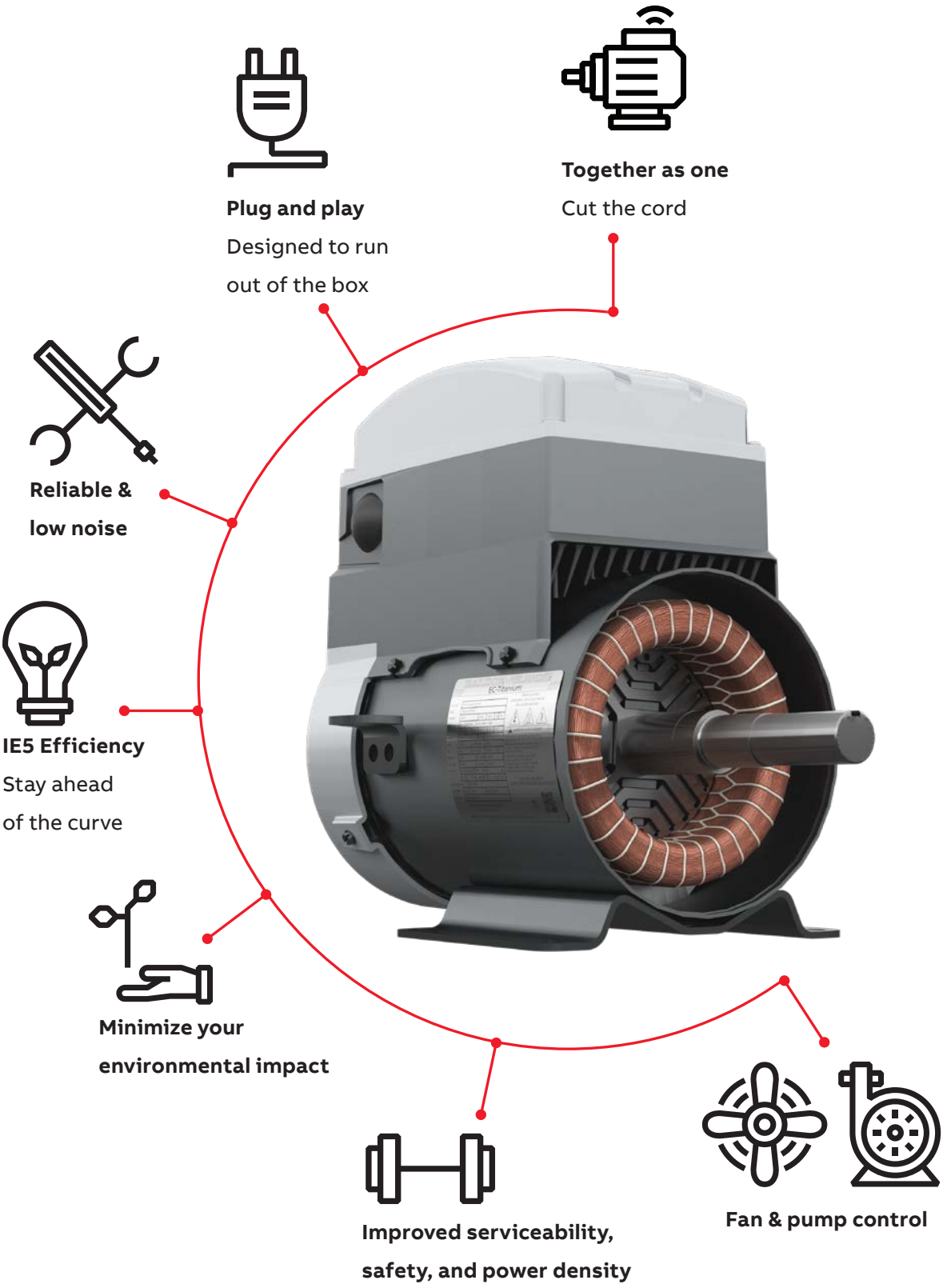
EC Titanium
Beyond EC efficiency and performance is here

EC, or electronically commutated motors, have traditionally been used to meet the high efficiency requirements. However, as efficiency regulations tighten, more may be required.

Introducing the Baldor-Reliance® EC Titanium™ integrated motor-drive. FASR™ (Ferrite Assisted Synchronous Reluctance) motors are extremely efficient, especially at reduced speeds, compared to traditional AC induction motors.

Our solution incorporates permanent magnet design into a synchronous reluctance rotor technology to achieve IE5+ ultra premium efficiency at rated design while maintaining performance across varying speed and load conditions. Equipment incorporating this technology can therefore achieve optimal performance no matter the operating point.

Get a glimpse into achieving the next level of energy efficiency


Plug and play
Designed to run
out of the box
Together as one
Cut the cord
Reliable &
low noise
IE5 Efficiency
Stay ahead
of the curve
Minimize your
environmental impact
Improved serviceability,
safety, and power density
Fan & pump control

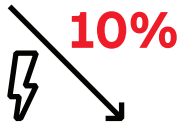
Let's talk about saving energy

Motors at the forefront of global efforts to reduce emissions

Up to 70% of electricity consumed by industry is used by electric motor systems. The technological advancement and adoption of high-efficiency motors and variable speed drives on the market, are key factors in achieving significant energy efficiency improvements in industry and infrastructure.

Electric motors consume **over 45% of the world's electricity.**

By 2040 the number of motors **will double.**



Adoption of high-efficiency motor systems would **cut global electricity consumption by up to 10%.**

Changing just one motor can make a difference.

International Efficiency (IE) standards stipulate the energy efficiency of low voltage AC motors. These IE codes serve as a reference for governments who specify the efficiency levels for their minimum energy performance standards (MEPS).

Five levels of motor efficiency

1 **IE1 Standard Efficiency**

2 **IE2 High Efficiency**

3 **IE3 Premium Efficiency**

4 **IE4 Super Premium Efficiency**

5 **IE5* Ultra Premium Efficiency**

*The IE5 class has not been specified in the standard yet, but some manufacturers have already developed motors that will be compliant.

Switching up to IE5+ efficiency levels

Industrial motors[1]

When added to the existing motor of a pump, fan or compressor, a variable speed drive can typically reduce power consumption by **25%**.[3] Replacing 80% of motors with IE5 levels **will save more energy than the annual energy consumption of Poland.**[4]

Fans[2]

Chiller compressors[2]

Smoke exhaust fans

Pumps[2]

Pumps[2]

WATCH VIDEO

WHITEPAPER

MOTOR SAVINGS CALCULATOR

1 Omdia, "Motor-driven Equipment Research Package," 2020
2 US DOE Energy footprints 2015 https://www.globalefficiencyintel.com/new-blog/2017/infographic-energy-industrial-motor-systems
3 For an example of the calculations involved, see "Program Insights: Variable frequency drives," Consortium for Energy Efficiency, 2019, https://www.cee1. org/content/variable-frequency-drives.
4 U.S. Energy Information Administration, international data: electricity, 2019, Poland

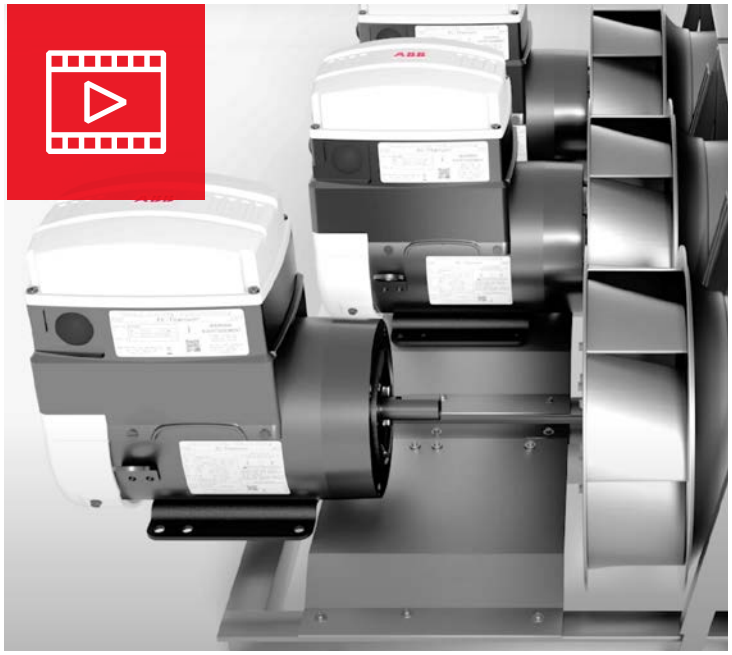
Improving your total performance
Sustainable solutions for your system

Motor standards have been in place for decades, yet there is a growing demand to achieve greater efficiencies as regulations continue to tighten on the total design of fans, pumps and compressed air packages. Equipment manufacturers are turning to new motor technologies to achieve the highest system efficiency possible from wire to air while using sustainable materials.

ABB's Baldor-Reliance EC Titanium product line utilizes FASR (ferrite assisted synchronous reluctance) technology with non-rare earth magnet materials to meet and exceed IE5 efficiency. Suitable for constant and variable torque applications, the EC Titanium offers excellent performance across a wide speed load range and above base speed conditions.

Key features

- More than 15% efficiency gains compared to IE3 (NEMA premium)
- Save up to 40% when using drives to control motors
- Sustainable non-rare earth magnetic material
- Higher power density for smaller footprint



Optimized pump performance

Optimized fan performance

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Greenheck chooses EC Titanium™ for their air handling systems

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HVAC interactive brochure

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SUCCESS STORY

HVAC OEM chooses Baldor-Reliance® EC Titanium for efficiency and standardization of rooftop air handling solutions

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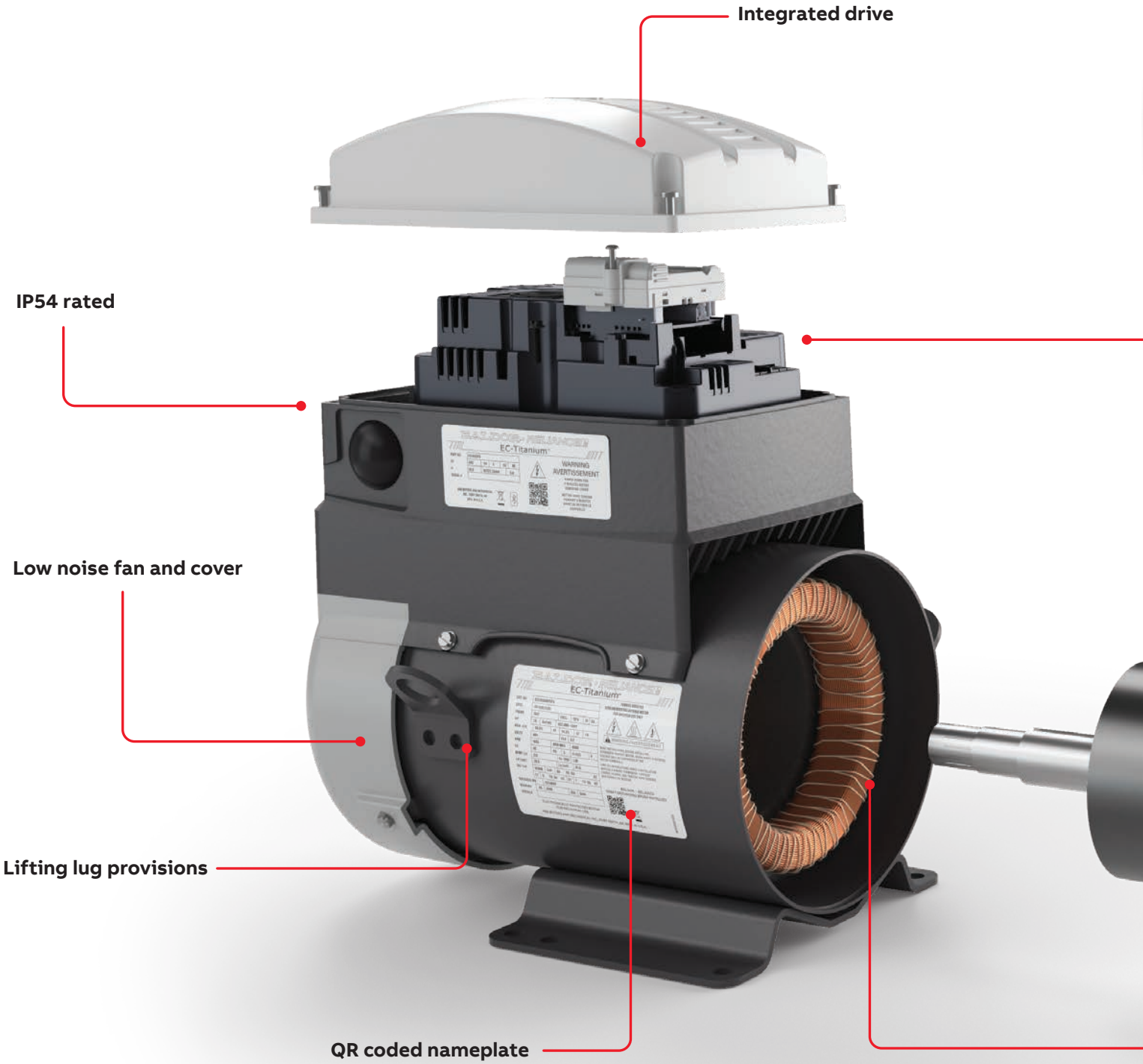
EC Titanium motor innovation



Top mount Plenum use
Foot mounted

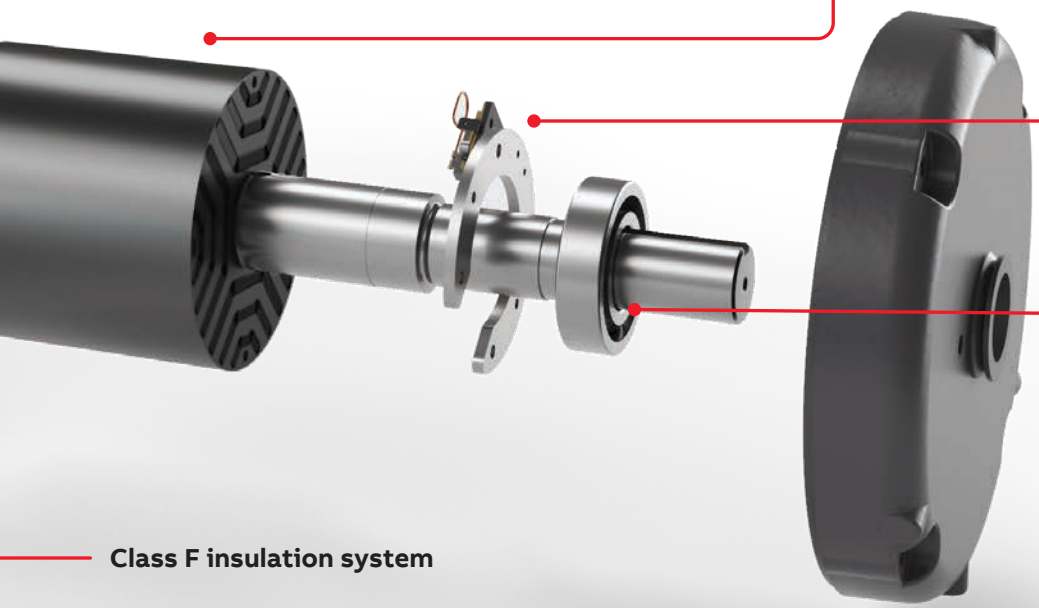
Axial mount
C-Face footless

Motor only
C-Face foot mounted

Drive pre-wired and programmed

IE5 efficiency guaranteed

Shaft grounding brush



Polyrex EM grease

Class F insulation system

IE5+ efficiency level

Ultimate efficiency and reliability to lower your total cost of ownership

Innovation inside

The idea is simple. Take a conventional, proven stator technology and an innovative rotor design. Synchronous reluctance technology combines permanent magnet motor performance with the simplicity and service-friendliness of an induction motor. The rotor suffers virtually no power losses while the magnets further reduce the work required and losses seen in the stator. Maintenance is as straightforward as with induction motors.

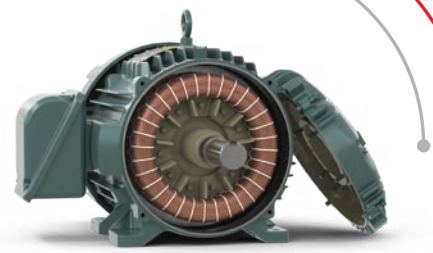
IE3 induction motor

Total losses

I^2R stator

I^2R rotor

Other



Higher losses in rotor and stator

IE5 EC Titanium

Total losses

I^2R stator

Other

20% reduction in stator losses - eliminate rotor loss

ARTICLE

NEMA vs. IEC efficiencies

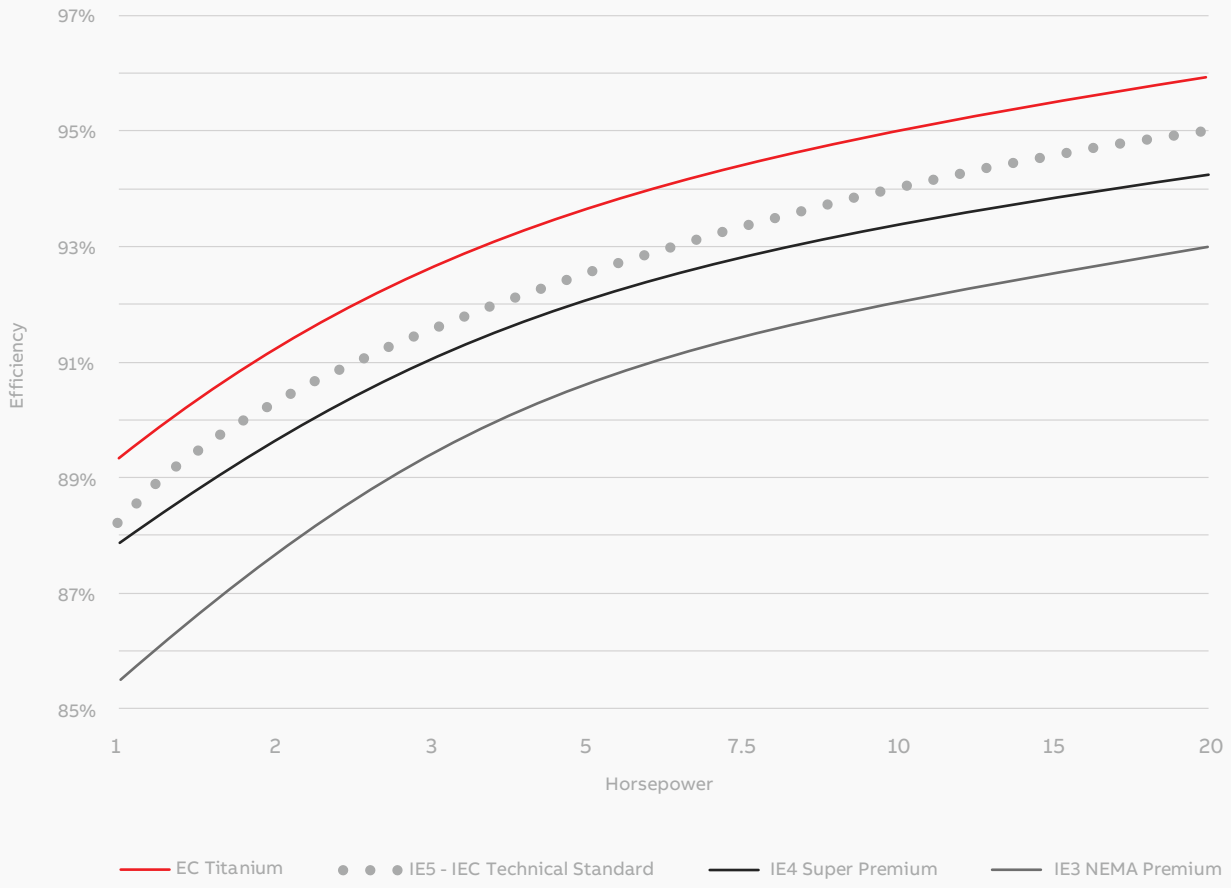
- Understanding efficiency bands and motor standards
- Why is efficiency a hot topic

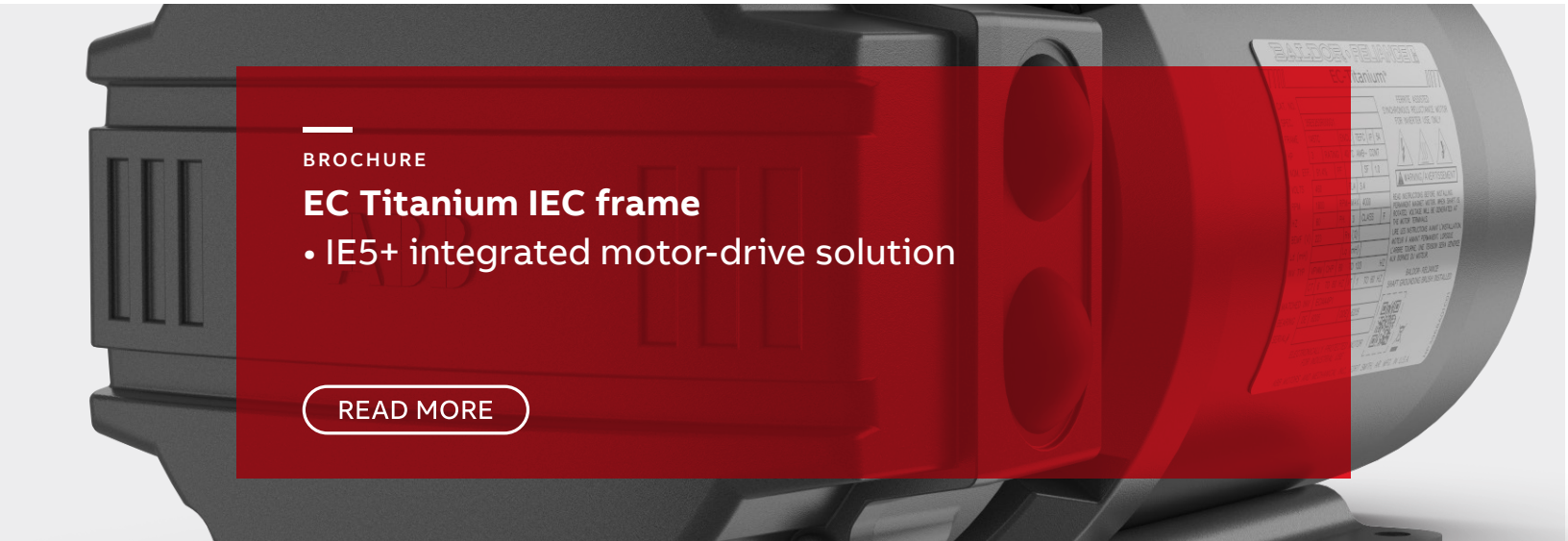
READ MORE

EC Titanium products exceed IEC Technical Standard 60034-30-2 for IE5 efficiency.

The purpose of IEC/TS 60034-30-2 is to create a level playing field between established and new, innovative motor technologies in order to enable fair competition and market development.

EC Titanium efficiency curves





BROCHURE

EC Titanium IEC frame

• IE5+ integrated motor-drive solution

READ MORE

EC Titanium products exceed IEC Technical Standard 60034-30-2 for IE5 efficiency.

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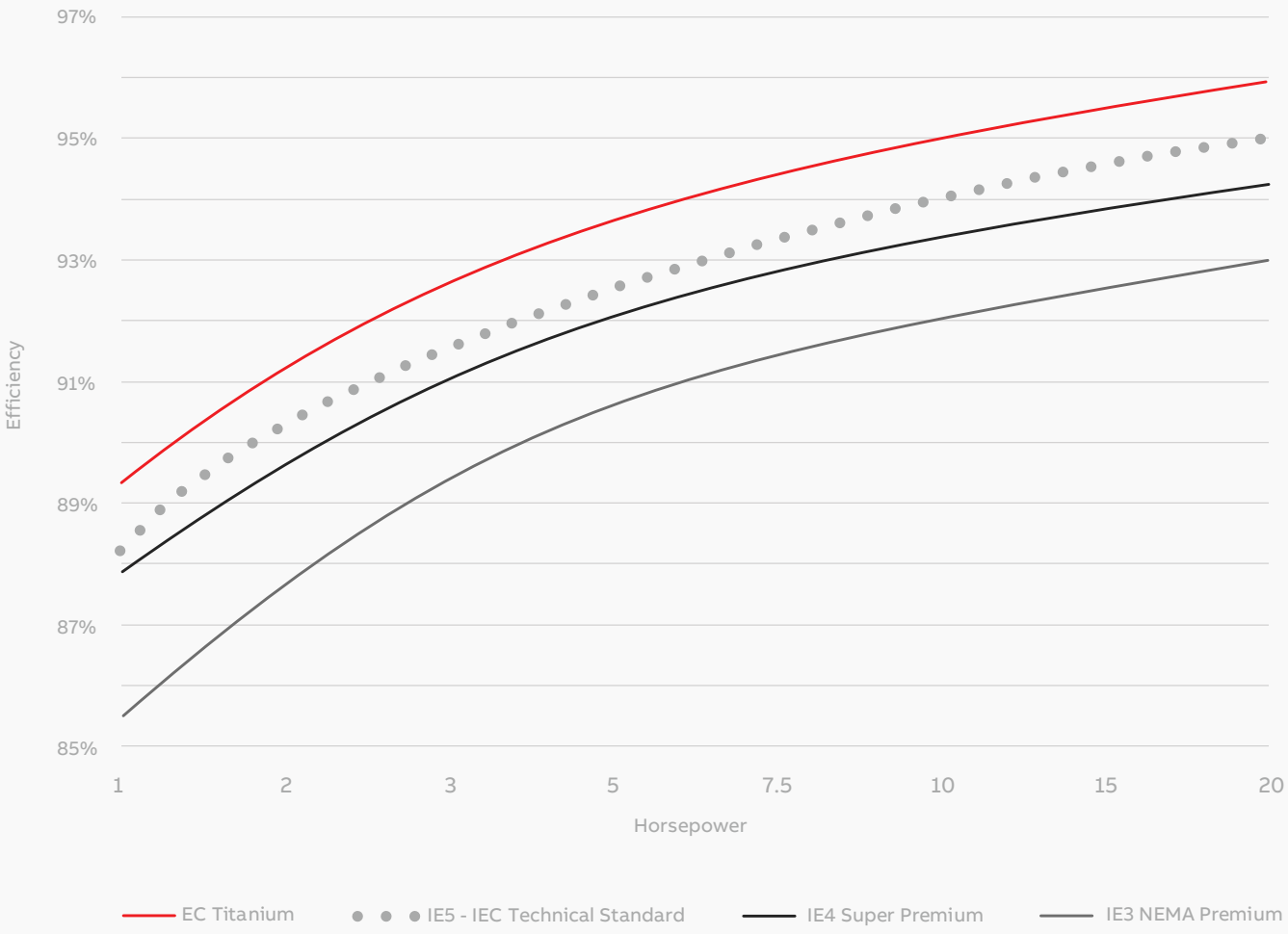
EC Titanium efficiency curves



Plug and play
Wireless start-up, control and troubleshoot

Using the latest communications protocols, operators can configure and change parameters, securely control and receive real-time alerts and diagnostic information for troubleshooting. Diagnostic status is displayed with LED indicators on the drive, or with an optional keypad displaying fault type. Commissioning is straightforward by utilizing PC or mobile tools and the onboard Bluetooth wireless interface.

- Easy startup pre-programmed drive, no drive expertise required
- Eliminate expensive wiring, reduce installation time
- Ready to run out of the box, minimize personnel risks and hazards

Quick and fast field upgrades
Drop in replacements

Easy upgrade of existing installations:

Drop-in replacement for NEMA 56 to 210 frames

Compact and light

EC Titanium is safer to install because they are lightweight and available in smaller frame sizes.

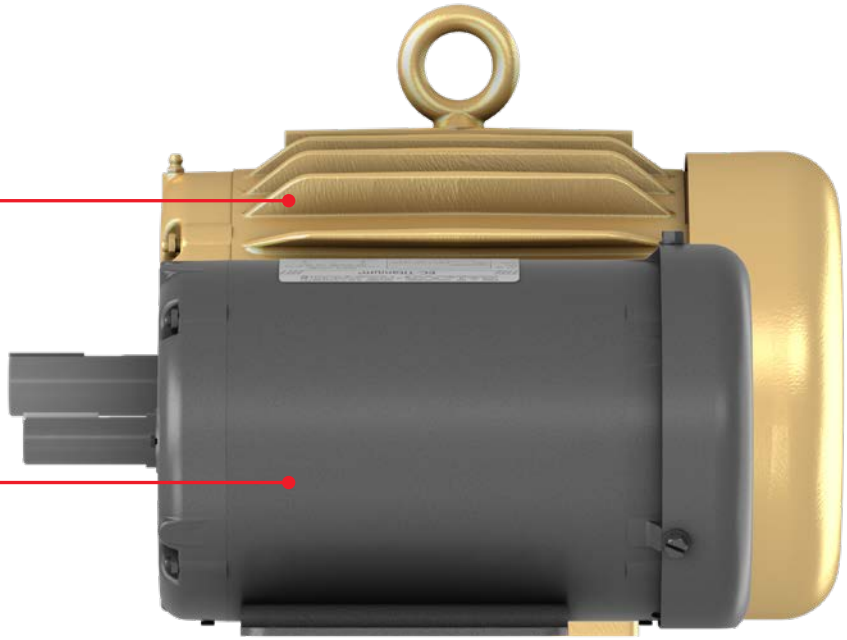
This reduces the need for heavy structural support requirements.

5 Hp induction motor

180 NEMA frame

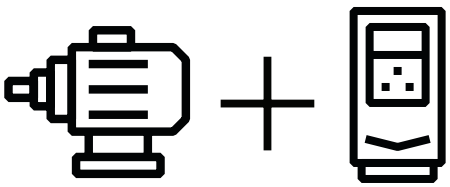
5 Hp EC Titanium

140 NEMA frame



Power matched ABB Drive & EC Titanium Motor

Optimized performance and flexibility



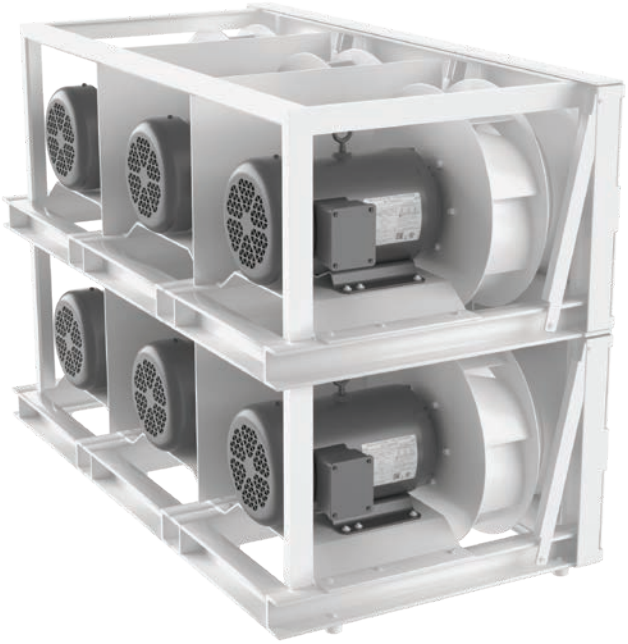
Pairing **EC Titanium** with the **ABB ACH580** drive enables the use of advanced motor control algorithms for higher efficencies across the speed and load range than traditional motor solutions.

ABB drive and Baldor-Reliance motor pairing advantages:

- ACH580 firmware support for EC Titanium motor
- Accurate motor and speed control while maintaining superior safety and reliability
- Extensive fan and pump drive features
- One vendor that stands behind the motor and drive package

ACH580 drives are ideal for controlling:

- HVAC system and fans
- Pumps
- Compressors
- Air handling units and chillers
- Data center fan array and CRAC units

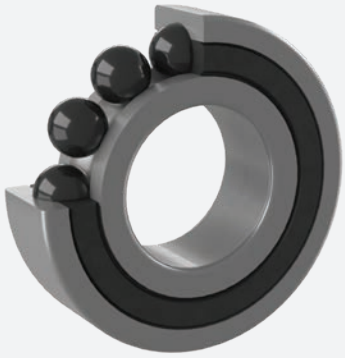


Multi-motor to drive solution: the most efficient and economical way to optimize your fan array system is to pair EC Titanium motor-only with an ABB ACH580 drive. This patented combination gives you flexibility and guaranteed to optimize your overall performance.

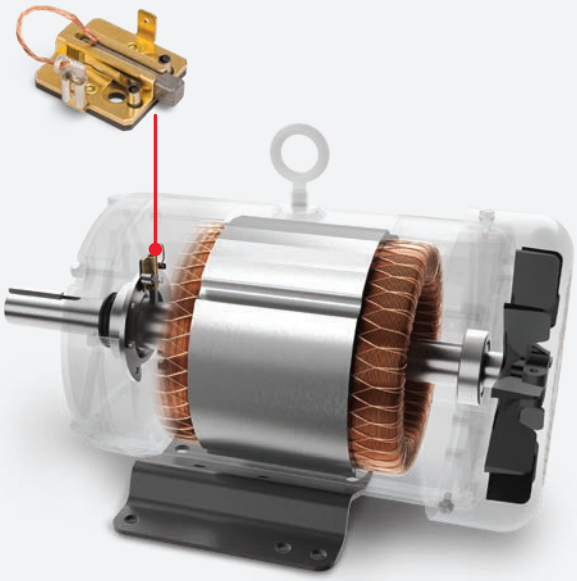
Shaft grounding and shaft current mitigation techniques

Problem: Without proper grounding techniques, the shaft currents induced by variable frequency drives (VFD) will find the path of least resistance and pass through the bearings to ground. This can lead to catastrophic failures to the motors or driven equipment.

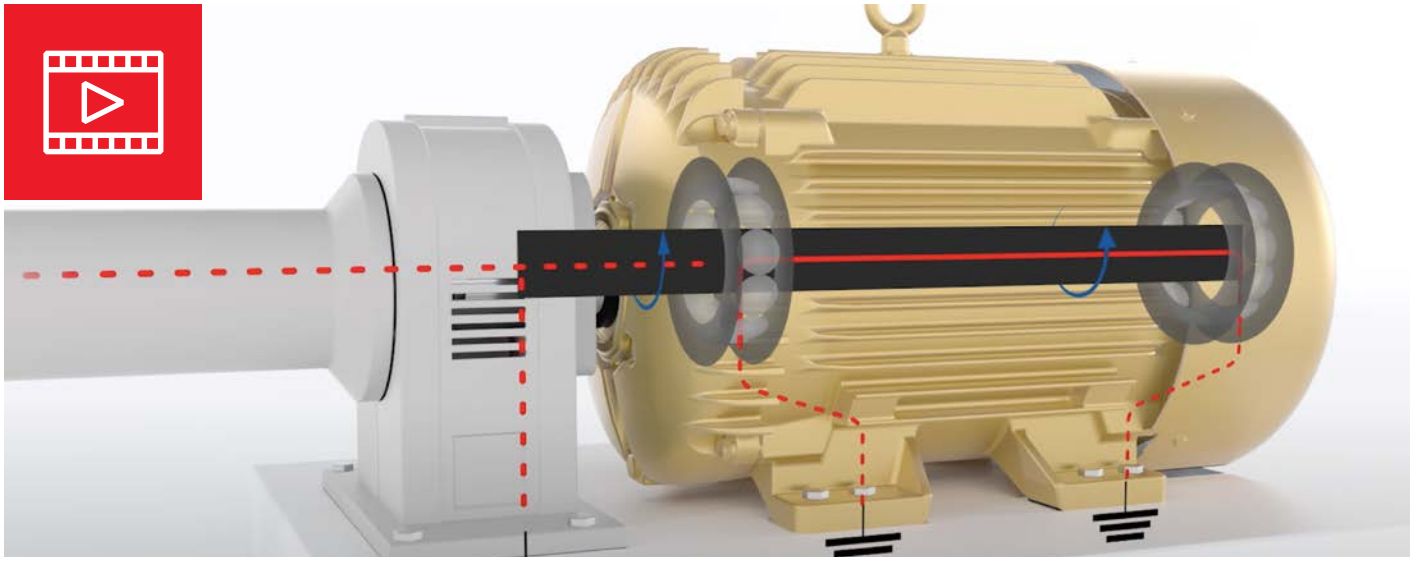
Solutions: There are many ways to mitigate shaft grounding issues, including carbon brushes (standard on EC Titanium) and hybrid ceramic bearings (standard on Critical Cooling motors).



Hybrid ceramic bearings



Carbon brushes



Motors for data centers
Powering the connected world

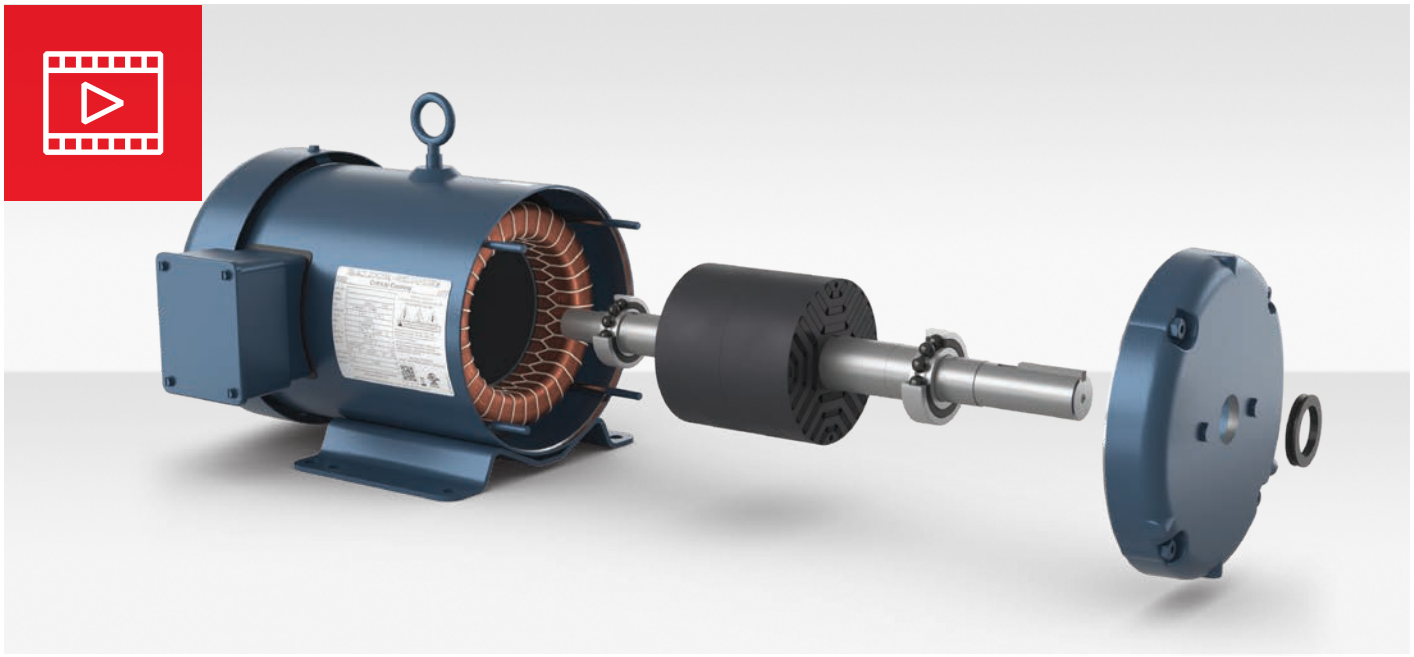
EC Titanium utilizes a shaft grounding brush for protection against shaft currents – suitable for many variable speed operations.

Critical Cooling motors utilize the same FASR rotor technology as EC Titanium, but also utilize enhanced hybrid ceramic bearings on both motor end. This will protect your equipment but not resolve shaft current issues (suitable for direct drive applications).

The world has become increasingly dependent on data, computing power and connectivity making data centers mission-critical facilities requiring special attention. Critical Cooling motors are specifically designed for data centers that has additional bearing protection to ensure nonstop operation.

Critical Cooling motors

- Induction rotor: 1 – 30 Hp (.75 – 23 kW)
- FASR rotor: 5 – 20 Hp (3.7 – 15 kW)
- Lifetime warranty against bearing failures from shaft currents
- Sealed hybrid ceramic bearings installed on both motor ends
- TEAO and TEFC enclosures available (TEFC only for FASR rotor design)
- Designed for longevity with 5-year warranty



PC & Mobile tools

Intuitive and easy-to-use software

ECM Tools PC Software

Programming can be done in real-time or offline using a hard wired cable or Bluetooth interface.

Features include:

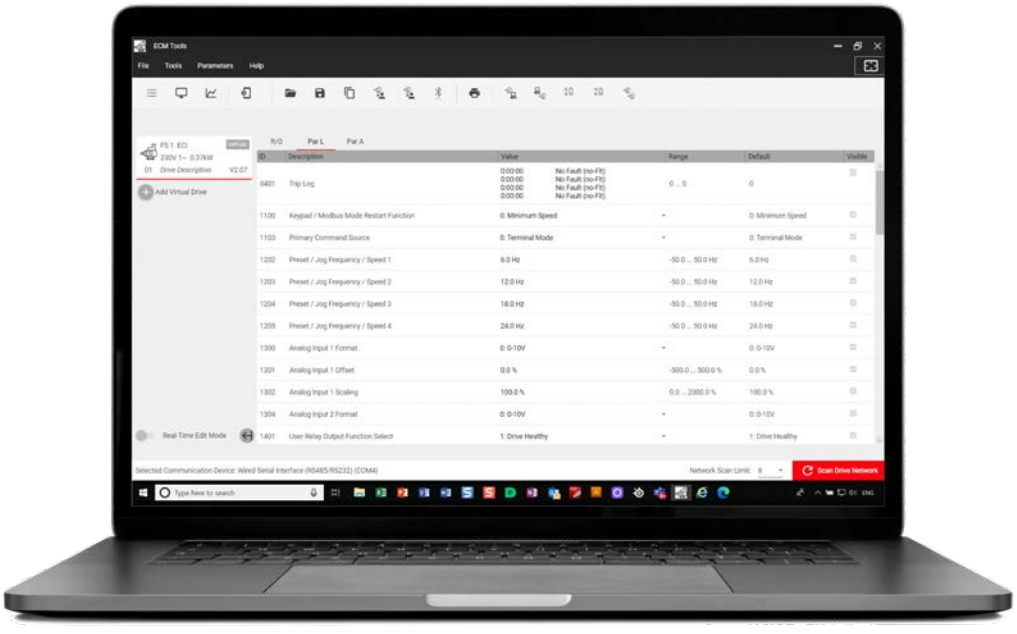
- Parameter editor, upload / download, saving to a local file or compare values to factory default settings
- Real time control functions for startup and tuning
- Four channel chart recorder for monitoring and diagnostics (trend data, set trigger points, capture, record & store data)
- Firmware upgrade capable

ECM Tools Mobile

Intuitive and easy-to-use smartphone app for use with Bluetooth drives. Provides wireless configuration and monitoring for the drive.

Features include:

- Parameter editor, transfer and real time monitoring
- Save parameters to smartphone, send and receive by email
- Send and receive saved files by email
- Real time motor control from the app
- View drive status, motor speed, motor current and motor power in real-time



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Soler & Palau chooses EC Titanium to help improve air quality

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SUCCESS STORY

EC Titanium keep chickens cool while saving energy

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SUCCESS STORY

Real-world results prove performance and ROI

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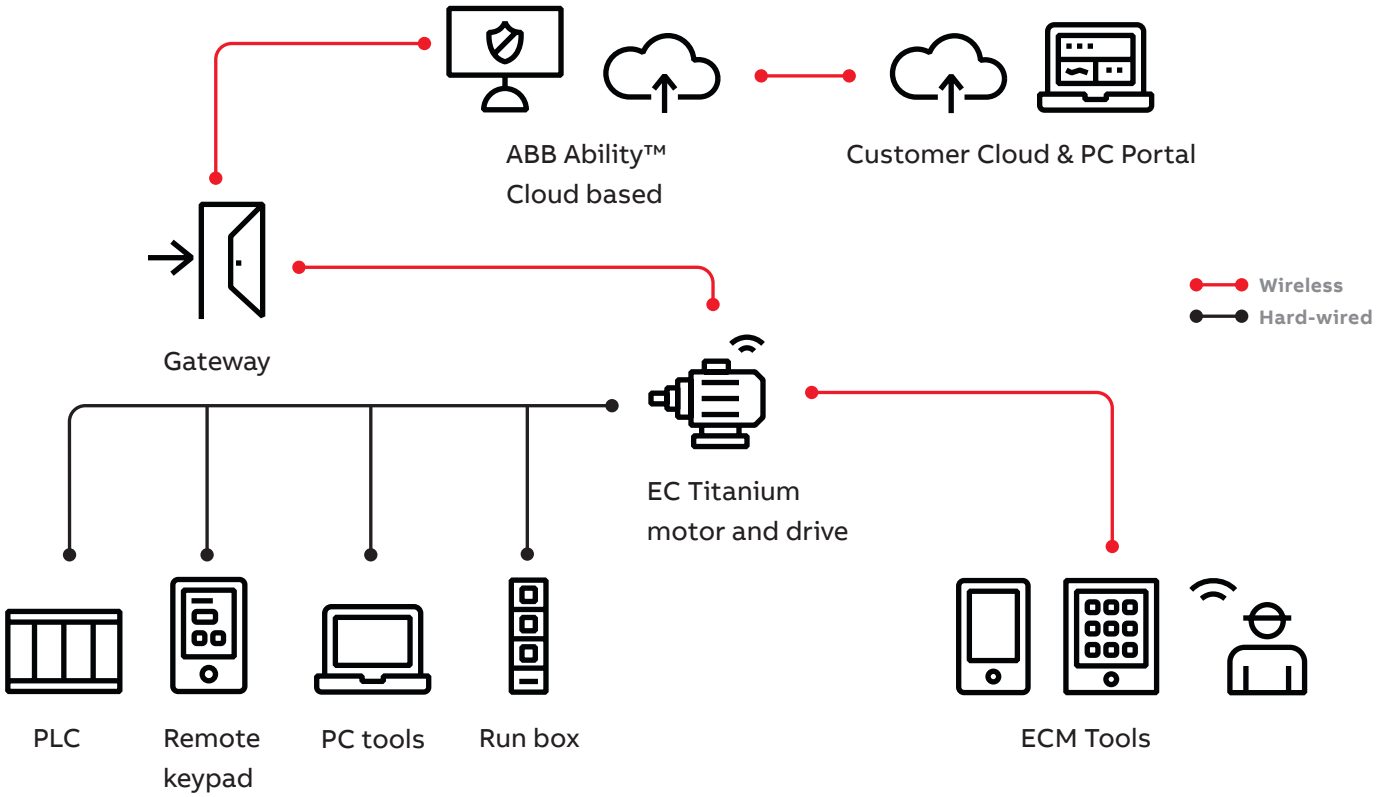
ABB Ability™ ready
Turning insights into actions

ABB Ability™ smart sensor ready, EC Titanium allows operators to easily monitor and maintain equipment remotely, minimizing downtime while optimizing energy efficiency and application speed. ABB is committed to cyber-security and data protection.



- **Process optimization** monitors key system information to improve energy savings
- **Prevent unexpected downtime** - schedule preventive maintenance based on data trends to reduce overall operating costs
- **Longer equipment lifetime**
- **Improved safety** - the sensor enables easy access to drive information in locations that are difficult or dangerous to access allowing maintenance inspections from a distance

Health Parameters:

- Drive module temperature
- Drive control board temperature
- DC bus voltage
- Estimated speed
- Output frequency and voltage
- DC ripple
- Drive status and fault indicators
- Digital input status
- Motor power and torque

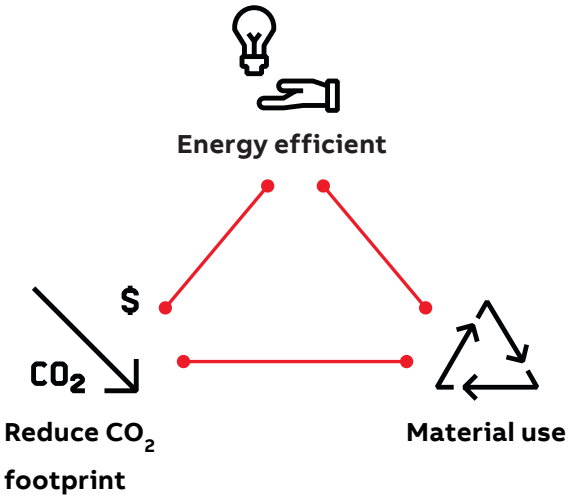
Sustainability

ABB has set ourselves the ambitious target of helping our customers reduce their annual CO_2 emissions in excess of 100 megatonnes by 2030. This is equivalent to the annual emissions of 30 million combustion cars. An example of how this can be accomplished is the ability of ABB drives powering electric motors that can reduce electricity consumption by up to 25%.

Smart sensor for energy consumption

The ABB Ability™ calculates several parameters of datapoints including speed, motor power and torque. With this information, we can accurately calculate energy usage and help our customers optimize their operations.

SYSTEM EFFICIENCY WHITEPAPER



Find out more information about our EC Titanium motor!

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EC Titanium web page

Online product catalog

Product note