

GE  
Power Conversion

# Motors

Medium / High Voltage  
and High Speed

190 to 100,000 kW

250 to 134,000 HP



imagination at work





GE has been setting the standard in manufacturing motors for over 125 years.



GE manufactured motors for some of the first commercial and industrial electrical applications. We continue to deliver innovative mechanical power solutions to the world.

## We continue to innovate with product quality

Motors are designed and manufactured to operate efficiently and reliably in challenging applications and severe environments where reliability and ease of maintenance is critical.

## Standards & Certifications

We work with all global standards such as ABS, API, ATEX, CSA, GOST, IEC, IEEE, and NEMA. GE machines are available for use in Division I or II and Zone 1, 2, or 22. GE manufacturing facilities are ISO 9001 certified.

## Testing

Every machine is tested in our global state-of-the-art facilities to your exacting requirements. GE has one of the largest capacities for full load testing.

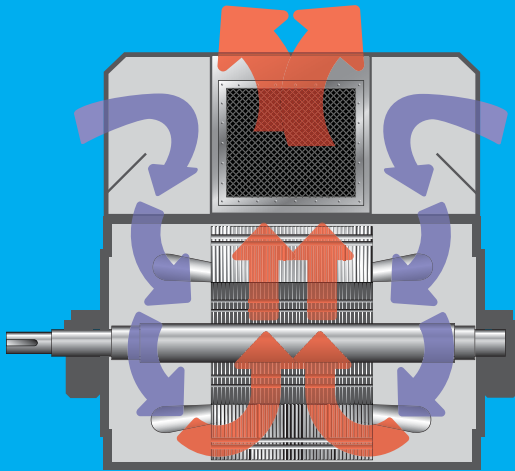
## Applications

Fans, pumps, compressors, grinding mills, metal rolling, mine hoists, refiners, propulsion and many others.

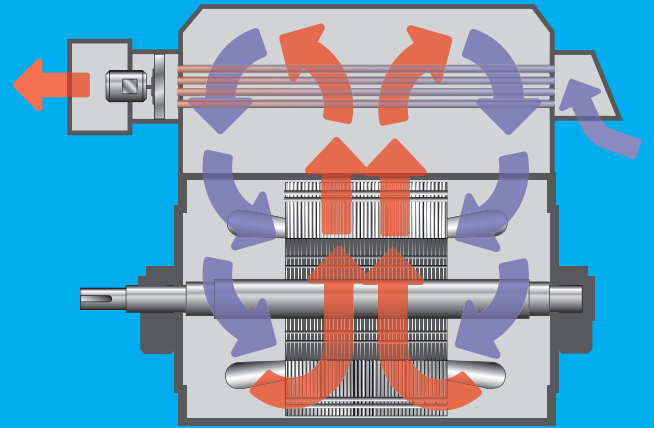
## Industries

- Oil & Gas
- Power & Energy
- Metals
- Pulp & Paper
- Water & Wastewater
- Other Process Industries
- Mining
- Cement
- Marine



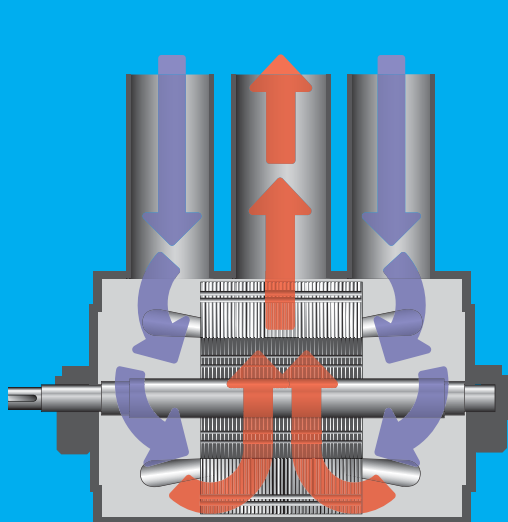


Weather Protected  
WP11, ICOA1

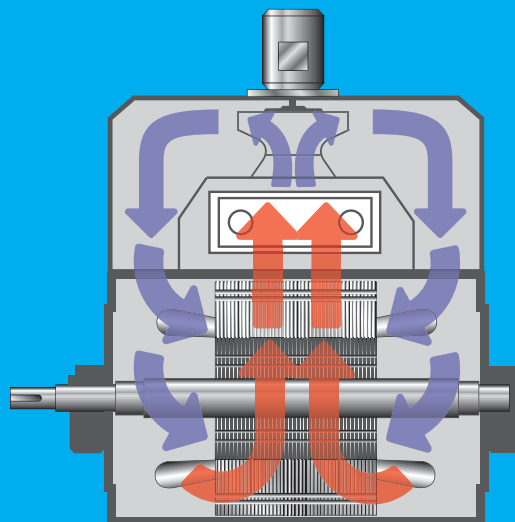


Totally Enclosed Air to Air Cooled  
TEAAC/CACA, IC6A1A6





Pipe Ventilated, Forced Ventilated  
Ducted - IC3A7



Totally Enclosed Water to Air Cooled  
TEWAC/CACW, IC8A6W7

## Enclosures Designed for Performance

### Global Enclosure Designations for Heat Exchange Designs

| IEC and NEMA Enclosure Codes   | IP          | IC      |
|--|-------------|---------|
| Open, Drip proof and/or weather protected<br>(ODP, WPI, WPIL)                | IP00 - IP44 | IC0A1   |
| Open, externally ventilated<br>(machine mounted blower) (ODP)                | IP00 - IP44 | IC0A6   |
| Duct ventilated (separate blower) (TEPV)                                     | IP22 - IP44 | IC3A7   |
| Totally enclosed non-ventilated (TENV)                                       | IP54 - IP56 | IC4A1A0 |
| Totally enclosed fan cooled (TEFC)   | IP54 - IP56 | IC4A1A1 |
| Totally enclosed fan cooled<br>(machine mounted blower) (TEFC)               | IP54 - IP56 | IC4A1A6 |
| Totally enclosed air-to-air cooled (TEAAC, CACA)                             | IP54 - IP56 | IC6A1A1 |
| Totally enclosed air-to-air cooled<br>(machine mounted blower) (TEAAC, CACA) | IP54 - IP56 | IC6A1A6 |
| Totally enclosed water-air cooled (TEWAC, CACW)                              | IP54 - IP56 | IC8A1W7 |
| Totally enclosed water-air cooled<br>(machine mounted blower) (TEWAC, CACW)  | IP54 - IP56 | IC8A6W7 |

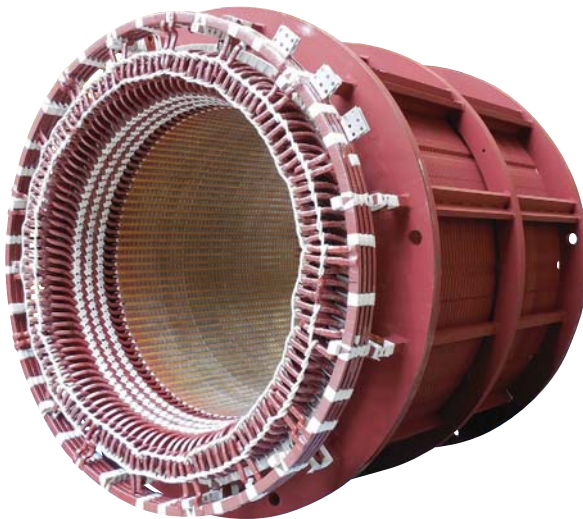


## Superior Construction

### Stator Frame and Magnetic Core

- Low Loss Core Design
- Easy Access for Routine Maintenance
- Low Vibration – Long Life

Our stator frame has been optimized utilizing advanced finite element analysis tools. Over the decades, these structures have been proven to comply with the most demanding industry standards and requirements.



The stator core is made up of low loss, high grade electrical sheet steel insulated with an inorganic coating. By combining high performance materials, well-proven design techniques and modern manufacturing tools, we are able to offer some of the most compact and efficient designs in the industry.



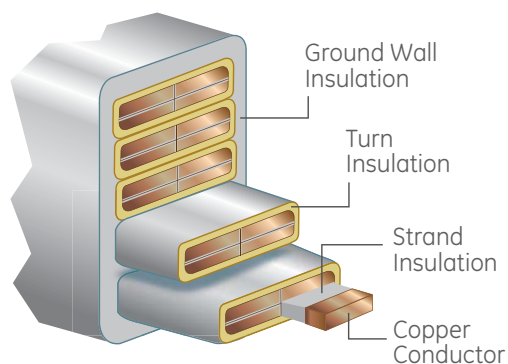


## Insulation System

The reliability of our insulation systems are validated through a combination of rigorous qualification testing and service life experience.

Our insulation system ensures long life and reliability by meeting the stringent mechanical and thermal requirements of a wide range of challenging specifications.

Our system is comprised of specially engineered materials selected for thermal capability, high dielectric strength, electrical reliability and chemical resistance. The system then undergoes a Vacuum Pressure Impregnation (VPI) process for added protection and rigidity.



## Acceptance Testing

Tests are made during the manufacture of the windings to assure that each machine meets critical material and manufacturing quality standards. Additional tests are available to assure the machines meet unique functional, environmental or even regional requirements for every application.

# Rotors to Fit Your Applications

## Cage Induction Rotors

- High Performance
- Rugged Reliability
- Small Footprint

This well proven industry work horse is available in a number of different designs from low voltage fractional horse power up to 300 ton machines. Designs are offered with copper or copper alloy, or for smaller machines, both copper and fabricated aluminum. Each machine is optimized to suit specific needs by modifying the stator and stator winding as well as the rotor cage bar profiles and materials. In this way a design can be optimized to give the right starting torque capability, ensuring high efficiency and an optimized power factor.

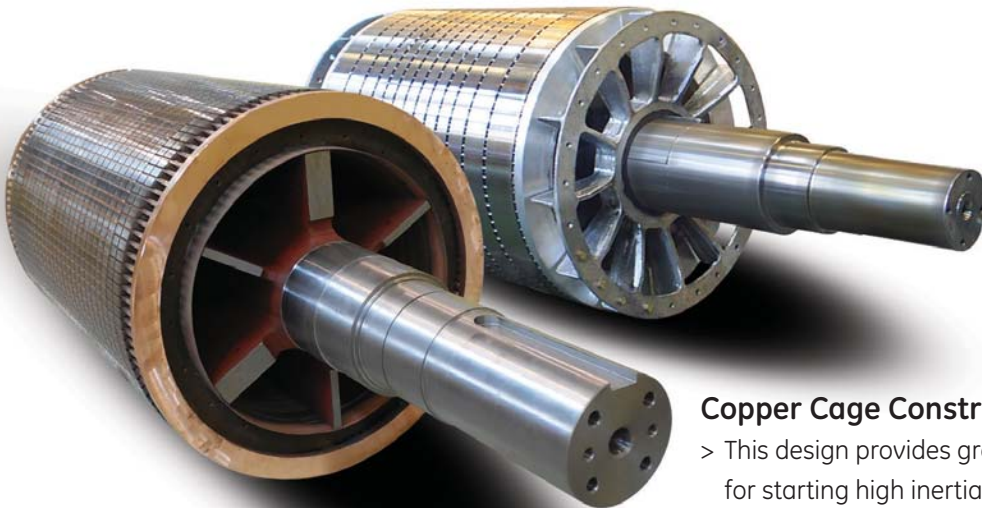
With our ability to optimize motor designs for use with variable frequency drives, cage motors are now being supplied for applications never previously considered. GE has supplied very high speed cage induction motors that eliminate the need for gearboxes (some of which operate at 20,000 rpm!) Our mine hoist technology supplies shaft-less induction motors in excess of 100 tons.

### Aluminum Cage Construction

- > Low mass bars and end-rings reduce centrifugal force.

### Copper Cage Construction

- > This design provides greater capability for starting high inertia loads.
- > High efficiency helping to reduce CO<sub>2</sub> emissions.





## Synchronous Rotors

- Highest Available Efficiency
- Brushless Excitation for Minimum Maintenance and Maximum Reliability

Synchronous motors are utilized for a number of applications across a broad range of industries. Because of the high efficiency and controllable power factor of the design, utility costs (and CO<sub>2</sub> emissions) are minimal. Starting characteristics and normal operating performance can be optimized separately and independently giving you the benefits of both. A number of different design options are available for your application. Included are laminated and solid pole designs – both cylindrical and salient pole. GE also offers a unique forged integral pole tip design well suited to high load inertia applications. Field windings are optimized to suit individual applications utilizing either wire wound or strip wound options. By eliminating the need for a rotor-mounted synchronizing module, GE has further improved motor reliability. Fixed speed applications benefit from the use of our ESP1 excitation control. This not only gives reliable starting but also ensures the best protection for your investment.

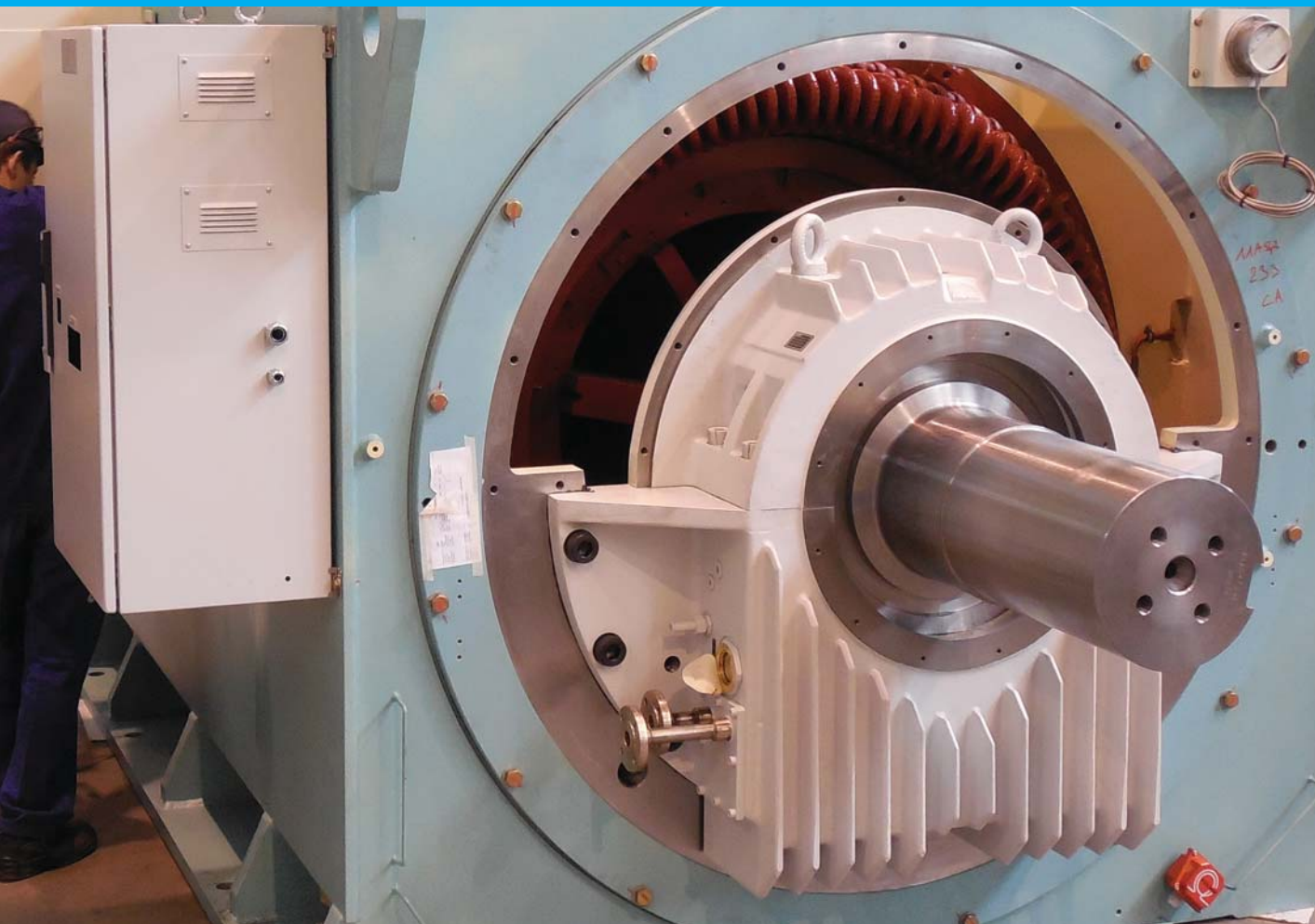
## Wound Rotors

- Versatile
- Long Track Record of Success
- Soft Starts

With the ability to provide a ‘soft-start’ when used in conjunction with a liquid resistor as well as some speed control, the wound rotor motor has long been utilized in mining and other process industries with great success.

By employing modern design techniques and updated materials, we have revitalized this technology. Through our variable speed drive expertise, we are now able to offer slip energy recovery systems making this an efficient option.





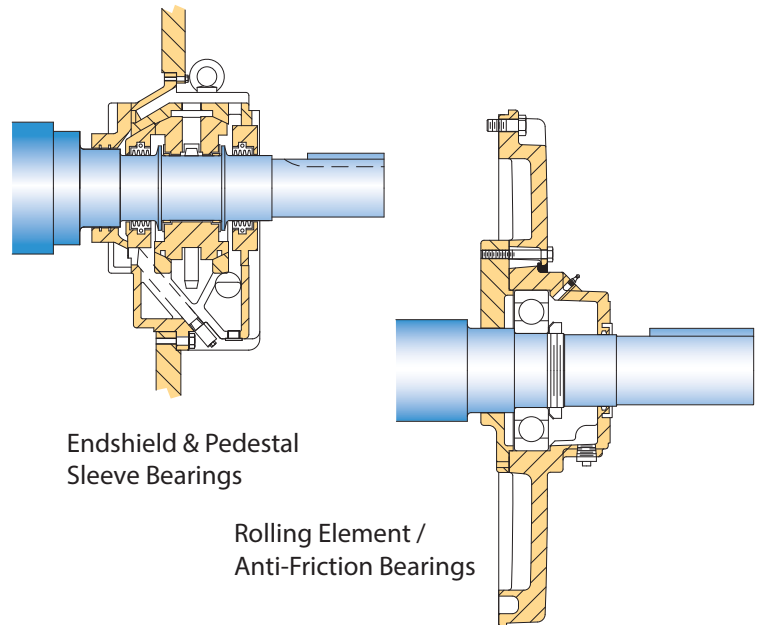
## Bearings and Lubrication

Plain white metal or rolling element endshield-mounted bearings are available appropriate to the motor speed and application. All bearings are of the highest quality produced to the standards of internationally recognized manufacturers. This ensures replacement bearings will be readily available.



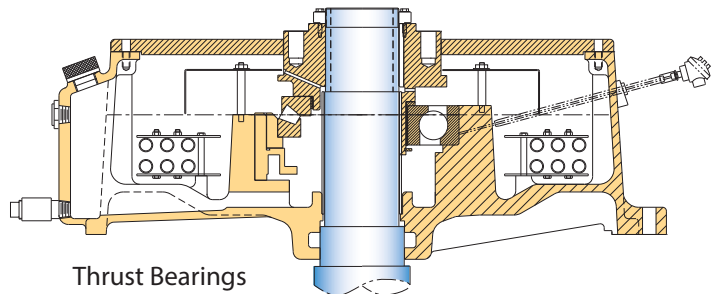
## Endshield & Pedestal Sleeve Bearings

These bearing designs incorporate specially developed multiple labyrinth floating oil and air-seals. This ensures dynamic pressure changes inside the motor will not adversely affect the lubrication system and allow for IP56 degree protection. Center flange bearings are used on larger machines improving rotor dynamic performance and overall efficiency. Self-contained or flood lubricated options are available along with suitable provisions for emergency run-down.



## Rolling Element / Anti-Friction Bearings

Ball or roller type bearings on horizontal machines are regreaseable and operate smoothly providing long life with low running noise. They are assembled with grease in a sealed housing to avoid contamination and allow for IP56 degree protection. The lubrication system includes a suitable pressure relief plug to purge excess or old grease during lubrication.



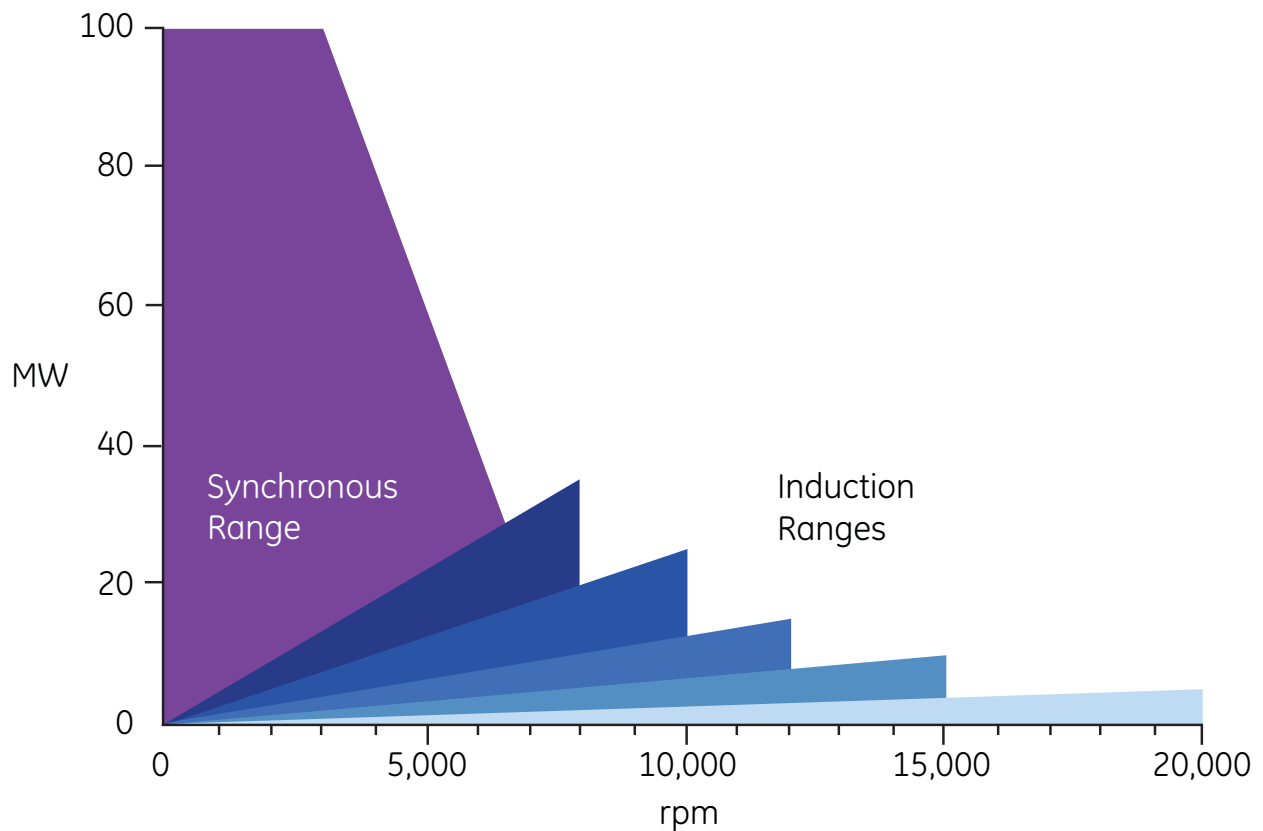
## Thrust Bearings

Angular contact ball, spherical roller and sleeve tilting pad (hydrodynamic plate) thrust bearings are designed to meet specific project requirements. Depending upon application, bearings can be self-contained grease or oil lubricated, water cooled or flood lubricated.

## Vibration

All motors are capable of complying with the requirements of API 541, 547 or 546 (as applicable). The rotors are dynamically balanced in two or more planes. The vibration level is then checked in the factory before and after over-speed tests. This check is designed to prove the stability required to achieve quiet operation and long bearing life.

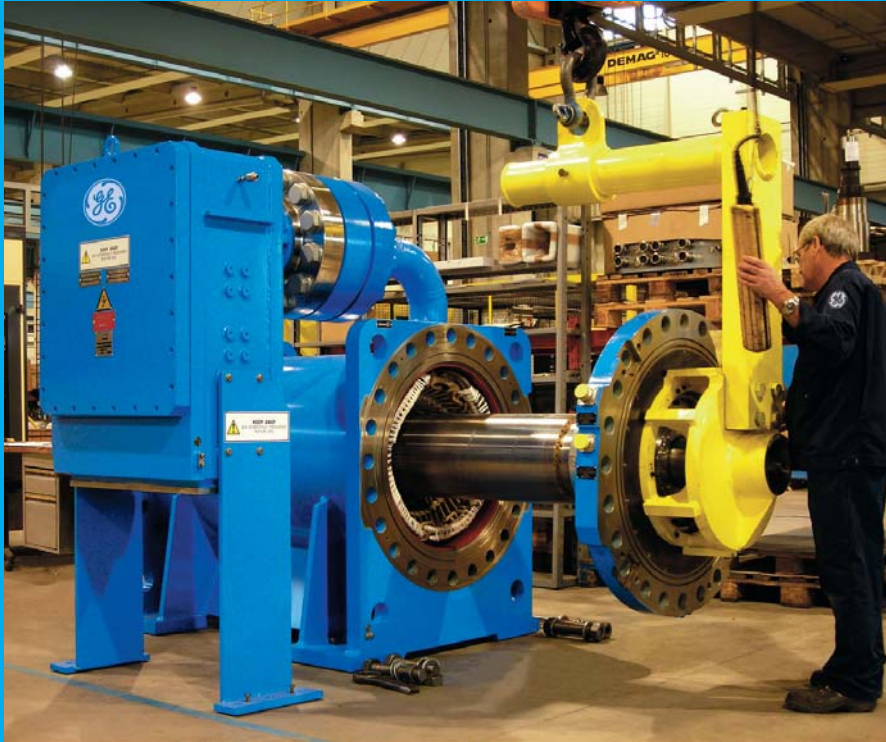
## High Speed Motors



With over 120 machines in our reference list, GE is the leading supplier of high speed motors. We have 20 years of experience with this design and are constantly improving it to ensure reliable performance for this demanding application.

Our third generation MGVI induction range is based on a reliable 'stiff-shaft' design. Available with a Class H insulation system, sleeve, tiling pad or active magnetic bearings, we offer a flexible design suitable for a broad range of applications.





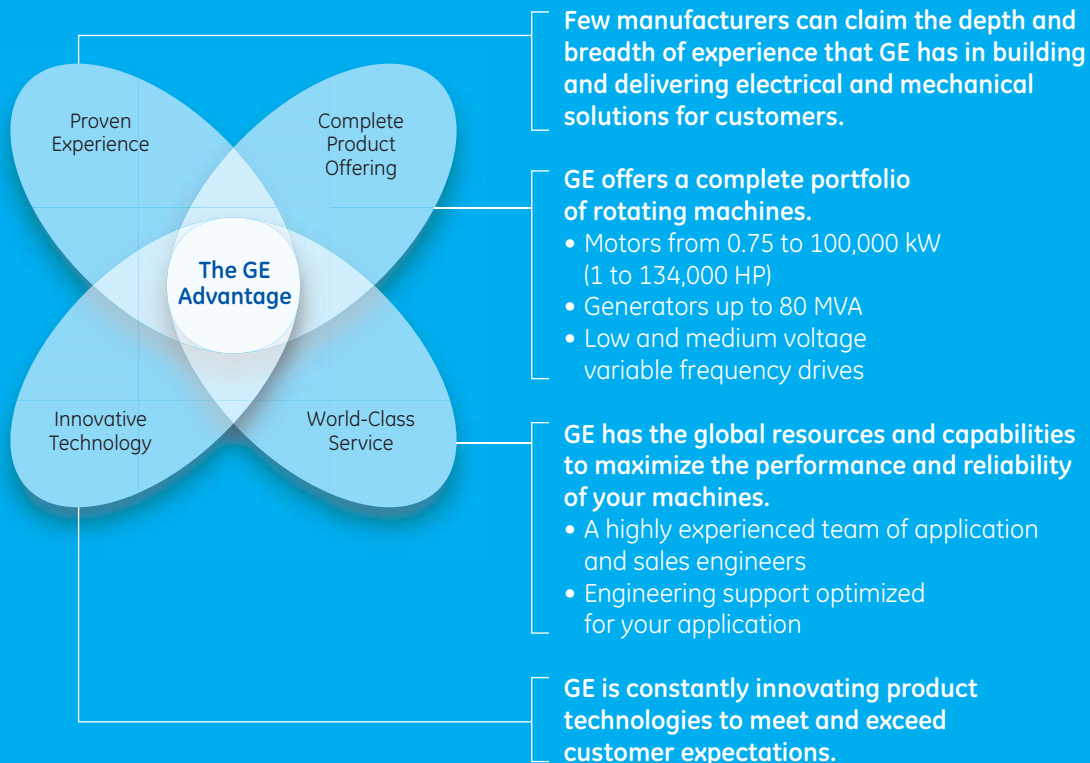
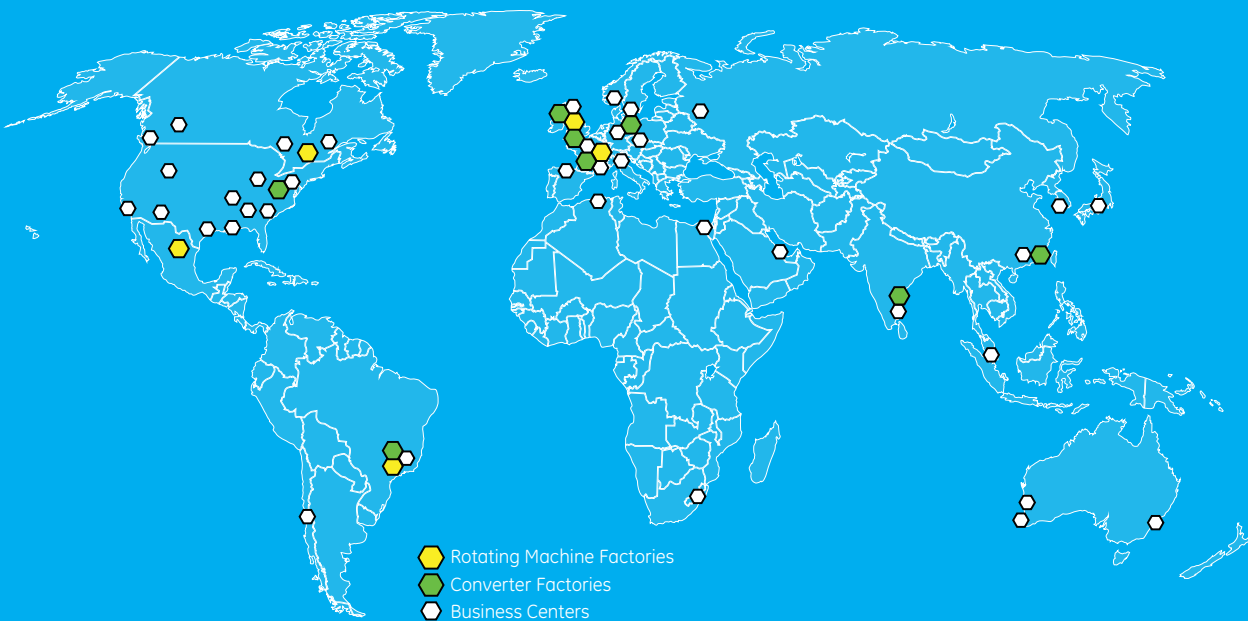
- Our technology and manufacturing teams have dedicated parts people to help you.

- **Commissioning Benefits**
  - > GE experts observe in real-time to guide engineers onsite
  - > Quicker and smoother commissioning process
- **Operations Benefits**
  - > Optimize your system with full visibility
  - > Full lifecycle coverage
- **Warranty Benefits**
  - > More proactive, less downtime
  - > Your teams can solve minor issues quicker based on remote diagnosis
  - > Field service engineers can arrive fully equipped with solutions

| Machine Section               | Parts   |
|-------------------------------|---|
| <b>Coils</b>                  | Armature, Field, and Stator coils<br>Ammortisseurs, Synchronous Poles, Equalizers   |
| <b>Commutators/Collectors</b> | Replacement Commutators and Slip Ring Assemblies  |
| <b>Brush Assembly</b>         | Brushes, Springs and Brushholders   |
| <b>Bearings</b>               | Sleeve Bearings and Oil Rings   |
| <b>Exciters</b>               | Rotors and Stators  |
| <b>Accessories</b>            | Molded Equalizer Trays, Air Filters, Thyristors, Speed Limit Switches, Heaters<br>Thermostats, Converter Assemblies, Oil Gauges, Fans<br>Blower Assemblies or Wheel |



# Global Expertise



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