

Synchronous Motors

1- 60 MVA, 1-15 kV



ABB

The Global Power in Synchronous Motors

ABB is the world's leading supplier of synchronous motors and generators, with more than a century of experience in manufacturing AC machines for industrial use. Our products are designed for high reliability and efficiency, and our know-how and experience, combined with the resources of ABB's global organization, have made us the preferred supplier for many applications.

We are a major supplier of large synchronous motors. Our motors are in use all over the world, providing reliable and efficient operation in process industries, the marine and offshore sectors, utilities, and special applications. In every case we work with our customers, using our application-specific know-how to ensure that their exact needs are met.



ABB (www.abb.com) is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 103,000 people.

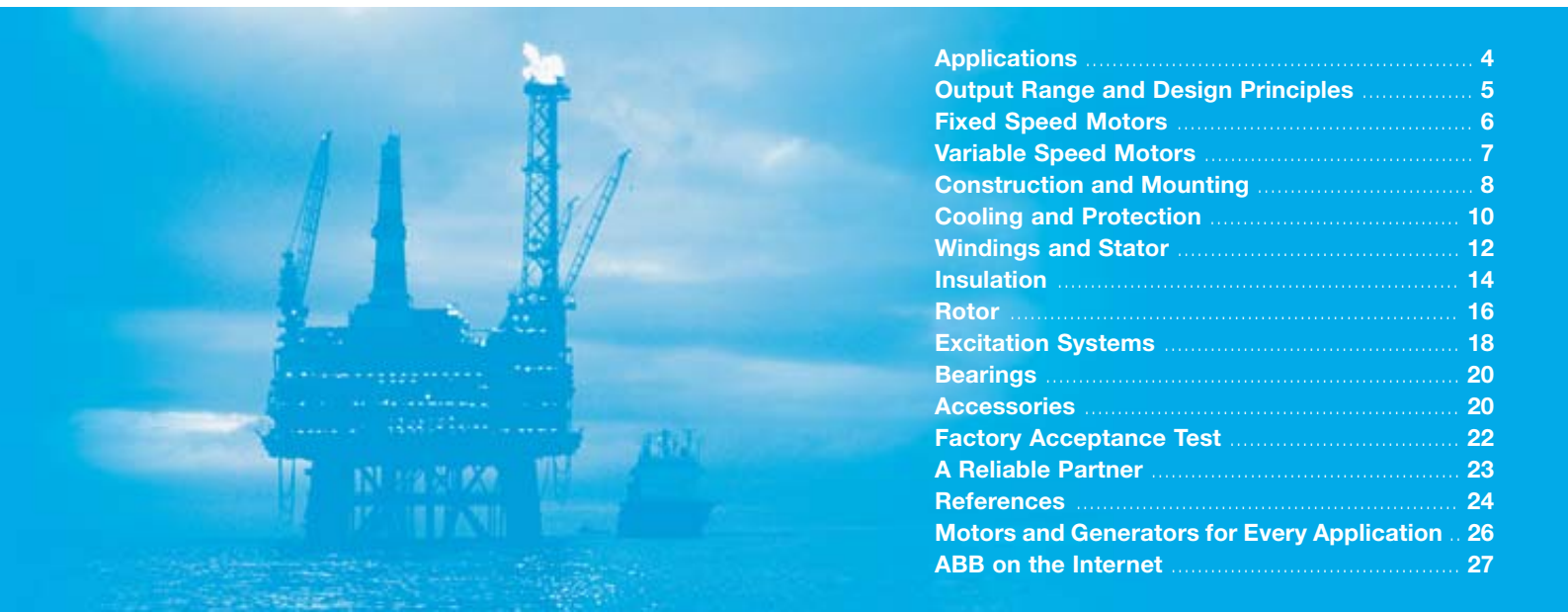
Generating Added Value

Customer focus is at the heart of the way ABB does business. By providing extensive support to our customers – who are mostly OEMs, contractors, packagers, or end users – we seek to generate added value for them.

We understand the importance of reliability and on-time delivery, and we provide expertise in integrating our motors with the surrounding

parts of the overall mechanical and electrical system of the plant.

By leveraging our economies of scale and using highly standardized modular construction methods, we are able to deliver consistently high quality. We naturally work in compliance with the ISO 9001 and ISO 14001 quality and environmental standards, and with the OHSAS 18001 occupational health and safety standard.



Applications	4
Output Range and Design Principles	5
Fixed Speed Motors	6
Variable Speed Motors	7
Construction and Mounting	8
Cooling and Protection	10
Windings and Stator	12
Insulation	14
Rotor	16
Excitation Systems	18
Bearings	20
Accessories	20
Factory Acceptance Test	22
A Reliable Partner	23
References	24
Motors and Generators for Every Application ..	26
ABB on the Internet	27

Recognizing Our Responsibilities

Environmental sustainability is of vital importance to our company, and we are committed to responding to demands for enhanced environmental solutions. In particular, our products are designed to provide high levels of efficiency over a long service life with low overall life cycle costs.

The ABB Group is also working hard in the field of corporate social responsibility – which it sees as the commitment by business to contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve the quality of life.

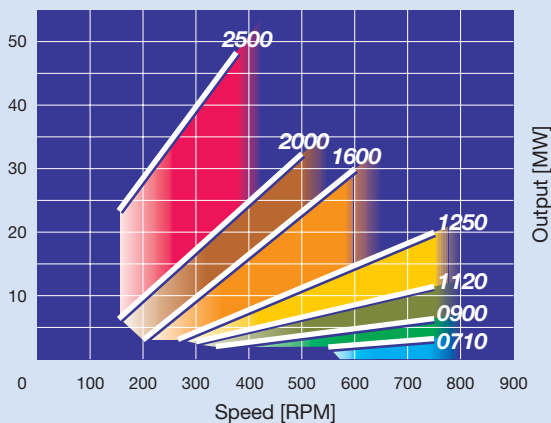
Applications



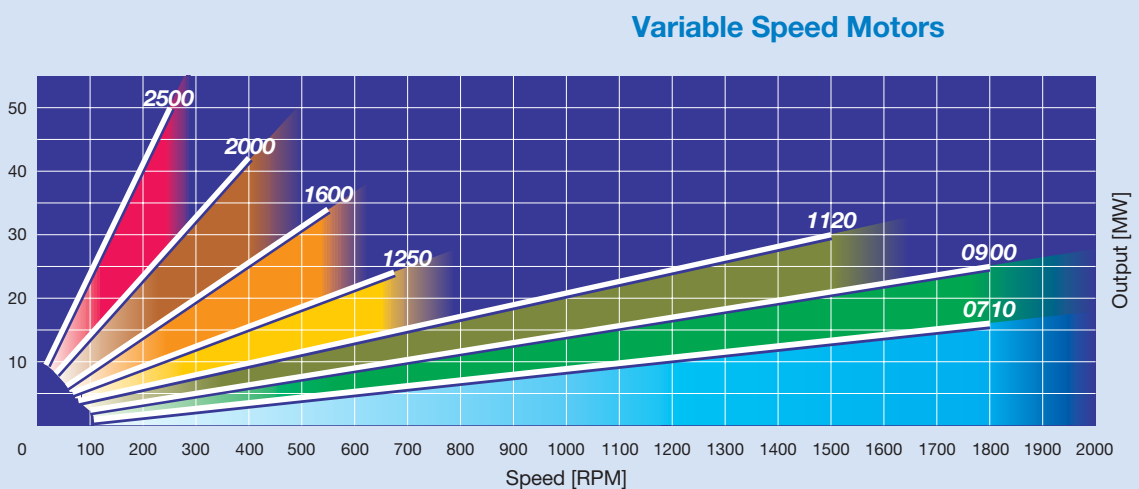
ABB synchronous motors operate in various industries and applications:

- **Chemical, Oil and Gas**
Compressors and extruders
- **Marine and Offshore**
Variable speed motors in azimuthing propulsors and shaft line applications
- **Metals and Minerals**
Rolling mills, hoists, processing lines, SAG and ball mills, and fans
- **Power Utilities**
Pumps and condensers
- **Pulp and Paper**
Chippers, refiners and grinders
- **Water and Waste Water**
Pumps
- **Special Applications**
Wind tunnel motors and MG sets

Output Range and Design Principles



Fixed Speed Motors



Variable Speed Motors

Design Standards

The electrical design is based on the relevant IEC or NEMA standards and mechanical design on the relevant ISO standards.

In marine or offshore applications the additional design criteria of the applicable classification society are followed. We have extensive experience of working with all major classification societies in offshore, naval and merchant shipping applications. In hazardous area applications the applicable standards and requirements are fully complied with.

Efficiency

Our motors are designed for high efficiency, which benefits end users through lower operating costs. Losses are minimized through the effective use of materials, state-of-the-art insulation, and optimization of rotors, stators

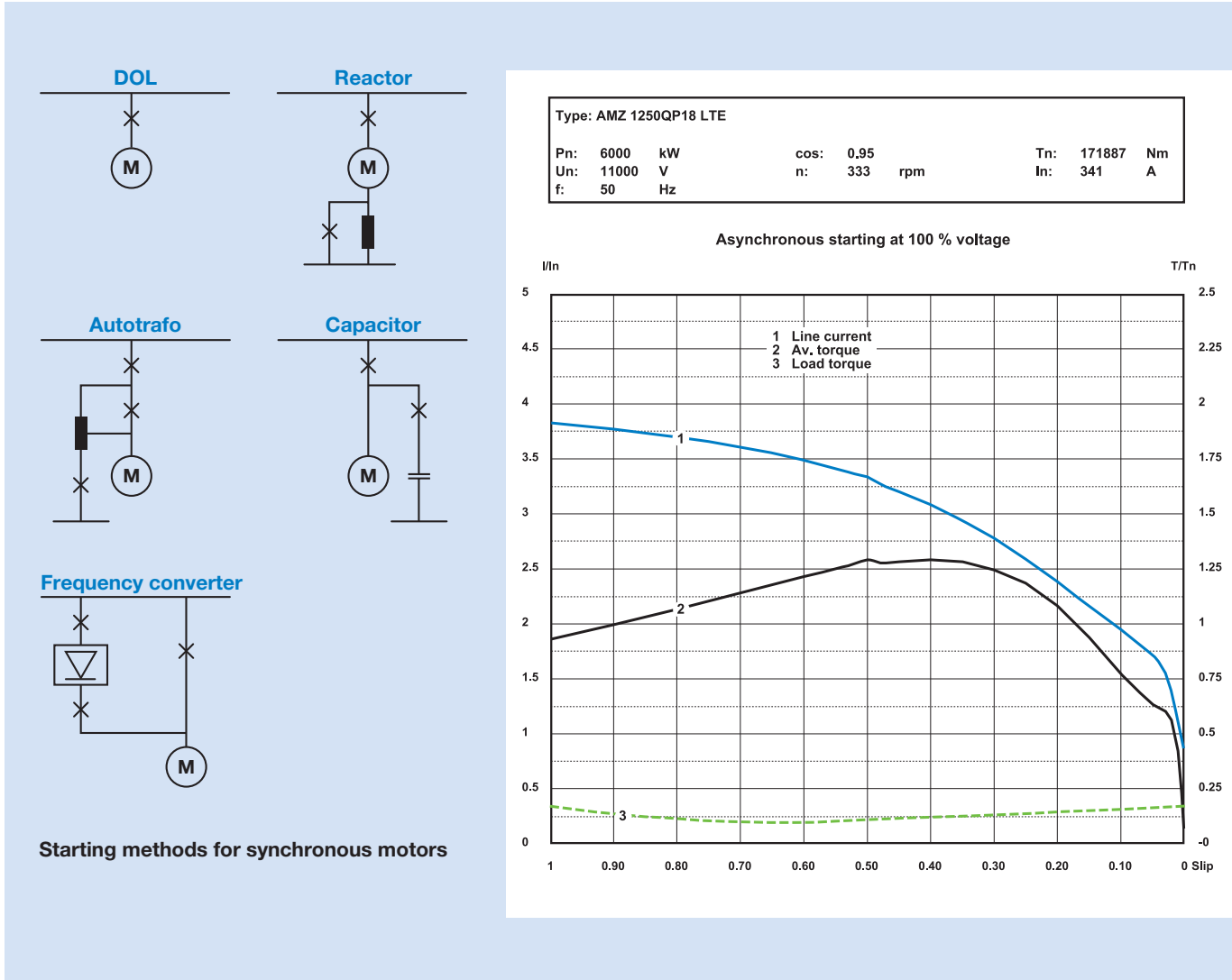
and fan designs. We carefully analyze the impacts of different electromagnetic design and voltage supply types on motor operation and losses. Our motors are fully compatible with industrial direct-on-line or converter supplies.

Vibration Tolerance

Motors coupled to reciprocating machines, like compressors, are exposed to induced vibration. We use sophisticated design tools to analyze the impacts of external torsional and linear vibrations on the motor to help ensure trouble-free operation. This work is based on information from the manufacturer of the driven equipment about excitations, system natural frequencies and mode shapes, inertia and stiffness properties. The motors withstand vibration levels exceeding those originating from the motor itself.

Fixed Speed Motors

Typical applications for fixed speed synchronous motors include reciprocating compressors, fans, pumps and wood grinders.



Optimized Starting Sequence

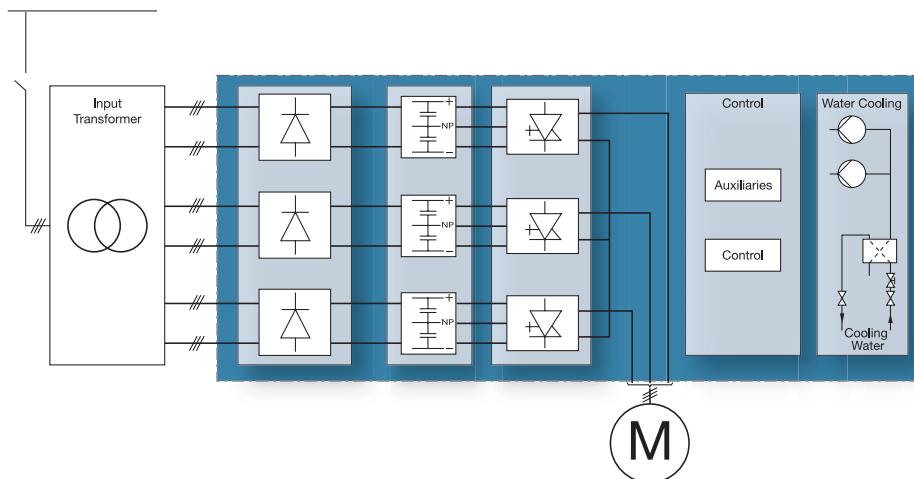
For every application, software tools are utilized to optimize the motor design and verify that the starting method is appropriate. The results are output in graphic format and form part of the technical specification which accompanies each proposal.

For most applications ABB can supply motors which develop sufficient torque for smooth starting and acceleration with the

starting current limited to 350-500 % of the rated current. If this level of starting current is likely to cause unacceptable line voltage drops then alternative starting methods can be used. The key factors in selecting the starting method are customer needs, the network capability and process demands. The most commonly used starting methods for synchronous motors are direct-on-line (DOL) and autotransformer starting.

Variable Speed Motors

Variable speed motors are typically used in demanding process industry applications, such as rolling mills and mine hoists, and in the main propulsion system in vessels. Extruders, compressors and pumps represent applications where variable speed motors can provide considerable energy savings through the use of optimized electrical drive systems.



ACS 5000 converter for a synchronous motor



Optimized Performance

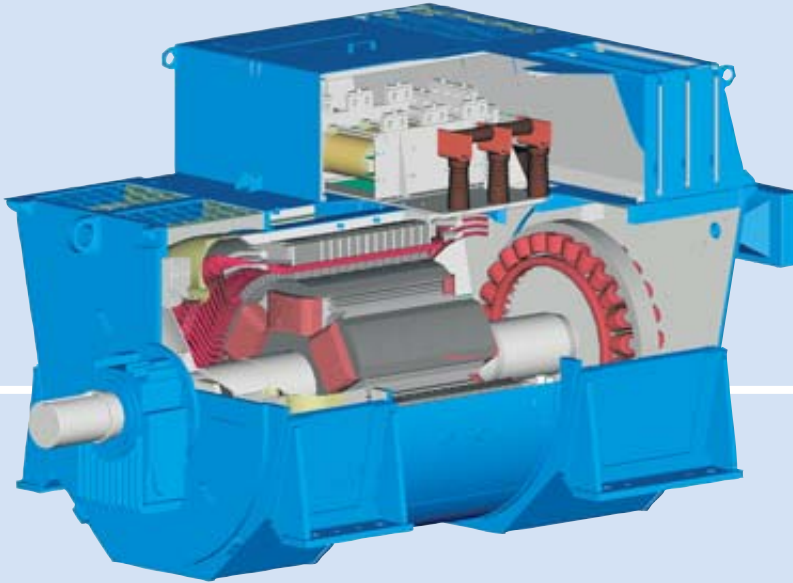
To ensure smooth starting, acceleration and operation, ABB supplies motors and drives that meet torque requirements over the entire operating range – from zero to maximum process speed. By using an ABB electrical drive package (with ACS 5000, ACS 6000 or other converter) the customer can take full advantage of ABB's know-how. In this case all components, particularly the converter-motor interface, are optimally integrated to fulfill all process needs. Benefits of this optimization include

special converter fed motor designs, increased efficiency and improved motor torque production capabilities.

For every application, computer-based tools are used to optimize the motor design with the converter type best suited for the application. All commonly used converter types are supported: Load Commutated Inverter (LCI), Cycloconverter (C) and Voltage Source Inverter (VSI).

Construction and Mounting

Modular design combined with a high degree of standardization means shorter manufacturing times. This benefits customers in terms of faster lead times.



ABB's R&D engineers work closely with driven equipment manufacturers, using FEM and dynamic animation techniques to determine various vibration models, test critical parts and verify that hazardous mechanical resonances do not occur in the motor.

**Motor with endshield bearings
(frame sizes 0710-1120)**

Mounting

Synchronous motors are designed for horizontal, inclined or vertical mounting. They can be supplied as integral units, even up to the largest sizes and outputs. Therefore no further assembly on site is

needed, which means that installation times and installation related risks are substantially reduced. The air gap between the stator and rotor is also factory set and does not need any further adjustment during coupling with the driven equipment.

The most common mounting arrangements are:

IM 1001 - two endshield bearings, cylindrical shaft end, feet down

IM 1101 - two endshield bearings, cylindrical shaft end, raised feet

IM 1205 - one endshield bearing, flanged shaft end, feet down

IM 1305 - one endshield bearing, flanged shaft end, raised feet

IM 3011 - two endshield bearings, cylindrical shaft end, vertical mounting with D-end down

IM 3231 - two endshield bearings, cylindrical shaft end, vertical mounting with D-end up

IM 4011 - two endshield bearings, mounting flange at D-end facing down, shaft downwards, no feet

IM 4131 - two endshield bearings, mounting flange at D-end facing down, shaft upwards, no feet

IM 5610 - without bearings, without shaft, feet down

IM 5710 - without bearings, without shaft, raised feet

IM 7201 - two pedestal bearings, cylindrical shaft end, feet down

IM 7301 - two pedestal bearings, cylindrical shaft end, raised feet

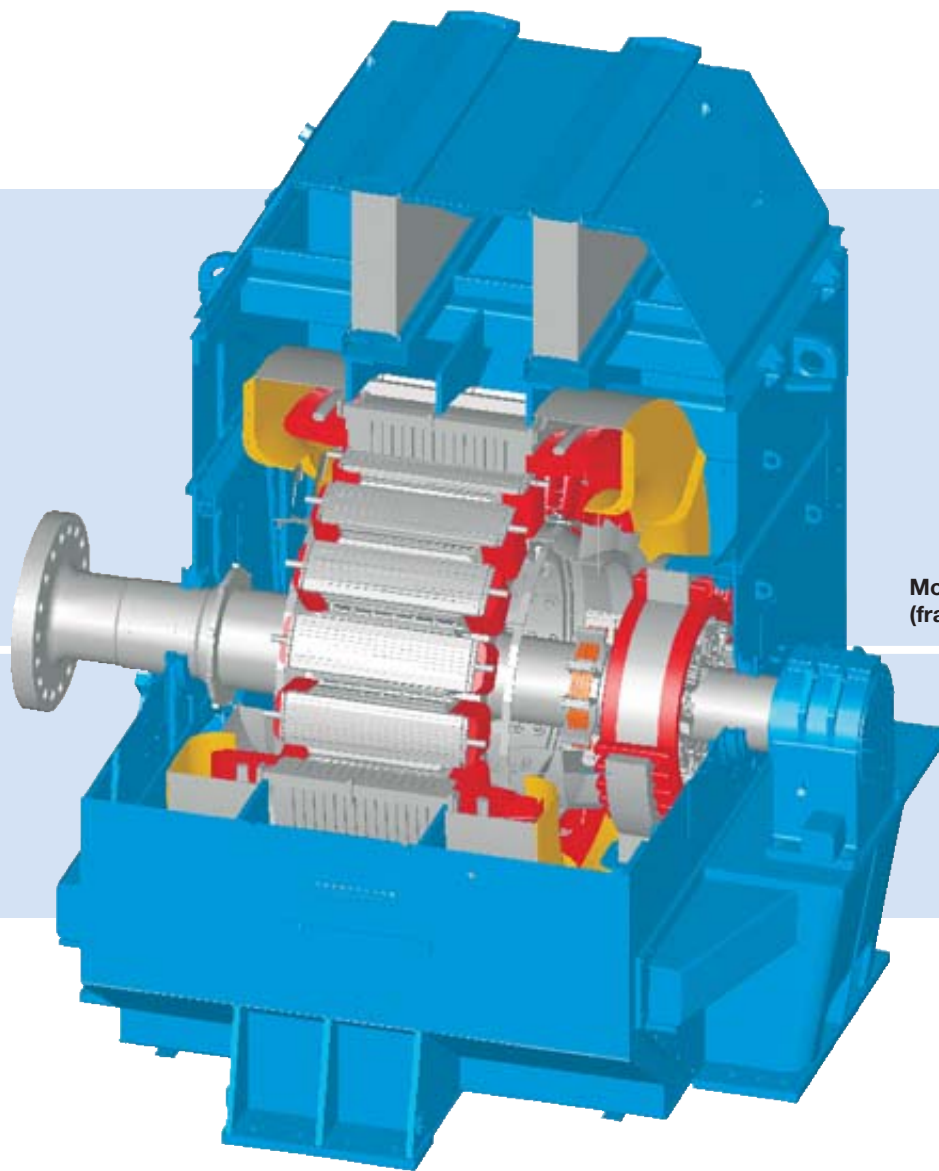
IM 7025 - one pedestal bearing, flanged shaft end, feet down

IM 7125 - one pedestal bearing, flanged shaft end, raised feet

IM 7221 - two pedestal bearings, feet down, sole-plates

IM 7311 - two pedestal bearings, raised feet, bedplate

IM 7315 - two pedestal bearings, flanged shaft end, raised feet, bedplate



**Motor with pedestal bearing
(frame sizes 1250-2500)**

Frame Construction

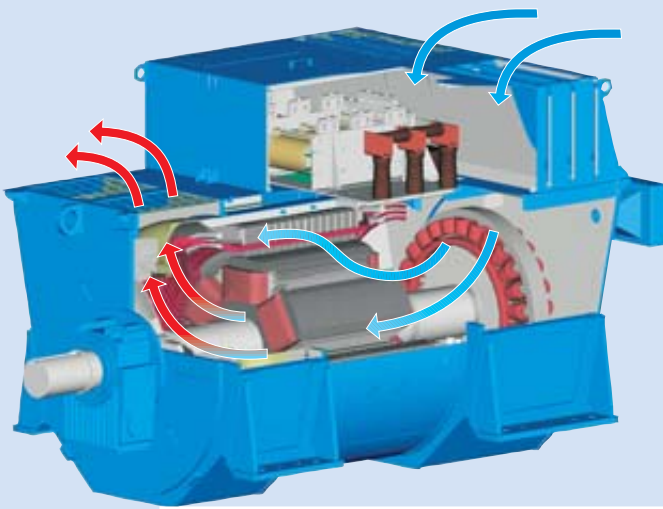
The smaller motors (AMZ 0710 to AMZ 1120) feature a three part modular frame consisting of the stator housing and two end housings. The end housings are precision machined and finally welded to the stator housing, ensuring perfect alignment and sufficient rigidity to withstand vibrations. Endshield type bearings are mounted on the end housings. The larger motors (AMZ 1250 to AMZ 2500) are built in a self-supporting full frame and equipped with integral or separate pedestal bearing(s).

Corrosion Protection

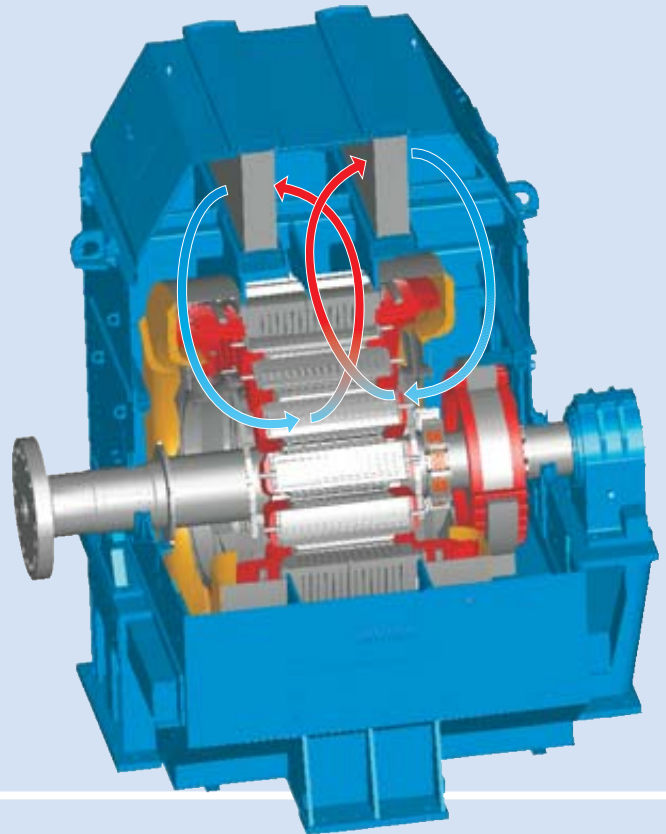
Our motors are designed and built to withstand the applicable environmental conditions. All surfaces made of steel, aluminium alloy or cast iron are treated in accordance with the chosen paint system. Selection of a suitable paint system gives reliable anti-corrosion protection even under the most severe environmental conditions. For moderate indoor conditions the standard finish is a two-pack epoxy paint that is moisture-proof in accordance with the relevant standards. Solvent free paints are used wherever possible in order to minimize environmental impacts.

Cooling and Protection

The three most commonly used cooling arrangements are open air, air-to-water and air-to-air cooling.



An open air cooled motor (IC0A1) with drip proof protection (IP23)



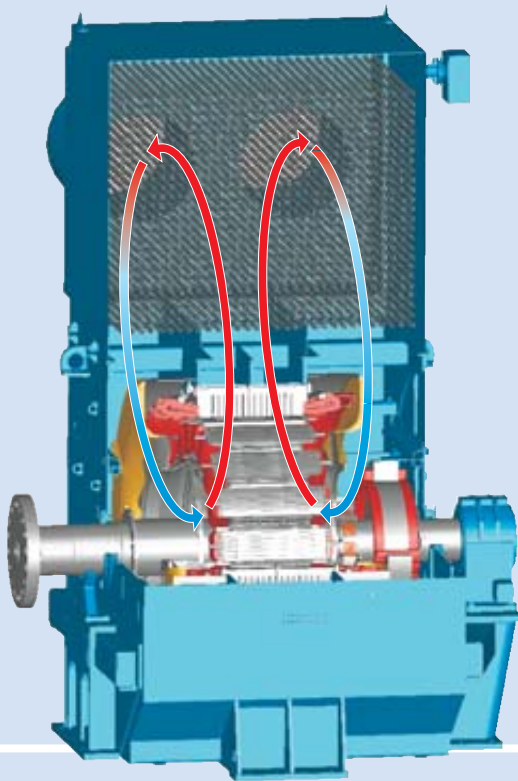
A totally enclosed motor (IP54) using an air-to-water heat exchanger (IC8A1W7)

Open Air Cooling

Open air cooling can be used where the air in the immediate environment is relatively clean and there is adequate air circulation. The cooling air is typically drawn in through air filters, passed through the active parts of the motor, and then exhausted back to the environment. If the room ventilation system cannot compensate for the temperature gradient, the motor air outlet can also be ducted to allow the air to be exhausted outdoors.

Air-to-water Closed Circuit Cooling

The cooling air circulates in a closed circuit through the active parts of the motor and then through an air-to-water heat exchanger. This configuration passes hardly any heat to the surrounding environment, and represents an ideal solution for situations where closed circuit cooling is required due to installation outdoors, installation in a hazardous area, or whenever the quality of the surrounding air is not otherwise suitable for direct cooling. It is also ideal for installations in machine rooms with limited ventilation, such as on board ships or in pumping stations which are fully enclosed.



A totally enclosed motor (IP54) using an air-to-air heat exchanger (IC6A1A6)

Air-to-air Closed Circuit Cooling

The cooling air circulates in a closed circuit through the active parts of the motor and through an air-to-air heat exchanger. This solution is generally used in situations where a closed circuit cooling system – such as air-to-water cooling – is required but water is not readily available. This cooling arrangement requires an additional shaft mounted or separate electric fan to ensure sufficient air flow through the cooler.

Protection

The enclosures feature protection in classes IP23, IP44, IP54 and IP55 (totally enclosed), or equivalent NEMA protection classes. Motors are also available for hazardous areas in accordance with IEC/ATEX or NEC definitions (non-sparking or pressurized construction).



Windings and Stator



Form wound coils are used for medium or high voltage stators. High voltage coils include a semiconducting layer to decrease the electrical field at the slot surface.



Stator Winding and Insulation Classes

Medium and high voltage windings up to 15 000 V are made of form wound rectangular copper wire insulated with multiple layers of glass-fiber reinforced mica-tape. Additional voltage stresses associated with converter supply are allowed for.

All materials used, including the vacuum pressure impregnation resin, exceed thermal class F (155 °C) requirements.

After insertion into the corresponding slots, the coils are firmly held in place by means of soft wedges and surge ropes at the coil heads prior to vacuum pressure impregnation. The completed process assures long and trouble-free service.

Rotor and Exciter Windings

Rotor and exciter windings are made to match the insulation class of the stator. This ensures high reliability and a long service life even with asymmetric loads and exceptional conditions.

The rotor windings are either made of pre-formed enameled rectangular copper wire or flat copper. Proper supports between adjacent windings are used to ensure stability up to the rated overspeed. The rotors are typically vacuum pressure impregnated as a whole unit. Exciter windings are made of enameled copper wire. Proper glass fiber supports are used in the exciter rotor to ensure stability up to the rated overspeed. The exciters are also vacuum pressure impregnated.



The automated manufacturing process is located in an environmentally controlled area, ensuring that each medium or high voltage coil is produced with uniform and consistent quality for the highest reliability.

Stator

The stator frame is a rigid steel structure that has been designed to withstand vibrations induced by the driven equipment.

Frames up to size 1120 are of modular type. The stator core is welded into a cylinder, after which the end-modules with feet are welded to the stator core. The bearings are flange-mounted on the end-shields. For larger motors integrated pedestal frames incorporating both the stator core housing and feet are typically used.

The bearings are mounted on pedestals integrated with the frame, allowing transportation and installation of the motor as a fully assembled single unit. In applications with high axial thrust forces, like rolling mills, separate pedestal bearings are used.

The stator core itself is built of stacked, high-grade, low-loss laminated electric sheet steel, insulated on both sides with a heat-resistant inorganic coating. Radial cooling ducts ensure uniform and effective cooling of the stator.

Insulation

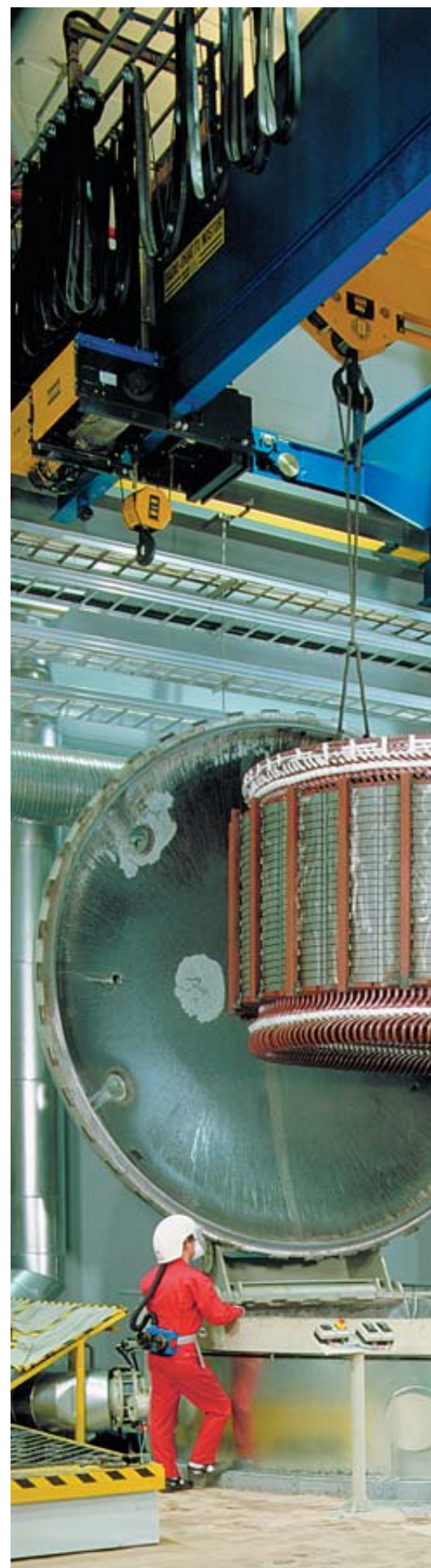


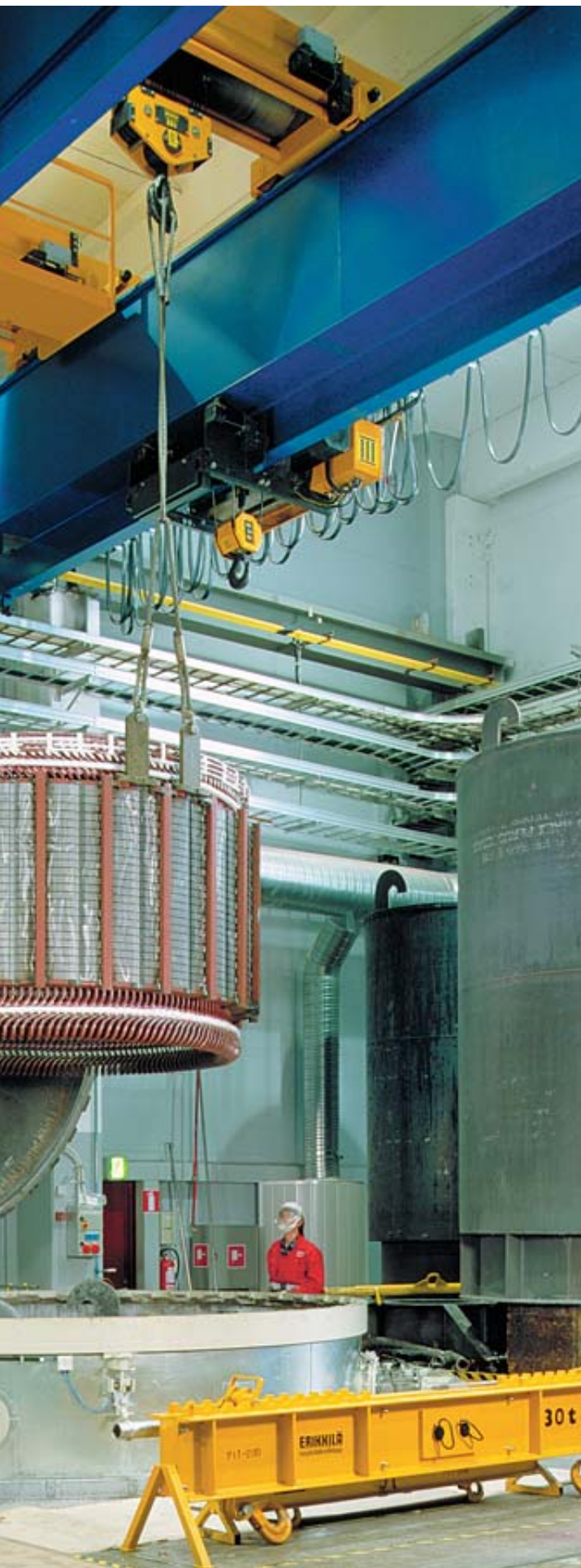
MCI Insulation System

ABB uses the MICADUR® Compact Industry (MCI) insulation system, which is based on the vacuum pressure impregnation (VPI) method. The VPI and curing of the completely wound and connected stator winding with a specially formulated epoxy resin ensures a sealed and homogenous insulation system. This results in high dielectric strength, excellent heat transfer, and the elimination of hazardous internal partial discharges.

ABB has been using the MCI system for 30 years. In that time it has been used on tens of thousands of our larger motors and generators, which are operating successfully all over the world. No primary insulation failures due to thermal ageing have been experienced. Thermal lifetime tests performed on the MCI system also show that its endurance substantially exceeds IEC and IEEE requirements.

MCI insulated windings require very little maintenance. Usually it is sufficient to ensure that the cooling ability of the winding is not reduced by the ingress of moisture or dirt during periods when the motor is not operating.





The VPI process features:

- High vacuum cycle - removing air and moisture from the voids and pores of the insulation.
- Highly stable epoxy resin - ensuring superior protection under the most difficult environmental conditions (against lubricants, oil, moisture, common solvents, chemically aggressive gases, abrasive dust, tropical climate etc.).
- High pressure cycle - forcing the resin into even the smallest pores.
- Oven curing - after the VPI process has been completed, stators and rotors are cured in an oven at high temperature. This produces very strong and stable insulation, exhibiting high mechanical and electrical strength. This is especially important in order to resist inadvertent high stresses from out-of-phase synchronization, transients and short circuits. Even the largest wound stators are impregnated as complete units. This ensures that both the insulation and the mechanical properties of the windings are excellent - which means that they can withstand prime mover induced vibrations and the mechanical stresses caused by transients such as short circuits.

Rotor

The characteristics of the rotor play a crucial part in achieving the best possible levels of electrical and mechanical performance. As a result, ABB continues its development work to optimize rotor designs.



State of the art precision machined forgings are used in rotors with maximum reliability.

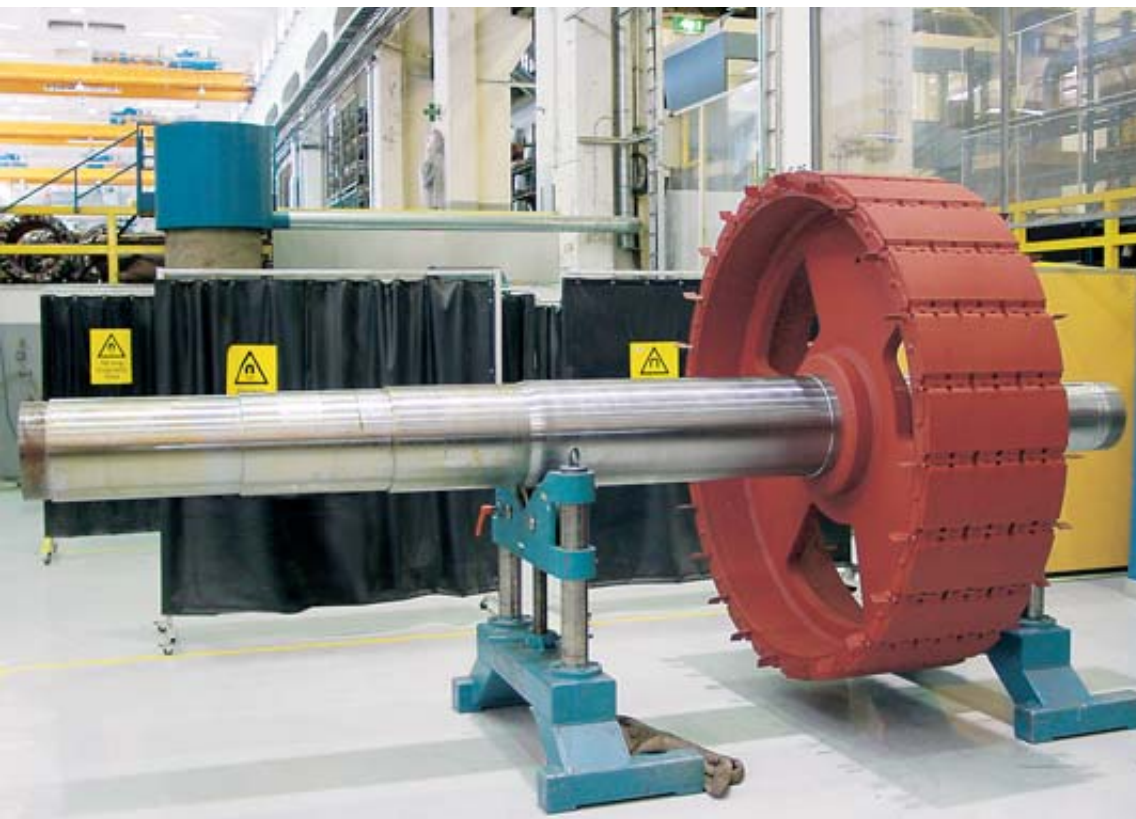
Shaft

The rotor comprises a shaft, a rotor center for larger machines, and salient poles. The shaft is manufactured of forged or rolled steel and machined to exact specifications. Rotors for frame sizes 1250 and greater are normally equipped with a separate rotor center which is shrink-fitted onto the shaft. The shaft ends are normally cylindrical or flanged.

Poles

Wound rotor poles are normally manufactured from 2 mm laminated steel sheet. The sheets are pressed together with inserted steel bars which are welded to the end plates. The pole structure is integrated or the poles are secured to the shaft





The robust construction of permanent magnet rotors offers maximum reliability for variable speed applications.

or rotor center by bolts from above or below, or by means of dovetails. The poles are often fitted with a copper or brass damper winding.

Wound rotor assemblies are vacuum pressure impregnated (VPI) for excellent insulation and mechanical strength. After impregnation, the balance of the complete rotor assembly is dynamically checked.

Permanent magnet poles are used in certain variable speed applications. Permanent magnet rotors do not require any excitation system, and are simple, low weight and robust constructions with virtually no maintenance requirements. High pole numbers can be used when necessary in slow speed applications.

Excitation Systems

Fixed speed synchronous motors typically have a brushless exciter and an automatic voltage regulator. The brushless system has no wearing parts, and the external excitation power requirement is small.

Variable speed synchronous motors requiring very fast speed or torque control are generally equipped with brushes and a slip ring unit for excitation and control of the motor from the converter. For dynamically less demanding applications the brushless system is optimal.

Variable speed synchronous motors based on permanent magnet rotors do not require any excitation system.



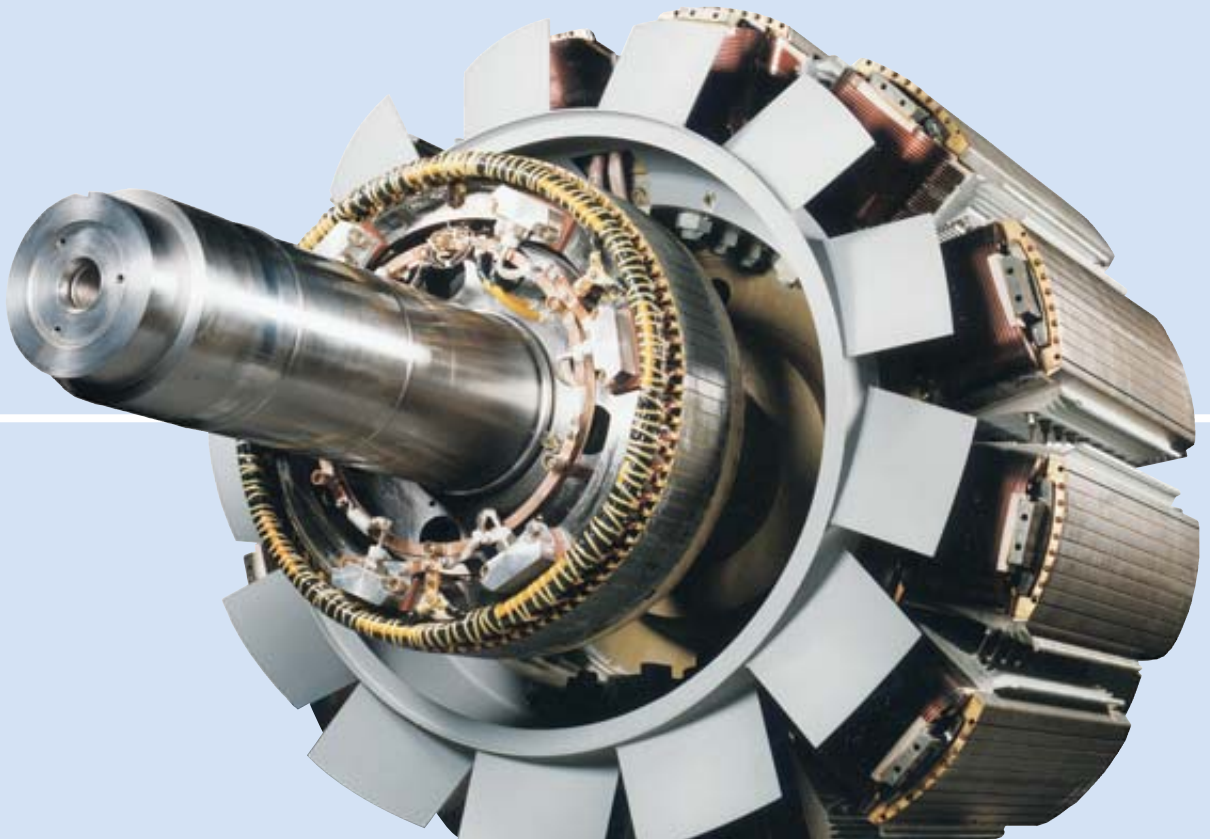
Brushless Excitation System

The brushless exciter is a separate AC generator mounted on the motor shaft. The exciter is located at the non-drive end. In fixed speed motors the field winding is DC fed; in variable speed motors (and fixed speed motors with LCI starting) the field winding is AC fed. The exciter is vacuum pressure impregnated using the MCI method, ensuring that the windings are sealed and secured.

In fixed speed motors the excitation current control and related protections are based on a separate excitation control system. This utilizes the UNITROL 1000 digital voltage regulator, which features both automatic and manual operating modes. The automatic mode maintains either the power factor or reactive power at set values regardless of the active power. Manual control allows a constant excitation current to be maintained. Using the regulator it is possible to change parameters, settings

and operating modes during running. The regulator set points can be changed locally or remotely using an increase/decrease switch. The system also includes the necessary protections. Typical features are:

- Excitation field application logic
- Out of step/pull out protection
- Minimum and maximum field protection
- Stall/Too long start protection (based on speed of motor)
- Rotating diode monitoring. Measures ripple component of DC excitation current and protects against diode short circuit and cut-off
- Meters for power factor and excitation current
- All necessary push buttons (Lamp Test, Trip Reset), control switches (Auto/Manual, PF/VAR, Increase/Decrease) and indicator lamps (Ready For Start, Excitation ON, Excitation Trip, Diode Fault, Out Of Step Trip, Incomplete Start)
- Excitation transformer installed in excitation cubicle



- Windows-based commissioning, maintenance and communication software
- Potential free (dry) contacts for communication with plant control system (Ready For Start, Excitation ON, Excitation Trip, Diode Fault, Out Of Step Trip, Incomplete Start)
- 4–20 mA signals from measured values (PF, MVar) to plant control system.

Optional features, including a communication port and motor protection relays, are available on request.

In variable speed motors with a brushless excitation system, the converter provides the supply voltage and excitation control, as well as the necessary protections, instead of a separate excitation control system.

Static Excitation System

Excitation with slip rings and brushes is typically used with variable speed motors, with the supply voltage and excitation control, as well as the necessary protections, provided by the converter.

To supply the excitation current into the rotor, slip rings are installed on the motor shaft with access via removable inspection covers. The slip rings, together with the mounting flange or hub, are usually made of steel and are normally mounted as a single unit. Slip ring units with brass rings, as well as split flange mounted units, are available on request. The slip ring unit is equipped with brass connection pins to facilitate installation.

Bearings

The choice of bearing arrangement and type is based on the application, radial and axial loads, rotation speed, coupling type, customer preferences. Operating conditions such as ambient temperature, air cleanliness, vibrations and shocks affecting the bearing are also taken into account.

The life expectancy of sleeve bearings is very long provided that the operating conditions and maintenance intervals are as specified. To prevent bearing damage from circulating currents, all non-drive end bearing housings are electrically insulated by means of non-conducting film. In VSD motors the drive end bearing is also electrically insulated and the shaft is grounded by an earthing brush.

Sleeve bearings withstand high levels of vibration and they offer excellent quality and performance, as well as first-class reliability. The bearing assembly is highly suitable for static as well as radial and axial dynamic loads. Excellent heat transfer capability makes these bearings especially suitable for high speed applications. The bearings are of the split type and easy to maintain.

The bearings are typically self-lubricated by means of an oil ring. The lubricating oil is picked up by the oil ring and transferred directly to the shaft.

In the case of high loads, high speeds, high ambient temperature or inclined operating

Accessories

We offer a large selection of accessories to meet our customers' requirements. Certain accessories are included as standard, depending on the size and type of motor. For non-listed accessories, please contact us.

Measuring and Monitoring

- Pt-100 resistance temperature detectors in stator winding
- Pt-100 resistance temperature detectors in bearings
- Pt-100 resistance temperature detectors for hot or cooled air
- Leakage detectors for water cooled motors
- Speed and position encoders
- Thermometers for cooling circuit or bearings for local or remote monitoring
- Vibration probes for sleeve bearings

Protection

- Air filters at air inlet
- Anti-condensation heaters
- Bearing insulation
- Differential protection current transformers
- Earth fault protection
- Surge arrestors
- Surge capacitors
- Diode failure monitoring unit
- Ex accessories for hazardous areas

Excitation

- Digital voltage regulators
- Free standing cubicle with chosen protection equipment

Terminals

- Separate air insulated terminal boxes
- Separate phase insulated terminal boxes
- Separate phase segregated terminal boxes
- Auxiliary terminal boxes
- Termination kits for phase segregated terminal boxes
- Cable glands (e.g. Roxtec)

Shaft End Alternatives

- Cylindrical
- Flanged
- Conical
- Two shaft ends

Lubrication

- Hydrostatic jacking
- External lubrication unit

Cooling

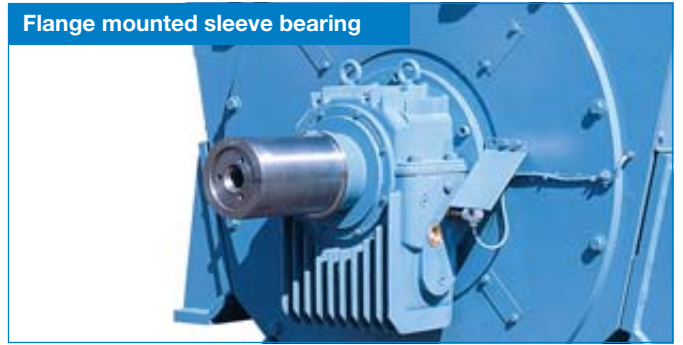
- CuNi or stainless steel, single or double tube, fresh or sea water heat exchangers for air-to-water closed circuit cooling

position, an external cooling and circulation circuit for the oil may be necessary, unless the oil comes direct from the driven equipment lubrication oil system. In certain applications a jack-up system may be necessary for starting with slow speed running.

Flange mounted sleeve bearings are typically used for frame sizes 0710-1120 and they are mounted on the end-shields of the motor.

Pedestal mounted sleeve bearings are typically used for frame sizes 1250-2500. Motors with integral pedestal bearings are as easy to mount and align as motors with flange mounted bearings. The motors are normally delivered ready assembled and require no further assembly on site. Separate pedestal bearing motors are often mounted on a common base frame.

Flange mounted sleeve bearing



Pedestal mounted sleeve bearing



- Aluminum or stainless steel air-to-air heat exchangers with shaft mounted secondary fans or electric fans for air-to-air closed circuit cooling

Hazardous Area Modifications

- Overall design for EEx nA/Ex n; EEx p/Ex p (all ATEX certified), or C11 Div2 requirements
- Purging and pressurization systems
- Main and auxiliary terminal boxes to match hazardous area requirements

Mounting

- Hold down bolts
- Locking pins
- Jacking screws
- Shims
- Sole plates
- Anchor bolts
- Grouting moulds
- Separate steel frames

Handling

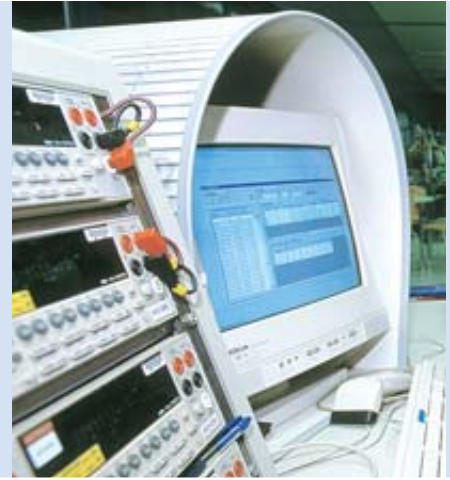
- Lifting beams
- Shaft extensions for rotor removal
- Wooden packing for under-deck sea transportation
- Tarpaulin packing

Terminal Boxes

Separate main terminal box is mounted on the side of the motor, featuring bus bars outside the motor frame and allowing connections from any specified direction. Neutral terminal box is typically mounted on the opposite side of the motor from the main terminal box. For auxiliary and instrument cables, separate auxiliary terminal boxes are supplied as required.



Factory Acceptance Test



Numerous tests are performed on the motor components as they progress from one manufacturing stage to the next. These tests include quality monitoring, inspections and insulation reliability evaluations. A set of final tests is performed once all the parts and components have been integrated, in order to verify that the motor meets or exceeds the customer's requirements. All tests are performed according to IEC-34 unless otherwise specified. Testing according to NEMA MG 1, IEEE-115 or marine classification society requirements is available upon request.

Routine Tests

The routine test program is performed on every motor and is included in the price of the motor.

- Visual inspection
- Air gap measurement and sleeve bearing clearance check
- Insulation resistance measurement before dielectric test
- Measurement of winding resistance

- Checking of temperature detectors and space heaters
- Terminal markings and direction of rotation
- Axial play for unlocked bearings
- Bearing run
- Vibration measurement
- No load point
- Short circuit point
- Testing of the excitation controller
- Overspeed test
- Auxiliary check
- Withstand voltage test
- Insulation resistance measurement after dielectric test

Type Tests

Type tests are performed in addition to the routine tests. They are normally performed on one machine in a series of motors not previously manufactured, or at the request of the customer.

- No-load curve
- Short circuit curve
- Temperature rise test
- Losses and efficiency
- Inertia measurement

Special Tests

Special tests may be conducted to verify performance in special conditions. They may, for example, be based on customer specifications, hazardous area or classification society requirements.

Such tests may include:

- Overpressure, leakage, and purge tests
- Determination of reactances and time constants
- Measurement of shaft voltage
- Voltage waveform measurement
- Sound level measurement
- Transient and sub-transient reactance measurement
- VSD tests with converter supply
- Back-to-back tests

A Reliable Partner

Customer focus is an integral part of ABB's internal processes. It starts from the very first contact, extends through manufacturing and delivery, and continues with after sales service available around the world.



Application Engineering

In addition to its standard product range, ABB is also a leading supplier of customized motors. Our engineering department can design motors that meet the customer's requirements in every respect. This flexibility has made us a recognized leader in supplying tailored solutions.

Documentation

Every motor is supplied complete with all necessary operating and maintenance manuals. This documentation should be studied prior to installation and operation. The machine should be inspected and maintained on a regular basis in order to ensure continuous and reliable operation.

Online Tools

ABB uses the Internet to provide information and communicate with its customers. Extensive information about the entire range of synchronous motors is available at www.abb.com/motors&drives. An advanced online project management tool - eSolutions - provides customers with a number of functions, including facilities to download documentation relating to their motor and

monitor the progress of their unit through manufacturing.

After Sales Services

ABB has a global presence through its worldwide organization and network of selected partners, enabling it to deliver fast and competent product support to customers wherever they may be located. We can provide systematic life cycle management with proactive service products that aim to maximize production process availability, reliability and performance.



References



▲ Extruder motor

◀ Compressor motor



▼ Azipod® propulsion unit



◀ Integrated submersible permanent magnet pump motor



◀ Rolling mill motor (twin drive)

▼ Grinder motor



▼ Mine hoist motors



Motors and Generators for Every Application

ABB offers several comprehensive ranges of AC motors and generators. We manufacture synchronous motors for even the most demanding applications, and a full range of low and high voltage induction motors. Our in-depth knowledge of virtually every type of industrial processing ensures we always specify the best solution for your needs.



Low Voltage Motors and Generators

General Purpose Motors for Standard Applications

- Aluminum motors
- Steel motors
- Cast iron motors
- Open drip proof motors
- Global motors
- Brake motors
- Single phase motors
- Integral motors

Process Performance Motors for More Demanding Applications

- Aluminum motors
- Cast iron motors
- Motors for high ambient temperatures

NEMA Motors

Motors for Hazardous Areas

- Flameproof motors
- Increased safety motors
- Non-sparking motors
- Dust ignition proof motors

Marine Motors

- Aluminum motors
- Steel motors
- Cast iron motors
- Open drip proof motors

Other Applications

- Permanent magnet motors
- High speed motors
- Wind turbine generators
- Smoke venting motors
- Water cooled motors
- Motors for roller table drives

High Voltage Induction and Synchronous Motors and Generators

- Cast iron induction motors and generators
- Modular induction motors and generators
- Slip ring induction motors and generators
- Wound rotor synchronous motors and generators
- Permanent magnet synchronous motors and generators
- Motors and generators for hazardous areas

ABB on the Internet

We provide extensive information about our range of synchronous motors on the Internet. Visit our website at www.abb.com/motors&drives





ABB Oy

Machines

P.O.Box 186

FI-00381 Helsinki

Finland

Tel. +358 (0)10 2211

Fax +358 (0)10 22 22675

<http://www.abb.com/motors&drives>