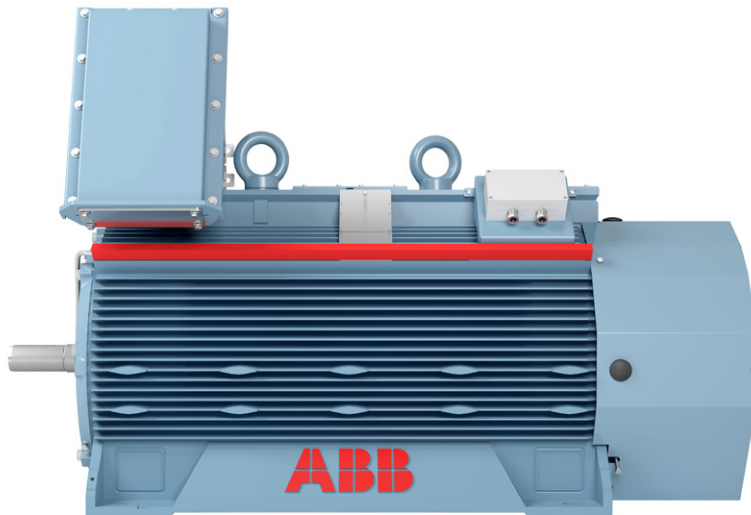


# Latest generation of high voltage rib cooled motors



01

01 The design enables flexibility in the positioning of the terminal boxes. The main terminal box can be mounted on either side, at the D- or N-end.

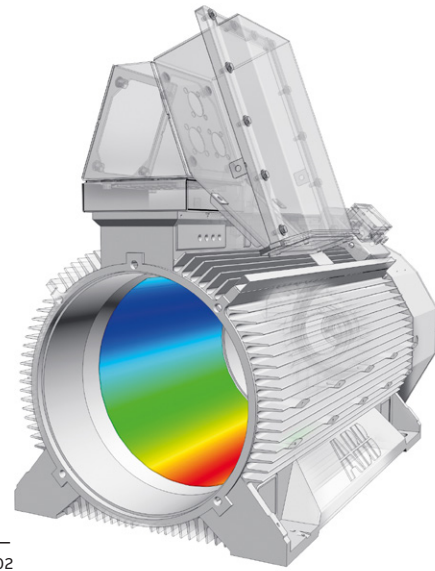
02 Modelling of rotating electromagnetic traction to predict mechanical vibrations (shield and rotor removed for clarity).

**ABB's latest generation of high voltage rib cooled motors is the outcome of a major engineering effort. The motors offer high power density and easy configurability. Together with an optional, independently certified IP66 rating, the motors' design brings enhanced reliability and ease of maintenance.**

**The NXR and AXR motors are based on the successful high voltage rib cooled motor range, type HXR. They incorporate the experience ABB has gained over more than 130 years of manufacturing electric motors. Versions are available for both direct-on-line (DOL) and variable speed drive (VSD) operation.**

### Optimized cooling

Effective cooling plays a key role in achieving high power density. Our design team applied CFD (computational fluid dynamics) to study airflows and investigate in detail the different cooling mechanisms operating inside the motor and over its external surface. As a result the cooling effects of both the internal and external airflows have been optimized. This means longer lifetime for bearings and longer lubrication intervals.



02

The innovative internal cooling system increases air circulation throughout the motor, with air routed through the channels in the stator and rotor. On the outside, the design of the outer cooling ribs (including their length, pitch and angle) is optimized to maximize the cooling surface area. The ribs are kept clear, with nothing to block the free flow of air.

The new cable tray is an additional feature which helps to keep the cooling ribs clean and clear of obstacles that might disturb airflows. This wiring duct provides a managed cable route, keeps accessory cables tidy, and contributes to consistent high quality by supporting standardized assembly.

### Improved coil design for higher power

The motor's coil design helps to increase the power density. The active parts of the coil have been redimensioned for increased power, and we developed more accurate forming tools to ensure that the active material is used more efficiently. Overall coil quality has been further enhanced.

### **Rigid, weight-optimized frame**

FEM (finite element method) modeling techniques were utilized in the design of the frame. This has enabled us to optimize material use while avoiding resonance, which could cause increased vibration. As a result, the frame is very rigid with minimal vibrations and complies with all main international standards. Combined with a stable running temperature, this results in very reliable motor operation.

The advanced frame design gives the motors improved rigidity without excess weight. Wide feet increase stability and improve accessibility, for example by providing more space for tools. Oval fixing holes mean additional mounting flexibility.

### **Optimized AXR design for the oil and gas segment**

The oil and gas segment version of AXR motor is specifically designed to meet the toughest specifications such as API 541 and Shell DEP. It provides a competitive and cost-efficient solution for pumps, compressors and other applications. Optimized design has a special 2-pole frame, which increases stiffness and reduces vibration, improving reliability on flexible foundations. Additional mounting points are available to further increase stiffness on flexible skids.

Internal ventilation guarantees improved temperature distribution between the bearings. This also prevents hot points inside the motor frame.

### **End shields promote cooling**

The end shields make their own contribution to optimum cooling. The outside surface is rigid but light in weight, and the outside ring is finished with a 30° chamfer for better air guide performance and enhanced airflows. The inside surface of the shields is optimized for cooling.

In order to ensure faster customization and reduce delivery times, the end shields are pre-engineered for accessories like instrumentation and the waste grease box.

### **Terminal boxes provide extra flexibility**

The motors are designed to enable great flexibility in the positioning of the terminal boxes. The main

terminal box can be mounted on either side, at the D- or N-end. On frame sizes 400 and up, it can also be mounted in the center. Repositioning can be done quickly on site by ABB service personnel, avoiding the need to ship the motor to a service shop.

This flexibility means that you only need one spare unit if your plant has several identical motors with the terminal boxes mounted in different positions. The auxiliary terminal boxes also provide maximum flexibility: they can be mounted on either side and can be positioned along the length of the motor.

With configurability built into the basic design of the motor, engineering and assembly times are cut, enabling short delivery times – even for motors requiring a high degree of customization.

### **Straightforward fixing for accessories**

Mounting accessories is very straightforward, thanks to ready-made fixing points along the sides of the motor. A wide range of standardized accessories is available.

The accessory fixing points are designed to allow optimum airflow. The accessories are mounted clear of the cooling surface – rather than within the ribs themselves – so the airflow is not obstructed and the motor is easier to keep clean.

### **Built-in serviceability maximizes uptime**

Built-in serviceability makes maintenance straightforward, and therefore reduces downtime. You can easily remove the fan cover for fast access, and check the coil end and bearings with an endoscope without removing the end shields.

The flexible mounting system cuts the service time needed for repositioning the terminal box. The cable tray ensures that the cables are clearly routed and always secured in the same position, making maintenance easy.

To maintain maximum performance over the entire life cycle, pre-designed fixing points enable easy mounting of ABB condition monitoring systems. These systems collect and analyze operating data from the motors, providing early warnings of problems before failures can occur.