



Brochure

# Condition monitoring solutions for motors and generators

## Enabling the right maintenance at the right time

We provide motors, generators and mechanical power transmission products, services and expertise to save energy and improve customers' processes over the total life cycle of our products, and beyond.



# Powerful tools that put intelligence into maintenance

Motors and generators – like any other machines – are subject to wear and aging. The materials and components they are made from degrade over time, and if no action is taken they will eventually fail. Fortunately most types of failure can be prevented by maintenance. To plan maintenance effectively, the plant operator must have accurate information: which components need repairing or replacing, and when?

## Detect defects at an early stage

ABB's condition monitoring solutions provide reliable information on the condition of motors and generators. These powerful tools identify defects at an early stage, while there is still time to take action. Users get clear recommendations that can be included in their preventive maintenance plans. This means that problems like worn components can be resolved during scheduled stoppages – before an actual failure happens – so avoiding unplanned downtime and optimizing the cost of ownership.

## Complex monitoring of all major components

Our solutions cover all major components of motors and generators: rotor, stator, shaft, bearings, cooler, brushes or slip rings, as well as overall mechanical condition and, for motors, power supply quality. We can therefore help you to address all the potential problem areas in your motors and generators. Furthermore, our versatile services are not limited to ABB products – they are just as effective on equipment from any manufacturer.

Reliable testing and analysis, accurate diagnosis and timely, targeted maintenance improve the availability of your motors and generators and can help you achieve major cost savings.

## Key benefits

- improved reliability
- decreased replacement costs
- reduced system downtime
- improved spares management
- increased maintainability
- enhanced performance

# ABB MACHsense-P

Regular health checks help to maintain maximum performance over the entire life cycle

ABB MACHsense-P is a condition monitoring service that uses vibration and electrical data from motors in order to diagnose problems.

## How it works

Our field engineer visits your site and takes readings from your motors with a portable data collector. Advanced signal processing methods are applied to analyze the raw data, and an instant summary report is provided to you during the site visit. Shortly afterwards, when the data has been analyzed in detail, you receive a full report with recommendations for corrective action and preventive maintenance.

## Integrated approach

ABB MACHsense-P addresses problems in four crucial areas: the rotor winding, bearings, overall mechanical condition, and power supply quality. It uses vibration and electrical measurements in combination, analyzing the data with a single instrument and software platform. This integrated approach avoids false positives and negatives, accuracy problems and other serious drawbacks that affect conventional methods based on separate analysis of vibration and electrical data.

Another advantage of our solution is that its powerful software customizes the analysis for a precise match with each motor. Special algorithms ensure that defects and their severity are reliably identified. This produces much better results than the 'one-size-fits-all' approach.

## Levels of service

Two levels of service are offered for ABB MACHsense-P, Standard and Advanced.

**Standard service** delivers a condition assessment with respect to four key areas (rotor winding, bearings, overall mechanical condition and power supply quality). It should be performed regularly (six month intervals are generally recommended), so that trends in the condition of the motor can be followed.

**Advanced service** is only performed when it is known that there is an issue but further investigation is needed to identify the specific problem. It provides an in-depth assessment, including analysis of the root causes.

## ABB MACHsense-P

### Applications\*

Induction motors (both DOL connected and VFD driven).

### Capabilities

Detects problems in rotor winding, bearings, motor installation (ie, overall mechanical condition), and power supply quality.

\*The versatile software platform can easily be extended with new algorithms to cover additional types of motors and generators. Please check the availability of other applications with our Local Service Centers.





## Key benefits

- instant summary report, with full report after detailed analysis
- earlier warnings and more comprehensive diagnosis than conventional solutions
- vibration and electrical measurements are processed in single software platform to avoid false positives and negatives
- advanced software delivers high degree of accuracy:
  - actual operating slip is calculated from measured data other services calculate slip from nameplate information
  - analysis is customized to motor, other services take 'one size fits all' approach
  - load is automatically normalized, other solutions fail to take loading into account
- collection of vibration data over wider frequency range covers greater number of potential problems
- testing is done with motor in its operating condition, so no preparatory work is necessary
- optimized cost of ownership

# ABB MACHsense-R

## Continuous, remote monitoring with instant alarms and expert follow-up

ABB MACHsense-R is a remote condition monitoring solution for motors and generators. It continuously checks the status of key parameters while the motor or generator is running and sends an alarm to the user if it detects a problem.

### How it works

ABB MACHsense-R is installed by an ABB engineer, who fits sensors to the motor or generator. The sensors feed raw vibration and temperature signals to a compact Data Analysis Unit (DAU), which is mounted on the motor or generator, or close by.

During installation the DAU is configured to process the raw vibration and temperature signals into Key Condition Parameters (KCPs). These are numerical values corresponding to key operating conditions. KCPs cover potential fault areas – the cage rotor, bearings and overall mechanical condition – and can also address issues with the cooler.

The KCPs are transmitted to a secure ABB server, which monitors them to detect possible faults. When an operating parameter exceeds its preset limit this may indicate that a fault is developing. An alarm is therefore triggered and sent to you by SMS text message or e-mail. This provides an early warning that maintenance is needed, and you also get information about the underlying problem that caused the alarm.

### Detailed reports and real-time data on server

When an alarm is generated the DAU exports all the supporting raw data to the server, making it available to our support centers. Depending on the type of service agreement, customers can receive detailed reports with recommendations for corrective action and preventive maintenance.

In addition, authorized users can log on to the server at any time and access real-time data on a range of motor or generator operating parameters.

Its continuous, remote monitoring capabilities make ABB MACHsense-R ideal for motors and generators that play a critical role in production, such as kiln motors in cement works, and for inaccessible machines, like motors or generators in offshore or mining applications.

## ABB MACHsense-R

### Applications

#### Motors and Generators

### Capabilities

Continuous remote condition monitoring to detect problems relating to cage rotor, installation (ie, overall mechanical condition), bearings and cooler.



## Key benefits

- motors and generators are constantly monitored while they are running
- multi-channel operation and fast data collection rates increase sensitivity and accuracy
- on-board data processing within DAU reduces volume of data transmitted to server for lower communication costs
  - communication can use mobile phone network or internet
- ABB's dedicated software customizes analysis to motor or generator design for higher precision
- model based analysis reliably identifies defects and their severity
- false alarms are avoided by monitoring KCPs rather than overall values
- customers can receive regular condition reports on motors and generators, authorized users can log on to server to access real-time information
- early warning of problems helps reduce unplanned downtime
- optimized cost of ownership

# ABB LEAP

## A reliable solution for estimating stator winding lifetime

ABB LEAP (ABB Life Expectancy Analysis Program) is used to assess the expected lifetime of the stator winding insulation in motors and generators.

### How it works

Testing with ABB LEAP can be done during a normal maintenance break, so it can be easily fitted into plant routines. In many cases only a single set of tests is needed to produce results – a big advantage over other methods that require a whole series of surveys to provide meaningful output. Following the tests we supply you with a full report, including details of the findings and lifetime estimation, as well as recommendations for maintenance (or rewinding/replacement) and the timing of the next ABB LEAP inspection.

A special feature of ABB LEAP is that it produces an actual lifetime estimate for the stator winding – with many other methods you only get a rough overview, perhaps with a red, yellow or green 'traffic light' symbol to show the condition of the stator.

With ABB LEAP the results are delivered to you in a clearly understandable form. The measured data is converted into different parameters – such as stator winding contamination or aging of the insulation system – for even greater accuracy.

### Multi-level service

ABB LEAP is a multi-level service, with Standard and Premium being the most commonly applied service levels.

**Standard service:** measurements are taken with the motor or generator stopped but assembled. You receive a prediction of stator insulation lifetime with an 80% confidence level, as well as a condition-based inspection and maintenance plan.

**Premium service:** performed with the motor or generator stopped and the rotor removed. A detailed inspection is undertaken (including wedge tightness mapping, measurement of coupling resistance, visual inspection, stress analysis of windings). Stator insulation lifetime is predicted with 90% confidence, and a condition-based inspection and maintenance plan is provided.

## ABB LEAP (ABB Life Expectancy Analysis Program)

Applications  
Motors and Generators

Capabilities  
Assesses condition and expected lifetime of stator winding insulation.





## Key benefits

- optimizes maintenance planning
- shifts the focus from time-based to condition-based maintenance
- supports efforts to extend motor and generator lifetimes, and therefore increases return on investment
- provides a sound basis for decision making (maintenance planning and run / replace)
- minimizes unplanned downtime, reduces risk levels
- provides input for life cycle cost estimations
- can be directly integrated into a maintenance plan
- optimizes cost of ownership

# Life cycle services and support

## From pre-purchase to migration and upgrades

**ABB offers a complete portfolio of services to ensure trouble-free operation and long product lifetimes. These services cover the entire life cycle, from pre purchase advice, through installation, maintenance and spare parts, to migration and upgrades. Local support is provided through a global network of ABB service centers and certified partners.**

**The service organization uses its broad experience in motors and generators applications to support customers' efforts to maximize availability and reliability, and optimize process performance.**

### **Pre-purchase**

ABB's front-end sales organization is equipped with advanced tools to help customers quickly and efficiently select, configure and optimize the right motor and generator for their application with full support from the experts in the manufacturing units.

### **Installation and Commissioning**

All ABB motors and generators are designed for easy installation and commissioning. ABB can provide certified engineers with extensive experience in commissioning. Their know-how ensures faster start-up times and trouble-free operation. Professional installation and commissioning represent an investment in availability and reliability over the entire life cycle.

### **Engineering and Consulting**

ABB's experts can provide a broad range of technical support. Available services include energy efficiency and reliability appraisals, advanced condition and performance assessments and technical studies. Engineering and consulting primarily aims at optimizing on-site life cycle maintenance practices concerning motors and generators for reduced costs.

### **Condition Monitoring and Diagnosis**

ABB's unique services deliver early warnings of developing problems before failures occur. The required data can be collected by an engineer during a site visit or by means of remote monitoring solutions. The services focus on critical areas like the bearings, rotor winding, stator winding insulation and overall mechanical condition.

### **Maintenance and Field Services**

ABB offers life cycle management plans and standardized preventive maintenance products tailored for each life cycle phase. The recommended maintenance program consists of four levels spaced over the lifetime. Site surveys can be performed to determine repair, maintenance and spare parts needs if there is insufficient information on the current status of the equipment.

### **Spare Parts**

Although ABB's motors and generators range from small standard products to large tailor made units, we are able to offer spare parts and support for all motors and generators throughout the product life cycle. Spare parts are available either as separate components or in packages tailored to the motor or generator design.

### **Repair and Refurbishment**

ABB provides worldwide manufacturer support for all ABB motors and generators as well as other brands. Specialist teams are standing by to deliver a full range of local support in case of emergency. ABB's global service organization includes local sales and service contracts, the site service specialist network and certified workshops worldwide.

### **Migration and Upgrades**

ABB offers life cycle audits to recommend the most appropriate migration paths and upgrades. Component upgrades are available on a turnkey basis to deliver improved efficiency, reliability and safety. Older motors and generators can be upgraded with completely new designs. ABB can supply a direct replacement motor or generator for the original unit.

### **Training**

ABB's product and service training courses take a practical approach. The training ranges from standard courses to specially tailored programs to suit customer requirements.

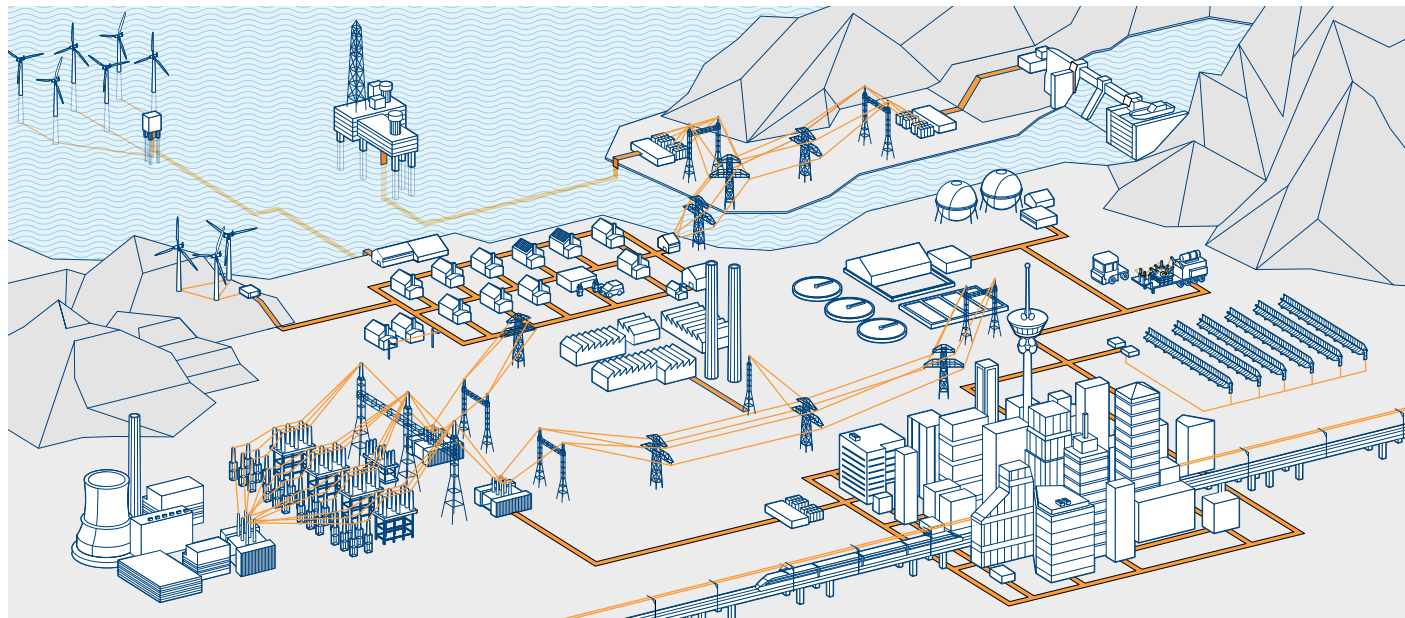
### **Specialized Support**

All ABB motors and generators are designed for fast repairs and maintenance, in many cases on site. Specialized support for customers is offered through a global services organization. Local units worldwide provide major and minor repairs as well as overhauls and reconditioning.

### **Service contracts**

ABB offers tailor made service contracts to fit every customer's service needs. The service contract combines whole service product portfolio and ABB's 120 years of experience to deploy the optimal service practices.

# Total offer of motors, generators and mechanical power transmission products with a complete portfolio of services



**ABB is the leading manufacturer of low, medium and high voltage motors and generators, mechanical power transmission products with an offering of a complete portfolio of services. Our in-depth knowledge of virtually every type of industrial processing ensures we always specify the best solution for your needs.**

## **Low and high voltage IEC induction motors**

- Process performance motors
- General performance motors
- High voltage cast iron motors
- Induction modular motors
- Slip-ring modular motors
- Synchronous reluctance motors

## **Low and medium voltage NEMA motors**

- Steel frame open drip proof (ODP) motors
- Weather protected, water cooled, fan ventilated
- Cast iron frame (TEFC)
- Air to air cooled (TEAAC) motors

## **Motors and generators for explosive atmospheres**

- IEC and NEMA motors and generators, for all protection types

## **Synchronous motors**

### **Synchronous generators**

- Synchronous generators for diesel and gas engines
- Synchronous generators for steam and gas turbines

## **Wind power generators**

### **Generators for small hydro**

### **Other motors and generators**

- Brake motors
- DC motors and generators
- Gear motors
- Marine motors and generators
- Single phase motors
- Motors for high ambient temperatures
- Permanent magnet motors and generators
- High speed motors

- Smoke extraction motors
- Wash down motors
- Water cooled motors
- Generator sets
- Roller table motors
- Servo motors
- Traction motors

## **Life cycle services**

- Installation and commissioning
- Service contracts
- Preventive maintenance
- Spare parts
- Diagnosis
- Repair and refurbishment
- Site survey and overhaul
- Replacement motors and generators
- Technical support and consulting
- Training

## **Mechanical power transmission components, bearings, gears**

# Contact us

[www.abb.com/motors&generators](http://www.abb.com/motors&generators)

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