

# Preventive maintenance for synchronous motors and generators

Protect your investment and avoid costly downtime



ABB has been manufacturing and maintaining motors and generators for more than 130 years. This provides a solid foundation for the company's maintenance services. Preventive maintenance is planned to take environmental and operating conditions into account. The on-site work is performed by fully qualified and certified service engineers.

## The need for maintenance

The main reason why motors and generators fail is component ageing during normal operation. Failures mean costly unplanned stoppages, which always seem to occur at the worst possible moment. Component failure may also result in secondary damage to critical parts such as the stator and rotor. It is therefore essential that steps are taken to prevent failures wherever possible.

ABB's standardized preventive maintenance products are tailored to the motor's or generator's actual life cycle phase. They help to maximize availability and reliability based on ABB's unique know-how as the original manufacturer.

## Recommended maintenance program

The recommended maintenance program for ABB's synchronous motors and generators consists of four levels, L1 - L4, that are to take place throughout the life of a motor/generator.

The time for each maintenance depends on the motor's/generator's age and ambient conditions. Tough conditions – such as high ambient temperatures, humidity, dirt or heavy loads – can significantly shorten component lifetime and reduce maintenance and component replacement intervals.

## Main benefits

- Maximized availability and reliability
- Minimized unplanned downtime
- Increased motor/generator lifetime
- Comprehensive maintenance report

## Benefits achieved through:

- Tailor made maintenance tools:
  - Improved service personnel safety
  - Motor/generator damage prevention
  - Reduced service time
- Service engineers with motor/generator-specific certificate:
  - Fully qualified with vast experience
  - Safe and effective work
- Original manufacturer:
  - Unsurpassed motor/generator-specific knowledge
  - Access to factory expert evaluation
  - Supply of original or upgraded parts

### Certified maintenance personnel

ABB's service engineers are certified to perform preventive maintenance on the customer's specific type of motor or generator. Trained and qualified personnel mean that maintenance is performed safely, correctly, and in accordance with the manufacturer's recommendations. The final setup of the service team depends on the scope of work and may include customer personnel.

### Preventive maintenance kits

Preventive maintenance kits include parts that need to be replaced during preventive maintenance. The kit should be available on site in time for the maintenance to minimize maintenance shutdown.

### Preparations for preventive maintenance

For effective preventive maintenance, planning must be made well in advance as the required resources and maintenance parts must be available on site in time for the maintenance.

For smooth and effective work it is important to know the site conditions prior to the maintenance to prepare detailed plans for any lifting and rotor removal. If sufficient information of site and operating conditions is not available, it is strongly recommended to have ABB do a thorough site survey prior to the maintenance.

### Example of preventive maintenance recommendations for AMS synchronous motors and generators

Variations may occur for other types

Maintenance level	Level 1 (L1)	Level 2 (L2)	Level 3 (L3)	Level 4 (L4)
Interval	Max. 10,000 to 20,000 equivalent hours <sup>1</sup> of operation	Max. 20,000 to 40,000 equivalent hours <sup>1</sup> of operation, or max. 3 years	Max. 50,000 to 70,000 equivalent hours <sup>1</sup> of operation, or max. 6 years	Max. 80,000 to 102,000 equivalent hours <sup>1</sup> of operation, or max. 12 years
Main customer preparations prior to maintenance	<ul style="list-style-type: none"> <li>Disconnect motor/generator electrically</li> <li>Connect outgoing lines to the earth</li> </ul>	<ul style="list-style-type: none"> <li>L1</li> <li>Give access to terminal connections</li> </ul>	<ul style="list-style-type: none"> <li>L2</li> <li>Block cooling and oil system</li> <li>Disconnect piping from motor/generator</li> <li>Drain water coolers and bearing house</li> </ul>	<ul style="list-style-type: none"> <li>L3</li> <li>Split shaft couplings</li> <li>Prepare for rotor removal</li> </ul>
Measurements, tools and special instruments		<ul style="list-style-type: none"> <li>IR/PI<sup>2</sup> of stator. Stator diagnostic measurement<sup>3</sup></li> <li>IR of rotor</li> </ul>	<ul style="list-style-type: none"> <li>IR/PI<sup>2</sup> of stator. Stator diagnostic measurement<sup>3</sup></li> <li>IR of rotor. Impedance measurement of rotor coils</li> <li>Bearing and exciter removal tools</li> <li>Optional: ABB Air Gap Inspector or video borescope</li> <li>Rectifier test equipment</li> </ul>	<ul style="list-style-type: none"> <li>IR/PI<sup>2</sup> of stator. Stator diagnostic measurement<sup>3</sup></li> <li>IR of rotor. Impedance measurement of rotor coils</li> <li>Rotor, bearing, exciter removal tools</li> <li>Rectifier test equipment</li> </ul>
Maintenance parts	<ul style="list-style-type: none"> <li>L1 Preventive maintenance kit</li> </ul>	<ul style="list-style-type: none"> <li>L2 Preventive maintenance kit</li> <li>Parts recommended in previous preventive maintenance</li> </ul>	<ul style="list-style-type: none"> <li>L3 Preventive maintenance kit</li> <li>Parts recommended in previous preventive maintenance</li> </ul>	<ul style="list-style-type: none"> <li>L4 Preventive maintenance kit</li> <li>Parts recommended in previous preventive maintenance</li> </ul>
<b>Expected duration</b>	<b>Approx. 1 working day</b>	<b>Approx. 2 working days</b>	<b>Approx. 5 working days<sup>4</sup></b>	<b>Approx. 10 working day<sup>4</sup></b>

<sup>1</sup> Equivalent hours = total hours of operation + number of starts x 20, or 1.2 x actual operating hours for variable-speed motors

<sup>2</sup> IR = Insulation Resistance, PI = Polarization Index

<sup>3</sup> Option: Diagnostic insulation test of the stator winding (ABB Ability™ LEAP)

<sup>4</sup> Depending on the accessibility of the motor/generator and lifting equipment

### Example of maintenance schedule for AMS motors and generators

Interval (approx. years)	1	2	3	4	5	6	7	8	9	...
Interval (hours x 1000)	10	20	30	40	50	60	70	80	90	...
Level	L1	L1	L2	L1	L1	L3	L1	L1	L4	...

Each maintenance schedule is determined by the actual site conditions, the number of operating hours, the operating mode and the number of starts of the motor/generator. The table above is for information only. Consult your ABB motor/generator specialist for specific recommendations.

For more information please visit:

[abb.com/motors-generators/service/maintenance](http://abb.com/motors-generators/service/maintenance)

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