SIEMENS

Industry Services

Maximize the performance of your air-cooled drives

Siemens Perfect Harmony Air-Cooled Drives Preventive Maintenance Services

Answers for industry.

Keep your Perfect Harmony drive systems up and running with Siemens preventive maintenance programs

Siemens drives provide more precise and efficient control of motors for any application. This will help you increase productivity, enhance energy efficiency, and reduce operating costs.

The patented Siemens Perfect Harmony drives design – featuring the integration of industry-proven components, redundant bypass control technology, and hierarchical warning systems – ensures a level of reliability, efficiency, and versatility that is unmatched in the power controls industry.

The problem

Even with high-quality parts and the industry-leading design of our systems, the probability of failure for industrial equipment that utilizes electronic components increases with age. Furthermore, the combination of demanding operating conditions and taxing environmental conditions (high ambient temperature, dust, dirt, high humidity, etc.) work together to significantly reduce a component's lifetime.

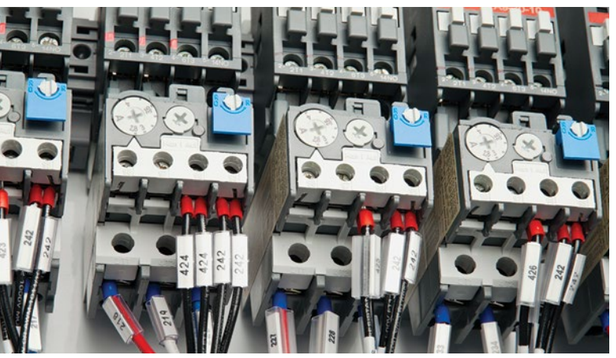
Drive component malfunctions may inflict collateral damage to other parts of the drive and cause failure. This can lead to mission-critical process shutdowns that may severely impact production, revenues, safety, and the environment.

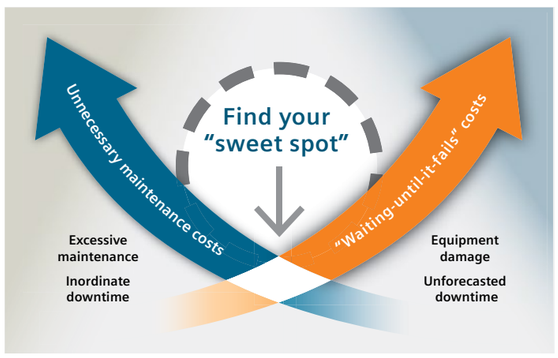
Our solution

Siemens provides maintenance options ranging from replacement parts to comprehensive service packages that will help you optimize the performance of your system over its entire lifecycle.

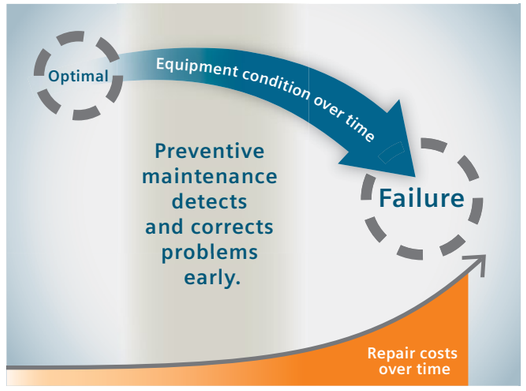
Benefits:

- Enhanced equipment reliability
- Optimized maintenance costs
- Reduced downtime
- Increased overall equipment effectiveness
- Improved control over maintenance costs
- Extended equipment lifetime
- Optimized equipment efficiency
- Increased safety
- Enhanced equipment availability





Reduce your total cost of ownership.



Optimize your overall equipment efficiency.

Maintenance programs

As the leading OEM and services provider for large drives equipment and systems, Siemens offers preventive maintenance programs that can help you to protect your people and your investment. Based on in-depth engineering experience, Siemens experts provide an efficient and functional outline of the recommended maintenance activities covering your equipment's lifecycle. This will enhance your ability to plan maintenance activities and resources in advance.

Preventive maintenance programs from Siemens address specific areas of your equipment relative to its age and overall operating conditions. To ensure that each service is performed in compliance with safety and environmental regulations, all procedures are performed by extensively trained Siemens field service professionals.

If necessary, as an initial step in the maintenance process, our On-site Evaluation Program is performed to determine which maintenance program best suits each piece of equipment. A comprehensive report containing the assessment findings and recommendations for actions will be provided.

Each maintenance program is based on a recommended list of activities to cost-effectively ensure that your equipment is capable of functioning optimally and that all safety and control features are fully operational. In addition, Siemens offers packages to address your entire drive system maintenance requirements at every stage of its lifecycle.

As power switching device technology advances and increases output voltage capabilities, Siemens is continuously improving its products in key areas such as: reliability, availability, efficiency, and reducing drive footprint. When the time comes to retrofit, Siemens can help you plan the best way to move forward including development of a cost-effective maintenance program tailored to your specific needs.

Regular preventive maintenance is the best way to identify signs of both aging in components and hazardous operating conditions. In addition to ensuring that your drives are operating at their best, preventive maintenance will significantly reduce the risk of costly equipment failures that result in unplanned process shutdowns.

Maintenance program highlights

Avoid the surprise of unplanned shutdowns. Keep your production going and your staff safe by learning how to protect your assets and ensure your systems' reliability and effectiveness.

ProTOPS™ system check

Process Tolerant Protection Strategy (ProTOPS™) is a groundbreaking process control system exclusively from Siemens that provides a hierarchical system of warnings to allow time for evaluating the failure and responding appropriately before unnecessary production loss occurs. To ensure this extremely important system is fully operational, main components including redundant cooling blowers, cell by-pass contactors, power supplies, and respective control boards are verified and tested as part of the system check.

Lifecycle management

Technology is rapidly evolving to meet ever-changing requirements, as are Siemens Perfect Harmony drives. Based on these advancements and feedback on the performance of our extensive fleet of operating equipment, our engineering teams are constantly improving our products. Siemens Lifecycle Management Services continuously assess data on factory designs as well as installed parts, then provide you with recommendations on system updates and product upgrades as soon as they become available.

Input transformer inspection

In addition to providing required protection for the drive semiconductors, the built-in input isolation transformer allows drives to maintain continuous operation without tripping – even with an input voltage below 30% of its nominal value. Furthermore, even if the drive input voltage falls below 65% of its nominal value, the drive will remain fully active for as long as the motor is spinning so that motoring can be resumed without delay as soon as the input voltage is restored. All maintenance programs include a thorough inspection of the system's input transformer which ensures optimal condition and maximized performance.

Power cell capacitors evaluation

A series of low-voltage cells are linked together to build the medium-voltage power output used in a Siemens Perfect Harmony drive. Regardless of any spikes or dips in the input voltage, the capacitors ensure a clean and steady DC link feeds the inverter system. To both minimize any conditions that could jeopardize equipment availability and maximize the lifecycle of the capacitors, an objective test is conducted on each power cell to detect predictive signs of deterioration.

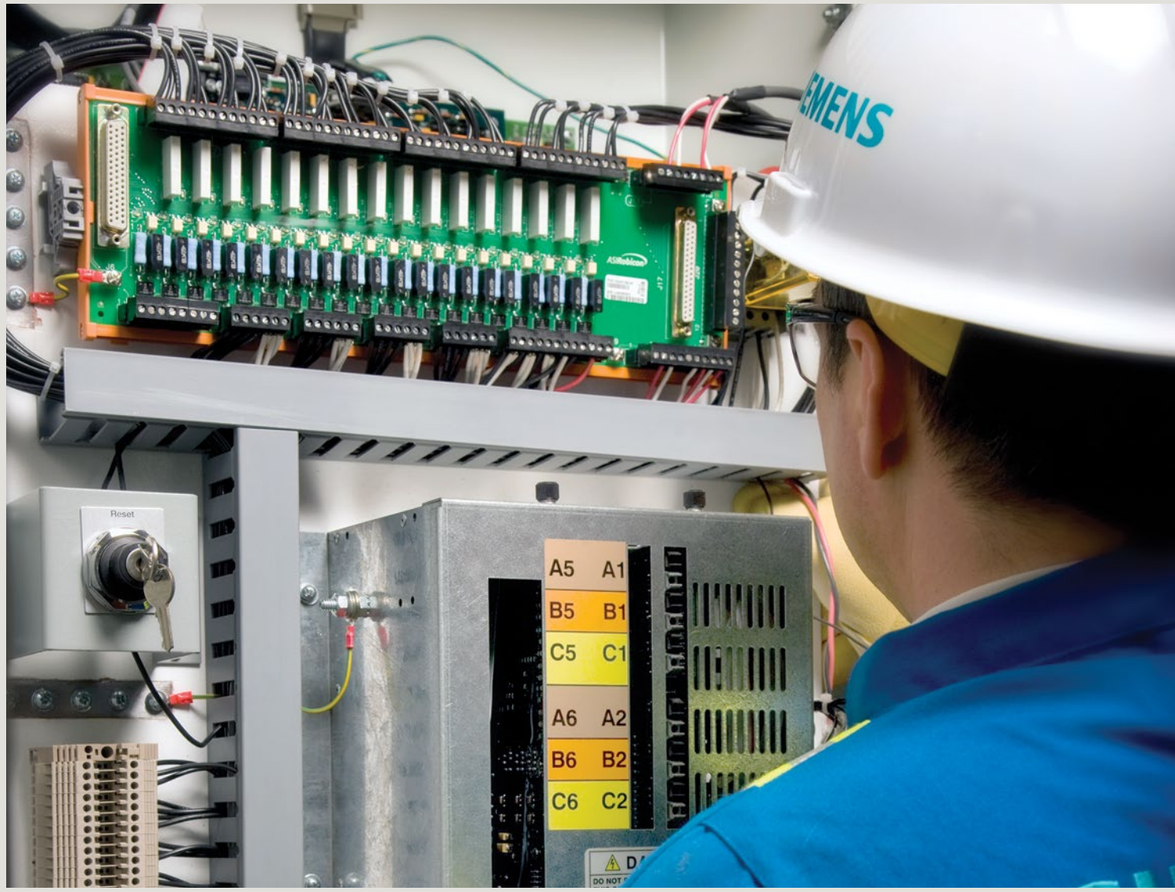
Replacement Parts Kits

Siemens Replacement Parts Kits contain all of the components necessary to conduct preventive maintenance services. They are assembled with care and consideration for both the technical characteristics and the phase of the lifecycle of the intended equipment.*

You can be assured that you will be receiving original components that meet your specific drive system requirements.

Key Component Replacement				
Replacement Parts Kits	**RP1**	**RP2**	**RP3**	**RP4**
• Door filters	•	•	•	•
• PLC/SBC** backup batteries	•	•	•	•
• UPS battery		•		
• Cabinet cooling fans			•	•
• Power cell components				•

* We recommend buying a specific parts kit that goes along with the preventive maintenance package shown in the maintenance schedule on pages 6-7.
** Single-board computer



Siemens Perfect Harmony Air-Cooled Drives – recommended maintenance schedule

Years of operation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Recommended component maintenance program																					
• Air-Cooled Basic Packages	ACB1	ACB2	ACB3	ACB2		ACB2	ACB3	ACB4	ACB3		ACB5	ACB2	ACB3	ACB2		ACB2	ACB3	ACB4	ACB3	Retrofit	Standard yearly preventive maintenance programs
• Air-Cooled Advanced Packages					ACA1					ACA2					ACA1						Advanced preventive maintenance programs
Key equipment maintenance – inspection, measurements, cleaning, and testing																					
• Drive component maintenance																					Recommended semi-annually in dusty environments
- Control and power I/O cabinet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection/cleaning – cabling; DCR controls and cards; and HMI
- Cell cabinet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection/cleaning – cell connections and selected cell inspection
- Transformer cabinet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection/cleaning – connections, power cabling, and heating issues
- Cabinet cooling fans	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection/cleaning – verify Thermal Overload and contactor operation
- Door filters	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Frequency increases in dusty environments
- Control fuses and power fuses	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection
- Cell and filter capacitors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection
- Fault logs, parameters, and set points	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Review historical and fault/cell logs; and check/verify parameters and set points
• Power-up sequence																					Tasks performed following the inspection/cleaning activities
- Cabinet cooling fans	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Verify cooling blower operation and transfer sequence
- Power supplies and UPS	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Verify calibration and check operation
- Cell bypass contactors	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Testing for timing operation – applicable to drives with cell bypass option*
- Control boards	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection – testing and checking on restart
- NXG DCR cards	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Inspection
- Spare parts – control boards	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Verification of spare parts stock and condition
- Spare power cell	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Rotation of spare into drive to ensure functionality
• Lifecycle management																					Program for maintaining/upgrading drives with new features/improvements
- Control boards and firmware		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Dependent on available/needed upgrades – test date verification
- Software and feature improvements		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Software version management and feature improvement recommended upgrades
- Power cell capacitors evaluation			•		•		•	•	•				•		•		•	•	•		Testing of power cells for objective data capture to detect predictive signs of deterioration
• System component maintenance																					Tasks performed at the recommended schedule or dependent on operational conditions
- Power control house			•		•		•		•		•		•		•		•		•		Inspection/testing of HVAC, fire extinguisher system, and power control house UPS
- Circuit breakers and switchgear					•					•					•						Inspection/operation – includes contact, insulation, and limiter resistance
- Output reactors and filters					•					•					•						Inspection/testing
- Input transformer					•					•					•						Inspection/testing
Key Component Replacement																					
• Replacement Parts Kits	RP1	RP1	RP1	RP2	RP3	RP1	RP1	RP2	RP1	RP4	RP1	RP2	RP1	RP1	RP3	RP2	RP1	RP1	RP1		Replacement Parts Kits developed for individual drives
- Door filters	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Frequency dependent on operational conditions
- PLC/SBC** backup batteries	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Refurbishment upgrade option – recommended after inspection during scheduled maintenance*
- UPS battery				•				•				•				•					Recommended refurbishment schedule*
- Cabinet cooling fans					•					•					•						Refurbishment upgrade option – recommended after inspection during scheduled maintenance*
- Power cell components										•											Refurbishment with inspection/cleaning/replacement of capacitors and other components, as required*

Recommended maintenance intervals and routines; and component replacement may vary upon different operational conditions.
For questions and requests, please contact our 24/7, toll free Service Center at 1-800-333-7421 or 1-423-262-5710.
You may also request support via our website support.automation.siemens.com/US

* Frequency dependent on operational conditions
** Single-board computer

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