



Maintenance+

Asset Performance Management (APM) for Drives

Maintenance +

If you're looking for ways to reduce downtime and enhance the performance of operations and assets, GE Power Conversion's simple suite of clever software applications can help. Its flexibility includes 'on-prem' and cloud-based options which help to optimize operations and energy, and enable predictive maintenance and cyber-secure service solutions. GE Power Conversion's digital suite is based on a straightforward, modular range of digital app's, tools and services, connecting data with the right people. Already, more than 500 sites are benefiting from Power Conversion's digital solutions. Each of our three easy-to-navigate modules focuses on a key area of improvement: Operations+, Maintenance+ and Services+ tools and app.

Maintenance+ is your Asset Performance Management range of tools, protecting your investment in valuable equipment by helping to improve its availability. It provides a view on the health of your critical assets with early warnings of developing issues to help you take timely, corrective actions. This can unlock a shift from unplanned to planned downtime, or even contribute towards avoidance of downtime.

Maintenance+ Asset Performance Management (APM) transforms equipment maintenance with unique analytical techniques and support. GE's Maintenance+ APM tools evaluate asset health by analyzing data from key systems, like rotating electrical machines and power electronics, using KPI analysis and Electrical Signature Analysis (ESA). Our tools assess asset health and monitor for performance degradation, providing an early warning system and helping operators thereby, to reduce unplanned downtime.

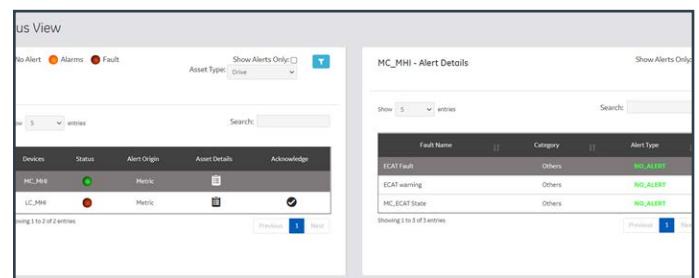
Maintenance+ APM for Drives tool is a cloud based analytic tool that analyzes Key Performance Indicators (KPIs) with predefined algorithms to provide early warning information of potential failures and help reduce unplanned downtime.

USE CASE: Many organizations already benefit from our **Maintenance+ APM for Drives** and Rotating Machines solutions, which collect indepth data when applied to drives and rotating machines manufactured by GE. This can also be suited for rotating machines of non-GE make. With extensive expertise in variable frequency drives and more than 100 years of experience engineering motors, generators and control equipment, our specialists put their software, data and domain expertise to work.

Maintenance+ APM solutions can be applied to any industry segment that uses electrical rotating machines or drives, such as the Wind, Metals, Marine and Energy sectors, to name a few. The GE difference is in translating analytics to user-friendly information and actionable insights for faster and more informed operational decisions. Not only do we help identify future issues, we also help you avoid or resolve these issues, and can help plan spares requirements.



Overview Dashboard



Analytics Dashboard

DIGITAL

Value added to our customers

Asset Performance

- View the health of your assets from anywhere in the world through intuitive cloud dashboards
- Profile charts indicate when your assets are nearing threshold or warning limits
- Predefined logic/algorithms transform high and low frequency KPI data into actionable insights

Asset Maintenance

- Insights into a component or subsystem that is degrading, enabling easier troubleshooting when tracking down root cause
- Early warnings of potential issues helps to avail a longer window of time to carry out corrective maintenance
- Helps to identify sub-system faults before they can propagate the entire system

Data Availability

- Asset performance metrics can be analyzed across different time data points for a better understanding of when assets are deviating from their optimum efficiency point
- Download KPI data for further analysis

Analytics covered

Electrical Signal Monitoring

Network side quantities of drive such as:

- Grid/Network Input voltage
- Current and frequency before or after the input transformer

Load/Machine side quantities such as:

- Machine voltage, machine current
- Drive input and output filter currents and DC capacitor voltages

Thermal Signal Monitoring

Machine side quantities such as:

- Bearing temperature (NDE, DE)
- Machine winding temperature

Drive quantities such as:

- IGBT heat sink temperature, cubicle internal temperature, CPU temperature
- Input and output filter inductor temperature, precharge transformer temperature

Mechanical Signal Monitoring

- Primarily Machine speed is measured

Based on electrical signature analysis of connected rotating machines the following areas could be monitored

- Bearing (inner/outer race defect, ball defect)
- Insulation (shorted turns)
- Rotor bar (broken rotor bar)
- Electrical (voltage/current THD, sequence voltage/current harmonics, energy usage)
- Temperature (bearing/stator temperature)

Customer Success Story

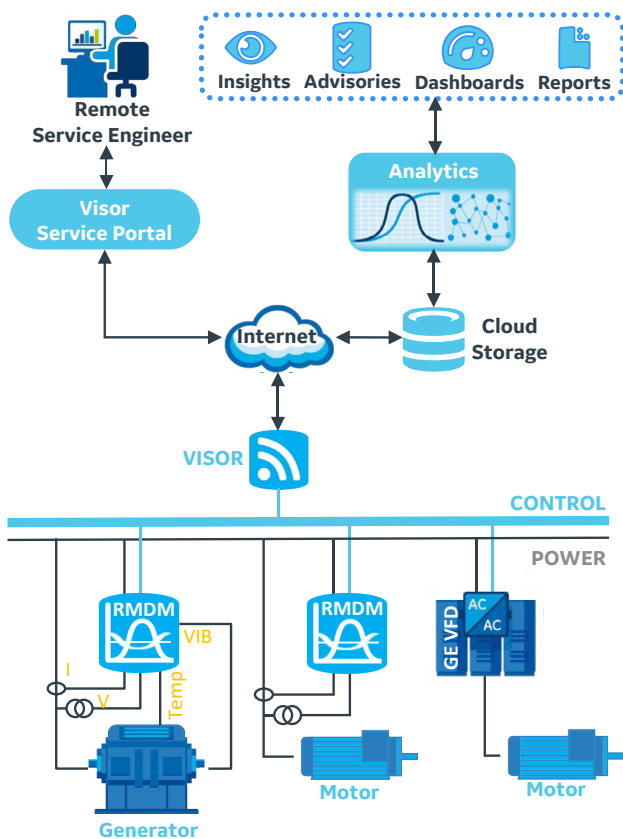
GE Power Conversion recently implemented **Maintenance+ APM** solution to monitor a fleet of Solar inverters. **Maintenance+ APM** has provided the solar farm operator the ability to monitor assets remotely, helping detect developing issues and implementing a quick course of corrective action, preventing failures in the cooling unit, gassing and complete inverter failures.

Maintenance+ APM for Drives can be used to monitor equipment across multiple solar farms, and it can also be used with equipment made by any manufacturer, meaning no matter when the solar farm was built, or by whom, solar farm

operators can still benefit from the real-time data insight that our Maintenance+ APM solution provides.



Typical Architecture



Options To Meet Multiple Topologies

GE drives are fitted with a software module enabling simple collation of data employing secure means for trending KPIs and to perform analytics for the drive, collation of data for trending KPIs and to perform analytics for the drive. In addition, high frequency measurements can be used to perform electrical signature analysis to evaluate performance.

To take advantage of APM, only one additional item of hardware is required, the Visor Connect Box (VCB), which provides a gateway for remote support and cloud connectivity. Visor is GE Power Conversion's remote access solution, also featuring a powerful data historian. Through VCB, information can be remotely accessed via a security compliant site.

Existing drives can be upgraded to include the software module for performing KPI analytics and ESA on the machine.

Cloud or On-Prem options available

Maintenance+ APM can be deployed as a cloud-based solution, or On-Prem if remote connectivity is not preferred.

Cloud Analytics and Dashboards

- Advanced algorithms and Machine Learning
- Single or multi-site view of assets
- Cloud storage of data
- Auto-reporting
- Alert management and case tracking

Site Data Storage and Secure Transport

- Communications interface to site equipment
- Storage of collected data and files
- Deadband and reporting options for streaming
- Automatic file push to cloud (buffered)

Data Collection

- Direct from GE or other non-GE equipment/systems
- Indirect using existing equipment
- Variable capture frequency to suit application

Conceived for Operators

GE Power Conversion's Digital Suite is built on GE's industry wide expertise in IT, OT (operating technology) and IIoT (the industrial internet of things). Above all we believe it should be intuitive, visual and customized for your operational needs. Featuring simple, clear interfaces it provides organizations of all sizes with access to GE's powerful data analytics, made accessible and usable by providing better intel and situational awareness. Genuine performance improvements are within reach, to help your organization work with increased efficiency and profitability.

To find out more:
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