GENERATOR VIBRATION MONITORING SYSTEM

GVMS

The GE Generator Vibration Monitoring System (GVMS) offers direct connectivity to control room DCS and is a time-tested, field-proven tool that can be applied to any generator, regardless of manufacturer.

- Safely monitor vibrations on high-voltage areas
- Evaluate transient effects caused by line faults
- Detect excessive vibrations, early and accurately
- Perform continuous monitoring as part of a condition-based maintenance program
- Connect output to a strip chart with time and date stamp
- Can be used with other GE condition-based maintenance products

Advanced Optical Technology

GVMS combines the reliability and accuracy of optical measurement technology with a proven method of filtering, amplification and vibration display.

Safe instrumentation of high-voltage areas (up to 24kV) is possible as a result of this technology.

The optical accelerometers can be reinstalled in other areas, if desired, by GE instrumentation specialists during a planned outage—making the overall system both versatile and cost-effective.

GVMS is an integral component of General Electric's Condition-based Maintenance Systems, which include:

- Partial Discharge Analysis
- Generator Gas Monitoring System

Avoid Potential Forced Outages

Early and accurate detection of excessive vibration in generators is key to finding problems before they turn into costly forced outages.

A proven way to detect vibrations is to continuously monitor specific locations within a generator—such as the end-windings, high-voltage terminal leads, core punching, excitation leads and transformers, and stator bar windings.

Results can be trended with a recorded historical database, enabling similar units to be compared.

Causes of End-Winding Vibrations

As generators age, the end-winding support structure begins to become more compliant.

Increased compliance heightens the forced vibration, resulting in reduced resistance to the 120 Hz vibratory forces naturally found in the stator end-turn region (100 Hz for 50-cycle machines).

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As vibration amplitudes increase, stator coil end-turns come under progressively more mechanical stress.

Natural frequencies may move closer to the value of the mechanical forcing frequency (100/120Hz), reducing stiffness and increasing vibration through the resonance amplification mode.

Principle of Operation

A variable number of modules are mounted in the monitor cabinet.

Each module accepts a signal from an optical accelerometer and features adjustable gain and four-digit LED readout.

Optional output modes for each module include DC voltage proportional to RMS displacement, AC voltage output and 4-20 milliamp output for DCS alarm monitoring.

An alarm can be activated, when needed, at a preset maximum vibration value by using available adjustable switch closure.

Discrete Detection Capability

The Generator Vibration monitor detects and filters discrete frequencies.

Vibration magnitudes directly related to specific excitation problems are displayed (e.g., electrical operating frequency and the second harmonic).

The system can be custom-designed to bandpass filter problem frequencies of all kinds, ensuring a more sensitive vibration signal for evaluating long-term degradation.

Typical Installation and Setup

The end-turn vibration monitoring system is positioned to observe critical resonance frequencies at locations determined by off-line dynamic impact tests.

Threshold triggering levels take into account changes due to the elasticity of the end-turn region at ambient temperatures, as compared to when the impact tests were performed.

Twelve points are typically monitored—six each on the turbine and generator ends. Custom systems are also available with different channel configurations.

Top phase coils are usually selected for the measuring points, typically the coil registering the highest amplitude vibration on each parallel.

For more information, contact your local GE representative.

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GEA 13026A *5M 07/01*