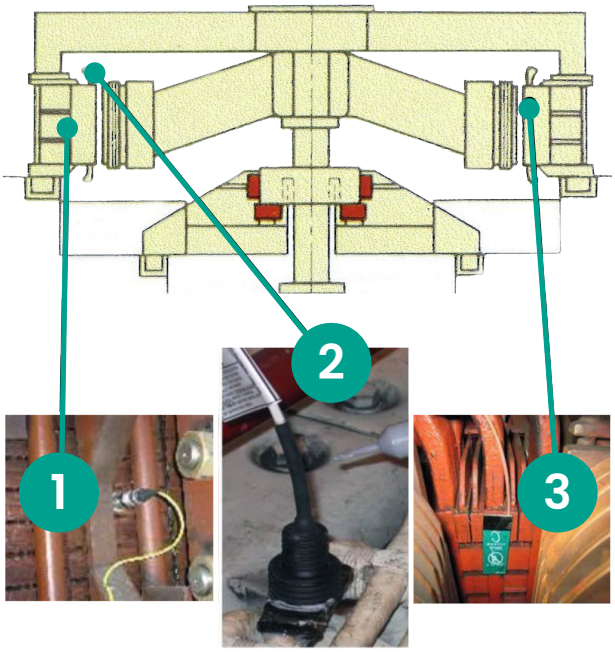
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Generator vibrations application note



Hydroelectric generator vibrations

Hydroelectric generators consist of many components that can loosen and eventually fail:

- Stator frame assembly
- Stator core assembly
- Generator end windings and supports
- Generator windings or bars in their slots

The loosening is primarily caused by oscillating electric and magnetic field forces in the generator, and results in vibrations at frequencies related to electric power generation rather than rotor speed.

Sensing mMethodologies

1. Stator frame and core vibration – an accelerometer or Velomitor† sensor is attached to the stator core and/or frame to measure vibrations.
2. End winding vibration – an accelerometer is attached to the stator end winding to measure vibration in the radial and tangential directions.
3. Stator bar vibration – a capacitive displacement sensor (by others) is mounted to measure the movement of the winding within a stator slot

Line frequency modifications

Baker Hughes Bently Nevada† offers modifications that replace the rotor-related measurements in certain 3500/46M hydro monitor channels with 2x line frequency and pole passing frequency measurements. These Multimode Dynamic Generator Monitoring (MM DGM) modifications are installed and enabled via 3500 configuration software. The variables can be viewed in 3500 operator displays and/or sent to a control system or System 1† software for trending

For more information:

Contact your local Bently Nevada representative

Sensor	Monitor	Measurements
330500 Velomitor, 190501 Velomitor* CT	3500/46M with Mod. 181253	Overall vibration amplitude, line frequency amplitude, pole passing amplitude, 1x amplitude and phase
330400/330425 General purpose accelerometer	3500/46M with Mod. 181255	Overall vibration amplitude, line frequency amplitude, pole passing amplitude, 1x amplitude and phase
330447 Stator End Winding (SEW) accelerometer	3500/46M (no Mod. required)	Overall vibration amplitude, bias voltage, pole passing amplitude, direct resultant1, pole passing resultant[1]
Capacitive displacement sensor (by others)	3500/46M with Mod. 181251	Stator bar vibration amplitude, gap, line frequency amplitude, pole passing amplitude, 1x amplitude and phase, mode

1. Resultant is the maximum peak level of vibration geometrically derived from both the X and Y axis of the dual axis SEW accelerometer.

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