

Welcome to our latest newsletter, keeping our customers and partners up-to-date with the latest developments at Sensonics. New projects, new products and case-studies, all helping to protect your critical rotating plant.



HELPING ROMANIAN TURBINES RUN SMOOTHLY

The supply of over 25 vibration monitoring systems for a wide range of hydro turbine plants in Romania, is the milestone recently achieved by SENSONICS. This project is part of an extensive instrumentation upgrade for a key customer in Romania, HIDROELECTRIC SA, and is in partnership with SC TN GRUP EXIM SRL. The systems have been supplied as part of a rolling programme over the past two years, with TN GRUP completing all installation and commissioning activities.

The Sensonics Sentry range of equipment has been utilised in all applications providing measurements of absolute bearing vibration and shaft eccentricity in combination with speed and rotor to stator air gap at selected locations. A phase reference module is included in each system for the generation of a once per revolution timing pulse to enable detailed dynamic and balancing analysis of the plant. Sensonics have provided all installed hardware, including junction boxes, plant cabling, Modbus communication modules and required set up and configuration software.

Sensonics established PZS range of shear mode accelerometers have been fitted to all bearing measurement locations and provide exactly the right performance for this type of application, with a frequency measurement response down to 0.4Hz in combination with low overall integrated noise. This is essential for Hidroelectrica's turbines where generating running speed can be as low as 130RPM. This transducer, in combination with the Sentry protection modules, provides operators with the capability to measure peak vibration displacement levels below tens of micro metres at the rotational speed.

Sensonics specialise in vibration transducers for low speed applications and can provide 500mV/g and above accelerometer sensitivities, particularly suitable for hydro turbine applications. The successful upgrading of Hidroelectrica's turbine plants is another example of Sensonics position as a leading supplier of turbine supervisory and high integrity protection equipment to industry worldwide.

VIBRATION TRANSDUCERS & APPLICATION TO TURBINES

For turbine bearing pedestal or casing vibration measurements there are three main types of transducer to choose from - a self generating velocity transducer (4mV to 20mV/mm/s) a standard accelerometer (100mV/g), or a piezoelectric velocity transducer (4mV/mm/s).

So what are the advantages of each and what is the best approach?

The self generating velocity transducer utilises a suspended mass and coil arrangement. The devices are simple to interface with monitoring equipment, being passive, and the high sensitivity in conjunction with low noise makes them particularly suitable for power applications where the grounding and electrical interference environment is always a challenge.

The limited upper frequency response (typically 2kHz) also assists in steam turbine applications where high frequency steam noise can saturate active devices leading to spurious alarms.



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However, reliability can be an issue with wear of the moving parts over time. The low frequency roll-off is typically between 5Hz and 10Hz, which can limit the quality of vibration information during run up and run down. Most devices also experience a small spurious response at several hundred hertz as a result of the suspension system orthogonal to the measurement direction, although for most applications this can be ignored.

Accelerometers

The accelerometer offers high reliability in conjunction with a wide frequency response and is suitable for a broad range of measurement applications. However, limitations include susceptibility to frequencies outside its operational bandwidth and high resultant noise for vibration displacement measurements through double integration of the acceleration signal. Noisy environments result in pickup being included in this integration and generally the system is sensitive to transient events – particularly any low frequency excursions.



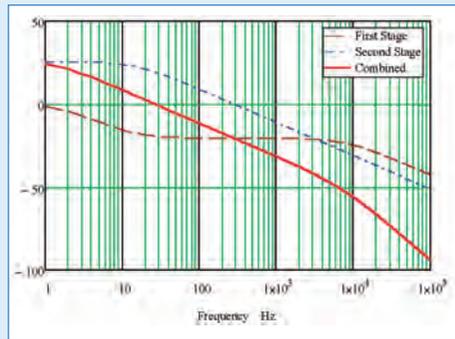
This can be exacerbated through the use of compression mode as opposed to shear mode transducers, which are more susceptible to base strain effects caused through the mounting and temperature changes on the machine. Steam flow causing significant resonances in the turbine can also result in the accelerometer resonating at its natural frequency, restricting the device current, resulting in a low frequency modulation processed as a large vibration displacement.

Piezoelectric Velocity Transducers

A good compromise for power turbine applications is the piezoelectric velocity transducer which incorporates a stage of integration. Therefore the electrical noise contributed to the overall signal during cabling to the instrumentation rack is only integrated once more to achieve the required displacement reading.

The frequency range is also improved on passive velocity transducers (2.5Hz to 6kHz). However, these types of transducers can still be susceptible to high frequency resonances in the presence of steam noise.

Sensonics range of PZV velocity transducers use a dual mode integrator to alleviate this problem. By splitting the frequency band (see graph below) and integrating the lower section first effectively attenuates any high frequency resonance that could cause saturation. The higher frequency band is then integrated and compensated to provide correct integration across the full band.



PZV velocity vibration transducers are available in a range of mechanical packages & cable arrangements. With ATEX approval for intrinsically safe applications they are ideal for turbine and generator applications.

QUALITY SYSTEM MEETS WITH ATEX

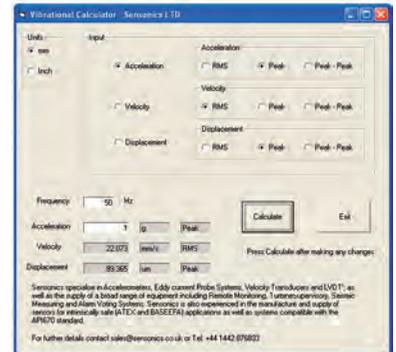
A recent quality audit at Sensonics by Baseefa confirmed the continuing conformance of our Quality Management System to the requirements of the ATEX directive.



This in addition to our ISO9001 registration is a key approval for the manufacture of our range of intrinsically safe vibration transducers and proximity probe systems.

VIBRATION CALCULATOR – CONVERTER

Converting vibration between the three measurement regimes – acceleration, velocity and displacement – is something we do a lot of at Sensonics. To simplify the process we have developed a Windows desktop Vibration Calculator.



The program provides calculations in either metric or imperial units with results displayed in rms, pk or pk to pk. Select the input vibration level & frequency and press calculate to display the vibration levels in acceleration, velocity and displacement.

Contact sales@sensonics.co.uk if you would like to receive a copy of the application.

RECENT CONTRACT AWARDS

- Turnkey supply of Sentry differential expansion measurement systems for steam turbine application. **Location Pakistan**
- Supply of DN26 vibration, thrust and speed monitors and transducers for steel plant. **Location China**
- Further supply of 15 Wilmore seismometers for geophysical monitoring. **Location Germany**
- Volume accelerometer supply for ship hull vibration monitoring. **Location UK**
- Sentry vibration protection monitors for Cooling Fan tower monitoring. **Location Russia**

Sensonics are a leading supplier of turbine supervisory and high integrity protection equipment to industry. With 30 years experience in providing vibration, displacement and speed instrumentation solutions in demanding environments, not only do they supply a full range of sensors and API 670 compliant measuring and protection equipment, but also offer design through to installation & commissioning services.



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