



The new features of Ansaldo Energia's PSS offer power plant operators higher performance and reliability through improved sensors and more robust design.

Pulsations are pressure waves generated by gas density variations arising from the combustion process.

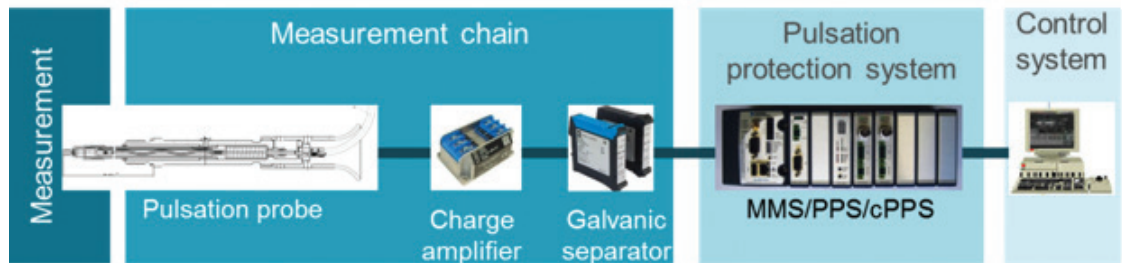
Their frequencies and amplitudes are influenced by different parameters: ambient conditions, combustor geometry, operational parameters (e.g. heat input, fuel/air ratio, fuel type and water & steam flow).

A reliable pulsation supervision and protection system

is required to prevent excessive stresses that might compromise the mechanical integrity of the combustor hardware.

The entire GT26 fleet is equipped with a pulsation supervision and protection system.

This leaflet covers the most recent improvements on the pulsation supervision system:



How You Benefit

CUSTOMER BENEFITS

- Redundancy of pulsation measurement leading to improved reliability and availability
- Reduce unnecessary protection events due to failures in the measurement chain
- Increased measurement redundancy
- Improved reliability
- Extends the lifetime of your equipment renewing components and timely addressing obsolescence
- Early detection of mechanical or electrical failure

TECHNICAL FEATURES

- Fully integrated pulsation measurement system with new crystal and sensor redundancy
- Improved reliability by increased sensors' redundancy
- Compatible and retrofitable into any existing configuration
- Reduced wiring and fully automated system
- Modular design for simpler maintenance and serviceability

Technical Specification

The pulsation supervision system consists of several components ranging from the pulsation probe installed in the combustion chamber to the pulsation monitoring rack.

The layout of the pulsation supervision system is shown below in figure 2. It consists of the pulsation probe, charge amplifier and galvanic separation unit for the EV and SEV combustor.

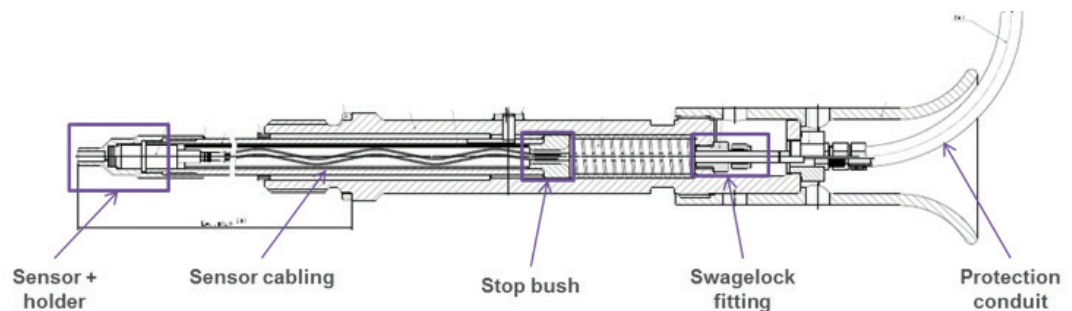
The pulsation supervision system converts the dynamic pulsation pressure into digital signals to the GT control system.

The Pulsation Supervision System is composed of the following main equipment:

- The Pulsation Probe with a new piezoelectric sensor for improved thermal behaviour & excellent signal quality
- The Compact Pulsation Protection System (cPPS): Modular, robust & reliable monitoring system
- Redundant Pulsation Probe (RPP): Triple redundant sensor for improved reliability

New Piezoelectric sensor

The pulsation probe contains a piezoelectric high temperature dynamic pressure sensor.



The sensors detect pressure fluctuations (pulsation) and provide an electric charge signal as output, proportional to the dynamic pressure.

The current pulsation probe is equipped with the CP10X sensor made from a naturally grown crystal. Due to the shortage of the raw material, this sensor can no longer be reliably supplied. The artificially grown piezoelectric high temperature sensors CP506/CP505/CP545 have been identified as a suitable alternative for the specific needs. In future, all pulsation probes at Ansaldo Energia will be equipped with the new type of sensor.

The following sensors in the pulsation probe are used:

- CP506 Sensor: higher temperature rated version for applications on the GT26 EV combustor
- CP505/CP545 Sensor: small acceleration compensated pulsation sensor rated for applications in the GT26 SEV

Implementation of the new pulsation probe fitted with the new sensor will require replacement of the charge amplifier in the measurement chain with the corresponding sensitivity settings of the CP506/CP505/CP545 sensors.

Compact Pulsation Probe System (cPPS)

Ansaldo Energia GT26 engines either have the analogue Machinery Monitoring Solutions (MMS) pulsation monitoring system or the Pulsation Protection System (PPS).

Currently no spare parts are available for the MMS and the controller and digital I/O cards of the PPS system will be soon out of production.



Ansaldo Energia will maintain the PPS system as long as the components are commercially available. In the meantime, Ansaldo Energia has developed the new compact Pulsation Protection System (cPPS) as a replacement for both the MMS and PPS.



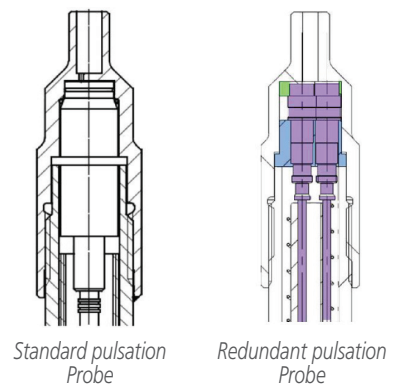
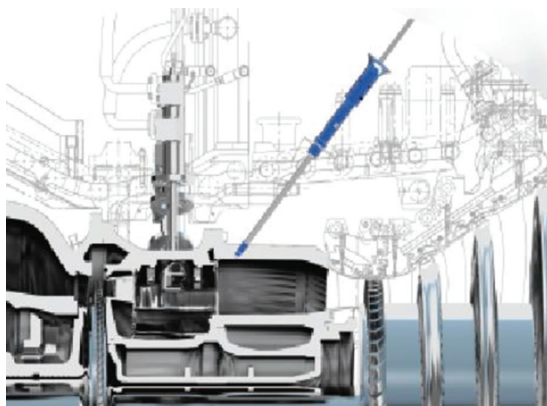
The cPPS is a modular system with Profibus communication and a conventional analog interface to the GT control system. The cPPS is equipped with the software cPPSView, which provides advanced data visualisation and combustion monitoring information to the user (such as online

and historical spectra analysis, data sampling, data logging, etc.). It is fully compatible with all GT26 and with all pulsation probe and sensor variants. Ansaldo Energia recommends GT26 users to switch to the cPPS system when a complete PPS or MMS needs to be replaced.

Redundant Pulsation Probe (RPP)

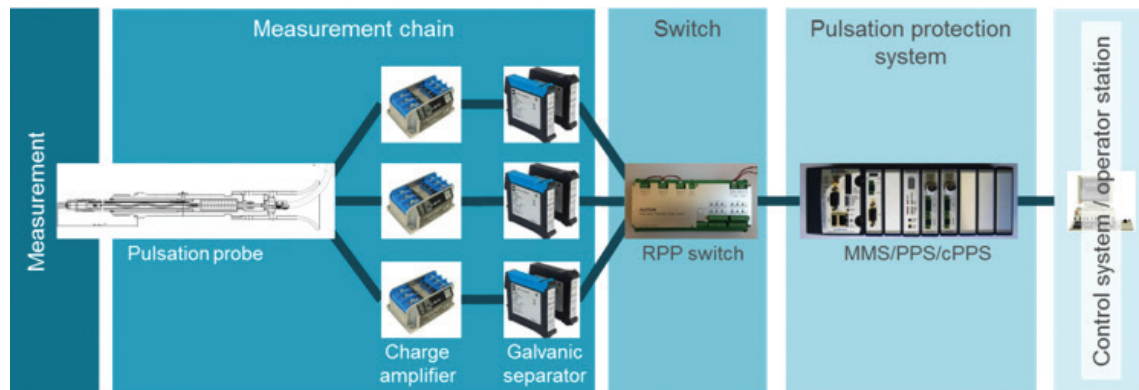
The standard pulsation probe has a single measurement chain with a charge amplifier and galvanic separator. A failure in the measurement chain triggers either an alarm, a trip or PLS. The replacement of the failed pulsation probe can only be carried out during an engine shutdown.

In order to improve the system availability and reliability, Ansaldo Energia has developed a redundant pulsation probe (RPP), which contains three separate pulsation sensors in the sensor head compared to the single sensor in the existing probe.





The redundancy also extends to the three independent measurement chains , including the three separate sensor cables (one for each sensor), three charge amplifiers and three galvanic separators. In addition to the pulsation probe, an electronic switch is installed after the measurement chain collecting the signals from all the three measurement chains.



Should the system detect a channel to be unhealthy, an alarm is triggered at the operator station and the channel is automatically blocked. The Redundant Pulsation Probe is compatible with MMS, PPS and cPPS and requires a new charge amplifier and galvanic separator, which are part of the implementation.

Performance & References

After extensive internal validation, the RPP has been in commercial operation for the last years, with implementation both on the EV and SEV combustion chambers. It is now the standard on new GT26 and has contributed to increase the availability and reliability of the fleet.

The new piezoelectric sensors and the cPPS have also been successfully implemented in the fleet and have shown full reliability.

For more information and to reach our sales Team, please go to www.ansaldoenergia.com

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