

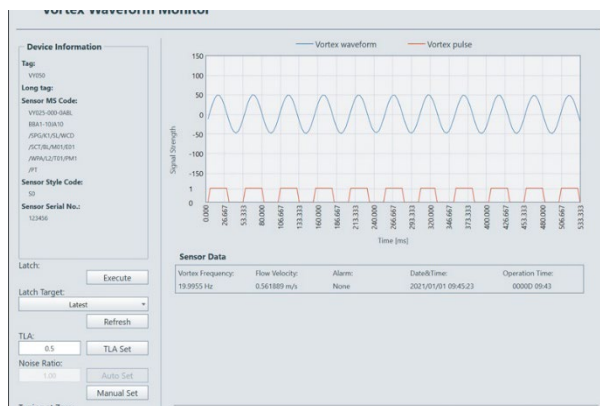
Precise Steam Massflow Measurement

Vortex Flowmeter VY Series

Measuring steam mass flow accurately is crucial for optimizing boiler performance, energy efficiency, and steam system control — yet traditional methods struggle with stability and complexity.

Introduction

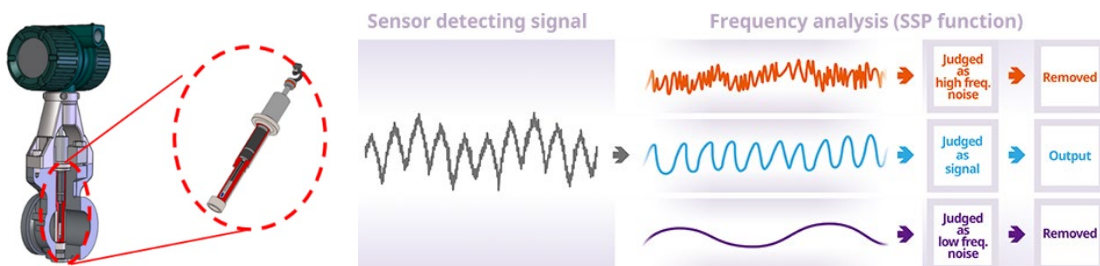
In steam-driven processes, the mass flow rate is a key performance indicator. Without accurate mass flow data, operators risk inefficient fuel use, inaccurate energy balancing, and unstable boiler control. A high-precision, compact vortex flowmeter with built-in temperature sensing helps deliver real-time, reliable mass flow measurement, reducing costs and improving operational efficiency.



Massflow Measurement of Steam in use

Application

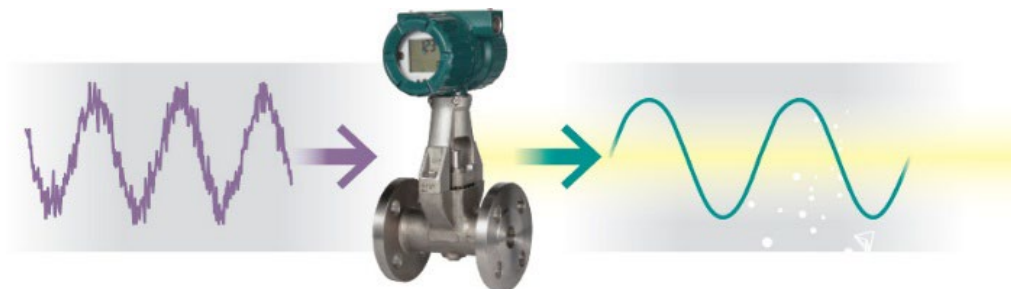
This application focuses on saturated steam (e.g., ~155 °C, 5.3 kg/cm² abs) in industrial boilers or steam systems. The goal is to monitor the **mass flow rate** of steam through a pipe (in this case, a 50 mm line) to support better boiler control, energy management, and process optimization.



Challenge

Accurately measuring the mass flow of steam poses several challenges:

- **Stability Issues:** Steam flow can fluctuate due to boiler oscillations, making volume-only measurements unreliable.
- **Additional Instrumentation Needs:** Traditional mass-flow setups often require external temperature (RTD) sensors and pressure gauges, adding cost and installation complexity.
- **Measurement Accuracy:** Without real-time compensation for temperature and pressure, density calculations (and thus mass flow) can be inaccurate.



Solution

The **Yokogawa Vortex Flowmeter VY Series**, particularly the built-in temperature sensor (Pt1000) version, provides an integrated solution:

Integrated Temperature Measurement

- The VY Series includes a built-in RTD (Pt1000) in its shedder bar, which eliminates the need for separate temperature sensor installation.
- Real-time temperature data is used in conjunction with steam-table algorithms (embedded in the flowmeter) to compensate for density changes.

Mass Flow Calculation

- The VY Series uses embedded steam tables (saturated/superheated) combined with volumetric flow to calculate **mass flow (M)**.
- For saturated steam, density is derived from the measured temperature and steam table.
- For superheated steam, calculation uses measured temperature + an external pressure gauge, if needed.

Stable Signal Processing

- Spectral Signal Processing (SSP) in the VY Series filters out vibration and flow pulsation noise, ensuring stable output.
- The VY's digital processing yields optimal vortex signals even under oscillating boiler conditions — similar to the behavior described in the original technical note.

Diagnostics & Maintenance

- Advanced self-diagnostics on the VY monitor sensor integrity, clogging, and signal stability.
- Remote maintenance capabilities help reduce manual checks and maintenance interventions.

Conclusion

Switching to the **Vortex Flowmeter VY Series** for mass flow measurement of saturated steam gives you a compact, highly reliable solution — combining volumetric flow and in-situ temperature sensing for real-time mass flow calculation. This leads to better process control, lower installation and maintenance costs, and more efficient steam system operation.

Key Benefits

- **Reduced Instrumentation Complexity:** Built-in temperature sensor removes need for external RTD, saving on installation and piping.
- **High Accuracy & Stability:** Real-time compensation via embedded steam tables + SSP processing ensures precise mass flow rate output.
- **Lower Lifecycle Cost:** Integrated design means fewer components, lower maintenance, and simplified calibration.
- **Robustness in Harsh Conditions:** The VY's strong shedder bar and diagnostics ensure long-term stability even with boiler pulsations.
- **Efficiency Optimization:** Accurate mass flow data supports better boiler control, energy balancing, and fuel savings.
- **Scalable Integration:** Digital communications and diagnostics make it easy to connect with control systems and perform condition-based maintenance.



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