Panametrics Solution Brief

Overcoming geothermal flow-measurement challenges using ultrasonic flow meters

Geothermal energy production delivers low-carbon baseload power, making it a desirable option in renewables. However, high-temperature environments and corrosive brines degrade equipment, while remote locations increase operational complexity and cost.

Innovative flow-measurement solutions from Panametrics, a Baker Hughes business, drive reliability and uptime for geothermal operations. They reduce maintenance and labor costs with robust designs optimized for harsh conditions. High-precision measurement and reliable data management systems simplify regulatory compliance and help you make informed operational decisions. With Panametrics, harnessing geothermal energy becomes easier, more efficient, and more profitable.

Challenges of geothermal flow measurement

Geothermal power generates energy from naturally heated groundwater and steam, returning cooled water to the earth. Accurate measurement of steam, water condensate, water, and brine flow throughout the cycle is critical.

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However, geothermal plants are often located in remote areas and exposed to harsh environmental conditions, such as extreme temperature fluctuations and even seismic activity—not to mention the effects of geothermal fluids. Rapid degradation of traditional measurement instruments increases the frequency and cost of maintenance and repairs. Retaining skilled workers to install, maintain, and replace meters under challenging conditions creates significant costs. Consistent service and support can also be difficult to obtain. On top of this, maintenance may require production stoppages that decrease asset yield.

At Panametrics, we help unleash the potential of geothermal energy production with innovative products and expert, globally available support. As your partner, we help enhance efficiency, reduce costs, and support the safety and profitability of your operations.

Calpine's Lake View U-17

Steam flow

The natural mineral content of geothermal steam can rapidly deposit matter on the measurement surfaces of traditional meters, compromising data integrity. Proper operation requires regular cleaning and daily pressure bursts. The resulting flow variations can lead to inaccurate measurements. Standard meters also necessitate time-intensive reporting and substantial labor and resources for cleaning and upkeep, resulting in higher operational costs.

Ultrasonic flow meters: A reliable alternative

Ultrasonic flow meters provide consistently accurate and reliable readings without downtime, even with dirty steam. This is ideal for geothermal power plants seeking continuous operation under challenging conditions and compliance requirements. With advanced diagnostics, plant operators can remotely detect anomalies in the flow-measurement system to ensure trouble-free operation and reduce maintenance costs.

Panametrics DigitalFlow meters accurately measure steam mass flow rate with low maintenance and no pressure drop. Compact, nonobstructive transducers, placed in the pipe, measure flow using ultrasonic pulses. The system handles various pipe sizes and velocities in saturated and superheated steam.

Panametrics DigitalFlow GS868

This full-featured flow meter provides digital and analog output options for data transmission and can handle a wide range of pipe sizes and flow conditions. Installation is straightforward. The system includes transducers, preamplifiers, and an electronics console. The DigitalFlow GS868 offers diagnostic parameters and various output and display options for convenient data analysis and troubleshooting.

Panametrics DigitalFlow XGS868i

The DigitalFlow XGS868i offers a unique combination of rangeability, ease of installation, low maintenance, and accuracy in a cost effective transmitter. It shares the many advantages offered by Panametrics ultrasonic flow meters, including no pressure drop, no moving parts, and reliable, drift-free operation.

Calpine's Ridge Line U-7/8

Brine flow

Brine—water and water condensate containing high levels of dissolved salts and minerals—fills the underground reservoirs whose heat powers geothermal energy production. Naturally heated by the earth, it generates steam that powers turbine generators. Brine temperature, pressure, and flow rate are crucial to efficiency and output.

Traditional flow-measurement technologies, such as differential pressure and electromagnetic flow meters, often struggle with high temperatures and abrasive components. Brine leakages can occur when devices fail, creating environmental hazards, generate interruptions, and added costs. In addition to maintenance costs, repair, refurbishment, or calibration typically requires a complete process shutdown. This interruption can lead to significant production losses.

Choosing the right flow-measurement solution for brine applications reduces maintenance costs, increases accuracy, and provides peace of mind. Additionally, a flow meter that works with brine will deliver the same great outcomes with water and water condensate.

Clamp-on ultrasonic flow meters are nonintrusive, requiring no contact with the fluid and avoiding the complications of corrosive solutions such as geothermal brine.

The clamp-on advantage

Clamp-on ultrasonic flow meters are nonintrusive, requiring no contact with the fluid and avoiding the complications of corrosive solutions such as geothermal brine. This dramatically increases reliability and longevity. High accuracy enables fine optimization to drive maximum efficiency. Last but not least, they can be installed while the process is running.

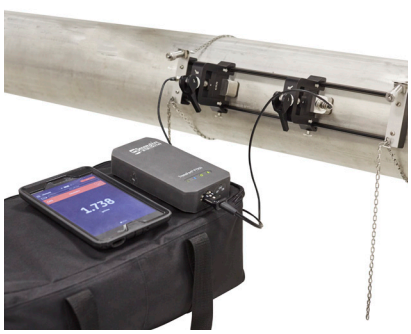
Portable testing options enable spot checks and diagnostics in remote locations without an external power supply. Because the clamp-on meters are nonintrusive, they can be installed in minutes without cutting into pipelines or shutting down the system, reducing downtime and minimizing the impact on plant operations. With a long, virtually maintenance-free service life, they reduce the total cost of ownership over the plant's life.

Panametrics AquaTrans AT600

The AquaTrans AT600 ultrasonic flow meter uses transit-time flow-measurement technique, with two transducers serving alternately as ultrasonic signal generators and receivers. Several outputs are available, including fluid velocity, volumetric flow, and totalized flow. The device is highly accurate, with an uncertainty of ±1% depending on pipe size and liquid velocity, making it ideal for measuring brine flow in geothermal power generation. It is all-digital, with no moving parts and low maintenance needs. Its weatherproof enclosure handles outdoor use.

Panametrics PanaFlow LC

This clamp-on ultrasonic flow meter features high-quality signal processing and is certified for hazardous areas. It is suitable for most pipe sizes and materials and can handle a variety of liquids with one, two, or three paths. For safety-critical applications, an optional SIL certification is available. A wide selection of transducers and support for digital protocols, such as HART, Modbus, and Foundation Fieldbus, provides unparalleled versatility.



Panametrics PT900

The Transport PT900 is versatile, portable, and easy to install, capable of making reliable measurements in demanding applications. It features a wide selection of transducers, wireless or wired communication from a tablet transmitter, and a user-friendly touch screen with a multiple-language interface. The meter can perform velocity, volume, mass, totalizer, and energy flow-rate measurements and is ideal for diagnostics in remote locations. With a fast-responding transmitter and 8 GB of data logging storage, the Transport PT900 makes flow-rate measurement manageable. It can also be used to check fixed-liquid meters and run flow surveys.

Partnering with Panametrics and Baker Hughes for geothermal energy success

We are your partner in realizing the potential of geothermal energy. Innovative technology driven by industry experience provides unparalleled accuracy and reliability, enabling you to optimize production, reduce downtime, and increase efficiency. Our products, services, and parts are globally available, and we can create custom solutions to fit your unique requirements.

Scan the QR code to learn more.

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