Fuji Electric

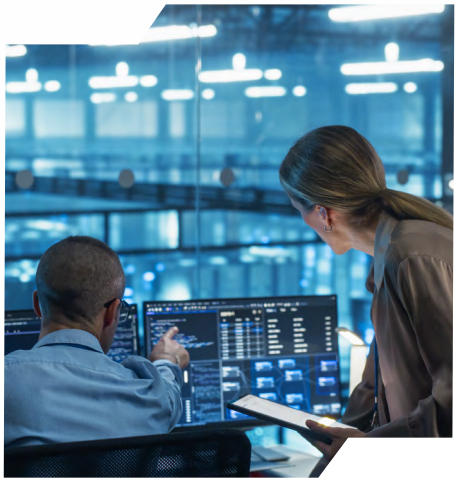
Innovating Energy Technology

Ensure precise control of secondary cooling loops in data center IT rooms

Data centers

Mots clés

- Secondary cooling loops
- Flow measurement
- Energy efficiency
- IT Service Continuity



Modern data centers, whether colocation, hyperscale or private cloud, host IT equipment with very high power density. Almost all of the electrical energy consumed by servers is ultimately dissipated as heat, which requires highly reliable and accurate cooling systems.

In this context, hydraulic secondary loops play a key role. They distribute chilled water or heat transfer fluid from exchangers, CRAH/CRAC or CDU units to IT rooms and server racks.

Flow stability, combined with temperature maintenance and good hydraulic balancing, directly determines cooling capacity, equipment availability and compliance with SLAs.

Industry benchmarks, operating targets and, depending on the jurisdiction, certain regulatory requirements drive continuous improvement in energy efficiency, including through indicators such as PUE and other operating KPIs. Operators are facing increasing expectations in terms of traceability, cybersecurity of supervision systems and reduction of water and energy consumption. Reliable and continuous flow measurement is therefore essential to finely manage installations and anticipate operating drifts.

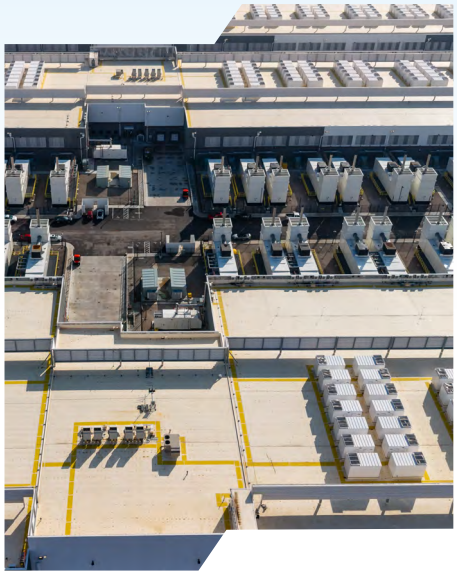
Operational challenges and issues

Data center operators face several critical issues on cooling secondary loops.

Variations in IT load, such as the activation of dedicated AI or machine learning servers, lead to rapid fluctuations in thermal requirements. Without accurate flow measurement, it becomes difficult to ensure consistent cooling, which can cause localised hot spots and increase the risk of an IT incident.

In addition, the availability constraints are very strong: any mechanical intervention on a pipeline in operation is complex, costly and potentially risky. The addition of an intrusive sensor often requires a major intervention on the piping and can, depending on the architecture of the site, impose a partial shutdown or an operation at risk for the continuity of service. Finally, operators must have reliable and communicating data to feed BMS, BMS or SCADA systems, in order to optimise hydraulic settings, detect imbalances and reduce energy consumption.

The extended Time Delta-C fixed ultrasonic flow meter, combined with two PT100 temperature probes, addresses these challenges by simultaneously measuring flow, return temperatures and thermal energy exchanged, providing a complete and usable view of the operation of secondary loops.



Control secondary loop flow rates with the extended Time Delta-C fixed ultrasonic flow meter

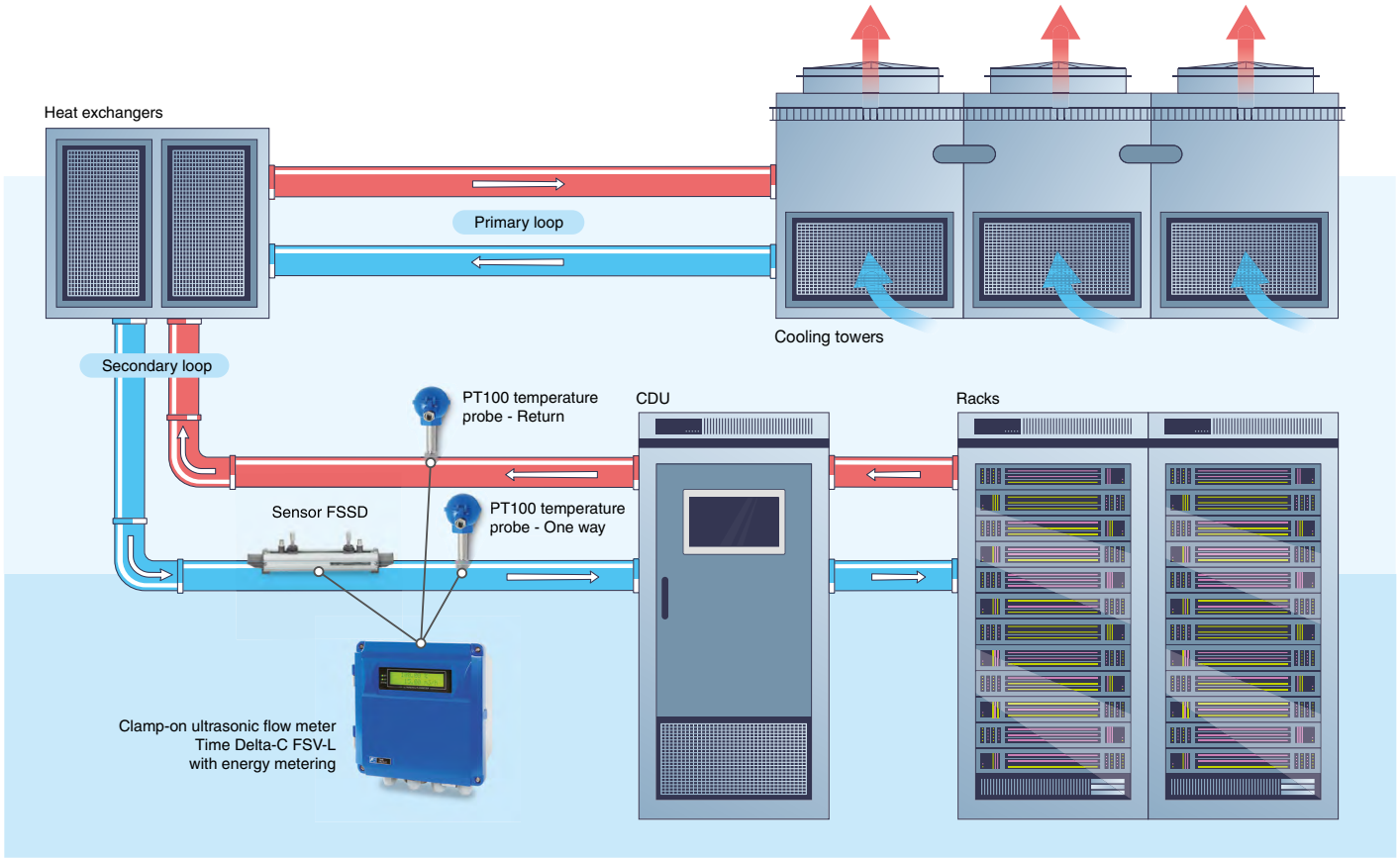
The Time Delta-C Advanced Flow Meter is an ultrasonic transit time flow meter designed for the measurement of liquids such as chilled water, hot water, or water-glycol mixtures used in data center cooling circuits.

Its measurement principle is based on the comparison of the propagation time of ultrasonic waves in the direction and opposite of the flow, guaranteeing excellent accuracy without direct contact with the fluid.

Thanks to its external sensors to be mounted on the pipe, the Time Delta-C ultrasonic flow meter can be installed without interrupting the process or modifying the piping. This is essential in IT rooms where availability must be maximised.

In addition to non-intrusive flow measurement, this solution incorporates two PT100 temperature probes installed on the outbound and return pipes. This configuration makes it possible to continuously measure the temperature difference and to directly calculate the thermal energy exchanged in the circuit.

On the technical side, the system provides a combined flow and temperature measurement, allowing real-time calculation of power and thermal energy. Data can be transmitted via analog outputs and industrial communication protocols compatible with data center supervision architectures. This allows operators to visualise energy performance, optimise hydraulic settings and improve the overall efficiency of cooling installations.



Benefits for data center secondary loops

+ **Secure IT room cooling with combined flow and temperature measurement.**
+ **Optimise energy efficiency by controlling the actual thermal power.**
+ **Monitor energy performance and operating drift in real time.**
+ **Improve the availability and lifespan of IT and HVAC equipment.**

A reliable and non-intrusive flow measurement solution for secondary cooling loops

Ultrasonic Flow Meter Time Delta-C Advanced with PT100 Probes

- **Combined flow and thermal energy measurement**
  Ultrasonic flow meter with energy metering.
- **Precision adapted to IT cooling circuits**
  Transit time technology with excellent repeatability.
- **Non-intrusive installation on secondary loops**
  Multi-diameter compatibility and mounting on existing pipes.
- **Simple integration with BMS and SCADA systems**
  Analog outputs and industrial communication compatible with data center BMS architectures.

Probe PT100

Clamp-on ultrasonic flowmeter
Time Delta-C FSV-L

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