Flow measurement technology for modern data center cooling systems

Supporting accurate, scalable flow measurement across enterprise and hyperscale cooling systems with affordable 0xDN and communication options that fit data center needs

Benefits at a glance

- Picomag's Bluetooth functionality is deactivated, allowing for the highest operation security in data center environments
- Supports a wide range of data center sizes, from small enterprise facilities to large hyperscale campuses
- Enables accurate flow measurement across diverse cooling architectures, pipe diameters and flow rates
- Proline Promag W 300's 0xDN design eliminates the need for straight pipe runs, helping reduce footprint in spaceconstrained mechanical rooms
- Picomag and Proline Promag W 300 provide conductivity measurement as a standard for maximizing the efficiency of every measurement point
- Introduces no pressure loss, supporting energyefficient cooling system operation
- Provides reliable, bidirectional flow measurement largely independent of pressure, temperature, density and viscosity

Summary Modern data centers are under increasing pressure to improve cooling efficiency while navigating tighter mechanical spaces and rapidly evolving system designs. Precise, reliable flow measurement has become essential, but traditional instrumentation often requires straight pipe runs that consume valuable footprint.

Challenge Data centers vary widely in size and design, ranging from smaller enterprise facilities to large hyperscale campuses, each with unique cooling architectures, flow rates and space constraints. As facilities scale up or evolve over time, cooling systems must accommodate different pipe diameters, flow demands and layouts without sacrificing measurement

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accuracy or reliability. This diversity makes it difficult to standardize instrumentation, especially when traditional flowmeters require long straight pipe runs or introduce pressure loss — limitations that become increasingly problematic in large, complex mechanical rooms and central utility plants common in modern data centers.

Data centers face escalating demands for cooling efficiency, compact system design and precise flow measurement. Limited mechanical space and evolving cooling technologies require instrumentation that delivers high accuracy without traditional installation constraints.

Many data centers also operate under strict security protocols that prohibit the use of any hardware with active wireless communication capabilities. In these tightly controlled environments, operators must ensure that instrumentation cannot introduce unintended access points or external connectivity risks. For facilities where wireless technologies are not allowed, a hardwired, non-wireless measurement solution becomes essential. Flow instruments designed with wireless functions fully deactivated at the factory help data centers maintain compliance with their security policies while still achieving accurate, reliable measurement within constrained mechanical spaces. This approach ensures operators can meet both operational and cyber security requirements without compromising system visibility or performance.

Our solution Endress+Hauser addresses these challenges with Picomag Inline electromagnetic flowmeter. Designed for secondary cooling loops, water treatment and utility monitoring in modern data centers, the meter enables full measurement accuracy, eliminating footprint limitations.

Picomag's compact, cost-effective design, plus optional wireless features suitable for controlled environments, provides flexibility and operational insight for high-density data center architectures while also including additional outputs like conductivity to provide multivariable out of a single device. Picomag can be delivered with Bluetooth® deactivated from the factory for installations that prefer a non-Bluetooth default. In this configuration, the device integrates seamlessly through IO-Link or standard signal outputs — 4–20 mA current, pulse, switch or 2–10 V — offering a controlled starting point ideal for secure or regulated environments.

Endress+Hauser's Proline Promag W 300 electromagnetic flowmeter (0xDN)

Endress+Hauser's Proline Promag W 300 electromagnetic flowmeters are well suited for use in large data

Endress+Hauser's Picomag Inline electromagnetic flowmeter

centers where high-volume water distribution, reliability and long-term accuracy are critical. Its 0xDN design eliminates the need for upstream and downstream straight pipe runs, reducing overall piping costs and simplifying engineering, design and procurement by removing concerns about piping configuration and meter placement. In practice, operators can specify a Promag W 300 sized directly to the line—such as a 6-inch meter for a 6-inch pipe—without needing to finalize the exact installation location early in the project.

Designed for demanding water and wastewater applications, Promag W 300 supports very large nominal diameters and wide measuring ranges, making it appropriate for primary cooling loops, utility water distribution and central plant infrastructure common in hyperscale facilities.

Its electromagnetic measuring principle delivers accurate, bidirectional flow measurement that is largely independent of pressure, temperature, density and viscosity, while introducing no pressure loss—an advantage in complex mechanical rooms. Robust sensor construction with IP68 protection, corrosion-resistant materials, and compact or remote transmitter configurations supports reliable operation in harsh mechanical environments.

Integrated diagnostics and verification via Heartbeat Technology, along with digital connectivity and an embedded web server, provide operators with the visibility and confidence needed to maintain uptime and efficiency at scale.

Results No matter what your flow application needs are, Endress+Hauser offers the technology and portfolio to support a wide variety of liquid cooling applications.

In smaller data centers, using Endress+Hauser's Picomag Inline electromagnetic flowmeter allows data center operators to gain reliable flow measurement in tight mechanical spaces. The technology supports scalable architectures, reduces installation restraints and enhances cooling system performance.

For larger data center environments, Endress+Hauser's Proline Promag W 300 electromagnetic flowmeters enable accurate, reliable flow measurement across primary cooling loops and central utility systems. Designed to handle large pipe diameters and high flow rates, Promag instrumentation supports the scale and complexity of hyperscale and campus style data centers without introducing pressure loss or requiring straight pipe runs. Its robust construction and advanced diagnostics provide long-term measurement stability in demanding mechanical environments, while digital connectivity and verification capabilities give operators greater visibility into system performance.

With the use of electromagnetic flow technology, these benefits help data center operators maintain cooling efficiency, support future expansion and ensure reliable operation at scale.

Learn more about Endress+Hauser and its data center operations

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