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Water Flow Measurement in Data Centers

Application Note: W-AN27



Industry

Data Centers

Application

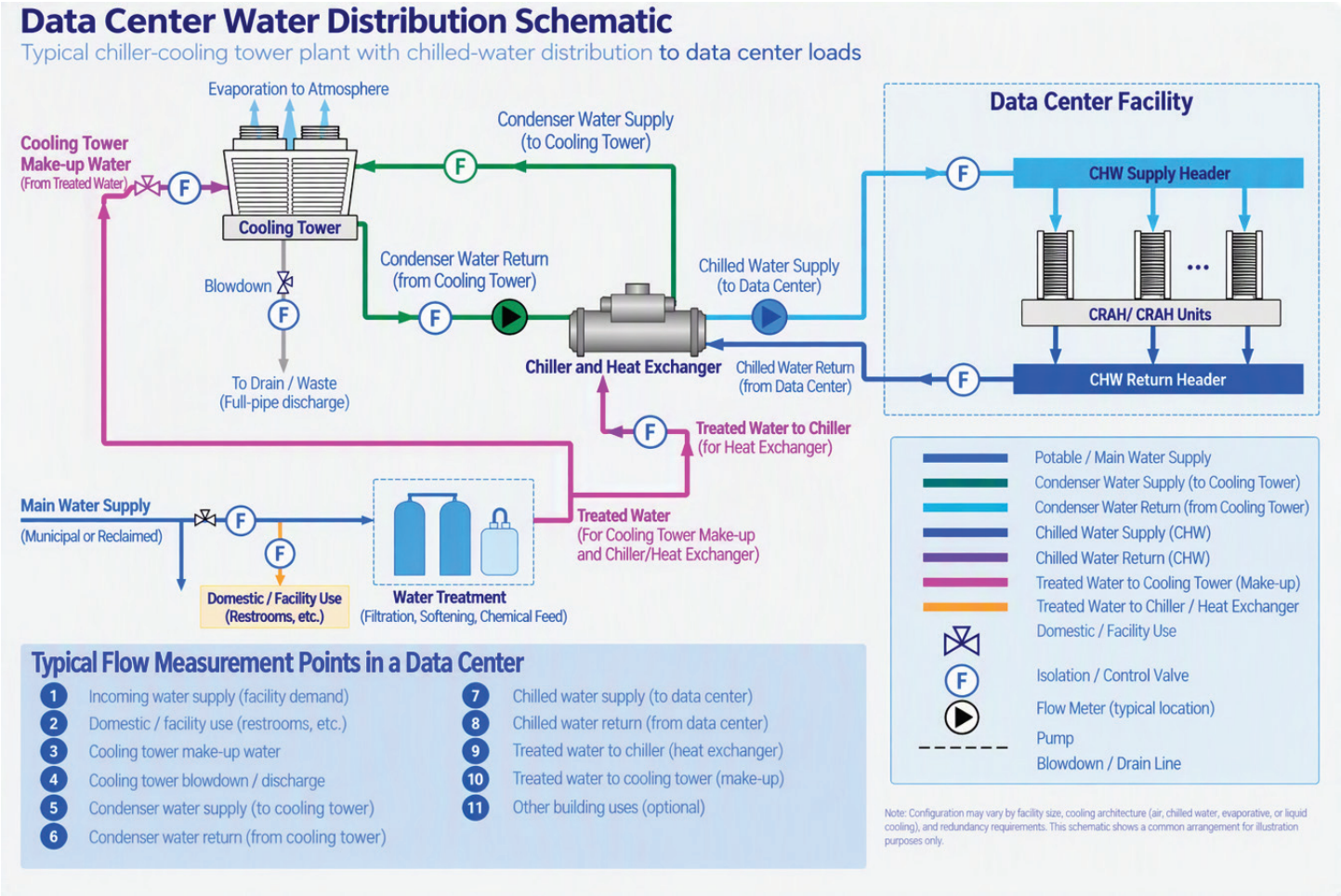
Managing Water in a Growing Data Center Industry

Challenge

Data centers range from enterprise/on-premises facilities serving a single organization, to colocation facilities hosting equipment for multiple customers, hyperscale/cloud data centers supporting very large computing environments, and increasingly high-density AI/HPC facilities. Regardless of size, maintaining reliable thermal management is fundamental to data-center operation.

Cooling approaches vary according to facility size, computing load, climate, equipment requirements, and water availability. They can include air cooling, chilled-water systems, evaporative cooling, and liquid cooling. Water-cooled systems use circulating water to transfer and ultimately reject heat generated by IT equipment.

Consequently, understanding where water is going, how much is circulating, and whether flow is within the expected operating range is becoming increasingly important.



Where Flow Measurement Is Needed

In water-cooled data centers, flow measurement can be useful at several points within the facility:

Facility Water Supply: Measuring incoming municipal, reclaimed, or other suitable source water gives operators visibility into facility water demand.

Domestic and Facility Water Use: Measuring water supplied to restrooms, cafeterias, kitchens, cleaning stations, and other facility services helps operators distinguish domestic demand from cooling-system consumption and develop a more complete site water balance.

Cooling-Tower Make-Up Water: Cooling towers lose water through evaporation and therefore require make-up water. Measuring this flow can support monitoring of cooling-system water demand.

Cooling and Chilled-Water Circulation: Chilled-water systems circulate water through piping and heat exchangers to remove heat from the data-center environment. Flow measurement at appropriate locations can provide operators with another operational parameter for understanding water movement through these systems.

Cooling-Tower Blowdown and Discharge: Evaporation concentrates minerals, total dissolved solids (TDS), and biological contaminants, which can reduce cooling-system efficiency. Periodic blowdown controls this buildup, while measuring the flow or volume of discharged blowdown water helps track water use and make-up requirements.

Indicative Data Center Water Applications and Pipe Sizes

Facility Type	Typical Measurement Points	Indicative Pipe Range
Enterprise/ Edge	Main supply, make-up water, building cooling loops, full-pipe discharge	4–12 in.
Colocation	Main supply, cooling-tower make-up, chilled- and condenser-water loops	4–20 in.
Hyperscale/ Cloud	Campus supply, central headers, building loops, make-up water	6–36+ in.
AI/HPC Campus	Campus supply, central cooling-water, headers secondary distribution	6–40+ in.

Solution:

The Teledyne Valeport Water Model 804 is an insertion electromagnetic flow meter designed for conductive liquids in full, closed pipes. Its architecture is particularly well suited to new or existing data-center water lines where installing a conventional full-bore meter would require significant piping modification or system downtime at a much higher cost. It is suitable for flow measurement across the data centers because of following features:

- Broad pipe coverage: 4 to 80 in. (100 to 2,000 mm)
- Wide operating range: bidirectional velocity measurement
- Specified accuracy: ±2% under steady, fully developed flow conditions
- Hot-tap capability: installation or removal without interrupting the water supply
- Flexible integration: RS485/Modbus RTU and pulse outputs, with optional Display Hub support for local indication and additional outputs including 4-20 mADC
- Additional process visibility: integrated water-temperature measurement help in thermal management and a pressure-monitoring port
- Rugged construction: IP68/NEMA 6 enclosure for demanding environments
- Flexible deployment: battery-powered or external-power configurations with multiple insertion lengths

User Benefits:

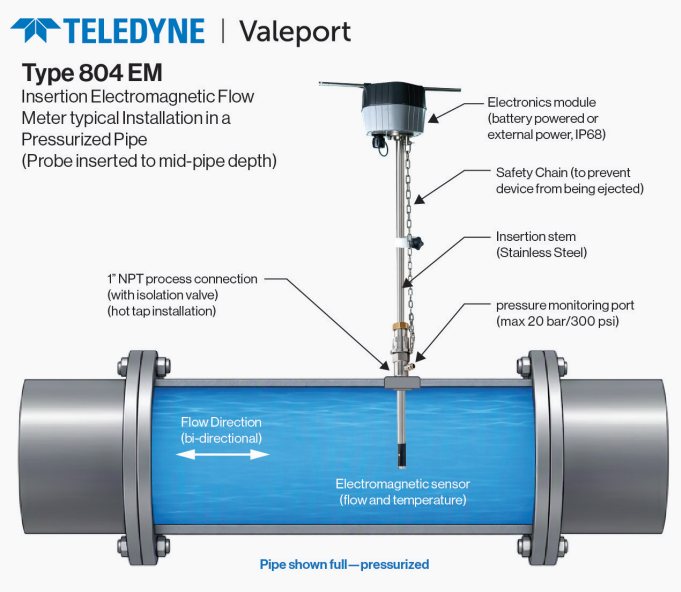
- Lower retrofit disruption: hot-tap installation minimizes shut-down requirements and avoids major pipe modifications.
- Economical large-pipe measurement: one insertion-meter platform covers a wide range of pipe diameters without a size-matched full-bore meter body.
- Improved operational visibility: continuous flow information supports troubleshooting, pump and cooling-system monitoring, and confirmation of expected water movement.
- Water-management support: measurement of supply, make-up, circulation, and discharge flows helps operators develop site water balances and evaluate conservation efforts.
- System connectivity: standard communications simplify integration with compatible PLC, SCADA, telemetry, building-management, or facility-monitoring systems.
- Scalable standardization: the same technology can serve building-level loops, central plants, and large campus headers.

Teledyne Valeport Water Model 804 is an insertion electromagnetic flow meter

The Type 804 EM is a fully waterproof, electromagnetic insertion flow meter that offers industry standard performance coupled with robust build quality and reliability, all backed up with Teledyne's exceptional customer service and support mechanisms.

The Type 804 flow meter will measure bi-directional flow rates as low as 0.02 m/s-1 (0.07 f/s) and up to 5 m/s-1 (16 f/s) with accuracies of better than 0.002 m/s-1 (0.006 f/s) possible. Add a real-time temperature measurment and flexible interfacing protocols, here is a tool that can help manage your water distribution networks.

A highly cost effective solution due to reliability, ease of installation and recovery, with no interruption to supply, for pipe diameters from 100 mm to 2000 mm (4 in to 80 in).



Teledyne ISCO is continually improving its products and reserves the right to change product specifications, replacement parts, schematics, and instructions without notice.