Liquid-cooled data center solutions



Overview

Data Center Liquid Cooling: The AI Heat Solution Advanced AI chips are generating more heat in data centers, necessitating improved cooling solutions. Liqu.

Key Takeaways

Liquid cooling is rapidly becoming the standard for modern data centers, offering superior heat removal, energy efficiency, and support for high-density AI workloads. Why Liquid Cooling is EssentialTraditional air cooling struggles to manage the heat generated by modern high-performance servers, especially AI and GPU-intensive workloads. Racks now commonly exceed 30-100 kW, with some NVIDIA GPU racks reaching 132 kW and projected to hit 240 kW per rack, far beyond the capabilities of air cooling systems.

Liquid cooling provides up to 3,000 times more effective heat removal by capturing heat directly at the chip level, enabling higher rack densities and improved performance. Types of Liquid CoolingDirect-to-Chip (D2C) Cooling: Cold plates are mounted directly on CPUs, GPUs, memory, and voltage regulators. Coolant circulates through these plates, removing 70%-80% of heat at the source, reducing the load on facility-level cooling infrastructure.

Immersion Cooling: Entire servers are submerged in dielectric fluids. Single-phase immersion: Coolant absorbs heat and circulates through heat exchangers. Two-phase immersion: Coolant vaporizes upon heat absorption and re-condenses, offering extremely high efficiency.

This method is particularly effective for AI model training, HPC clusters, and crypto mining where rack densities exceed 80-100 kW.

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Benefits

Energy Efficiency: Liquid-cooled data centers achieve PUE scores below 1. 2, compared to 1. 4–1.

6 for air-cooled facilities. Water Conservation: Many liquid-cooled designs eliminate the need for water-based cooling towers, saving millions of gallons annually. Operational Savings: Despite higher upfront costs, densification and reduced energy use typically deliver ROI within 2-4 years.

Design Flexibility: Smaller, denser data halls are possible without large air plenums or ducting, optimizing real estate in high-cost regions. Sustainability: Liquid cooling can cut energy use by 30-60% and reduce carbon emissions, supporting environmentally responsible operations.

Industry Adoption

Hyperscale cloud providers like Microsoft Azure, Google TPU clusters, and Meta's LLaMA training nodes have adopted liquid cooling to support AI workloads. Colocation providers, including Digital Realty and Equinix, are deploying liquid-ready suites to accommodate high-density AI and ML workloads.

Conclusion

Liquid cooling is no longer optional for modern data centers. It enables higher performance, sustainability, and operational efficiency, making it critical for AI, HPC, and other compute-intensive applications. By directly addressing heat at the source, liquid-cooled data centers are shaping the future of high-density, energy-efficient computing.

Article Content

Data Center Liquid Cooling: The AI Heat Solution

Advanced AI chips are generating more heat in data centers, necessitating improved cooling solutions. Liquid cooling is becoming a viable alternative to traditional fan-based systems.

Liquid cooling solutions for AI and high-density data

Explore why data center liquid cooling is essential for optimizing performance, reducing energy costs, and enabling the scalability required for next-generation

DCX Liquid Cooling Systems

DCX Liquid Cooling Systems is an EU-based premier global manufacturer of comprehensive liquid cooling solutions – the essential component of AI

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Data Center Liquid Cooling Solutions | nVent

Liquid cooling can help data centers increase capacity while maintaining efficient space and energy use. These systems can provide an effective solution for achieving the required temperature parameters

Liquid and Immersion Cooling Options for Data Centers

Learn about the future of data center cooling and how liquid cooling solutions support high-density computing and enhance performance and energy efficiency. Explore our solutions now!

Liquid cooling: the future of data center architecture and

Liquid cooling is emerging as a key enabler of sustainable data center operations. By transferring heat directly from servers into a liquid medium –

Liquid Cooling

Liquid-to-Air CDU provides a closed-loop liquid solution that eliminates the need for raised floors or extensive piping, and seamlessly integrates with direct-to-chip cooling for superior performance.

Liquidpulse – Data Center Cooling Solutions

Liquidpulse designs and manufactures advanced liquid-cooled load banks and cooling solutions that keep high-density data centers running at peak

IT News Online

As the use of AI continues to grow, demand for data center capacity is rising faster than what can be supplied, and one of the biggest challenges is efficiently meeting growing power

Datacenters that make sense | Liquid Cooling at Scale | Submer

Company specializing in immersion liquid cooling solutions for data centers. We create liquid-cooled datacenters that scale smarter, run cleaner and cost less.

Top 10: Liquid Cooling Companies | Data Centre Magazine

Discover the leading liquid cooling companies transforming data centre infrastructure with sustainable, high-performance thermal management solutions

Accelsius – Designed for the Mission Critical

Accelsius LLC is the unrivaled leader in liquid cooling for modern data centers. Our unique Accelsius Ascent Model guides you on a tailored, scalable journey from

TTK Leak Detection

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In this cutting-edge data center, where an in-row cooling solution is implemented, the client seeks a reliable water leak detection system to monitor

Eaton signs agreement to acquire Boyd Thermal, expanding solutions

Expands Eaton''s existing data center portfolio, offering a global solution to serve hyperscale and colocation customers from the chip to the grid Further augments Eaton''s aerospace

Data center industry news, analysis, and opinion

DatacenterDynamics is the world''s largest data center publication. We publish news, magazine features, and podcasts about the hyperscale & cloud, colocation & wholesale, generative

Home of Data Centre News

Data Centre Magazine connects the leading data centre executives of the world''s largest brands. Our platform serves as a digital hub for connecting industry

Upgrade legacy data centers for AI workloads with RDHx liquid cooling

The good news is many of these servers come in air-cooled versions, and cooling solutions exist for air-cooled servers that can support densities up to 72kW per rack. The challenge

Ecolab Inc.

Acquisition accelerates Ecolab''s sales growth by significantly expanding its Global High-Tech growth engine, creating an end-to-end fluid management and cooling platform for AI data

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Website: https://fdsoluciones.es
Technical inquiry: https://fdsoluciones.es/project-enquiry.html

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

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