

Energy-efficient constant-temperature server racks for intelligent computing centers



Overview

Parker Hannifin's Elvis Leka and Josh Coe detail how direct-to-chip liquid cooling, careful routing, low-restriction couplings and advanced monitoring and control can be combined to manage high heat loads while preserving rack density and system efficiency. Energy-efficient racks are designed to address these challenges by optimizing airflow, power usage, and system performance. Unlike traditional server racks that mainly support CPU-based enterprise applications, AI racks are engineered for GPU-intensive. AI computing is redefining data center energy density, with 100 kW racks fast becoming the standard and megawatt-class deployments approaching reality. GOTTOGPOWER in row precision cooling, also known as row-based cooling, places cooling units directly between server racks, bringing cooling. Flex, the global partner of choice for advanced manufacturing, data center IT and power infrastructure solutions from the grid to the chip, offers customizable server designs engineered to the specific power, compute, and cooling demands of hyperscalers and enterprise customers.



Article Content

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Experimental and optimization research of the rack thermal

Abstract Dynamic fluctuations in server power consumption significantly impact the thermal environment within the rack and the efficiency of computer room air conditioners (CRACs),

Top Methods for Efficient Server Rack Cooling

This guide of gbc engineers explores the fundamentals of server rack cooling, and innovative technologies shaping the future of cooling infrastructure.

Best Practices Guide for Energy-Efficient Data Center Design

This guide provides an overview of best practices for energy-efficient data center design which spans the categories of information technology (IT) systems and their environmental conditions, data center

Optimization of the thermal environment of a small-scale data center in ...

This paper chooses a small-scale data center located in China to analyze the thermal environment for the operation of these critical equipments. The wind speed and temperature in the

AI-driven cooling technologies for high-performance data centres:

The increasing computational demands of artificial intelligence (AI), high-performance computing (HPC), and hyperscale cloud platforms are placing significant thermal and energy

Huawei AI Data Center Reference Design

of multi-scenario intelligent computing centers. This manual is both a phase summary of Huawei's exploration of intelligent computing center construction and a roadmap to the next-generation data

Coolant Distribution Unit (CDU) | CDU Liquid Cooling

Why use a coolant distribution unit? As computing chip power increases, liquid cooling becomes the necessary cooling technology to replace conventional air

Towards energy-efficient data centers: A comprehensive review of ...

With the rapid growth of cloud computing, the number of data centers (DCs) continuously increases, leading to a high-energy consumption dilemma. Cooli

Compact thermal management strategies for next-gen

New AI data centres require more power and generate more heat; as a result, these new facilities need additional cooling. The irony is that AI server

Data Center Equipment List: Every Part Explained (2026)

A full data center equipment list for 2026: servers, racks, power, cooling, and network gear, with what each part does and why your build needs it.

Energy-Efficient Racks for AI & HPC: Designing for High

Learn how energy-efficient racks for AI & HPC manage high power density using advanced cooling, smart power distribution, and optimized rack

In Row Precision Cooling: The Future Of Efficient Data Center

GOTTOGPOWER in row precision cooling, also known as row-based cooling, places cooling units directly between server racks, bringing cooling closer to the heat source. This design

AI Data Center Server Rack: Design, Power, and

Explore AI data center server rack design, covering GPU density, power architecture, cooling systems, networking, and future infrastructure trends.

Efficient Cooling System of Cloud Data Center by Reducing Energy ...

We analyze energy consumption trends and show that by using appropriate optimization techniques guided by our energy consumption models, cloud data centers may save 20% of energy.

AI Rack Cooling: Applying Directed Energy Thermal

Discover proven cooling strategies for high-density AI and HPC racks from 50 kW to 1MW+. Learn how two-phase direct-to-chip cooling—adapted from advanced

Integrated, scalable, and liquid-cooled compute racks for AI data centers

This high-efficiency CDU architecture integrates seamlessly into high-density racks, enabling hyperscalers to meet evolving thermal management needs without compromising on energy

Rack-level cooling technologies for data centers – A comprehensive ...

As the heat flux density of electronics increases, the energy-efficient cooling technology becomes a concerned issue for solving the problem of high cooling energy consumption in data

Numerical study on the optimal power distribution of server racks in a ...

Data centers, as the infrastructure of all information services, cost tremendous amount of energy. Reducing the hot spot temperature in the data center room is benefit to prevent overheating

Research on cooling performance of a built-in cooling equipment for ...

To address the challenges of high energy consumption and the significant risk of overheating associated with cooling systems in data centers, a rack-based cooling equipment was

The Innovations Powering AI Chip Cooling in the Data Age

The shift to liquid cooling and intelligent, AI-driven thermal management enables higher performance, greater sustainability, and lower total

AI-driven cooling technologies for high-performance data centres:

This RDHx schematic highlights how rack-level thermal isolation and higher return water temperatures improve energy efficiency and facilitate integration with hybrid systems.

A Free Guide to Data Center Racks

Learn how to choose data center racks, their technical features, and maintenance considerations for optimal performance and efficiency.

Comprehensive Guide to Rack Cooling in Data Centers

Whether for new AI training centers or upgrading traditional facilities, Attom delivers efficient, safe, and sustainable rack cooling solutions that help data centers stay cool, stable, and high-performing in the

Improving Data Center Efficiency with Rack or Row Cooling Devices

Rack- and row-mounted, close-coupled cooling devices are more efficient than computer room cooling devices. Rack- and row-mounted devices are appropriate for legacy data center retrofit upgrades as

Optimizing Cooling Efficiency in Modern Data Centers

Optimizing Cooling Efficiency in Modern Data Centers Cooling systems in data centers account for roughly 30% to 40% of total energy

Server Rack Heat Dissipation in Next Generation In-Row Architectures

In addition to the increase in efficiency, the Hot Aisle containment also increased the effectiveness of the data centre through the 1.8 C temperature drop at the server inlet.

Contact Us

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