Liquid-cooled rack solutions to address power, heat, and scale challenges in the AI era

Flex OCP ORv3-inspired liquid-cooled systems are designed to support the most demanding artificial intelligence (AI) and high-performance computing (HPC) workloads, efficiently cooling up to 120kW per rack and beyond. These racks are integrated with single-phase liquid cooling and enabled for two-phase liquid cooling.

The future of AI data centers

The rapid adoption of Generative AI, AI-enabled applications, and HPC workloads has accelerated the demand for advanced computing that requires high-power GPUs and AI accelerators. With this increased performance comes tremendous power consumption and heat generation.

Typical server processor Thermal Design Power (TDP) is scaling from 250W to 350W, with roadmaps to 500W+, and GPUs are on the path to scale from 800W today to 1200W and beyond. Liquid cooling has become a necessity, driving cloud service providers to re-architect the data center with the necessary IT infrastructure and cooling to support these higher thermal and power requirements.

Scale performance with liquid cooling

As AI-enabled applications and other high-performance workloads push the limits of conventional cooling methods, the need for advanced solutions becomes critical. Flex has developed customizable, open standards based server and rack designs that integrate JetCool's SmartPlate™ direct-to-chip liquid cooling products. JetCool's patented microconvective cooling® technology extends the value of single-phase, direct-to-chip liquid cooling deployments to over 1,500W per socket, more than enough headroom to accommodate the most advanced AI servers.

The Flex liquid-cooled system and rack solutions provide a versatile platform for hyperscalers and data center customers to design customized AI chip architectures and tailored server configurations to meet their unique performance requirements. Flex liquid-cooled rack solutions have these key benefits:

- **Enhanced cooling capacity:** Advanced liquid cooling technology enables substantially higher processor power and increased thermal densities.
- **Maximize energy efficiency:** Outperform traditional node and rack air cooling, significantly reducing power consumption by up to 4kW per rack.
- **Increased serviceability:** Based on open standards rack architecture, front-access design supports hassle-free installation and maintenance with blind mate connections for power and liquid cooling system.
- **Management control system:** Enables detailed monitoring and control of flow rates, temperatures, and speeds, ensuring precise system management.

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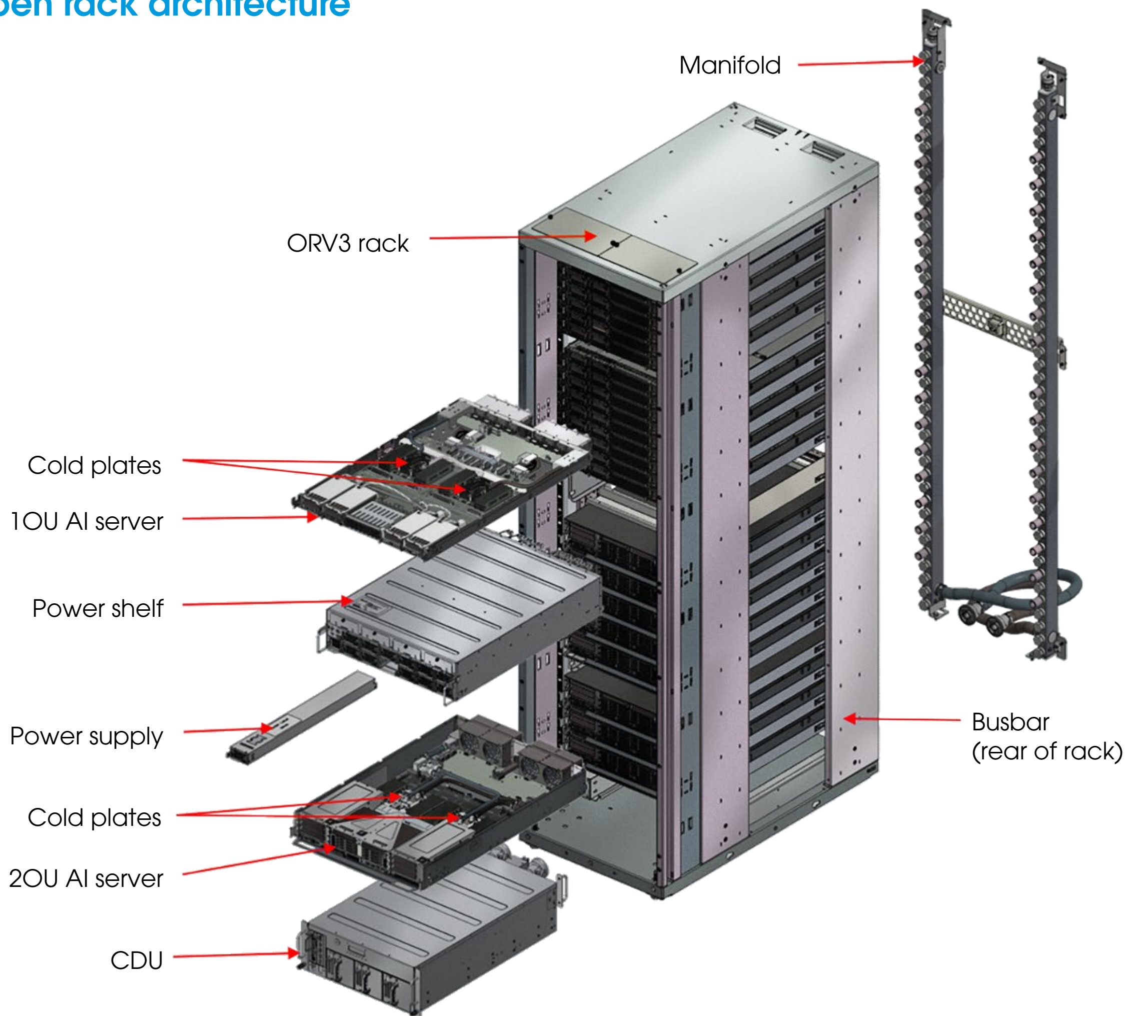
Flex open rack architecture



From design to global deployment

Flex delivers advanced manufacturing, data center IT, and power infrastructure solutions from the grid to the chip, and product lifecycle services to address industry-wide challenges with power, heat, and scale.

The company's cloud-focused manufacturing services span the value chain to support the mass deployment of vertically integrated data center racks—from sourcing of materials and private-label components to the design, manufacturing, fulfillment, and sustainable maintenance of servers, storage, racks, cabling, switches, bus bars, power shelves, and battery back-up, coupled with liquid cooling technologies.

Key features

21-inch open rack V3

- ORv3 design customized to your requirements, including 19″ footprints
- 29% more front space available
- Optimized front-to-back airflow

High-density power shelf

- 48V DC directly connected to IT equipment
- 3OU form factor with enclosure management
- Twelve 5.5kW power supplies for 66kW, expandable to 132kW +132kW N+N redundancy
- Titanium+ efficiency power supplies

Modular compute platform

- 2OU form factor, DC-MHS 2.0 compatible
- Supports JetCool® SmartPlate™ cold plates
- Single Host Processor Module (HPM) supports up to two Intel® Xeon® 6900 series processors
- Flexible PCIe I/o expansion: Up to six PCIe add-in cards with support for double-wide GPU cards
- Single OCP 3.0 card
- Flex Secure Module, DC-SCM 2.0 compliant

Liquid cooling

- Single-phase direct-to-chip technology
- Supports higher thermal densities
- Increases node and rack-level power efficiency
- 6OU in-rack Coolant Distribution Unit (CDU) cools up to 120kW, with upgrade path to 300kW to support the next-generation GPU and AI accelerators
- Rack manifold provides blind make quick disconnects for easy installation and maintenance

High-voltage DC busbar

- Eliminates the need Power Distribution Units (PDU)
- High-efficiency rack-level power delivery
- Supports up to 120kW per rack

Flex (Reg. No. 199002645H) is the manufacturing partner of choice that helps a diverse customer base design and build products that improve the world. Through the collective strength of a global workforce across 30 countries and responsible, sustainable operations, Flex delivers technology innovation, supply chain, and manufacturing solutions to various industries and end markets.

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