CompuDynamics™
UPTIME IN NO TIME

Direct-to-Chip Liquid Cooling

Complex liquid cooling for high density racks at a hyperscale data center in North Carolina.

As high-performance computing (HPC) and artificial intelligence (AI) reshape IT infrastructure, cooling technology has become critical for optimal data center performance. With rising computing demands, traditional air-cooled solutions often fall short, paving the way for advanced liquid cooling methods. Since 2002, Compu Dynamics has built a comprehensive data center solutions portfolio, offering services like white space integration, liquid cooling, and specialized installations for electrical, mechanical, and low-voltage systems. Compu Dynamics' expertise in data center innovation positions it at the forefront of implementing cutting-edge liquid cooling solutions for clients' specific needs.

Real Expertise, Real Stories.

From design to deployment, Compu Dynamics delivered a full **electrical fit-out and direct-to-chip liquid cooling solution** for a global investment firm at a hyperscale data center in North Carolina.

Compu Dynamics' expertise in water-cooled technology ensured technical precision and adherence to top operational standards.

The electrical fit-out included installing new 1200A distribution panels, 480V and 208V feeders, busways, and overhead conveyance system. The mechanical setup featured Motivair CDUs and hot aisle containment to enhance cooling efficiency and airflow. Secondary piping loop with motorized control valves and auxiliary sensors for temperature, flow, pressure, and leak detection were installed under the raised floor. This entire setup was integrated with the client's Building Management System (BMS) for dynamic environmental monitoring. During commissioning, water-cooled load banks simulated operational loads to fine-tune the CDU systems, and optimize them for the client's IT environment.

Project Scope:

- Installation of new 1200A PDUs
- 480V and 208V feeders, busways and tap boxes
- Overhead conveyance systems for cable management
- Grounding
- Hot aisle containment
- Motivair CDUs installation and integration
- Secondary loop mechanical piping under raised floor
- Motorized Control Valves
- BMS integration and auxiliary sensors for temperature, flow, pressure, leak detection
- Commissioning via water cooled load banks
- Balancing and fine-tuning the CDU systems

Things to consider before beginning liquid cooling deployments

Here is a starting point for the many new design considerations that one must address when planning a high-density liquid cooling installation:

Power and Density:

- Rack power densities (day one and future)
- Total POD power density (day one and future)
- CDU selection (matching capacity and POD density)
- CDU redundancy (N+1 or N+?)
- Spare CDU loop taps for future expansion

Infrastructure and Materials:

- Piping material selection
- Drip pans and leak detection
- Building supports: Will the ceiling grid support new overhead piping? Will the raised floor support rack weight and/or CDU?

Fluid Flow and Cooling:

- At the chip level: target fluid flow rate and operating temperatures
- In-rack manifolds: port-quantity / size / fitting type and flow control devices
- Secondary POD piping location (overhead or bottom)
- Secondary loop redundancy (isolation and bypass)
- Primary and secondary loop filtration.

System Integration and Maintenance:

- BMS integration and auxiliary sensors (temperature, flow, pressure, leak detection)
- System validation, commissioning, operation, maintenance, and repair

Benefits of working with Compu Dynamics:

Compu Dynamics encompasses all the skills and expertise needed to deliver end-to-end solutions for data center tenants and operators. As our customers' needs evolve throughout the life cycle, we tailor our solutions to match each phase.

- We meet with customers to evaluate specific needs, identify the best solutions, and develop a detailed scope of work.
- Provide comprehensive design schematics, permit documents, and product specifications.
- Deploy state-of-the-art liquid cooling systems that meet current and future standards.
- Installation of complete heat rejection systems, if not already present.
- Complete start-up, validation and commissioning, training, and provide essential O&M documents.
- 24/7 support is available for emergency response, backed by a full one-year warranty.

It is essential when embarking on a high performance fluid-to-the-rack project for AI or any high density deployments that data center owners proceed with the best available knowledge and resources at hand to ensure a smooth implementation process. A successful liquid cooling strategy needs the right partner who is vendor agnostic, and can design, build, and support the infrastructure throughout its life cycle.

LEARN MORE

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For full solutions details, visit compu-dynamics.com.