INNOVATION WITH PURPOSE
ALLEGRO microsystems

COOLING THE CLOUD

Unlocking efficiency in data centers with advanced thermal solutions

The relentless growth of data demands, fueled by high-performance computing (HPC) and AI, presents significant thermal management challenges for servers and cloud infrastructure. Increasing heat densities, rising energy costs, and environmental concerns demand innovative cooling solutions.

As power demands rise, thermal management evolves beyond traditional air and liquid cooling to innovative methods such as single-phase, dual-phase, liquid-phase immersion, and direct-to-chip cooling. Solutions to support these techniques rely on intelligent motor drivers, integrated current sensors, and 3D magnetic position sensors.

For efficient, seamless operation in 12V and 48V server fans, Allegro's intelligent, code-free BLDC motor drivers leverage high-speed capabilities and integrated sensorless sinusoidal and Field-Oriented Control. Additionally, enabling effective thermal management, our integrated current sensors deliver high accuracy and precise current monitoring – crucial for real-time heat load assessment and cooling optimization in condenser pump heat exchangers or rack coolant distribution units. Furthermore, for improved energy efficiency and optimized heat removal, our precise 3D magnetic position sensors provide feedback for valves and dampers in datacenter cooling systems to regulate air and coolant flow.

Allegro's advanced solutions seamlessly integrate with both air and liquid cooling architectures, delivering critical thermal management to meet the rising power demands of datacenters.

What you can achieve with Allegro solutions

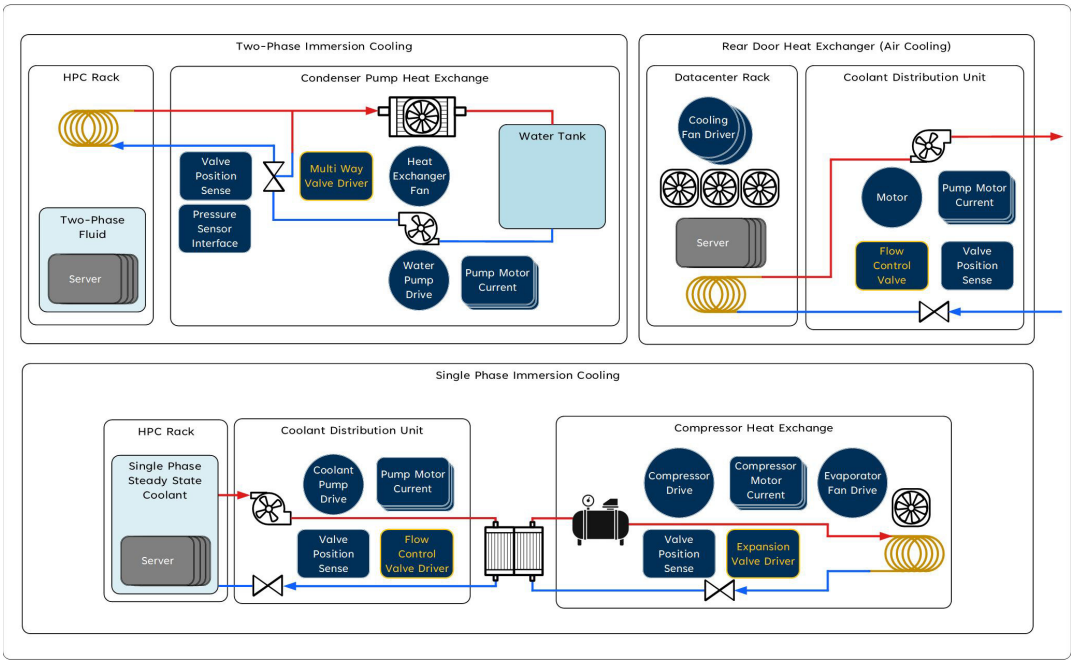
- **Precision Thermal Monitoring:** Accurate real-time monitoring of temperature-critical components, enabling proactive thermal management and preventing costly downtime.
- **Intelligent Fan Control:** Facilitate precise fan speed control, optimizing airflow and minimizing energy waste while maintaining optimal operating temperatures.
- **System Efficiency and Cost Reduction:** Streamline thermal management system design, reducing BOM cost, simplifying implementation, and improving overall system efficiency.

In the face of expanding cloud infrastructure and the relentless demand for greater efficiency and reliability in data centers, maintaining optimal operating temperatures is paramount.

Allegro's comprehensive solutions, particularly our advanced thermal management technologies, are designed to address this challenge head-on. By providing the precision and robustness needed for effective thermal management, our solutions help prevent overheating, enhance system longevity, and ensure uninterrupted, high-performance operation in critical server and cloud applications.

Market-Leading Portfolios that Sense, Regulate and Drive

Block Diagram



Key Products and Solutions

Subsystem	Component	Allegro Parts	Key Differentiator
Air Cooling Fan, Evaporator Fan	**Fan Driver**	A5931 A5932	Efficient BLDC drivers for high RPM operation, minimizing noise and vibration with customizable speed control
Air Cooling Fan, Coolant Circulation Pump, Evaporator Fan	**Fan/Pump Driver**	A89333	48V BLDC driver with highly-efficient sensorless FOC for the lowest noise and vibration. Includes Power Loss Brake
Condenser Pump Heat Exchange, Datacenter Rack	**Pump Motor Current**	ACS37220	Accurate current monitoring with ultra-low resistance, minimizing power loss and optimizing coolant flow control
Compressor Heat Exchange	**Compressor Motor Current**	ACS772/3	High-accuracy, isolated current measurement for high-power compressor motors, improving safety and performance with minimal power dissipation
Condenser Pump Heat Exchange, Coolant Distribution Unit, Compressor Heat Exchange	**Valve Position Sense**	A31301	Precise 3D position sensing for accurate valve positioning with low power consumption and flexible communication interfaces
Condenser Pump Heat Exchange	**Pressure Sense**	A17701	High-accuracy pressure sensor interface for customizable measurements directly from strain gauges or Wheatstone bridges
Condenser Pump Heat Exchange, Coolant Distribution Unit	**Multi-way Valve, Flow Control Valve**	A4950	Integrated full-bridge driver for efficient bidirectional valve control, reducing system complexity and cost
Compressor Heat Exchange	**Expansion Valve**	A5984	Advanced microstepping for precise and quiet expansion valve control
Coolant Distribution Unit	**Coolant Pump Drive**	A89332	Sensorless sinusoidal driver minimizing vibration in high-power, high-speed pumps. Customizable speed control without external MCU

To learn more about the Allegro family of products and to explore available design resources, visit allegromicro.com