

SynthCool Product Brochure

SynthCool

Single-Phase Liquid Cooling Solutions

- Single-Phase Cold Plate
- Single-Phase Immersion
- Intelligent Control

Overview of SynthCool Single-Phase Liquid Cooling Technology

The Onsager™ and Nusselt™ series are SynthCool's comprehensive single-phase liquid cooling solutions, covering two major product lines: single-phase immersion cooling (1PIC) and single-phase cold plate cooling (1PCP). Based on efficient and stable single-phase sensible-heat transfer, the solutions continuously remove heat through liquid coolant circulation, enabling efficient full-stack thermal management from the chip level to the data center level.

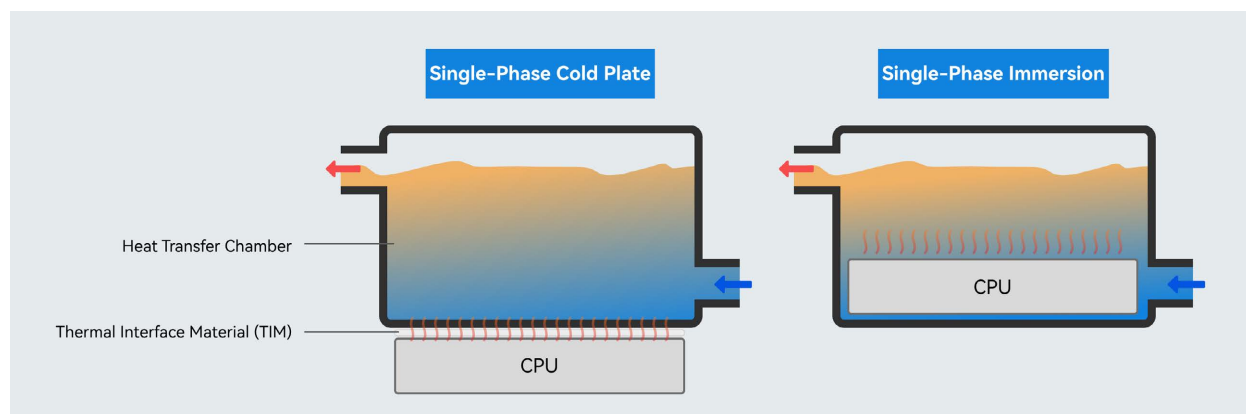
SynthCool's single-phase liquid cooling solutions support 3000W+ heat dissipation per chip, heat fluxes of 180W/cm²+, and rack power densities above 200kW. They are widely compatible with current and next-generation high-performance CPU and GPU platforms, providing mature, reliable, and scalable liquid cooling infrastructure for AI data centers, supercomputing centers, and high-density data centers.



SynthCool Single-Phase Product Portfolio

Why is Single-Phase Liquid Cooling the Mainstream Solution Today?

Single-phase liquid cooling continuously removes heat from chips through the sensible heat of the coolant, delivering efficient cooling through stable liquid circulation. It combines high heat-density cooling capability with a mature deployment ecosystem, broad compatibility, and lower O&M costs.

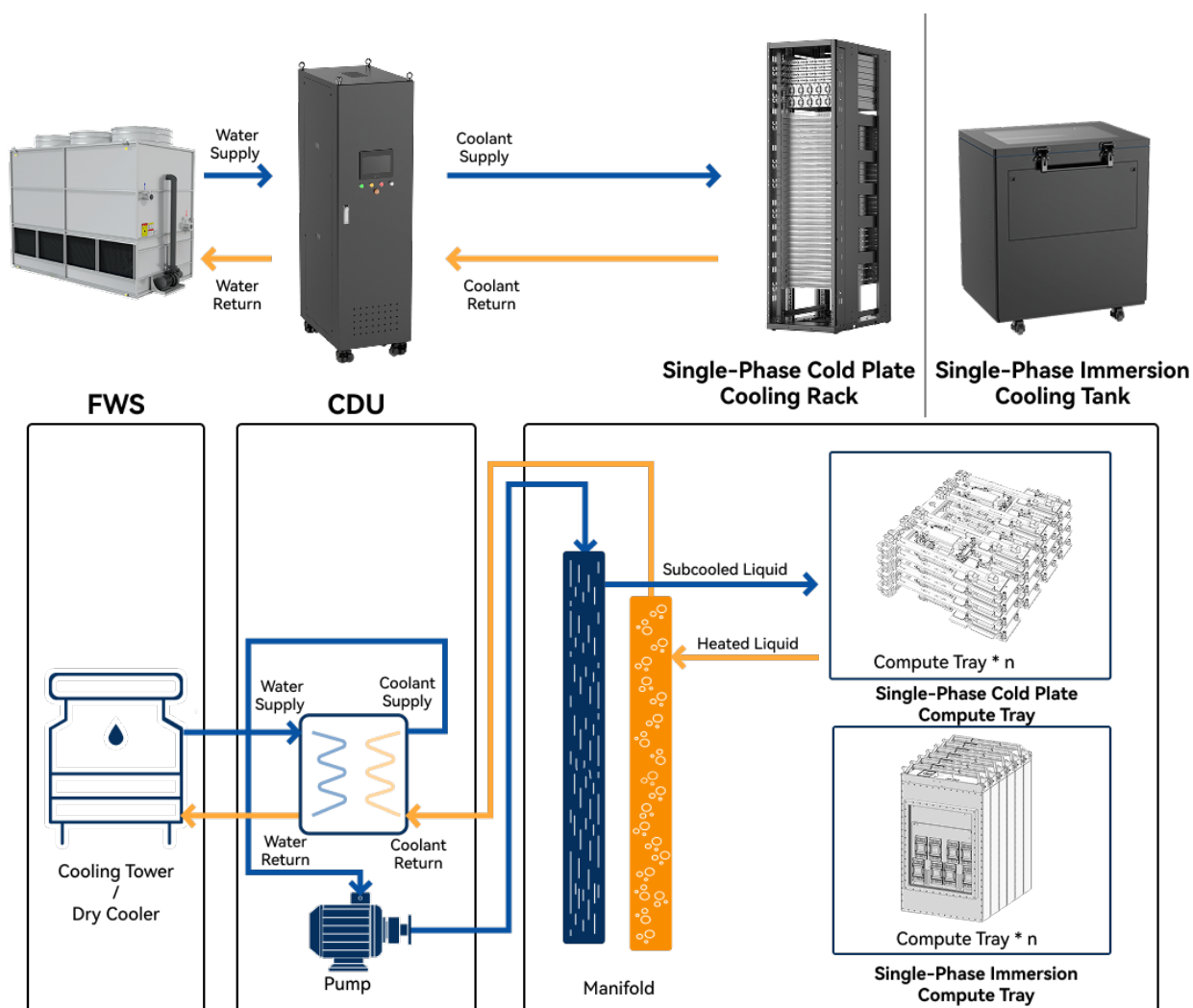


Single-Phase Cooling System schematic

Where Does the Single-Phase Loop Fit into the Cooling Infrastructure?

How heat capture, transfer, and control are integrated into data center cooling infrastructure.

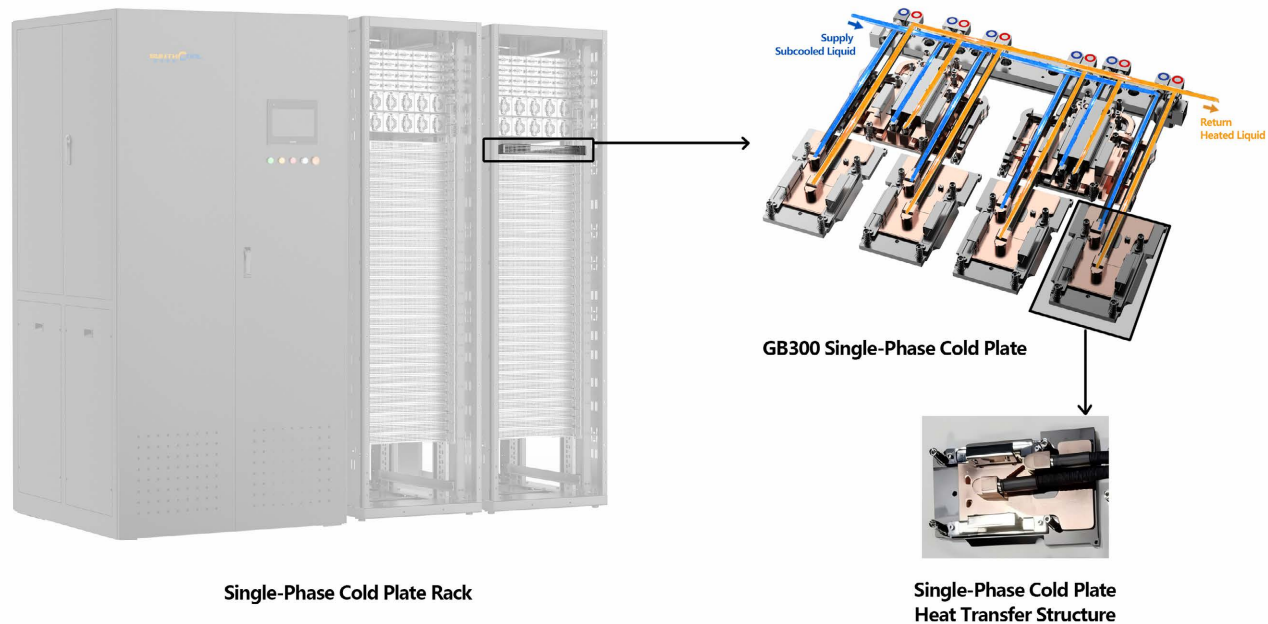
- Chip generates heat
- The Single-phase cold plate / Tank brings the coolant close to the chip surface, rapidly removing heat through sensible heat transfer.
- The CDU (Coolant Distribution Unit) circulates the coolant, transfers heat, and regulates coolant flow.
- The facility side connects to the primary cooling system, enabling free cooling and high-density deployment.



Single-Phase Liquid Cooling System Architecture

 Single-Phase End Devices: Nusselt™ + Onsager™ Dual Solutions

1PCP



System path	The cold plate is in direct contact with the chip. The coolant is cooled in the CDU (Coolant Distribution Unit) and circulates through a controlled closed loop within the rack.
Key benefits	· Compatible with NVIDIA GB300, supporting total heat dissipation of $\geq 6,800\text{W}$ with $T_{\text{case}} \leq 78^\circ\text{C}$. · Compatible with a wide range of components and standard server architectures, enabling rapid integration and scalable deployment.

 Single-Phase End Devices: Nusselt™ + Onsager™ Dual Solutions

1PIC



System path	The entire server is immersed in a TANK (immersion cooling tank). The coolant is cooled in the CDU and then pumped back into the tank.
Key benefits	· Uniform cooling across all components, eliminating localized hot spots. · Modular design with redundancy for critical components and support for online replacement. · Steady-state temperature accuracy: $\pm 0.5^{\circ}\text{C}$; dynamic response accuracy: $\pm 2^{\circ}\text{C}$, with continuously variable load control.

 Why SynthCool?

**Manufacturing
Capability**

**Control
Capability**

**Delivery &
Validation Capability**

**Technology
Evolution**

▼ **Cold Plate Manufacturing Capability**

With expertise in high-efficiency flow-channel design, low-thermal-resistance copper cold plate development, high-reliability brazing, and corrosion protection, SynthCool optimizes single-phase liquid cooling performance directly from the chip-level thermal interface while ensuring long-term operational reliability.

▼ **CDU Control Capability**

By integrating high-efficiency plate heat exchangers, N+1 redundant variable-speed circulation pumps, and intelligent monitoring and coordinated control systems, SynthCool enables efficient heat exchange, stable coolant delivery, and adaptive closed-loop control throughout the liquid cooling loop.

▼ **System Validation Capability**

Supported by intelligent flexible production lines, stringent quality-control systems, and comprehensive professional test platforms, SynthCool provides full-process validation from individual components to complete systems, ensuring consistent quality and reliability for large-scale deployment.

▼ **Continuous Evolution from Single-Phase to Two-Phase Cooling**

SynthCool is simultaneously advancing its two-phase liquid cooling technology roadmap, enabling customers to smoothly evolve from today's mature single-phase architectures toward next-generation cooling systems designed for higher heat fluxes, while protecting long-term infrastructure investments.

3000W+

Cooling Capacity Per-Chip

Supports today's mainstream high-performance GPU/CPU platforms

180W/cm²+

High Heat Flux

Optimized flow-channel design enables efficient cooling of localized high-heat-flux areas

200kW+

Rack Power Density

Reduces data center footprint and enables large-scale AI cluster deployment

1.1

Low pPUE

Free-cooling operation significantly reduces long-term O&M costs



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