Data center cooling solutions are used for the maintenance of optimal operating conditions required for the smooth operation of data centers. As data centers process massive amounts of data heat is a directly associated byproduct. The majority of power usage in a data center is associated with the cooling necessary to maintain optimum operating conditions. Liquid cooling is an approach that tends to be more efficient than standard air cooling. Liquid cooling solutions significantly reduce data center power consumption and Power Usage Effectiveness (PUE). Additionally, because liquid cooling is extremely efficient, data center can increase their processing per square foot beyond what is possible when using forced air cooling, increasing data center capacity. Most notably, liquid cooling is an absolute necessity for organizations interested in trying to capitalize on the rise of AI where GPUs often run at higher thermal requirements than traditional CPUs. Many of today’s latest computationally intensive workloads require the highest CPU and GPU performance possible, while at the same time utilizing higher rack density – a recipe for overheating.

Supermicro offers liquid cooled systems in complete rack-based solutions including cooling equipment from partners. The warm-water cooling solution enables high-density server racks with high performance systems together with a reduction in PUE. Overall, liquid cooling can reduce TCO by as much as 40-50% when compared to forced-air cooling. Without need to provision power for fans at maximum speed, system fans run at a minimum and result in whisper-quiet operation. The in-rack Cooling Distribution Unit (CDU) includes heat exchangers which cool the liquid loops connected to each server through a Direct to Chip (D2C) cooler. Each D2C is an integrated pump and cold plate directly mounted on each CPU and GPU. Each rack is connected to facility-provided water where heat is expelled through 1.25” flexible hoses. The CDU exchanges heat across two closed systems that never mix, the server coolant and the facilities water. As an integrated rack system, the Supermicro Liquid Cooled Rack offers 40kW and 80kW CDU capacities to accommodate Cooling Distribution Modules (CDM) with 76 or 108 loops to support a combination of Supermicro BigTwin™, TwinPro™, Ultra and GPU SuperServers.


<table>
<thead>
<tr>
<th>SMCI SKU</th>
<th>CDU capacity</th>
<th>CDM</th>
<th>Hose Pair</th>
<th>Rack Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRS-DCLC-KIT-02*</td>
<td>40kW</td>
<td>Up to 76 nodes/loops</td>
<td>1.5m</td>
<td>42U</td>
</tr>
<tr>
<td>SRS-DCLC-KIT-03*</td>
<td>80kW</td>
<td>Up to 108 nodes/loops</td>
<td>3.5m</td>
<td>48U</td>
</tr>
</tbody>
</table>

* Please consult with Supermicro to determine the optimum CDU/CDM capacity and configuration.
Supermicro Liquid Cooling Solutions

**BigTwin™**

The Supermicro BigTwin™ represents flagship performance for the most demanding applications and HCI environments. The innovative design supports up to four nodes in a 2U enclosure with no-compromise support for processors, memory and I/O. Each node can support dual 2nd generation Intel® Xeon® Scalable processors, up to 24 DIMMs of DDR4 memory and up to six high speed NVMe drives. SIOM networking options include 10GbE, 25GbE, 100GbE and IB. Shared power and cooling maximize the resource-savings of the multi-node design. D2C coolers are mounted on the processors within each BigTwin node and routed through a CDM loop to the Liquid Cooling CDU.

**TwinPro™**

The Supermicro TwinPro™ architecture is based on the Supermicro proven Twin technology in 1U and 2U form factors, supporting two or four nodes. Each node can support dual 2nd generation Intel® Xeon® Scalable processors, up to 16 DIMMs of DDR4 memory and hot-swappable 3.5” or 2.5” SAS3/SATA3 storage options. SIOM networking options include 10GbE, 25GbE, 100GbE and IB. D2C coolers are mounted on the processors within each TwinPro node and routed through a CDM loop to the Liquid Cooling CDU.

**Ultra**

Supermicro Ultra SuperServers are designed to deliver the highest performance, flexibility, scalability and serviceability to demanding IT environments. 1U and 2U Ultra systems support dual 2nd generation Intel® Xeon® Scalable processors, up to 24 DIMMs of DDR4 memory and with a variety of Ultra Riser options offer built-in 1G, 10G and 25G Ethernet. Multiple high performance NVMe storage configurations are supported as well as options for SAS/SATA and hybrid NVMe drive bays. A D2C cooler is mounted on each of the processors within the Ultra system and routed through a CDM loop to the Liquid Cooling CDU.

**GPU**

Supermicro GPU systems are at the heart of today’s AI and HPC excitement by combining the fastest processors, memory and GPUs together in a family of systems for AI/ML, Inferencing and HPC. The 1U GPU system supports up to 4 NVIDIA® Tesla® V100 GPUs together with NVLink®, the highest 2nd generation Intel® Xeon® Scalable processors, and up to 12 DIMMs of DDR4 memory providing an extremely compact and powerful Learning or HPC system. D2C coolers are mounted on each of the processors and GPUs within the GPU system and routed through CDM loops to the Liquid Cooling CDU.

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