



CHILLDYNE

LIQUID COOLING SOLUTIONS System Overview

Negative Pressure Cooling Without Risk of Leaks

The Chilldyne *Cool-Flo*® System is a direct-to-chip liquid cooling system that delivers coolant under negative pressure *in both directions*. Chilldyne's technologies were designed specifically to eliminate the risks associated with liquid cooling while keeping deployment and operating costs low. The Chilldyne system mitigates risk with its patented leak-proof design.

Retains Air Cooling

Utilizing standard finned heat sinks modified for liquid cooling, the Chilldyne system can retain the ability to air cool servers and can operate as a standard air-cooled system to minimize downtime.

Leak-Proof System

We use negative pressure on both supply and return so if a leak occurs anywhere, air will flow into the system instead of coolant leaking out.

Failure Tolerant

The system will maintain cooling even with a server open to air. Leaks are a maintenance issue, they do not impact uptime. N+1 redundancy with automatic fail over valves is available to maintain cooling if a CDU is down.

Low Cost and Easy Installation

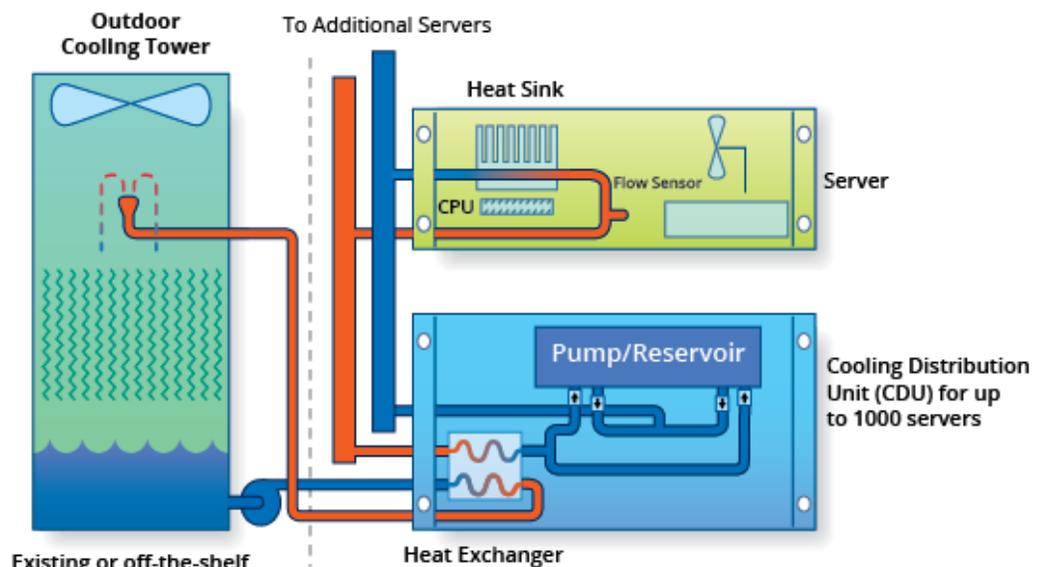
The Chilldyne system has no hidden installation costs or delays. Plumbing is only required for the CDU while the racks and servers can be installed by data center or facility technicians.

Increased Density

Our liquid cooling can cool up to 300kW of server power in a single server rack. (assuming 300 lpm at 10 C rise)

Reduced Setup Time

The CDU automatically fills and drains the system,



monitors the coolant and adds or drains coolant as needed. Air purging is automatic to reduce setup time

Automatic Coolant Evacuation

The Cool-Flo No-Drip/Hot Swap Connector automatically evacuates coolant from a server when it is disconnected from a system. The racks can also be drained automatically by the CDU.

Low Cost, High Volume

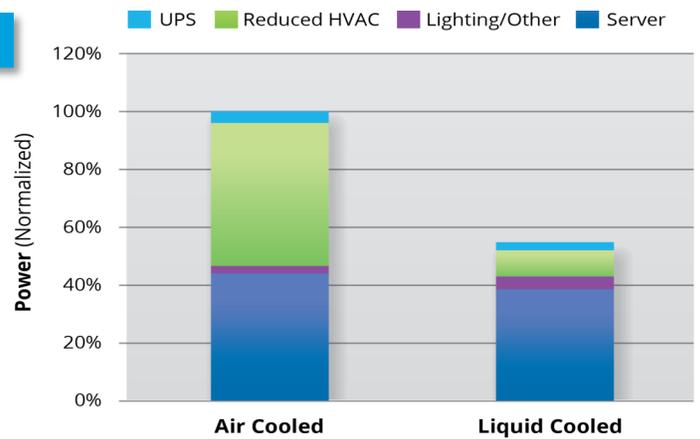
The system utilizes low cost plastic tubing and simple connections, minimizing cost and allows data center technicians, not plumbers, to install, move or reconfigure racks, because a loose fitting does not impact server cooling or leave a puddle on the floor.

Liquid Cooling Power Savings

Chillydyne's Cool-Flo System is an efficient and low cost liquid cooling system that reduces data center power consumption 3 ways:

- 75-100% reduction in HVAC power
- 75% reduction in server fan power
- 5-10% reduction in CPU power

This example shows a legacy data center power reduction of 45% with the Cool-Flo System. Any data center can bring their Power Usage Efficiency (PUE) down to 1.2 or less plus additional power savings at the server.



Chillydyne Components

Cooling Distribution Unit (CDU)

The Chillydyne CDU features 300 lpm cooling flow, data logging of key performance parameters and controls coolant temperature to ensure it stays above the dew point in the data center.

Liquid and Air Cooled Heat Sinks or Direct Cold Plate Technology

We use standard finned heat sinks modified for liquid cooling for air cooled backup, free rear door cooling and easy deployment. We can interface with stock liquid cooled GPU cards or a custom GPU cold plate can be designed.

No Drip Hot Swap Connector (Patented)

The No-Drip/Hot Swap Connector automatically evacuates coolant from a server when it is disconnected allowing for ease of maintenance and no down time. The connector fits into a standard PCI slot, or it can be built in.

Pistonless Pump Technology

The Chillydyne pistonless liquid ring vacuum pump will last 12 years or more with annual maintenance due to the slow moving valves and low speed pump.

Water Quality Control

The water quality is monitored and controlled to maintain corrosion and bacterial protection. Automatic fill, drain, air purge and leak test are included and coolant additive is stored onboard.

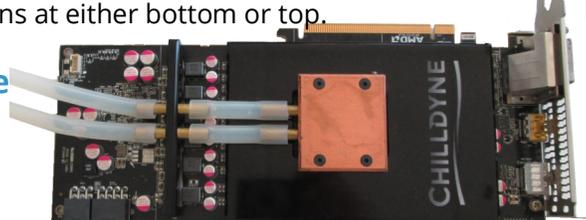
Coolant Handling Manifold

Standard 4-6 cooling loops exiting bottom of CDU. Optional single feed coolant supply for rear door HX applications at either bottom or top.

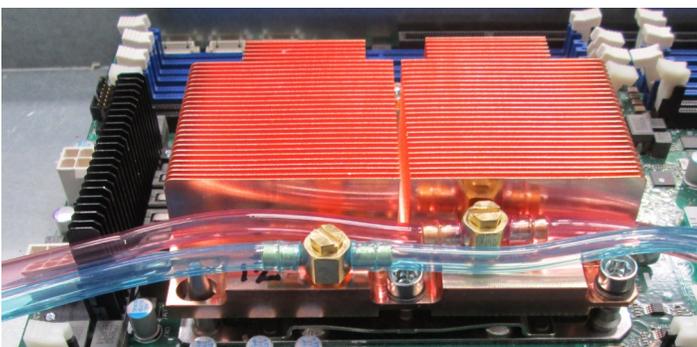
Cooling Distribution Unit



Chillydyne Cold Plate AMD GPU Card



Liquid and Air Cooled Heat Sinks



No Drip Hot Swap Connector in PCI Slot

