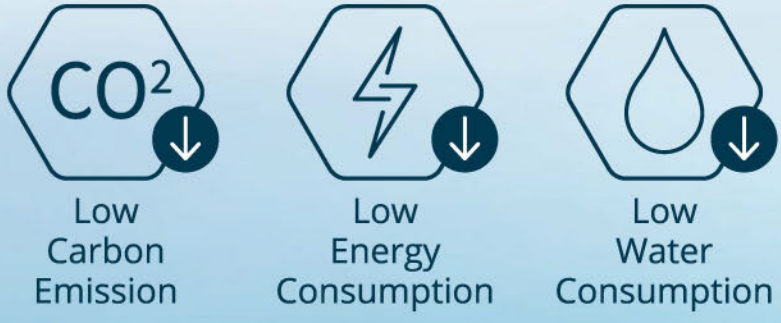
KAORI

Data Center Liquid Cooling Solution



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Liquid Cooling & Immersion Cooling Technologies

Running a data center, it consumes enormous power to operate and maintain servers, networking equipment, cooling systems, and other infrastructure. There are approximately 8.5 million data centers around the world, as the servers continue to grow to handle the surge in data traffic, the power consumed by each server has also grown 1.5kW increased to 3kW in the past few years.

According to the International Energy Agency (IEA) report, the global energy consumption of data centers reached 220 to 320 billion kWh, accounting for 0.9% to 1.3% of the worldwide power usage.

KAORI HEAT TREATMENT CO.,LTD has rich experience for solving the energy efficiency issues and heat dissipating problem since 2018. By implementing this Direct-to-Chip (D2C) Cold Plate & immersion cooling, fans and air conditioners are not necessary. That's how Kaori can significantly reduce the power consumption. By using a more efficient liquid cooling & immersion cooling systems, the PUE can then reach 1.1 or even lower.

KAORI's data center liquid cooling solution includes: In-Rack Cold Plate 80kW CDU (Coolant Distribution Unit) & 30kW RPU+RDHx for small and medium enterprise sever room; 2U & 4U All-In-One solution CDU & Immersion Tank, to cool down servers with dielectric liquid for laboratory testing and also for the large scale application such as In-Row (Liquid to Liquid) CDU、25U & 48U split designed solution.

Key Features

Design & Manufacture	Customized design for Coolant Distribution Unit (CDU) , Immersion Tank, Piping Networks and Centralized Temperature Control System.
Key Component	Brazed Plate Heat Exchanger is a crucial part in CDU. KAORI is designer & manufacturer of Brazed Plate Heat Exchanger (BPHE) since 1994.
Technical Support	Installation, deployment, maintenance and warranty.
Experience in working with Hyperscale Data Center	
Capability of Mass Production	

Power Usage Effectiveness (PUE)

Power Usage Effectiveness (PUE) is an indicator for measuring the energy efficiency of a data center. The ratio shows the total power consumed by the data center to the power consumed by the IT equipment. Nowadays, the average Power Usage Effectiveness (PUE) is about 1.8.

The coolant distribution unit (CDU) for servers is the latest achievement of the company's dedication to heat managements. The CDU combining with plate heat exchangers is able to collect and recover waste heat simultaneously to preserve energy, and improves the power usage effectiveness (PUE) ≤1.1.

Market Application

INDUSTRY 4.0

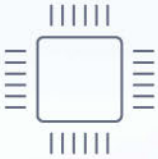
SEVER ROOM
DATA CENTER

EDGE COMPUTING
(5G & TELCO)

FINTECH
(CRYPTOMINING)

SMART
HEALTHCARE

RETAIL & LOGISTIC



EDA TOOL

HPC/AI/ML

ENERGY & POWER

Advantages & Efficiency

In line with Green Building Label (EEWH) specifications

Minimizes server failure rate

Suppression of A/C and air management systems (hot/cold aisles, plenum/raised floor, duct network)

Reduces data center height requirements

Cooling capacity of single rack density over 100kW

Up to 60 minutes of safe operation without cooling (High Specific Heat property)

Reduces carbon footprint

Minimize the power consumption by 70%

Improves thermal management

Lower backup power

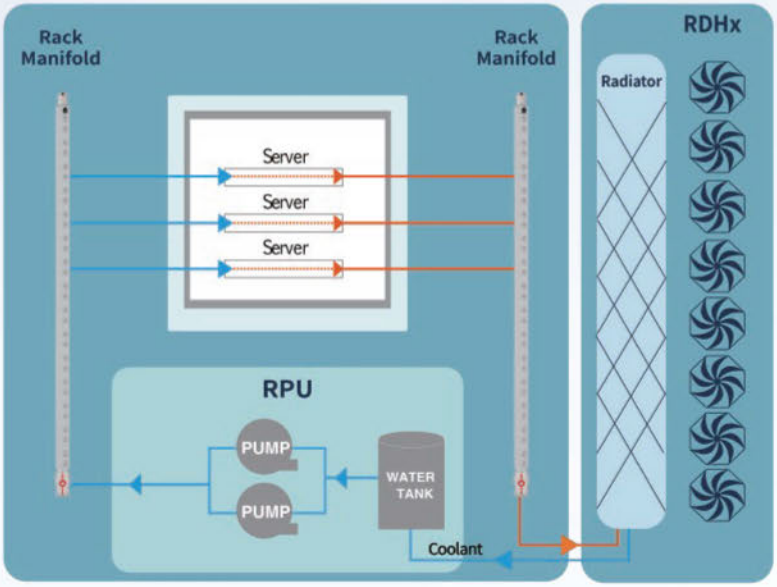
Lower noise level ≦50dB

Optimizes Total Cost of Ownership (TCO)

Liquid Cooling Systems

30kW RPU+RDHx

- No facility water required, could be easily installed in current data center.
- Remote control though SNMP (Simple Network Management Protocol) .



RDHx

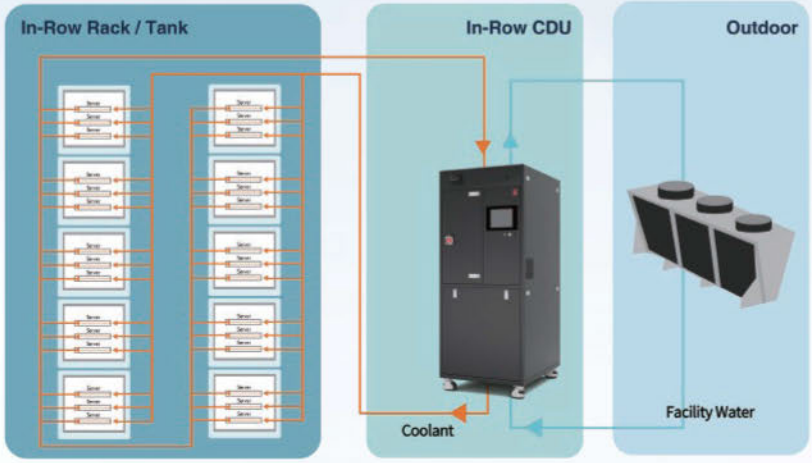
Dimensions	600 (W) x225 (D) x1980 (H) mm
Piping Connections	1" Hose Barb Fitting
Air Flow Rate	<8000 CFM
Weight	Dry:100kg/Wet:120kg

RPU

Dimensions	490 (W) x850 (D) x176 (H) mm
Piping Connections	1" Sanitary Clamp
Pump Redundancy	2N
Liquid Type	PG25
Cooling Capacity	30kW, @ Approach temp. 17°C
Power Input	1Φ220V AC 50/60HZ
Ambient Temperature	0°C~40°C
Weight	Dry:80kg/Wet:85kg

In-Row (L/L) CDU

- Liquid filters included
- Remote network monitoring
- Human machine interface control
- Leak detection
- Centralize water supply system
- Heat dissipation capacity
- Highly flexible application

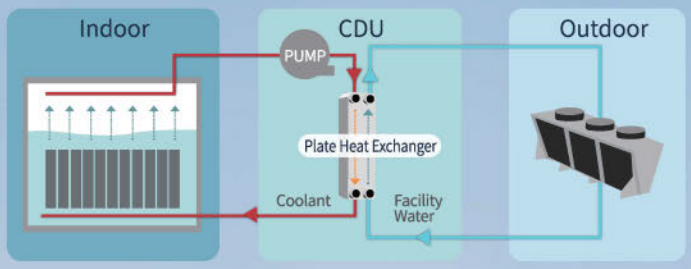


Dimensions	1000 (W) x1000 (D) x2000 (H) mm	**Pump Redundancy**	2N
Cooling Capacity	800kW, @ Approach temp. 8°C	**Power Consumption**	18kW
Liquid Type	PG25	**System Interface**	1xRJ45 to CDU controller
Liquid Volume	180L	**Operation Temperature**	Ambient:5°C~40°C PG25:35°C~55°C Water:25°C~45°C
Piping Connections	2.5" Sanitary Clamp		
Power Input	3Φ 380V 50/60Hz	**Weight**	Dry:650kg/Wet:850kg

Immersion Cooling Systems

All-In-One Immersion Tank for PoC

- Single-phase designed
- Low noise level, design for laboratory testing and demonstration
- Suitable for high power density server application (>1kW/U) and edge application
- These types of tanks can be also designed and placed in outdoor



2U3kW

IT Hardware Capacity	19", 2U, max server length 750mm
Dimensions	453 (L) x800 (W) x1286 (H) mm
Cooling Capacity	3kW, @ Approach temp. 15°C
Solution Type	Air-cooled
Liquid Type	Hydrocarbons/Fluorocarbon
Liquid Volume	75L
Power Input	1Ø 220V 50/60Hz
Ambient Temperature	15°C~40°C
Weight	Hydrocarbons Dry:178kg/Wet:238kg Fluorocarbon Dry:178kg/Wet:305kg

4U7kW

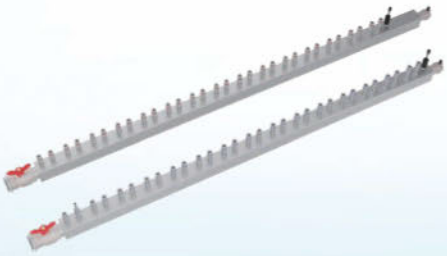
IT Hardware Capacity	19", EIA, max server length 900mm	21", OCP, max server length 1000mm
Dimensions	600 (L) x1000 (W) x1350 (H) mm	1200 (L) x1000 (W) x1430 (H) mm
Cooling Capacity	7kW, @ Approach temp. 8°C	7kW, @ Approach temp. 15°C
Solution Type	Air-cooled	Air-cooled
Liquid Type	Fluorocarbon	Hydrocarbons
Liquid Volume	120L	200L
Power Input	3Ø 380V 50/60Hz	3Ø 380V 50/60Hz
Ambient Temperature	15°C~40°C	15°C~40°C
Weight	Dry:300kg/Wet:400kg	Dry:400kg/Wet:580kg

In-Rack Cold Plate 80kW CDU

- Liquid-liquid cold plate cooling solution
- CDU Hot-swappable pump design
- Power Usage Effectiveness (PUE) can reach to 1.2
- Reliable magnetic pump for 2N redundant design
- Suitable for AI/HPC servers

CDU Dimensions	19", 4U, length 800mm
Cooling Capacity	80kW, @ Approach temp. 10°C
Piping Connections	1" Sanitary Clamp
Pump Redundancy	2N
Liquid Type	PG25
Power Input	1Φ 220V 50/60Hz,1.2kW
Operation Temperature	Ambient:5°C~40°C PG25:35℃~55℃ Water:25℃~45℃
CDU Weight	Dry:100kg/Wet:110kg

Rack Manifolds



- These rack manifolds are suspended in the rear space of the cabinet, primarily providing cooling liquid circulation to each cold plate on the server.
- Allowing a maximum of 2 cooling loops per 1U server.
- 8-80 Channel is used with cabinets and can be customized for production.

Coolant Distribution Unit (CDU)

- Hot-swappable pump design: Allows quick maintenance without system downtime.
- The CDU is installed at the bottom of the cabinet, corresponding to the height of four 1U servers.

Split-Designed Immersion Cooling Solution for Hyper-scale Data Center

25U90kW

- PUE≤1.1
- Single-phase & water-cooled
- Suitable for hyper-scale data center, high power density server (>1kW/U)
- No chiller is required
- Flexible to design and easy to maintenance
- Remote monitoring tools & management
- CDU high scalability

CDU

Dimensions	880 (L) x650 (W) x1620 (H) mm
Cooling Capacity	90kW, @ Approach temp. 15°C
Solution Type	Water-cooled
Liquid Type	Hydrocarbons
Power Input	1Ø 220V 50/60Hz
Operation Temperature	Ambient:5°C~40°C Hydrocarbons:35°C~55°C Water:25°C~45°C
Weight	300kg

TANK

IT Hardware Capacity	19", EIA, max server length 900mm	21",OCP, max server length 900mm
Dimensions	1280 (L) x910 (W) x1490 (H) mm	1430 (L) x837 (W) x1532 (H) mm
Liquid Volume	680L	900L
Weight	Dry:450kg/Wet:1000kg	Dry:500kg/Wet:1250kg

Best Experts of Liquid Cooling

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