DCX FDU

Facility Distribution Unit

Overview

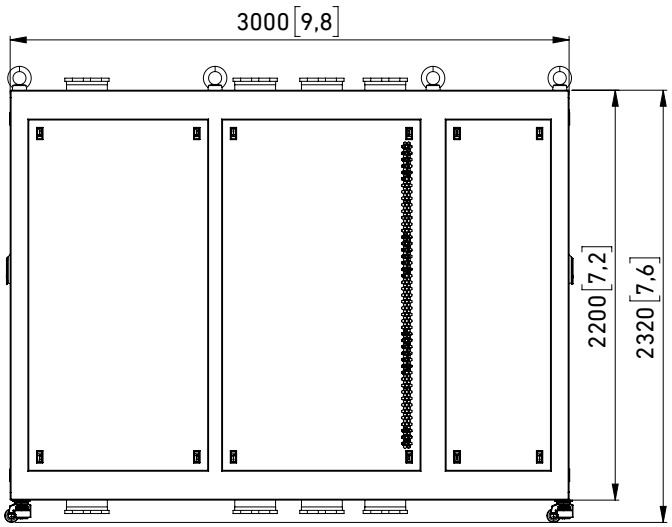
The Facility Distribution Unit (FDU) defines new category of high-capacity Coolant Distribution Units, engineered not for individual rack rows but for a complete data halls / facility installations in hyper-scale data centers, efficiently cooling large-scale, high-density AI server racks. FDU offers a heat transfer capacity of up to 5 MW at an approach temperature of approximately 8.0°C with a flow rate of 360 m^3/h. Advanced features include highly available N+1 redundant pump system of 4 pumps, condensation-free control, automatic coolant leveling, leak detection, and remote monitoring of essential parameters. Designed for high-performance computing (HPC) and GPU-intensive clusters, the FDU utilizes ASHRAE W3/W4 warm water to meet the stringent cooling needs of high-power environments.

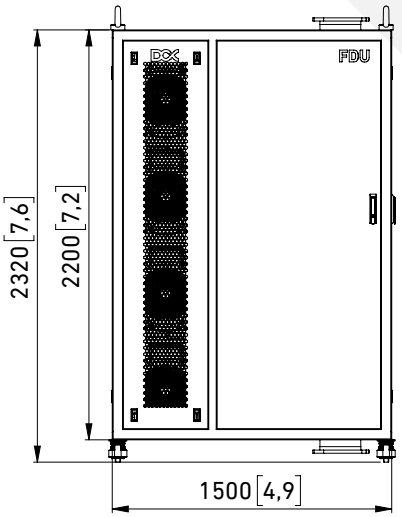
Tech spec

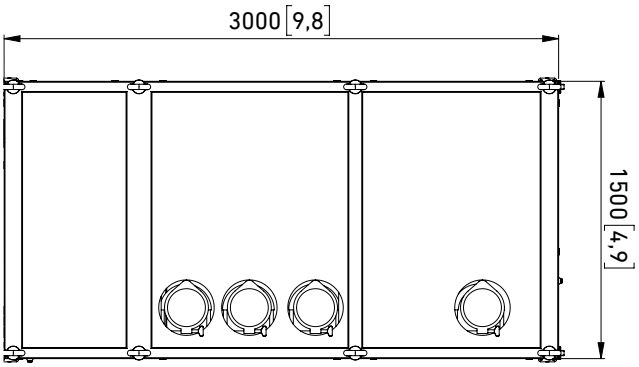
Specifications	
Cooling Capacity	5000kW@AT=8°C
Primary Coolant:	Ashrae W3/W4 warm water
AC power	2x 3P AC380V 50/60Hz
Power consumption:	95.3kW (3+1 pumps, 3x31.8kW)
Dimensions (mm):	2300 | 1500 | 3000 (W*D*H)
Transport / Wet weight:	5700 kg / 6500 kg

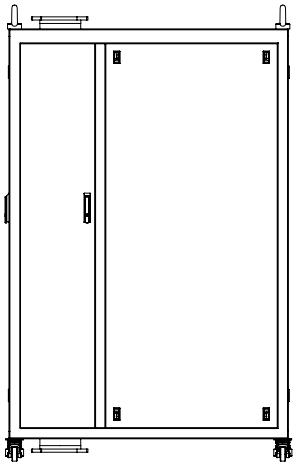
Features & Benefits

- Large scale, facility sized Coolant Distribution Unit dedicated for complete data halls with limited space for mutiple CDUs
- Most powerful Coolant Distribution Unit in the world with 5MW heat transfer capacity per single CDU
- Compact build of L 3m/9.8ft | W 1.5m/4.9ft | H 2m/6.5ft
- Unique dual stack configuration and 8-10MW in dual level installation
- Supports more servers, CPU's and GPU's than any other CDU in the world. Up to 50 x 100kW racks / 80 x 62.5kW racks / 200 x 25kW liquid cooled racks and up to 8400 servers per standard 42U config.
- N+1 redundancy pumps dedicated for extended TCS loop topologies deliver over 50m of head, 4x more than standard capacity CDUs
- Built-in water treatment station to keep high purity and quality of cooling medium without PG25 performance drop
- Easy upgrade & flexible configuration of pumps and plate heat exchanger capacity. From 2-4-5MW per single unit up to 8-10MW in dual stack configuration.
- Dual loop CDU system that provides reduced pressure to TCS (secondary loop) for ITE equipment
- Complete condensation and dew point control achieved by maintaining TCS water temperature above room dew point to prevent condensation and ensure consistent operation across varied environments.
- Primary & secondary fluid separation - establishing and maintaining a coolant quality and chemistry different from that associated with the FWS and more suitable to the TCS.
- Adaptive flow management - supplying flexible coolant temperature to ITE.
- Redundant pump system of Wilo Industrial Centrifugal Pumps with failover and built-in resiliency.
- Fully remote temperature monitoring of set point and ambient temperatures, flow, pressure and operation with full condensation control and reporting service









Performance Specification		
Product model	FDU / FACILITY DISTRIBUTION UNIT	
Cooling capacity [kW]	5000	
Approach temperature [°C]	8	
Operation condition	Primary side	Secondary side
Coolant	Facility water	DI Water
Flow [m3/h]	360	360
Output rated dP [bar]	/	≥3.5
Rated inlet temperature [°C]	24	38.7
Rated outlet temperature [°C]	32.6	30
Cooling capacity margin	7%	

Transport weight [kg / lbs]	5700 | 12600
Operation weight [kg / lbs]	6500 | 14300
Height [mm] | Width [mm] | Depth [mm]	2300| 1500 | 3000
FWS liquid connector style and dimension	Tri-Clamp 8"
TCS liquid connector style and dimension	Tri-Clamp 8"
Power consumption [kW]	95.3 (3+1 pumps, 3x31.8kW)
T-V coefficient [C*L]	20×10⁴
Power specifications	2x 3P AC380V 50/60Hz
Working environment T&H	0~50°C/ RH5~85%
Noise Level [dB]	81

Alternative Performance Configurations

1.8-2 MW	**FDU / FACILITY DISTRIBUTION UNIT**	
Cooling capacity [kW]	1800	
Approach temperature [°C]	6	
Operation condition	Primary side	Secondary side
Coolant	Facility water	DI Water
Flow [m3/h]	180	180
Rated inlet temperature [°C]	24	36.7
Rated outlet temperature [°C]	32.6	30
Power consumption [kW]	48.7 (2+2 pumps, 2x24.3 kW) / 37 (3+1 pumps, 1x37 kW)	

2.6-3 MW	**FDU / FACILITY DISTRIBUTION UNIT**	
Cooling capacity [kW]	2600	
Approach temperature [°C]	6	
Operation condition	Primary side	Secondary side
Coolant	Facility water	DI Water
Flow [m3/h]	270	270
Rated inlet temperature [°C]	24	38.4
Rated outlet temperature [°C]	32.3	30
Power consumption [kW]	57.2 (2+2 pumps, 2x28.6 kW)	

4-4.8 MW	**FDU / FACILITY DISTRIBUTION UNIT**	
Cooling capacity [kW]	4815	
Approach temperature [°C]	6	
Operation condition	Primary side	Secondary side
Coolant	Facility water	DI Water
Flow [m3/h]	480	480
Rated inlet temperature [°C]	24	38,7
Rated outlet temperature [°C]	32,6	30
Power consumption [kW]	121.4 (4 pumps, 4x30.3 kW) / 112.9 (3+1 pumps, 3x37.6 kW)	

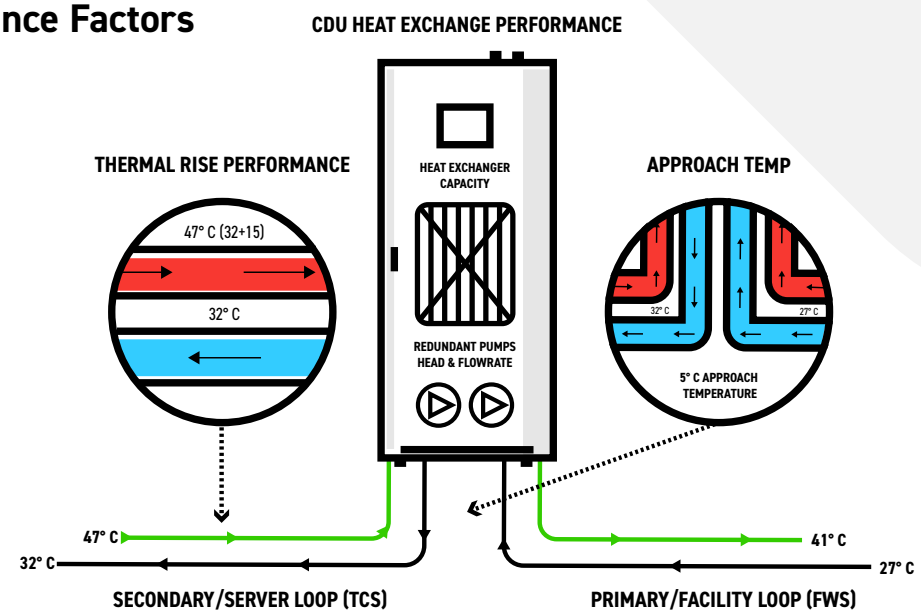
Overview

The AI-driven datacenters require new types of Cooling Distribution Units - more capable, more powerful, and with different form factors. This is why DCX introduced a new architecture of DCX HYDRO CDU's dedicated to high-performance computing, enterprise, and colocation datacenters. We offer the most comprehensive portfolio, providing complete flexibility for data center operators: -> IN-RACK +100kW capable CDU models, IN-ROW monobloc systems - CDU 3, 6, 9, and 12 with performance ranging from 300kW to 1.5MW; SCALABLE, MODULAR CDU'S with capacity from 600kW to 2MW, and finally, the new class of FDU'S - FACILITY DISTRIBUTION UNITS with capacities ranging from 2MW to 5MW. The DCX HYDRO portfolio offers cost-effective, reliable, and flexible direct liquid cooling systems.

CDU Heat Exchange Performance Factors

The main job of the CDU is to supply and circulate the cooling medium in the secondary (TCS) loop with enough flow, energy (head), and pressure, so the heat is transferred effectively to the primary (FCS) loop and then to heat rejection devices (dry coolers, cooling towers, or chillers). The CDU controls the pressure, flow, and temperature to automatically adjust for fluid flow requirements and to maintain specific loop temperatures below the dew point without overheating the servers.

The most important CDU performance factors are: **head of the pumps** which defines the number of racks and servers that the CDU can support; **heat transfer performance** defined by heat exchange capacity; and **approach temperature.**



Approach Temperature & Real World Performance

The approach temperature is an important parameter that defines the performance of the system. In liquid cooling systems, we define it as the difference between the supply temperatures on each side—specifically, between the water temperature of the facility cooling system inlet to the CDU and the temperature of the coolant leaving the CDU to the servers.

The cooling capacity of a CDU is always assumed at a specific approach temperature. Sometimes, manufacturers may present a high inlet temperature but with unrealistic expectations of the approach temperature, which can result in incorrect loop sizing. For example, CDU A is defined as 100kW with a 25°C approach temperature, while CDU B is defined as 100kW with a 3°C approach temperature. At a 25°C approach, CDU A would be rated for more than 800kW!

Heat Transfer Performance - Water	
Heat Output - AT= (4°C) @360m3/h	2400
Heat Output - AT= (6°C) @360m3/h	3600
Heat Output - AT= (8°C) @360m3/h	4900
Heat Output - AT= (10°C) @360m3/h	6000
Heat Output - AT= (15°C) @360m3/h	9000

Heat Transfer Performance - PG 25	
Heat Output - AT= (4°C) @360m3/h	1790
Heat Output - AT= (6°C) @360m3/h	2690
Heat Output - AT= (8°C) @360m3/h	3660
Heat Output - AT= (10°C) @360m3/h	4480
Heat Output - AT= (15°C) @360m3/h	6720

ASHRAE Liquid Cooling Class	
W1	2°C - 17°C
W2	2°C - 27°C
W3	2°C - 32°C
W4	2°C - 45°C
W5	> 45°C

Important Design Parameters

Coolant distribution units serve as the core of liquid-cooled data centers, functioning as the beating heart of each server cooling loop—a critical system that sustains optimal operating conditions. These units play a crucial role in effectively managing the distribution of coolant medium throughout the group of racks, ensuring efficient heat dissipation and maintaining stable temperatures within the facility. The choice of the right CDU should be based on:

- Topology and pressure drop of the TCS (Secondary) loop
- Required form factor, CDU location and available space
- Available head and flow of CDU pumps
- Approach temperature and heat transfer performance
- Cooling capacity and PQ curves
- Cooling medium in the Technical Cooling System (TCS) loop
- Available Facility Cooling System (FCS) temperature

FDU | Facility Distribution Unit

Would you like to learn more about our efficiency curves and performance data? Contact us at sales@dcx.eu for detailed insights and customized support.

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