

Data Center Cooling Distribution Unit (CDU) Operational Parameters - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The Data Center Cooling Distribution Unit (CDU) Operational Parameters platform represents a paradigm shift in high-density compute thermal management, engineered to meet the rigorous demands of next-generation AI factories, hyperscale cloud regions, and carrier-grade edge data centers. As rack power densities surge beyond 130 kW per cabinet, traditional air-cooling architectures become thermodynamically and economically unviable. This official technical overview details the operational envelope, hydraulic performance, control-plane intelligence, and safety certifications of our OEM CDU family, providing pre-sales engineers and data center architects with the authoritative data required for facility design, procurement, and commissioning.

Our CDU portfolio is purpose-built to bridge facility water systems (FWS) and technology cooling systems (TCS) with unparalleled precision. By maintaining strict differential pressure, flow rate, and temperature differential (ΔT) control, the CDU ensures optimal server inlet temperatures while maximizing the economizer hours of the facility chiller plant. This document serves as the definitive specification reference for the operational parameters that govern

our 1RU, 2RU, and 4RU CDU configurations, covering everything from primary/secondary loop hydraulics to SNMPv3 alarm thresholds.



ARCHITECTURE & CHASSIS DESIGN

The CDU is architected around a modular, serviceable chassis that separates the primary facility water circuit from the secondary technology cooling loop. This isolation is critical for preventing contamination, mitigating pressure transients, and enabling independent maintenance of the facility side without interrupting server cooling. The chassis supports both in-row and overhead deployment topologies, with front-to-back or side-to-side plumbing configurations to accommodate diverse rack manifold strategies.

At the heart of the CDU is a variable-speed, redundant pump assembly. Each

pump is a high-efficiency, electronically commutated (EC) centrifugal unit designed for continuous duty at elevated temperatures. The pumps are mounted in a parallel N+1 configuration, ensuring that a single pump failure does not degrade the cooling capacity below the design thermal load. The hydraulic manifold integrates a plate-and-frame heat exchanger (brazed or gasketed) selected for a low approach temperature (typically 1-2 degrees C), maximizing heat transfer efficiency while minimizing pump energy consumption.

The control plane is governed by a dual-redundant industrial PLC or edge controller with hot-standby failover. This controller executes a PID loop that modulates pump speed and control valve position based on supply temperature setpoints, return temperature feedback, and flow meter data. All operational parameters are logged at 1-second intervals and retained for 90 days onboard, with streaming telemetry available via Modbus TCP, BACnet/IP, and SNMPv3.

HARDWARE FEATURES

Key hardware features include: a 10-inch capacitive touchscreen HMI for local commissioning and diagnostics; isolated pressure transducers on both primary and secondary loops; ultrasonic or electromagnetic flow meters with +/- 2%

accuracy; and a motorized 3-way or 2-way control valve with fail-safe bypass. The electrical subsystem supports dual-feed AC input (100-240V, 50/60Hz) or -48V DC telecom power, with automatic transfer switching and surge protection to IEC 61000-4-5. Leak detection is provided via a combination of pan sensors, rope sensors, and humidity probes, with configurable alarm thresholds and automatic pump shutdown upon detection of a catastrophic leak.

COMPLIANCE & STANDARDS

The CDU platform is designed and tested to meet global compliance requirements for data center infrastructure. It carries CE, UL 61010-1, and CSA C22.2 certifications for electrical safety. Hydraulic components are compliant with ASME B31.1 and PED 2014/68/EU for pressure equipment. Electromagnetic compatibility is verified to EN 55032 Class A and EN 55035. The unit is RoHS and REACH compliant. For carrier-grade deployments, the CDU adheres to NEBS Level 3 (GR-1089-CORE, GR-63-CORE) when equipped with the ruggedized mounting kit and DC power option.

TECHNICAL SPECIFICATIONS

The following table summarizes the core operational parameters across the standard CDU models. Note that customized configurations are available for

immersion-cooled or two-phase applications upon request.

Parameter	Specification
Form Factor	1RU, 2RU, or 4RU rack-mount chassis (in-row or overhead)
Cooling Capacity	Up to 130 kW per unit (dependent on model and Delta-T)
Primary Loop Connection	2-inch to 4-inch NPT/BSPP/Flange, 50-100 PSIG max
Secondary Loop Connection	1.5-inch to 3-inch NPT/BSPP, 30-60 PSIG max
Heat Exchanger	Brazed plate or gasketed plate, copper or stainless steel
Pump Configuration	N+1 redundant EC centrifugal, variable speed
Flow Rate Range	10-300 LPM (per loop, model dependent)
Temperature Setpoint	18-45 degrees C supply, programmable
Temperature Control Accuracy	+/- 0.5 degrees C of setpoint
Differential Pressure Control	0.5-3.0 bar, PID modulated
Power Supply	1+1 Redundant AC (100-240V) or -48V

	DC, 500W max
Control Protocols	Modbus TCP, BACnet/IP, SNMPv3, REST API
Local Interface	10-inch capacitive touchscreen HMI
Leak Detection	Pan, rope, and humidity sensors with auto-shutdown
Operating Temperature	5-45 degrees C ambient (non-condensing)
Storage Temperature	-20-60 degrees C
Humidity	20-80% RH non-condensing
Dimensions (1RU)	44.5 x 482 x 800 mm (H x W x D)
Weight (1RU)	25 kg (dry)
MTBF	> 100,000 hours (pump assembly > 50,000 hours)
Certifications	CE, UL 61010-1, CSA C22.2, RoHS, REACH, NEBS Level 3 (optional)

ORDERING OPTIONS

Customers may configure the CDU by selecting the chassis size (1RU/2RU/4RU), heat exchanger material (copper/ stainless steel), pump redundancy (N+1 or

2N), control protocol (Modbus/BACnet/SNMP), power input (AC/DC/dual), and manifold connection type (NPT/BSPP/Flange). Each unit ships with a factory acceptance test (FAT) report documenting flow, pressure, and heat transfer performance at rated conditions. Optional accessories include remote HMI panels, extended warranty, and on-site commissioning services.

