

# NEUCOOL™ 2-Phase DTC In-Rack System

## The Mission-Critical Liquid Cooling Solution for Peace of Mind

Our highly-engineered 2-phase, direct-to-chip system delivers reliably superior heat removal for generations of CPUs and GPUs

### NeuCool Vaporators

- Direct-to-chip system promotes nucleation (boiling) and efficient heat removal from CPUs & GPUs
- Capable of cooling 1,500W+ per socket
- Internal hard tubing configured to OEM servers

### Intelligent Coolant Distribution Unit (iCDU)

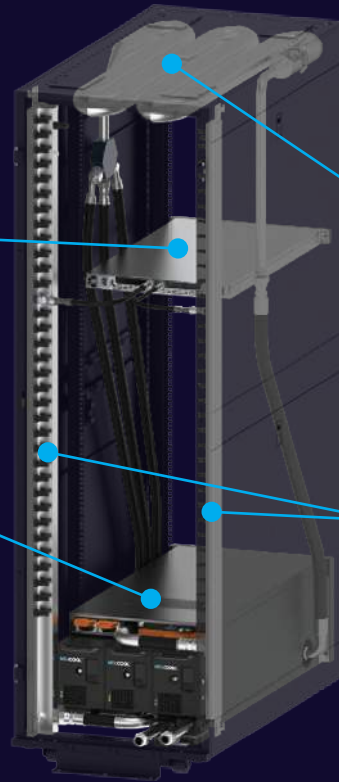
- OpenBMC based Embedded Controller
- Contains industrial condenser, N+1 pumps, system sensors, and touchscreen control system
- Hot-swappable pumps, power supplies, and core logic board
- Interface to facility water system

### NeuCool Reservoir

- Provides refrigerant expansion volume to respond to fluctuations in compute power
- Creates head pressure that extends pump life and prevents flow instabilities
- Redundant level sensors that enable leak detection system

### NeuCool Manifolds

- Aluminum manifolds direct refrigerant between servers and NeuCool iCDU
- Split design for installation flexibility, optimized flow, and heat isolation
- Low profile for rear aisle serviceability
- Stainless steel, dripless quick disconnects



## Key Features

- 100kW cooling per rack enabled
- Waterless, dielectric refrigerant with ~1 GWP & A1 Safety Rating
- Designed for standard rack sizes (42U+, 600mm+ x 1200mm+)
- Multiple redundancies with hot swap servicing - pumps, power supplies, core logic and sensors
- Industrial condenser with isolated facility water loop utilizing warm (ASHRAE W45) or chilled water
- Multilayer nylon AC hosing from servers to manifolds
- 7" touchscreen for monitoring and control of NeuCool system



Best-in-Class Technology



North American Supply Chain & Mfg.



Journey-Based Model



Enterprise-Grade Services

## Benefits

- Zero risk of water loop contacting electronics
- Resiliency & redundancy designed & tested for mission critical applications
- Operational serviceability for ease of maintenance
- Maximum lifetime value, backed by comprehensive warranty, support services and field engineering teams
- Significant reduction in electricity use and OpEx
- Safe & reliable operation with non-conductive refrigerant and advanced leak detection
- Standard data center compatibility means quick and easy installation and training



2 Socket CPU server showing Vaporators and metal internal tubing

# NEUCOOL™ 2-Phase DTC In-Rack System

OVERALL SYSTEM	
Cooling Capacity <sup>1</sup>	100kW+ per rack 1,500W+ per socket
Targeted Heat Removal	All heat from CPUs & GPUs; 75-80%+ of total server heat
Typical Thermal Resistance	<0.020 °C/W
Total System Power Consumption	<1.0kW
Power Supply	120/240VAC at 50/60 Hz, N+1 phase redundancy
Rack/System Sizing	Compatible with 42U+ racks, 600+mm wide x 1200+mm depth
Reliability	Redundant power supplies, pumps, core logic, and sensors
Serviceability	Hot-swappable main power supply units (PSUs), pump PSUs, pumps, and core logic board
Plumbing	Brazed/welded stainless steel or copper tubing; industrial, 5-layer, nylon braided hoses; stainless steel, dripless quick connects
Enterprise-Grade Services	Ascent program guides customer in journey to 2P DTC cooling; NeuGuard program offers best- in-class warranty & configurable professional services programs

NEUCOOL iCDU	
Purpose	Control unit for NeuCool system; monitors and regulates pressure, flow, temperatures, etc.
iCDU Placement	Bottom 7U of server rack
iCDU Dimensions	35.9"L x 19.2"W* x 12.2"H (7U) (*bezel width; chassis width is 17.4")
iCDU Weight	<200 lbs (<91 kg)
Display and Access	7" LCD touch display for local system interface, controls, and programming
Pumps	3 industrial-rated pumps with N+1 redundancy; hot-swappable
Condenser	High-performance brazed plate heat exchanger

NEUCOOL VAPORATORS	
Materials and Construction	Copper (skived) baseplate, stainless steel housing
Internal Server Plumbing	Industrial-grade, rigid copper or stainless steel
Fittings	Stainless steel compression fittings
Compatibility	Available for most high- performance CPUs and GPUs from Intel, AMD, and NVIDIA

NEUCOOL MANAGEMENT SYSTEM (NMS)	
Overview	Multiple system sensors deliver data, reports, alarms, and updates to NMS and DCIM
Communications and Integrations	SNMP, IPMI, Redfish, DCIM integration
Leak Detection	Multi-level leak detection and reporting (alarm, alert, or report)

NEUCOOL REFRIGERANT	
Type	IT-safe dielectric
Safety	ASHRAE A1 rating, non-toxic, non-flammable, non-conductive, non-corrosive
Sustainability	~1 Global Warming Potential (GWP), zero ozone depletion potential
Volume in System	40x less refrigerant than immersion
Operating Pressure and Flow Rate	Low pressure; 4-9x less flow rate than single-phase DTC
Leak Damage Potential	Zero. Dielectric will not damage servers or IT gear in unlikely event of a leak

FACILITY WATER (FW)	
Location	FW only enters the iCDU and passes through the condenser; can be replaced with refrigerant loop for waterless applications
Flow Controls	Characterized Control Valve (CCV) controls flow rate of FW
Temperature	Compatible with ASHRAE 45 and below, dependent on kW load

1. Dependent on incoming facility water temperatures ranging from ASHRAE 45 and below.