CONNECT AND PROTECT

Edge and Data Center Cooling Solutions

Precision and High Density Liquid Cooling

CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER

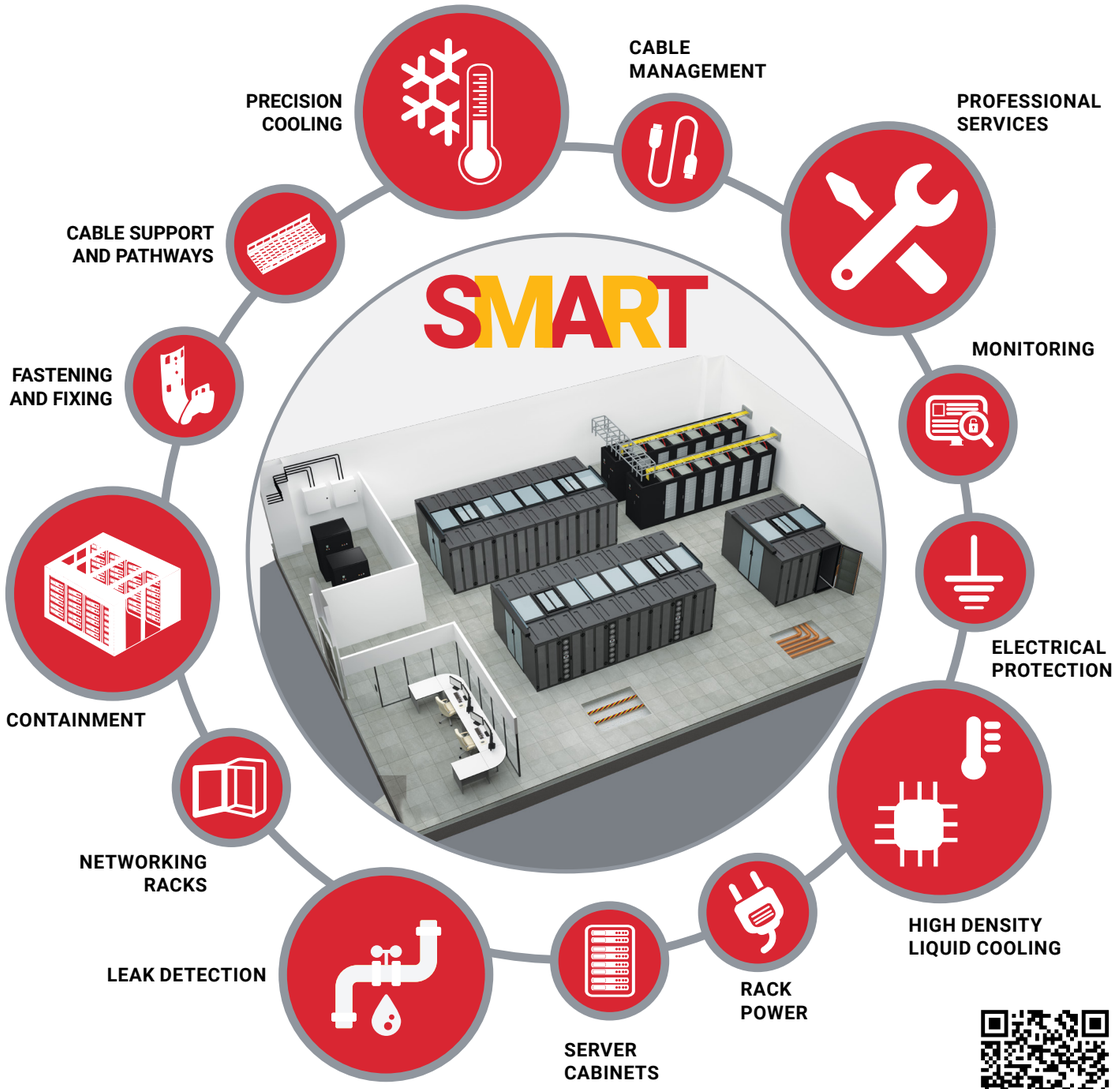
nVent

Edge And Data Center Cooling Solutions

Introduction

Content streaming, online banking, cloud computing, sophisticated smart phone apps, eCommerce, industrial automation. These are just a few examples of applications that are fueling data processing and traffic demand in data centers throughout the world. Emerging technologies, such as Artificial Intelligence (AI), telemedicine, machine learning, autonomous (driverless) vehicles and other real time modeling applications will accelerate demand further.

Increasing heat densities challenge data center operators and the demand for reduced data latency requires more computing power at the edge.



Find out more on nVent Cooling Solutions

Precision And Liquid Cooling Overview

Data Center Cooling Solutions

Maintaining high availability (uptime) at minimal operational costs remains a major challenge in today's data centers and networks. A significant portion of budgets includes energy consumption for IT equipment and server cooling.

nVent offers a comprehensive range of standard and customized air, indirect and direct water cooling solutions. Our product range enables you to meet these challenges and protect your IT assets, whether for smaller decentralized edge computing, harsh environments, or large data center installations.

Edge Computing Cooling Solutions

The rapid emergence of Big Data, 5G, Industry 4.0 and IoT deployments also require protection for edge-computing applications, such as high-speed wireless, autonomous vehicles, industrial automation, transportation, security and safety systems. These complex systems are powered by smaller and faster electronics that require effective cooling protection to ensure maximum operating performance and uptime.

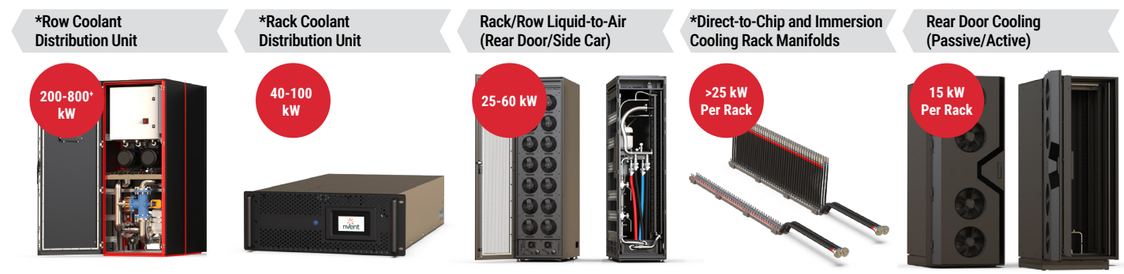
Maximize Infrastructure Performance And Uptime

Legacy cooling in data centers uses technology based on traditional air conditioning systems. Entire rooms, sometimes complete buildings, are cooled with a single system. These Computer Room Air Conditioning units (CRAC) or Computer Room Air Handler (CRAH) worked well for a number of years because data rooms were smaller, IT cabinets were not densely packed, and less heat was generated in a given space. While still popular today, whole room cooling can be inefficient and expensive.

Continuum Of Cooling

COMPLETE PORTFOLIO

AIR AND LIQUID COOLING SOLUTIONS



Edge Compute Cooling Solutions

Indoor/Outdoor Air Conditioners

Today's "Connected Enterprise" networks need to support expanding voice, data and video applications. Localized data processing at the edge redefines the traditional configuration of networking and wall-mount cabinets. Increased thermal loads require precision cooling solutions. Air conditioners can provide up to 8kW to address thermal loads when thermal requirements exceed convection cooling limits.

Features

- Thermostat control and EMI/RFI noise suppressor included
- Closed-loop cooling separates clean, recirculated air from ambient airflow system
- Front cover hinges open for quick access to all components
- Filter can be inverted to double operating time between cleanings and/or filter replacement
- Filterless operation possible in many applications
- For a typical application, unique condensate management system evaporates moisture from enclosure
- High performance fans and blowers are ideal for densely packed enclosures
- All units use a universally accepted CFC-free or environmentally safe refrigerant
- Mounting hardware, gasket kit, mounting template and instruction manual furnished

Application

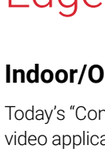
These air conditioners fit in the AC cutout provided in the AC-ready voice, data and server cabinet packages. The air conditioners are shipped separately and cannot be factory installed in the cabinets.

Closed Loop Cooling

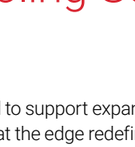
Recirculated air inside the air conditioner is kept separate from the ambient airflow system. This protects the electronic controls and prevents shutdowns caused by heat, humidity, dust and other contaminants.

Access the Cooling Selection Tool to define the right size of your air conditioner

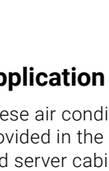
Wall-Mount Solutions



T-Series Compact Outdoor (T15)	
Outdoor Model without Heat Pkg.	T150116G100
Outdoor Model/SST/ Corrosion/4X	T150116G152
Cooling Performance	
Nominal: BTU/Hr. Watts	800/800
	235/235
At 131 F/131 F (55 C/55 C): BTU/Hr. (50/60 Hz) W (50/60 Hz)	819
	240
At 95 F/95 F (35 C/35 C): BTU/Hr. (50 /60 Hz) W (50/60 Hz)	948
	278



SpectraCool Compact Indoor (N21)	
Indoor Model	N210216G050
Indoor Model Stainless Steel Type 4X	N210216G051
Cooling Performance	
Nominal: BTU/Hr. Watts	1800/2000
	528/586
At 131 F/131 F (55 C/55 C): BTU/Hr. (50/60 Hz) W (50/60 Hz)	2000/2175
	586/637
At 95 F/95 F (35 C/35 C): BTU/Hr. (50 /60 Hz) W (50/60 Hz)	1950/2200
	571/645



SpectraCool Narrow Indoor/Outdoor (N28)	
Indoor Model	N280416G050
Outdoor Model with Heat Pkg. Stainless Steel Type 4X	N280416G151
Cooling Performance	
Nominal: BTU/Hr. Watts	3800/4000
	1114/1172
At 125 F / 125 F (50 C / 50 C): BTU/Hr. (50/60 Hz) W (50/60 Hz)	3940/4104
	1150/1000
At 95 F/95 F (35 C/35 C): BTU/Hr. (50 /60 Hz) W (50/60 Hz)	3754/4011
	1100/1175

Free-standing Cabinets And Outdoor Solutions

SpectraCool Indoor/Outdoor (G52)							
Indoor Model	G520816G050	G520826G050	G520846G050	G521216G050	G521226G050	G521246G050
Indoor Model Stainless Steel Type 4X	G520816G051	G520826G051	G520846G051	G521216G051	G521226G051	G521246G051
Indoor Model with Remote Access Control*	G520816G060	G520826G060	G520846G060	G521216G060	G521226G060	G521246G060
Outdoor Model without Heat Pkg.	G520816G100	G520826G100	G520846G100	G521216G100	G521226G100	G521246G100
Outdoor Model Partial Recessed Mount**	G520816G101	G520826G101	G520846G101	G521216G101	G521226G101	G521246G101
Outdoor Model with Heat Pkg.	G520816G150	G520826G150	G520846G150	G521216G150	G521226G150	G521246G150
Outdoor Model with Heat Pkg. Stainless Steel Type 4X	G520816G151	G520826G151	G520846G151	G521216G151	G521226G151	G521246G151
Cooling Performance						
Nominal: BTU/Hr. Watts	8000	8000	8000	12000	12000	12000
	2300	2300	2300	3500	3500	3500
At 131 F/131 F (55 C/55 C): BTU/Hr. Watts	7300/8200	7300/8200	8800/9800	12000/12500	12000/12500	11100/12000
	2139/2403	2139/2403	2578/2871	3516/3662	3516/3662	3252/3516
At 95 F/95 F (35 C/35 C): BTU/Hr. Watts	6000/6800	6000/6800	7400/8200	9900/10700	9900/10700	9900/10700
	1758/1992	1758/1992	2168/2402	2900/3135	2900/3135	2900/3135

Depending on the required computing and networking performance trust in nVent to **SECURE MISSION CRITICAL DATA AVAILABILITY combined with OPTIMIZED EFFICIENCY** at **MINIMAL COST** of ownership.

For Decentralized IT and Communication

NVENT SCHROFF VARISTAR LHX+ 5/10 AIR/WATER HEAT EXCHANGER

The Varistar LHX+ electronic cabinet including air/water heat exchanger with 5 kW or 10 kW cooling capacity is well-suited for applications where a fully sealed cabinet is required.

- Cooling capacity from 5kW up to 10 kW
- Control unit with remote control
- Temperature regulation accuracy of +/- 0.1°C
- Static load of 1,000 kg
- EMC protection
- IP55 — Protection class IP 55

COOLING

Concept:

- 19-inch heat exchanger (6 U) installed in lower cabinet section
- Scalable cooling performance
  - Double fan unit for 10 kW cooling performance
  - Single fan unit for 5 kW cooling performance
- The fan units can be exchanged without having to replace the ehat exchanger
- Air flow volume of ~ 1000 / 1800 m^3/h
- Water flow temperature from 6°C to 25°C
- Ambient temperature from 5°C to 50°C

ADVANTAGES AND FEATURES

- **Scalable:** By replacing the heat exchanger with an integrated fan with a heat exchanger with two fans, the cooling performance can be modified from 5 kW to 10 kW. The infrastructure in the cabinet stays the same.
- **Future-oriented:** When the number of complex electronics in the cabinet increases and the power density along with it, only the heat exchanger must be replaced to achieve higher cooling performance.
- **Hot-swap applicable:** EC fans with speed control can be maintained without tools and even replaced in ongoing operation.
- **Space-saving:** Available starting at 600W x 800D base area per cabinet.
- **Precision control:** Controller with precise temperature regulation accuracy of +/- 0.1°C.
- **Greater productivity, higher safety:** Heat exchanger control directly at the cabinet via the display on the door. Remote access control with EtherCAT, Ethernet/IP, Modbus, or Profibus is also possible. Web server access optional.

ORDER INFORMATION

	DESCRIPTION	MODEL NUMBER
Complete solution (heat exchanger and cabinet) Usable assembly height 35 U	Varistar LHX+ 5 kW, cabinet: 2000H 600W 800D IP55	10130-325
	Varistar LHX+ 5 kW, cabinet: 2000H 600W 1000D EMC IP55	10130-326
	Varistar LHX+ 10 kW, cabinet: 2000H 600W 1000D EMC IP55	10130-327
Replacement components	10 kW heat exchanger with two 230-V fans	29714-016
	5 kW heat exchanger with one 230-V fan	29714-017
	Control kit	23130-664
	Flow rate and water T° sensor kit	23130-663
	Display and accessories for LHX+	23130-666
	Door contact switch kit	23130-667

Learn more about LHX+ 5KW and 10KW

Ensure Maximum Performance And Uptime

Precision Air-to-Water Heat Exchangers

The push for high bandwidth and low-latency compute resources drive decentralized high density installations outside the data center floor space.

Modular rack integrated cooling solutions with cooling capacities up to 25 kW help you to overcome this challenge.

Watch the video to learn more about LHX+

Micro Data Center with LHX+

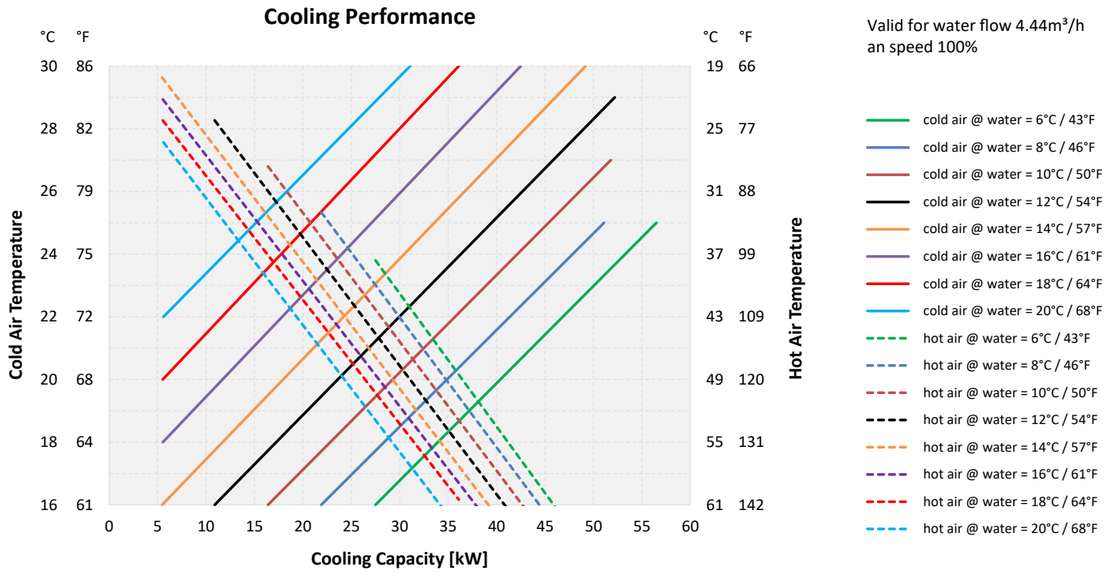
The air-to-water heat exchanger unit is integrated in a cabinet, to the left or right of the 19" plane. The cabinet offers full RU (rack unit) mounting space.

The warm exhaust air from the servers is forced past the fans of the cooler, through the air-to-water heat exchanger. The heat is transferred to the cooling medium and cooled air is provided in front of the 19" plane.

Benefits

- The rack-based cooling solution acts room-independent and allows for set-up of various rack configurations
- EMC-shielded, harsh environment, as well as outdoor solutions available
- Reduced noise levels

CONSULT NVENT TO GET ORDERING INFORMATION



Data Center Cooling Strategies

Localized Row And Cabinet Level Cooling Methodologies

Room cooling can be inefficient and expensive. Four approaches for dissipating ITE heat loads include:

- Air cooled: heat is transferred directly to the room air and cooled via traditional data center cooling
- Indirect water-cooled: heat is transferred indirectly to water through an air-to-water heat exchanger located within the row or single cabinet
- Direct water-cooled: heat is transferred directly to an attached heat transfer component, such as a cold plate
- Hybrid direct and indirect water-cooled - selective cooling of highest energy-consuming components with direct contact liquid cooling and the balance of the cabinet is cooled via secondary air-to-water cooling device, such as a Rear Door Cooler (RDC).

To maintain maximum IT equipment (ITE) availability, all equipment must be kept below a specified temperature range—a requirement that has recently become more challenging to meet. As the need for information has increased, so has the processing power of the network equipment, resulting in increasingly higher processor densities and heat levels.

Elevated temperatures result in equipment failure, and ultimately, costly downtime, making the need for efficient cooling systems more important than ever. Since nearly all power consumed by the processors is converted to heat—which must be removed via air (convection)—the data center in which this equipment resides must efficiently provide cold air to network equipment intakes and recycle the hot exhaust to remove the heat and keep vital networking equipment operating.

Localized cooling improves efficiency and reliability while reducing the risk of equipment failures.

Data Center Strategies - Cooling

Strategy	Approach	Raised floor	Capital costs/kW	Operating costs/kW	Average max kW per cabinet	Reliability (Complexity)
Random (chaos)	Room based	Yes	$	$ $ $ $ $	2,500 kW	☹
Hot aisle / cold aisle		Yes	$	$ $ $ $	6 kW – 8 kW	☹
Containment (raised floor)		Yes	$ $	$ $ $	up to 10 kW	😐
Chimney		Yes or No	$ $	$ $ $	10 kW – 20 kW	😐
Closed-loop, ducting, hot and cold containment		Yes or No	$ $ $	$ $	10 kW – 20 kW	😐
In-row cooling & containment (heat exchanger)	Row based	No	$ $ $ $	$ $ $	10 kW – 20 kW	🙂
In-Rack & Rear Door liquid cooling (heat exchanger)	Rack based	No	$ $ $	$ $	20 kW – 40 kW	🙂
Chip-level liquid cooling	Chip based	No	$ $ $ $ $	$	+40 kW	🙂

Aisle Containment

Improved Air Management Helps To Reduce Energy Costs

The use of containment systems can dramatically reduce energy costs, minimize hot spots and improve the carbon footprint of the data center. Both hot aisle containment (HAC) and cold aisle containment (CAC) systems greatly improve the data center cooling efficiency by segregating cold and hot airstreams and preventing them from intermixing. The basic design principle is to enclose the hot or cold aisle through the use of aisle-way doors, roof or baffle panels, and internal sealing within the cabinets. nVent offers tailored modular aisle containment solutions that include containment doors, aisle top covers, cladding elements and halogen-free gaskets.

Containment systems allow for higher cold temperatures per ASHRAE and ΔT, optimizing cooling systems and contributing to reduced energy costs.

Benefits

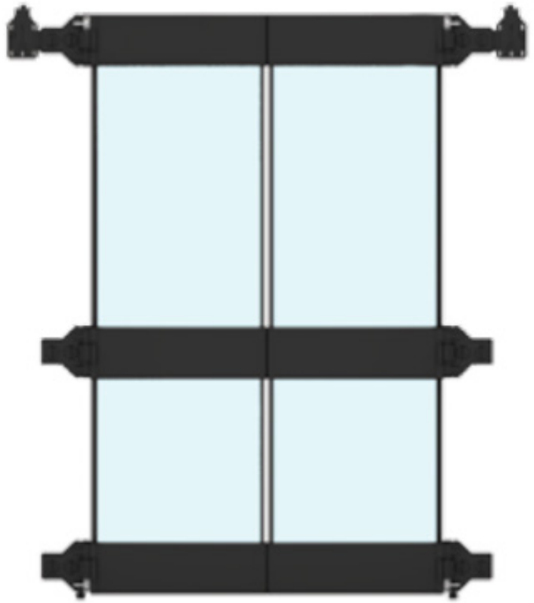
- Consistent separation of cold and hot air
- Enables optimized aisle airflow and temperature
- Low investment with short ROI – minimal maintenance costs
- Short implementation time with minimum investment
- Varistar or Proline sealed containment for maximum efficiency
- Proline Express containment for highest modularity and minimized installation cost

	Cabinet With Chimney Vertical Exhaust System	Cold Aisle Containment
Heat radiation	**No mixing of warm and cold air** Top covers and side panels are getting hot and heat up the room. CRAC has to compensate for this under certain conditions	**No mixing of warm and cold air**
Raised floor/ false ceiling	Sometimes requires extremely complex planning of arrangement in false ceiling and raised floor remain	Either raised floor or false ceiling not necessarily required
Noise	Noise level is reduced due to full metal doors at the back of the cabinet. On the other hand, noise level may increase with the high air velocity of 5m/s within the chimneys.	The server fans are creating the noise, mostly located in the rear side of the chassis. As the rear doors are open, noise level is increased
Room layout	Location in the room is limited as air ducts, building conditions (cross-ties), electrical cable assembly and CRAC have to be considered.	Free location in the room within the constraints of the cold aisle are possible
Influence of external ambient	Temperature delta between (cooled) room and external ambient temperature is smaller.	Temperature delta between (warm) room and outside ambient temperature is higher as server exhaust air into the room
Investment	Low initial investment, no operational costs, no points of failure	Low initial investment, no operational costs, no points of failure

Proline Quick Containment

Quick and Installation and Reconfiguration

The Proline Express containment is a set of predefined standard components optimized for easy installation using magnetic fixtures. It's conception minimizes the upfront planning effort, the components are designed such that there is no need for customization to the specific requirements of the facility. The containment assembly is done very fast as no screws are used. This also facilitates the reconfiguration of the containment in case of floor plan changes. This makes it a perfect fit for both retrofit solutions and ne installations.



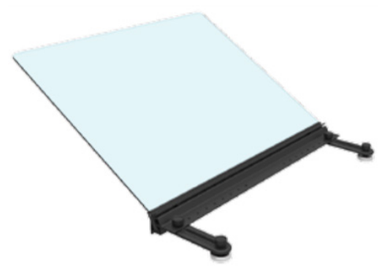
Proline Express Sealed Doors and Transom Windows

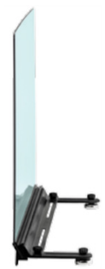
FEATURES

- Designed for 48-inch (1200 mm) wide aisles, but can also provide benefits for wider aisles
- The Bi-directional doors require a minimum 6-inch (152 mm) clearance from the front edge of the cabinet along its entire height for the hinges to attach
- Works with a variety of cabinets 76-inch (1930 mm) and taller
- Doors can be installed to hot or cold aisle
- Doors attached to side of rack magnetically

Proline Express Rack Top Baffles

The Rack Top Baffles are suitable for most standard width cabinets with solid, perforated or semi-solid steel tops. These attachment mounts allow a high degree of flexibility across the top of the cabinet to work around obstructions. The baffles prevent hot exhaust air from wrapping over the tops of racks. The angular baffle is designed for cold aisle application, vertical baffle hot aisles. However, the components are reconfigurable to allow for both angular or vertical installation.





Row Level Air-to-Liquid Cooling

RackChiller In-Row Precision Cooler

nVent SCHROFF RackChiller In-Row chilled water heat exchanger is a modular and scalable precision cooling solution that can replace or supplement traditional data center cooling infrastructure. The RackChiller In-Row is designed to deliver localized energy efficient cooling, which includes an air-to-water heat exchanger that removes and transfers heat to a water circuit. Six integrated Electronic Commutator (EC) fans provide chilled return air to the front of the unit for localized feed to a contained row and/or adjacent IT equipment.

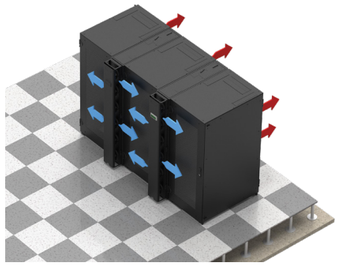
Features

- Water connection from above or below
- Built-in redundancy through EC fan technology
- Dual A-B power feed (integrated ATS)
- Control with internal and external sensors possible
- Monitoring via SNMP or Modbus
- Compatible with nVent aisle containment system
- Available in 300 mm and 600 mm widths

Benefits

- Up to 85% efficiency improvement vs. CRAC based systems in optimal operating conditions
- Operates with cooling water temperatures up to 84°F / 29°C while maintaining air temperatures within ASHRAE A1 allowable envelope
- Minimal planning outlay; short setup time
- Conforms to UL STD No. 61010-1 and CSA STD C22.2 No. 61010-1

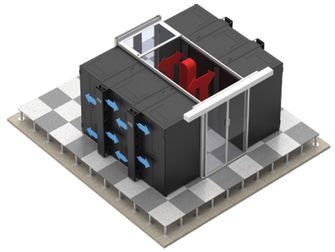
Row Level Cooling Configurations



Open Aisle

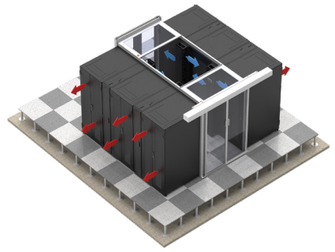
Open aisle row configuration includes a single row or dual row of cabinets that separate open cold and hot aisle, no aisle containment. The nVent SCHROFF Rack-Chiller draws hot air from the rear of the cabinets in the hot aisle, removes the heat through an air-to-water heat exchanger and supplies cooled air to the front of IT equipment in the cold aisle.

To increase efficiency it is allways better to combine in row cooling with a containment system to minimize air leakage.



Hot Aisle Contained Row

Hot aisle contained row configuration contains the hot exhaust air generated from IT equipment to prevent mixing with cool air in the room environment. The nVent RackChiller draws the contained hot air from the hot aisle, removes the heat through an air-to-water heat exchanger, and feeds cooled air to the front of IT equipment in the uncontained cold aisle.



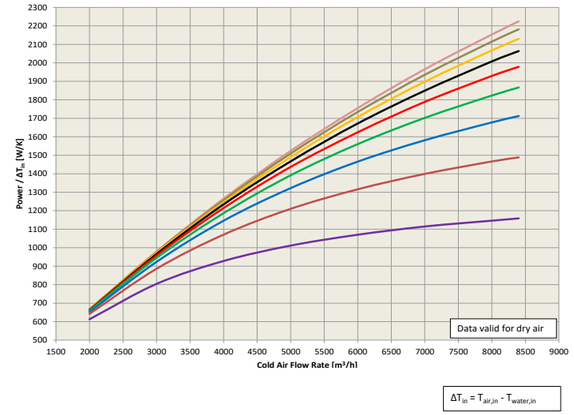
Cold Aisle Contained Row

Cold aisle contained row configuration contains chilled air provided by the nVent SCHROFF RackChiller in the cold aisle to prevent mixing with hot air generated by the exhaust of equipment within the hot aisle. The nVent RackChiller draws the contained hot air from the hot aisle, removes the heat through an air-to-water heat exchanger, and feeds cooled air to the front of IT equipment in the contained cold aisle.

RackChiller In-Row Technical Data

RackChiller In-Row	300 mm wide	600 mm wide
Depth	1200 mm adds 183 mm with front radial fans	1200 mm
Color	Black RAL9005; other colors on request	
Weight dry	309 lb/140 kg	441 lb/200 kg
Supply voltage [VAC]	Dual A-B power feed: 208-230 V	
Input power	Phase to phase or phase to neutral supply	
Connection	Water connection at back, top or bottom	
Pipe connection	1"/25 mm	
Coolant flow control	Included valve and actuator	
Water valve	2 way (standard), 3 way (optional)	
Volume capacity	2.9 gallons/11 liters	3.1 gallons / 11.8 liters
Fans	Backward curved centrifugal fans incorporating EC technology	
Max. airflow volume [m³/h]	4944 cfm/8400 m³/hr	
Number of fans	6	
Acoustic emission at 100% fan speed	74dB(A)	
Communication protocols	Modbus TCP/IP, SNMP	
Cooling capacity	**55kW**	**75kW**
Cold air temperature	72-75 °F/22-24°C	
Water supply	57°F/14°C	
Fan air flow	4944 cfm/8400 m³/hr (100%)	
Fluid flow	20.25 gpm/4.6 m³/hr	
Pressure drop	2.17 psi/15 kPA	3.9 psi/27 kPA

Cooling Performance 600 mm wide In-Row Cooler



Access RackChiller In-Row technical data

Monitoring

- Valve position (adjustable via cold air temperature)
- Fan speed (adjustable via hot air temperature)
- Return water temperature
- Fan-function display
- Local alarm display
- User-defined preventative maintenance alarms
- Alarm log
- SNMP and Modbus interface

Standard Product

Part No.	Height x Width x Depth mm	Height x Width x Depth in.	Input Voltage
60714079	2000 x 300 x 1200	78.74 x 11.81 x 47.24	230V phase to neutral
60714080	2000 x 600 x 1200	78.74 x 23.62 x 47.24	230V phase to neutral
60714081	2000 x 300 x 1200	78.74 x 11.81 x 47.24	208V phase to phase
60714082	2000 x 600 x 1200	78.74 x 23.62 x 47.24	208V phase to phase

RackChiller In-Row Accessories

Part No.	Description
60714083	Hose kit 3Mx25MM
60714084	Flow control valve
60714085	Controller nVent
20714007	Ganging and blanking kit - ProLine, 45U, 300mm
20714008	Ganging and blanking kit - ProLine, 45U, 600mm
20714009	Ganging and blanking kit - ProLine, 51U, 300mm
20714010	Ganging and blanking kit - ProLine, 51U, 600mm
21130594	Aisle containment adapter kit - top cover mount

Rack Level Air-to-Liquid Cooling

RackChiller Rear Door Precision Cooler

nVent SCHROFF RackChiller Rear Door chilled water heat exchanger is designed for managing high heat load cooling requirements within higher-density server, computing and storage racks. The entire system is integrated within an aesthetically framed perforated door with protective covers to isolate the liquid source and cooling loop from the rack-mounted equipment. The RDC installs on equipment racks as a separate complete rear door, enabling it to be retrofitted to existing racks. nVent SCHROFF Rear Door chilled water heat exchanger cools the warm exhaust air generated by the fans in the existing rack-mounted IT equipment through a large cooling coil surface before reintroducing back to the room.

Features

- Passive solution without fans - no noise, no additional power consumption, low maintenance requirements
- Active solution with fans supporting the air flow and minimize pressure drop of the heat exchanger
- Optional water control kit allows water flow regulation according the actual heat load
- Frame solution allows separation of coil and condensate management from the rack mount equipment
- Rear space inside the cabinet is completely available for cabling and power distribution
- Available in 600 mm and 800 mm width in 2,000 mm (42RU), 2,200 mm (47RU) and 2,450 mm (52RU) height
- Easily adapts to nVent cabinets; retrofit kits available for third party cabinets

Benefits

- Modular standard design - easy to adapt to your requirements
- Minimal planning outlay, short setup time
- Versatile infrastructure solutions and product combinations

The nVent SCHROFF Rear Door Cooler (RackChiller) is an air-to-water heat exchanger that can be mounted in place of the rear door of a server cabinet.

Passive

The passive RackChiller consists of a mounting frame and a perforated door with integrated heat exchanger. The overall depth is approx. 225 mm.

Active

The active RackChiller consists of a mounting frame and a perforated door with 4 fans and an integrated heat exchanger. The overall depth is approx. 335 mm.

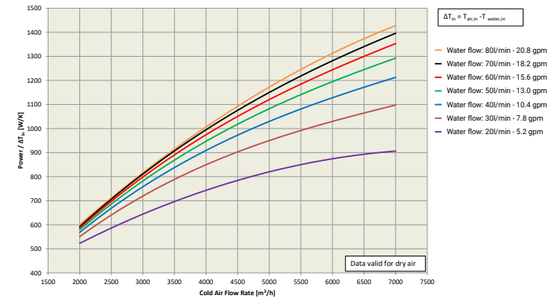
Access RackChiller Rear Door user manual for detailed description

RackChiller Rear Door Technical Data

Electrical rating	
RackChiller Passive	
Input voltage	200 - 240 VAC, 50/60 Hz
Input current rated	180 mA
Input current max.	450 mA
RackChiller Active	
Input voltage	200 - 240 VAC, 50/60 Hz
Input current rated	2,3 A (230 V)
Input current max.	6 A (200 V)
Power consumption max.	530 W (Fan speed 100%)

Maximum Air Flow (RackChiller Active)
6.800m³/h for 800mm wide units
5900m³/h for 600mm wide units

Cooling Performance 2000x800mm Rear Door Cooler



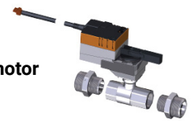
Part No.	For cabinet [mm]	Width (A) [mm]	Height (B) [mm]	Depth (C) [mm]	Weight (Dry) [kg]	Weight (W) packaging [kg]	Water capacity [l]	Cooling capacity [kW]	Air flow [m³/ h / cfm]
RackChiller Passive									
21130-800	600x2000	598	2018 -2040	226	71,6	125	7	32	2850/1676
21130-801	800x2000	798	2018 -2040	226	82,8	136	9	48	4600/2706
21130-802	600x2200	598	2218 -2240	226	76,1	130	8	37	3200/1882
21130-803	800x2200	798	2218 -2240	226	88,6	142	10	54	5150/3029
21130-804	600x2450	598	2468 -2490	226	80,3	138	8	37	3200/1882
21130-805	800x2450	798	2468 -2490	226	93,3	152	10	54	5150/3029
The cooling capacity is determined under the following conditions: Δp water: <100 kPa, Δp air: 15 Pa, Water flow temperature: 12°C / 53,6 F, Outlet temperature: 24°C / 75,2 F, Water flow: 4.8 m³/h / 21,1 gal/min Airflow: Depending on cooling module dimensions, see table									
RackChiller Active									
21130-806	600x2000	598	2018 -2040	333	106,8	179	7	30	5900 / 3500
21130-807	800x2000	798	2018 -2040	333	123,1	195	9	45	6800 / 4000
21130-808	600x2200	598	2218 -2240	333	112,1	184	8	34	6000 / 3550
21130-809	800x2200	798	2218 -2240	333	130,3	202	10	50	7000 / 4100
21130-810	600x2450	598	2468 -2490	333	117,8	198	8	34	6000 / 3550
21130-811	800x2450	798	2468 -2490	333	136,9	217	10	50	7000 / 4100
The cooling capacity is determined under the following conditions: Δp water: <100 kPa, Water flow temperature: 12°C / 53,6 F, Outlet temperature: 24°C / 75,2 F, Water flow: 4.8 m³/h / 21,1 gal/min									

Accessories RackChiller RearDoor
23130594 Control unit (RackChillller without fans)
23130599 Display for control unit (RackChillller without fans), PU 1 kit
23130621 Display for control unit (RackChillller without fans)
23130593 Water connection set, PU 1 kit
23130607 Control valve with servomotor, PU 1 kit
23130608 Water control package (sensor water flow, pressure and temperature)

Display for Control Unit

Water Control Package

Control Valve with Servomotor

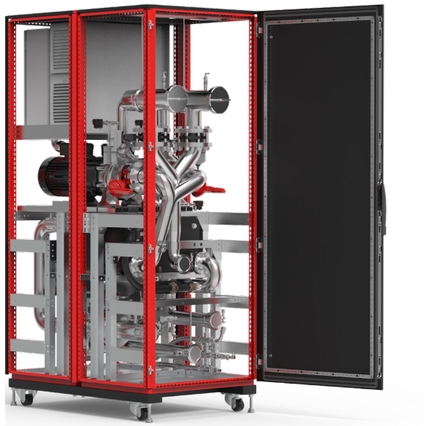


Online RackChiller Rear Door Calculation Tool

Use our online calculator to specify your operating parameters

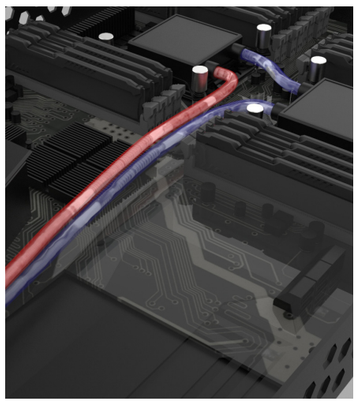
http://php7.schroff.biz/rackchiller-reardoor-calculator/public/us/calculation

High Density Liquid Cooling (HDLC)



Coolant Distribution Unit (CDU)

Rack Manifold



Cold Plate (Chip Level Cooling)

Direct Water Cooling Solutions

- Typically reduces energy consumption and operating costs
- Superior cooling capacity
- Acoustic sound abatement
- Liquid cooling eliminates thermal stratification, which occurs as cold air settles at the bottom of the cabinet and hot air moves towards the top, allowing for increased air intake temperatures up to 80° F—further reducing energy needs
- Functions in non-raised floor environments—either by including the piping in the slab floor or installing it in a plinth base under the cabinet
- Clustering high density heat loads into liquid cooled cabinets frees up floor space within the data center
- Higher chilled water temperatures avoid humidification issues, which decrease efficiency and increase energy costs

Features

- ASHRAE W4 warm direct liquid cooling
- 700kW+ cooling capacity
- Direct-to-chip & manifold connectivity
- Smart monitoring & control interface
- Integrated leak detection
- Redundant centralized pumps

Coolant Distribution Network

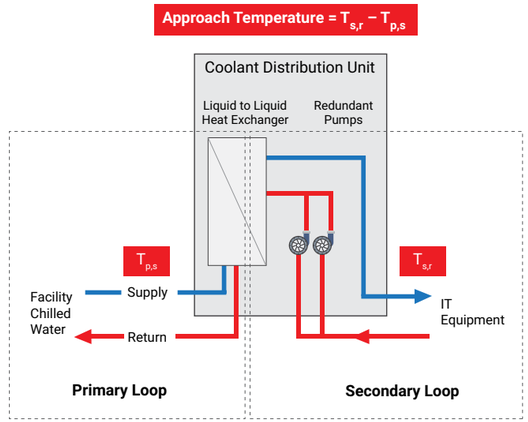
- Rack-mounted manifolds and hose kits
- Material - copper and stainless steel
- Joints - brazing, welding mechanical couples
- Dripless quick connectors

Experience and Capabilities

- 10+ years liquid cooling experience
- Specialized in custom Coolant Distribution Unit (CDU) design
- Thermal modeling & analysis
- System design & manufacturing
- Leak testing & quality control

With respect to its volume, water has a 3,500 times higher heat capacity versus air

HDLC Design Considerations

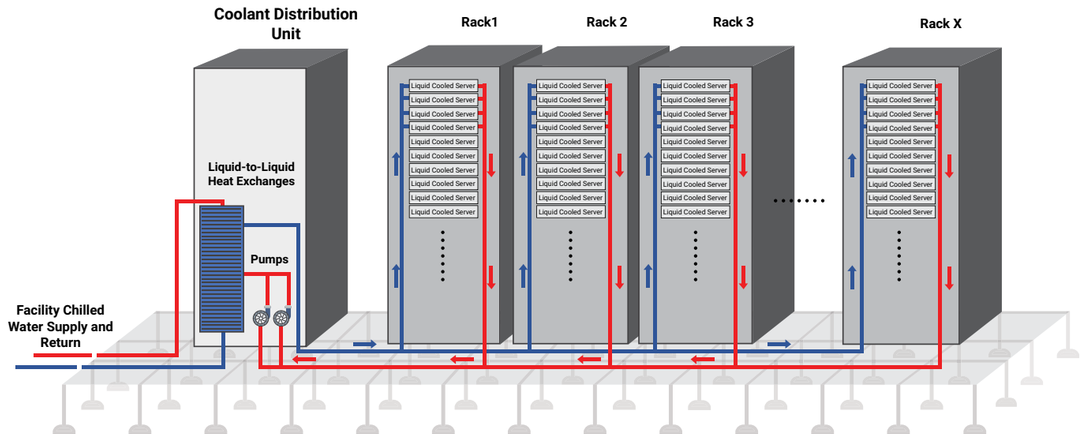


Specifying Liquid Cooling Systems

The major sub-assemblies within a high density liquid-cooled system are typically specific to unique product designs – such as the control system, cold plates, manifolds, arrangement of piping, pumps, valves, etc. Additional common cooling system components and subsystems include quick connects, hoses and connections.

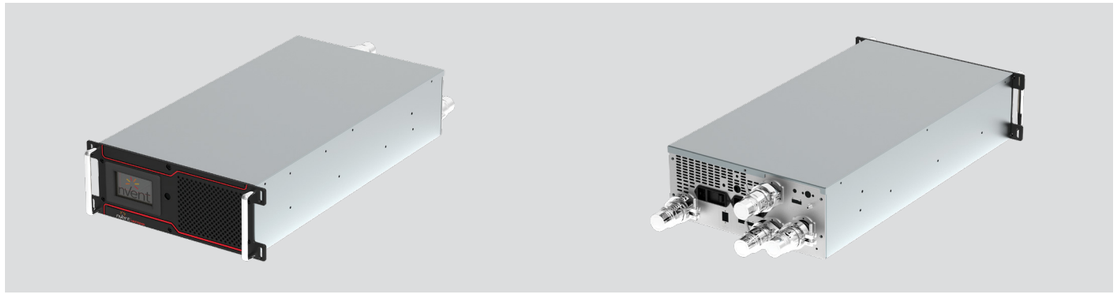
- Heat load
- Secondary return water temperature and secondary flow rate
- Primary (facility) water supply temperature and flow rate
- Secondary pressure drop
- Approach temperature
- Allowable max power consumption
- Form factor / dimensional constraints
- Voltage
- Controls/communication
- Agency approvals

Example High-Density Liquid Cooled (HDLC) System



In this example, the CDU separates the facility water, or primary side, from the much more tightly controlled secondary side water, which flows to the network of liquid cooled servers. Pumps within the CDU circulate the secondary water through the server cold plates and back to the CDU's heat exchanger, which transfers heat from the secondary loop into the facility water, without the two fluids ever touching.

RackChiller CDU40 Rack-Mount CDU



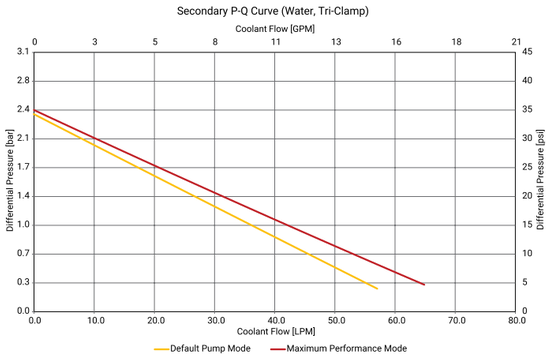
The nVent HOFFMAN RackChiller CDU40 is a rack-based Coolant Distribution Unit, built for the needs of today's demanding HPC requirements. The unit is capable of managing 40kW+ of heat load in small 4U of space. The RackChiller CDU40 is a highly efficient heat exchanger that uses ASHRAE W4 warm water to manage processor and component heat. It offers N+1 redundant pump design to provide safe supply of liquid coolant to the IT.
There are two versions available,

- Empty CDU without quick couplings
- Filled CDU with quick couplings

Benefits

- Enables up to 40 kW of liquid heat load in a single rack
- High degree of safety through N+1 pump design
- Best fit for small installations or when high modularity required

Increase performance and / or efficiency of a single rack



SPECIFICATIONS

General Data

- Pump redundancy: 3 pumps for n+1 redundancy
- Power requirement: 100V – 240V 50/60 Hz
- Current consumption 2.47 – 4.44A
- Power supply 2, N+1, 1000W each
- Cooling capacity: 40 kW at 10 C Approach (64 LPM Primary)
- Minimum approach temperature: 5K
- Secondary coolant supply range ASHRAE W17 to W45 (previous W1 to W4)
- Power consumption: 670W (default mode), 970W (max performance mode)
- Liquid Temp Range: 10 - 70 C (50 - 158 F)

Primary Rating

- Coolant: treated water with up to 25% PG
- Maximum Allowable Flow Rate: 80 LPM (21 GPM)
- Maximum Head Loss (at 64 LPM, Water): 0.1 Bar (2 psi)
- Maximum System Pressure: 3.8 Bar (55 psi)

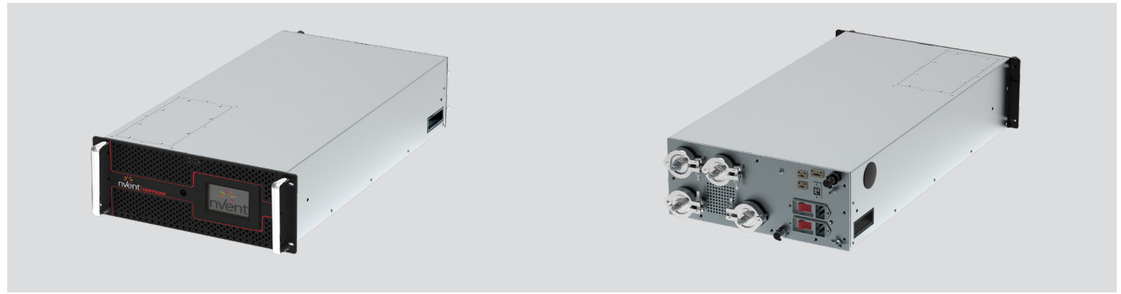
Secondary Performance

- Coolant: treated water with up to 25% PG
- Maximum Flow (dual pumps): 60 LPM (16 GPM) at 0.5 bar (7 psi)
- Maximum Flow (triple pumps): 75 LPM (20 GPM) at 0.4 bar (6 psi)
- Maximum System Pressure: 1.4 Bar (20 psi) - Secondary bypass opens at 20 psi, over pressure valve opens at 30 psi
- System Volume: 9.5 L (2.5 Gal)

Standard Product

Catalog Number	Description	Height in./mm	Width in./mm	Depth in./mm	Volume (g/l)	Voltage Rating (V)	Rated Frequency (Hz)	Rated Current (A)	Cooling Capacity (kW)	Weight (lb./kg)
CDU0402R001	Dry - No Coolant with tri-clamp	6.97 177	16.93 430	39.13 994	2.51/9.5	100-240	50/60	2.47-4.44	40	141.00 64
CDU0402R001Q	Filled - With Coolant with CGB20	6.97 177	16.93 430	39.13 994	2.51/9.5	100-240	50/60	2.47-4.44	40	164.00 74

RackChiller CDU100 Rack-Mount CDU



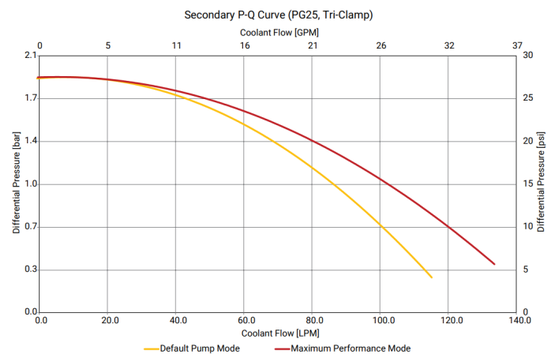
The nVent HOFFMAN RackChiller CDU100 is a rack-based CDU, built for the needs of today's most demanding HPC requirements. Capable of managing 100kW+ of heat load in a remarkably small 4U of space. The RackChiller CDU100 is an extremely efficient heat exchanger that uses ASHRAE W4 warm water to manage processor and component heat.
There are two versions available,

- Empty CDU with quick couplings
- Filled CDU with quick couplings

Benefits

- Enables up to 100 kW of liquid heat load in a single rack
- High degree of safety through N+1 pump design
- Best fit for extreme liquid load per rack, or high in 2-3 racks

Increase performance and / or efficiency of 1 - 3 racks



SPECIFICATIONS

General Data

- Pump redundancy: 2 pumps for n+1 redundancy
- Power requirement: 100V - 240V 50/60 Hz
- Current consumption 10 - 15A
- Power supply 2, N+1, 2500W each
- Cooling capacity: 100 kW at 6 C Approach (100 LPM Primary)
- Minimum approach temperature: 4K
- Secondary coolant supply range ASHRAE W17 to W45 (previous W1 toW4)
- Power consumption: 820W (default mode), 1134W (max performance mode)
- Liquid Temp Range: 10 - 70 C (50 - 158 F)

Primary Rating

- Coolant: treated water with up to 25% PG
- Maximum Allowable Flow Rate: 100 LPM (26 GPM)
- Maximum Head Loss (at 100 LPM, PG25): 0.9 Bar (13 psi)
- Maximum System Pressure: 3.4 Bar (50 psi)

Secondary Performance

- Coolant: treated water with up to 25% PG
- Maximum Flow (single pump): 115 LPM (30 GPM) at 0.5 bar (7 psi)
- Maximum Flow (dual pumps): 130 LPM (34 GPM) at 0.5 bar (7 psi)
- Maximum System Pressure: 2.8 Bar (40 psi) - Secondary bypass opens at 40 psi, over pressure valve opens at 50 psi
- System Volume: 15.6 L (4.1 Gal)

Standard Product

Catalog Number	Description	Height in./mm	Width in./mm	Depth in./mm	Volume (g/l)	Voltage Rating (V)	Rated Frequency (Hz)	Rated Current (A)	Cooling Capacity (kW)	Weight (lb./kg)
CDU1002R001	Dry - Without Coolant	6.97 177	16.93 430	37.40 950	4.12/15.6	100-240	50/60	10-15	100	137 62
CDU1002R001Q	Filled - With Coolant	6.97 177	16.93 430	37.40 950	4.12/15.6	100-240	50/60	10-15	100	167 76

High Performance Row CDU

Benefits

- Enable waste heat reusage or high temperature primary circuit for maximum cooling efficiency
- Minimize amount of row CDUs required for high load installations ➔ optimize floor space requirements
- Systems layout and design reduces need for redundant CDUs
- Minimum planning effort
- Reduced set up and installation time

RackChiller CDU800

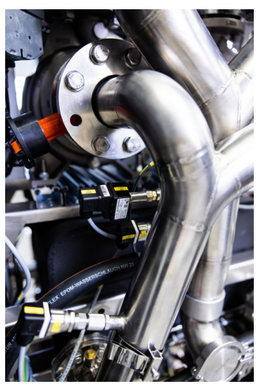
The nVent HOFFMAN RackChiller CDUB00 is designed for efficient and safe supply of IT equipment. The entire system is focused on providing the highest reliability, availability, and serviceability for supporting direct-to-chip liquid cooling. The CDUB00 is fed from a primary facility water system (FWS), where the integrated pumps drive the secondary technology cooling system (TCS) cooling loop flow. The heat exchanger transfers the excess heat from the secondary coolant to the primary. The complete system is integrated into an aesthetical enclosure with removable side panels and doors. The CDU can be installed onto a slab or raised floor, in-row with equipment racks or into a separate facility room.

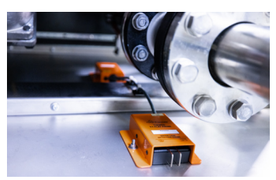
Features

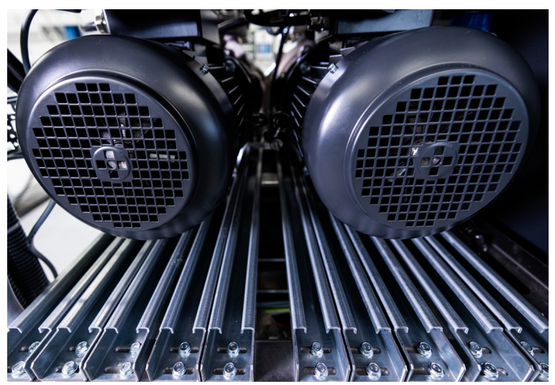
- Redundant high-performance, leak-free pump system
- Integrated variable speed drives
- Coolant connections through top or bottom panel
- Integrated 10-inch touch panel display
- Remote control features through Ethernet, SNMP v3, Mod bus
- On-board integrated leak detection
- 800 kW of performance at 6 K approach temperature difference (balanced flow) or 4 K (increased primary flow)
- Built in primary side 3-way valve with bypass shut valve – can operate as 2-way valve
- Dew point tracking and control of secondary supply temperature above condensing conditions

Watch the video to learn more about CDU800

The RackChiller CDU800 offers one of the highest performance densities in a standard rack footprint







RackChiller CDU800 Technical Specifications

SPECIFICATIONS

General Data

- 800+kW of cooling capacity @ 6K (850 LPM Primary)
- Pipe Connection: 3-inch ID hygienic tri-clamp
- Liquid Temp Range: 20 - 70 C (68 - 158 F)

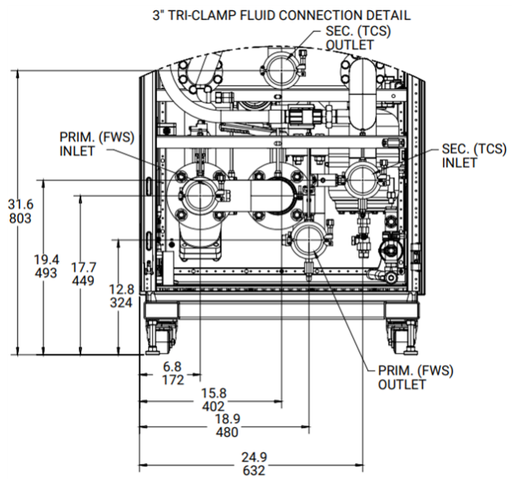
Primary Rating

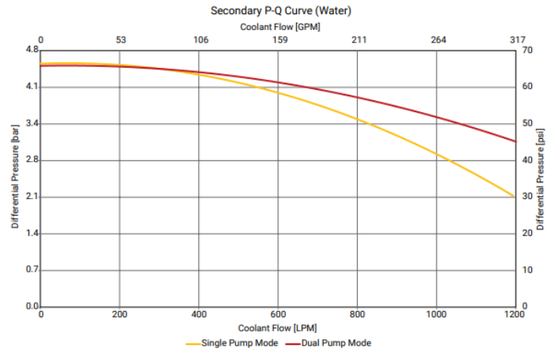
- Coolant: treated water with up to 20% PG
- Maximum Allowable Flow Rate: 1200 LPM (317 GPM)
- Maximum Head Loss (at 850 LPM, Water): 1.3 Bar (19 psi)
- Maximum System Pressure: 10.3 Bar (150 psi)
- System Volume: 50 L (13 Gal)
- Primary Filter Size: 250 micron

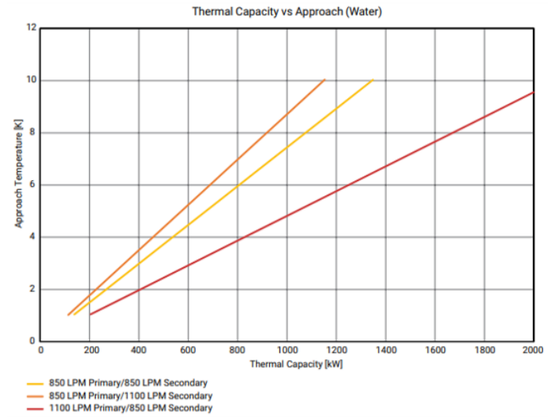
Secondary Performance

- Coolant: treated water with up to 30% PG
- Maximum Flow (single pump): up to 1100 LPM (290 GPM) at 2.6 bar (38 psi)
- Maximum Flow (dual pumps): up to 1100 LPM (290 GPM) at 3.4 bar (49 psi)
- Maximum Allowable Static Pressure: 3.5 Bar (50psi)
- Maximum System Pressure: 8.6 Bar (125 psi)
- Pressure Relief Valve Activation Pressure: 9.0 Bar (130 psi)
- System Volume: 100 L (26 Gal)
- Secondary Filter Size: 50 micron

3" TRI-CLAMP FLUID CONNECTION DETAIL







INDUSTRY STANDARDS

UL/cUL Listed; File No. SA7402

CE

Standard Product

Catalog Number	Description	Height in./mm	Width in./mm	Depth in./mm	Voltage Rating (V)	Phase	Rated Frequency (Hz)	Rated Current (A)	Power Consumption (kW)	Noise (dB)	Weight Dry (lb./kg)	Weight Package (lb./kg)
CDU8004L002	380-480V 3-PH with Primary Filtration	87.00 2200	31.00 800	47.00 1200	480	3	50/60	47.5	22.2	68	2500 1134	2820 1279
CDU8004L102	380-480V 3-PH without Primary Filtration	87.00 2200	31.00 800	47.00 1200	480	3	50/60	47.5	22.2	68	2500 1134	2820 1279

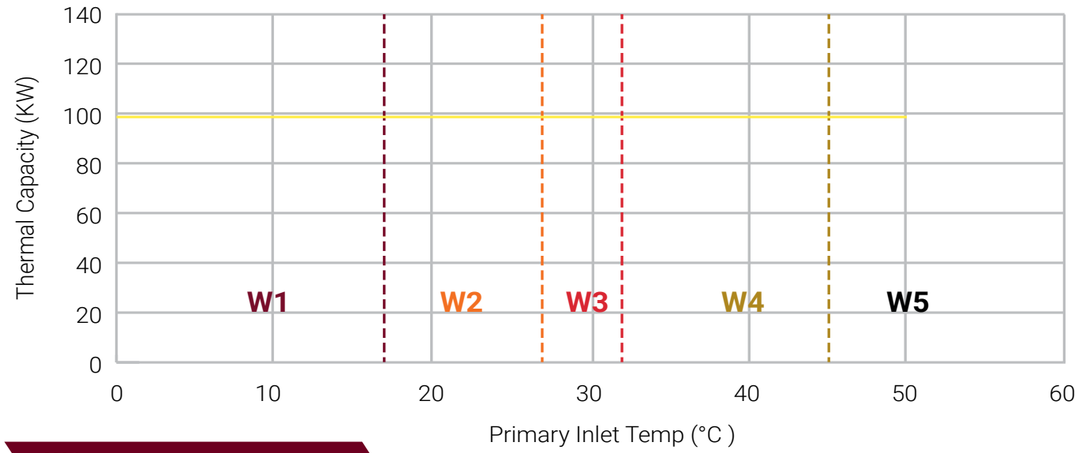
ASHRAE TC 9.9 Overview

Liquid Cooling Classifications For Data Centers

ASHRAE TC 9.9 defines different liquid cooling classifications for Data Centers based on facility water temperature available for cooling. The colder facility water would require higher upfront capital for the required cooling in terms of equipment and operating cost of chiller, cooling tower etc.

The warmer facility water would help alleviate the concerns of upfront capitol on primary side cooling but it leads to other important factors to consider such as IT equipment max. temperature and also the approach temperature you have to live with. If approach temperature is constant, and the IT equipment can run at elevated temperatures, then CDU thermal capacity remains the same across the DC facility water temperature range.

Thermal Capacity vs. Primary Inlet Temp



W1, facility water-W1 supply temperature of 2 °C to 17 °C

W2, facility water-supply temperature of 2 °C to 27 °C Class W1 and W2 typically apply to a data center that is traditionally cooled using chillers and a cooling tower but with an optional waterside economizer to improve energy efficiency depending on the location of the data center.

W3, facility water-supply temperature of 2 °C to 32 °C For most locations, these data centers may be operated without chillers in a waterside economizer mode. Some locations may still require chillers to meet facility water supply temperature guidelines during peak ambient conditions for relatively short periods of time.

W4, facility water-supply temperature of 2 °C to 45 °C To take advantage of energy efficiency and reduce capital expense, these data centers are operated in a waterside economizer mode without chillers. Heat rejection to the atmosphere can be accomplished by either a cooling tower or a dry (closed-loop liquid-to-air) cooler.

W5, facility water-supply temperature greater than 45 °C W5 facilities take advantage of energy efficiency, reducing capital and operational expense with chillerless operation, and by making use of the waste energy. The facility water temperature is high enough to make use of the water exiting the IT equipment for heating local buildings.

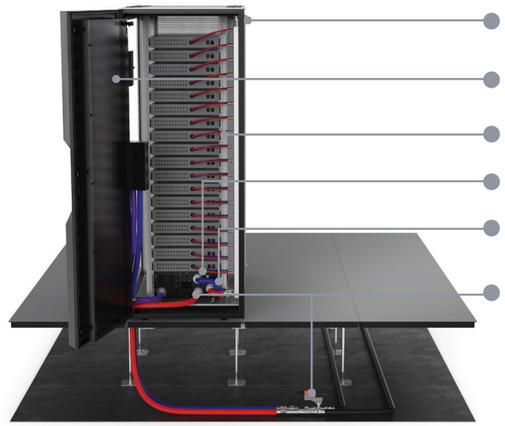
Moving from a room or row based cooling to a rack or direct-to-chip based cooling solution allows to increase the water-supply temperature.

*ASHRAE "Liquid Cooling Guidelines for Datacom Equipment Centers Second Edition, Datacom Series 4"

Exceptional Efficiency Performance

Hybrid Liquid Cooling Combining Liquid and Air Cooling

RackChiller Rear Door Cooler is combined with a rack mounted Direct Contact Liquid Coolant Distribution Unit (rCDU) to achieve new levels of rack-level cooling efficiency.



Benefits

- Reduces energy consumption
- Enables higher rack density
- Decreases total cost of ownership
- Quick and easy installation
- Modular design for easy future upgrades
- Ideal for Edge Computing applications

Features

- Designed to remove 100% of the heat generated in IT racks configured with high density heat loads
- Combines the extreme heat removal of Direct Contact Liquid Cooling at the chip level with a Rear Door air-to-water heat exchanger for residual heat removal
- Uses a single facility water line
- Sophisticated, coordinated controls
- Warm water exiting the RackChiller Rear Door Cooler complements the input requirements of the Rack Coolant Distribution Unit
- High temperature return water increases efficiency and can be used for heat re-use

Parameter	Unit	Operating Point 1	Operating Point 2	Operating Point 3	Operating Point 4
Server return water temp.	[°C]	60	60	60	60
Facility supply water temp.	[°C]	15	20	30	40
Room temp.	[°C]	22,5	25	33	41.5
RackChiller Rear Door Cooler capacity	[kW]	25,5	17	11	5,7
RackChiller Rear Door return / rCDU primary supply temp.	[°C]	21	24	32	41
rCDU approach temp. diff.	[°C]	18,1	16,7	12,7	8,6
rCDU capacity	[kW]	74,8	69	52,5	35,6
Combined capacity	**[kW]**	**100.3**	**86**	**63.6**	**41.3**
Percentage air-cooled	[%]	25	20	17	14
Percentage liquid-cooled	[%]	75	80	83	86

Leak Detection And Heat Tracing Solutions

Installing a water leak detection system allows building and facility managers to take quick and effective corrective action before the leak causes extensive damage

Avoid Major Problems With Water Leak Detection

Water leaks from burst pipes, indoor plumbing, faulty appliances or even the weather can damage property, data, and customer goodwill. That's why building owners invest in smart water leak detection equipment in offices, hotels, museums, computer rooms, data centers, or other industrial and commercial buildings.

nVent RAYCHEM TraceTek water leak detection systems detect, locate and communicate small leaks before major problems develop. Whether it's protecting datacenters with expensive electronics or protecting vital pipe infrastructure, our solutions are modular and tailored to your specific needs, to provide reliable and dependable protection for many years.

Benefits

- Long term reliable systems made with high performance polymers for maximum durability.
- Cables and probes that directly detect and accurately pinpoint the source of the leak.
- Digital communications powered independently of the sensor cable so that damage to the sensor cable does not cripple the entire system.
- A robust digital backbone that gives the ability to independently track many leaks at once, with local, networked or remote alarms and diagnostics.
- Flexible design options that permit sensor cables to be short or long and deployed on one floor or many levels of the building while being centrally monitored from the most effective locations.
- Graphic mapping that shows the location of any detected leak on a background graphic of your choosing that flashes an icon in the exact location of the detected leak.
- Optional fuel sensors to monitor the back-up emergency generators and associated diesel fuel tanks, pipes and fittings (FM7745 compliant).
- Multiple digital communications protocols and integration to building management systems, email / SMS or web page.
- Configuration options that automatically shut off pumps or valves where appropriate.
- Modular assemblies that can be configured for current needs and allow for future expansion of your leak detection system.
- Ability to monitor up to 250 cables independently of each other.

Prevent downtime in data centers - find leaks before they find you

Leak Detection

Product Name	Description
TTDM-128	Single channel and network master panel monitor
TT-TS12-PANEL	TT-TS12 12" touch screen monitoring panel and network master
TTSIM-1A	Modbus enabled sensor interface module with relay
TT1000	Modular water sensing cable
TT1100-OHP	Water sensing cable for use with suspended water piping
TT-FLAT-PROBE	Water and conductive liquids detector, flat probe
TT-MINI-PROBE	Water and conductive liquids sensing probe with metal connector
TT-MLC-PC	Modular leader cable with female connector on one side and pigtail lead on other side
TT-MET-PC	Modular end termination with plastic connector
TT-MBC-PC	Modular branch connector with plastic connector
TT-MJC-PC	Modular jumper cable with factory installed plastic connectors
TT5000-MC	Modular liquid fuels sensing cable with factory installed connectors
TT-FFS-WR	TT-FFS-WR series fast fuel probe. Water Resistant

Configured To Your Needs

Leak Detection Configured To Your Needs

Critical infrastructure and equipment typically requires both 24/7 availability and absolutely no damage. Our water leak detection systems consist of sensor cables, probes and monitoring systems, to detect and pinpoint leaks, allowing you to take action immediately and at the right location.

TraceTek technologies include sensor cables, fast acting probes, monitoring and alarm panels. These modular units can be configured to suit simple or complex applications and allow for future expansion. The capability to integrate in building information management systems, provides central visibility over the entire system. TraceTek leak detection systems are simple to operate, rugged in design and reliable in use.

Heating Cable Solutions

Specialized nVent RAYCHEM self-regulating heating cables, controllers, and accessories are ideal for pipe freeze protection, roof and gutter de-icing, and fuel oil temperature maintenance. These will help you protect your facility while complying with today's building regulations on energy savings. A complete nVent RAYCHEM system can result in energy savings of up to 80%! Additionally, nVent RAYCHEM connection systems are designed and configured to be fully compatible with our heating cables and decreases installation time by up to 80%.

Heat Tracing System Design Tools

TraceCalc Pro For Buildings is an intuitive, easy-to-use, online design tool that lets you create simple or complex heat-tracing solutions. Additional BIM, MasterSpec and CAD Details tools are available at our Designer's tool box.

Protect your Data Center's pipes, roofs, and gutters from freezing water, ice and snow.

Online Design Tool
https://www.nventthermal.com/design-tools/online-tools/ trace-calc-pro-for-buildings/index.aspx

Thermal Simulation

Computational Fluid Dynamics (CFD) can be used to analyze existing or future data center thermal capacity, installed IT equipment load and data center infrastructure performance. CFD analysis supports the optimization of existing or future IT equipment layouts. Virtual recording and tests maintain educated decisions on operational infrastructures to check fallout plans, redundancies, position of sensors and cooling components as well as capacity planning.

ADVANTAGES OF CFD

- Minimize planning outlay
- Reduce operational cost
- Improve existing infrastructure
- Asset planning

Application

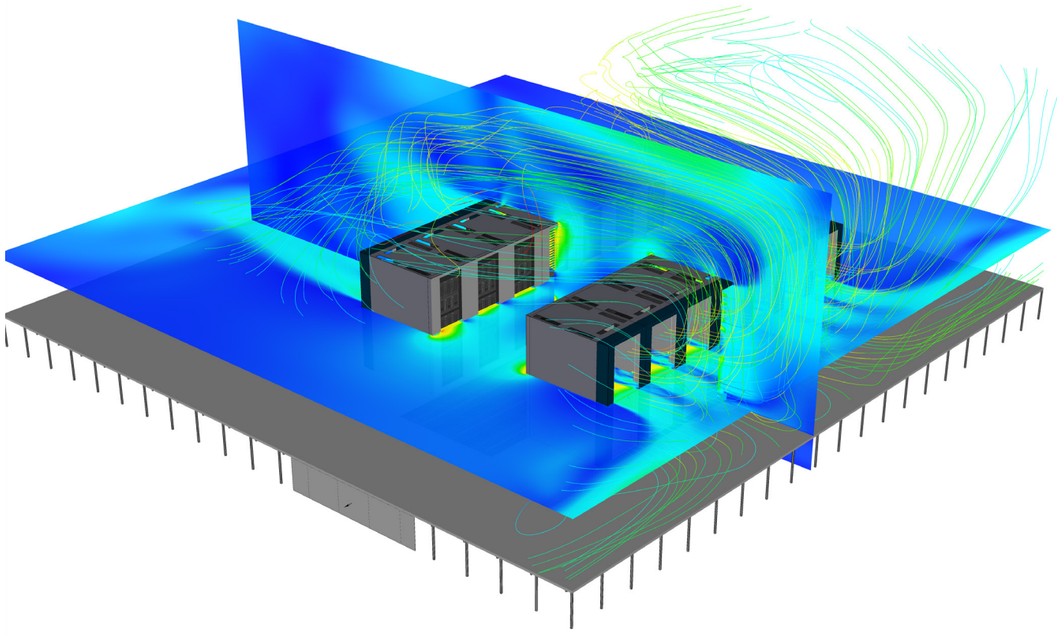
In the previous 5 years, the performance of servers, storage, and networking equipment has increased exponentially. Along with this performance growth has come a significant increase in the power dissipated by the server, storage, and networking hardware. This has caused a significant strain on the data center infrastructure that was built for hardware power levels much less than what is being delivered today. Placement of IT equipment, air handlers, close-coupled cooling, and direct liquid cooling technologies within the data center environment is critical to the efficient use of available space and data center cooling capacity. Lead time for facility upgrades and capital planning requirements mandate comprehensive planning.

Evaluation Completed By Expert nVent Engineers

A key to the effective deployment of IT equipment is an evaluation of the current and future thermal profile of the data center. nVent thermal analysis enables customers to choose the most efficient and effective cooling technologies and layouts for their specific IT hardware by modelling the necessary infrastructure modifications or layout changes.

Typical Project Tasks:

- Project scope/resources/schedule agreed upon
- On-site evaluation and consultation
- Analyze and optimize with CFD models
- Final meeting with evaluation report and recommendations for data center layout



Support And Services

Whatever challenges you have to overcome, we will work together to find the perfect solution. Standard off the shelf, preconfigured products or a custom solution, our products are the result of our experts know-how in cabinets and racks integrating mechanics, electronics and thermal management. Wherever you are: trust in nVent with the widest range of application requirements. With our pre- and post-sales services we support you over the full product life cycle.

Work with experts to specify your optimized cooling solutions.

PROFESSIONAL SERVICES

With a network of qualified field installation and repair technicians around the world, nVent offers unparalleled cooling support and services to quickly restore your system. Depend on us for local customer service, regional spare parts inventories and competitive standard warranties. Extended warranties and preventive maintenance are also available.

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