



## Market Insight Report Reprint

# Vertiv supports liquid cooling for high-density computing with new coolant distribution unit

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## Introduction

With high-performance computing on the rise, high-density computing environments are becoming increasingly difficult to manage. Air cooling is becoming less effective, and enterprises need alternative cooling technologies. Vertiv Holdings Co.'s new product, the Liebert XDU, provides a secondary fluid cooling loop to achieve heat transfer between the facility and secondary circuits for the IT space. This enables an alternative cooling fluid to be used than the datacenter's water, facilitating the adoption of liquid cooling technologies like rear door heat exchangers, direct-to-chip and immersion. The compact unit can be deployed in-row or on the perimeter.

## THE TAKE

With the rise of high-density computing applications such as data analytics, AI and machine learning, traditional air cooling is reaching its limits, requiring more efficient and sustainable methods, such as liquid cooling. With Liebert XDU, Vertiv offers its customers the opportunity to improve cooling in the datacenter while still keeping a similar footprint to what they already have. The Liebert XDU coolant distribution unit enables datacenters to run most current liquid cooling technologies, from core to edge computing sites.

## Context

Vertiv is one of the largest players in the datacenter technologies segment, rivaled only by Schneider Electric SE. The group announced \$5 billion in sales at the end of 2021. The company leads the market for datacenter critical cooling and is also very strong in electrical equipment and datacenter services. Vertiv has about 24,000 employees, some 30 manufacturing facilities worldwide and entrenched supply-chain partners. The company's headquarters are in Columbus, Ohio, and its owner is private equity firm Platinum Equity, which acquired Emerson Network Power, a division of Emerson Electric, from the latter in an all-cash transaction valued at \$4 billion and rebranded the company as Vertiv in late 2016. Vertiv Holdings Co. was listed on New York Stock Exchange in February 2020. Vertiv continues to use Liebert as the brand for most of its products, especially cooling. Founded by Ralph C. Liebert (1918-1984) as Capitol Refrigeration Industries in 1946, Liebert was formed in 1965 as one of the early designers and manufacturers of computer room air conditioning (CRAC) systems. Through a partnership with Conditioned Power Corporation in 1977 and the acquisition of the Programmed Power subsidiary from Franklin Electric in 1983, Liebert added its power division, which includes the design and manufacture of power distribution, conditioning and monitoring, as well as uninterruptible power supplies (UPS). Liebert was acquired by Emerson Electric in 1987 and became its network and computer protection business Emerson Network Power in 2000.

Mission-critical environments such as datacenters account for 70% of Vertiv's business; communication networks and commercial/industrial facilities account for 20% and 10%, respectively (2021). The group has a global, well-established footprint and supply chain network with the Americas as its biggest region as of the end of 2021, accounting for 44% of service revenues, with Asia-Pacific contributing 32%, and EMEA 24%. In terms of its offerings, Vertiv's financials at the end of 2021 highlighted share of revenues for critical infrastructure, integrated rack solutions and services/spares at 58%, 13% and 29% respectively.

When it comes to cooling, traditional datacenters are cooled by blowing cool air across the server components (using fans). The resulting hot air is then expelled or cooled and recycled. Many datacenters use liquid to transfer the heat from the hot air, then the liquid is cooled separately. However, this becomes more difficult as IT components start to give off more heat in a smaller area. The expanding use of high-powered GPU chips for artificial intelligence, data analytics and high-performance computing has put pressure on typical datacenter cooling systems, since the volume of air that can be blown across these chips may not be enough to cool them. This has been exacerbated by the rising power consumption of regular CPU chips. Liquid, which is more efficient than air at transferring heat, is starting to be used closer to where the heat is produced in order to improve thermal management. There are several ways of doing this, such as rear-door heat exchangers, direct-to-chip liquid cooling and full immersion of the IT components in liquid. Many datacenters currently have a liquid cooling loop for the building and could increase their cooling capacity by installing or retrofitting racks to support liquid cooling closer to the IT equipment. This process could be simplified by introducing a heat exchange capability, or cooling distribution unit, between the building's liquid loop and the loop that runs closer to the IT equipment. This is the gap Vertiv proposes to fill with the Liebert XDU.

## Liebert XDU

The Liebert XDU, developed in consultation with datacenter providers and server manufacturers, is a liquid-to-liquid cooling distribution unit that functions as a heat exchanger between the datacenter's main cooling loop and a liquid cooling loop for the IT equipment. The unit is compact enough to put in the row near the rack it is cooling or along the room's perimeter and comes in a capacity of 450 kW or up to 1,368 kW. Easy connections can be made to replace manifold devices, making planning and installation relatively quick and convenient.

The unit consists of water pipes, pumps and a heat exchanger, and it can be connected to three different cooling methods: rear door heat exchange, direct-to-chip and immersion. In the case of direct-to-chip liquid cooling, cold plates are attached to the surface of "big ticket" heat generators — CPUs and GPUs. The heat from the electronics is conducted via the cold plate to liquid in pipes in the rack. The heat is then exchanged with the primary loop in the CDU. However, supplemental cooling is still needed to account for the remaining 20% of heat generated by other server components. When using the rear door heat exchanger, the heated exhaust air passes through a liquid-filled coil in the exchanger mounted in the rear door, transferring the heat to the coolant in the coil.

## Services and strategy

Vertiv has more than 300 regional service centers and three global monitoring centers. It provides more than 200,000 hours of technical training to third parties and customers a year. Vertiv divides its focus into three main pillars: services related to the design and build of new facilities or capacity, equipment maintenance contracts, and services designed to optimize legacy sites (assessments, monitoring, asset management, equipment upgrades and efficiency services).

Vertiv has developed a standardized approach to service delivery that extends to appointing "operational customer success managers" for large colocation and hyperscale customers to help deliver a consistent service globally and includes embedding some Vertiv personnel with these large operators on an ongoing basis.

Vertiv also provides facilities management services — outsourced management of all aspects of a datacenter — in some key regions such as Asia. These are usually related to prefabricated modular (PFM) datacenter designs where some customers want ongoing facilities management. However, the company has no plans to provide facilities management in developed markets such as North America or Europe. In these regions, it plans to ramp up its provision of PFM designs with built-in remote monitoring and management features that reduce the requirement for third-party facilities management services.

## Competition

At the global level, Vertiv’s main competitor is Schneider Electric, with similar electrical, mechanical and IT room offerings. In some emerging markets, Huawei also provides stiff competition. Vertiv also competes with Stultz, which offers a full range of cooling approaches for mission-critical and datacenter applications. Data Aire is another company with a complete portfolio of cooling products, although it just announced that the business will cease operation on December 16.

Shenzhen-based Envicool, founded by a group of former Huawei/Emerson Network Power employees in 2005, has taken increasing market share away from Emerson Network Power/Vertiv in China and is expanding globally. Excool is another competitor that focuses only on indirect evaporative cooling offerings. Liquid cooling technology companies are among the active players offering CDU products to support their direct-to-chip approaches, including CoolIT and Motivair, and both have rack-mounted CDU offerings.

## SWOT Analysis

<p><b>STRENGTHS</b></p> <p>Vertiv has a large base, several client brands and a broad global footprint. It has extensive and technically strong global services. The group has product brand recognition for some major product lines in a risk-averse market. It is also in a solid financial position.</p>	<p><b>WEAKNESSES</b></p> <p>Vertiv has been relatively less strong in marketing its products, technologies and services than others. Investments in software and distributed control have yet to be fully aligned with its equipment and services offerings.</p>
<p><b>OPPORTUNITIES</b></p> <p>Multi-megawatt colocation and hyperscale sites offer many opportunities to land large wins. On the other end of the scale, demand for smaller edge datacenters is expected to balloon as the number of connected machines grows in many vertical industries.</p>	<p><b>THREATS</b></p> <p>Vertiv is exposed to the shrinking enterprise datacenter segment. Telecom and industrial expenditures are also muted in some areas due to cost pressures. A handful of emerging companies are battling for the liquid cooling market.</p>

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