



Vertiv™ 360AI

Solution Design Specifications

Model Number: 12XL1200E



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1. Executive summary

Vertiv™ 360AI Solutions uniquely combine deep domain expertise in power architectures, thermal management, IT systems, and remote management, to enable rapid deployment of infrastructure for AI applications and high-performance computing.

Your goals for high-density, floorspace optimization, sustainability and efficiency became our teams' key design criteria. We focused our efforts on designing solutions that will exceed your goals and expectations with seamlessly integration into your white space. Our engineering team delivered world class solutions on this promise, and our services team can fully support it on request with their unmatched expertise and global footprint.

2. General technical description

This high-density solution is sized for IT load of 1.2 MW across 12 racks, assuming 960 kW of direct to chip liquid cooling capacity and 240 kW traditional air-cooling via rear door heat exchangers with two separate fluid networks (i.e., 80:20 liquid and air split).

For the direct-to-chip circuit, the cooling capacity (960kW) of the Vertiv™ XDU1350 - a standalone Coolant Distribution Unit (CDU) - has been calculated assuming the temperature of the chilled water in the primary fluid network is 12.8°C (55°F) with 7.8°C (14°F) delta T, and 100% water. Outlet water temperature on the secondary fluid network has been specified at 25°C (77°F) and 1.5 lpm/kW or 0.3962 GPM/kW, with 25% propylene glycol, equating to a return water temperature of 34.8°C (94.7°F) or 10°C (17.7°F) delta T.

For the rear door heat exchanger circuit, the Vertiv™ XDU600 - a standalone Coolant Distribution Unit (CDU) – is used. The cooling capacity of the rear door heat exchangers (240kW) has been calculated assuming 18.3°C (65°F) inlet water temperature at 68.2 lpm or 18 GPM, 23.9°C (80.6°F) room temperature, and 45% relative humidity. This leads to a water delta T of 4.2°C (7.6°F) or 22.5°C (72.6°F) return temperature.

Included products are server racks that house rack PDUs, manifolds, rear door heat exchangers, and top-of-rack management appliance, as well as other accessories necessary for integration and normal data center operation. Above the racks is busway power distribution. Note: overhead manifold for secondary fluid network is not included by default.

The solution requires comprehensive deployment services for installation, fluid-fill, recurring a warranty service such as warranty inspection, start-up, and acceptance testing which are not included in the present scope of work. Optional services, available on demand, include workforce training on thermal management operation and servicing.

2.1 System capacity

12 Rack(s)

1200kW Total solution capacity

100 kW Load per rack

2.2 Technologies used

Cooling Method

Direct-to-Chip + Rear-Door Heat Exchanger

Heat Rejection Type

Water/Glycol

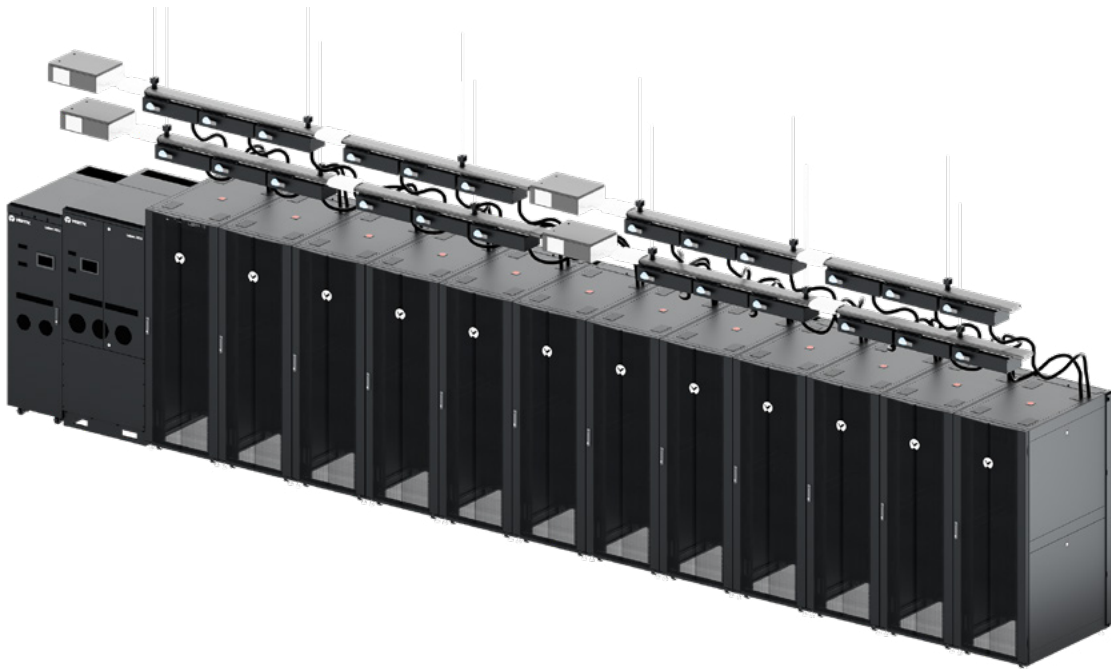
3. Material list

Qty.	SKU	Description
12	VR3357	Rack: Vertiv VR3357, 48U 800 mm x 1200 mm
1	XDU600	Liquid-to-Liquid CDU: Vertiv CoolChip CDU 600 Coolant Distribution Unit
1	XDU1350	Liquid-to-Liquid CDU: Vertiv Liebert XDU1350 Coolant Distribution Unit
12	DCD35	Rear Door Heat Exchanger: Vertiv Liebert DCD Water-Cooled Active Rack Door, 35 kW
12	RM124	Rack Manifold: Vertiv CoolChip Fluid Network manifold assembly in-rack 36U medium flow
12	LT460-Z20	Zone Leak Detection Sensors: Vertiv Liebert LT460 Leak Detection Kit, 6 m (20') cable
4	Powerbar iMPB	Vertiv PowerBar iMPB System: 630 A busway, tap-off units, and endcap
24	VP7UA0A0	Rack PDU: Vertiv Power IT, Switched Outlet Level Monitoring, 80 A, 240/415 V WYE, 57.6 kW, Vertical, (36) Combi C13/C19, Hardwired
1	RDU501	Monitoring Unit: Vertiv Liebert RDU501 Intelligent Infrastructure Management Appliance, 1U

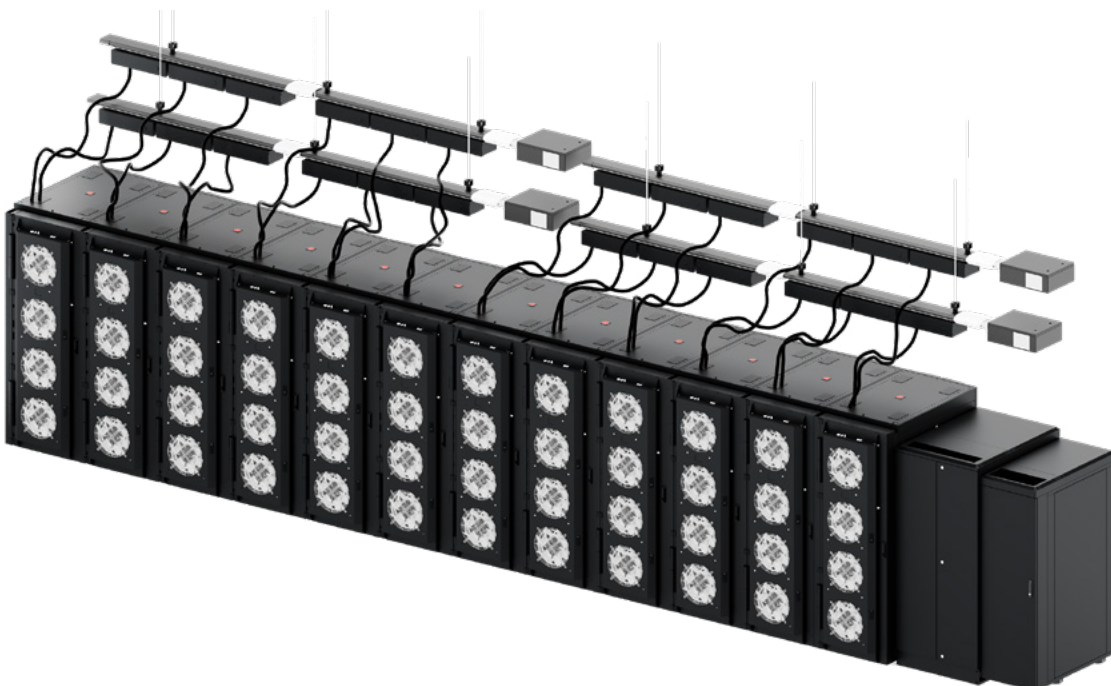
Material list only includes major components, other supporting peripheral components such as the hoses, valves, cable, adapter kits, etc. would be part of final quote document.

4. Solution pictures

4.1 Front quarter view

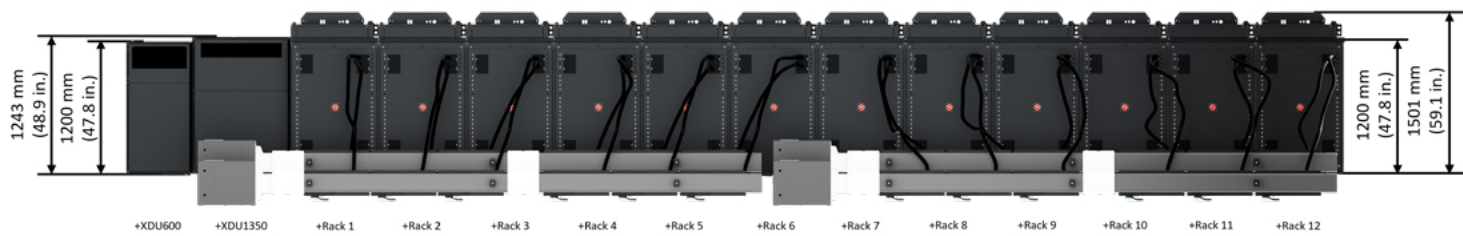


4.2 Back quarter view

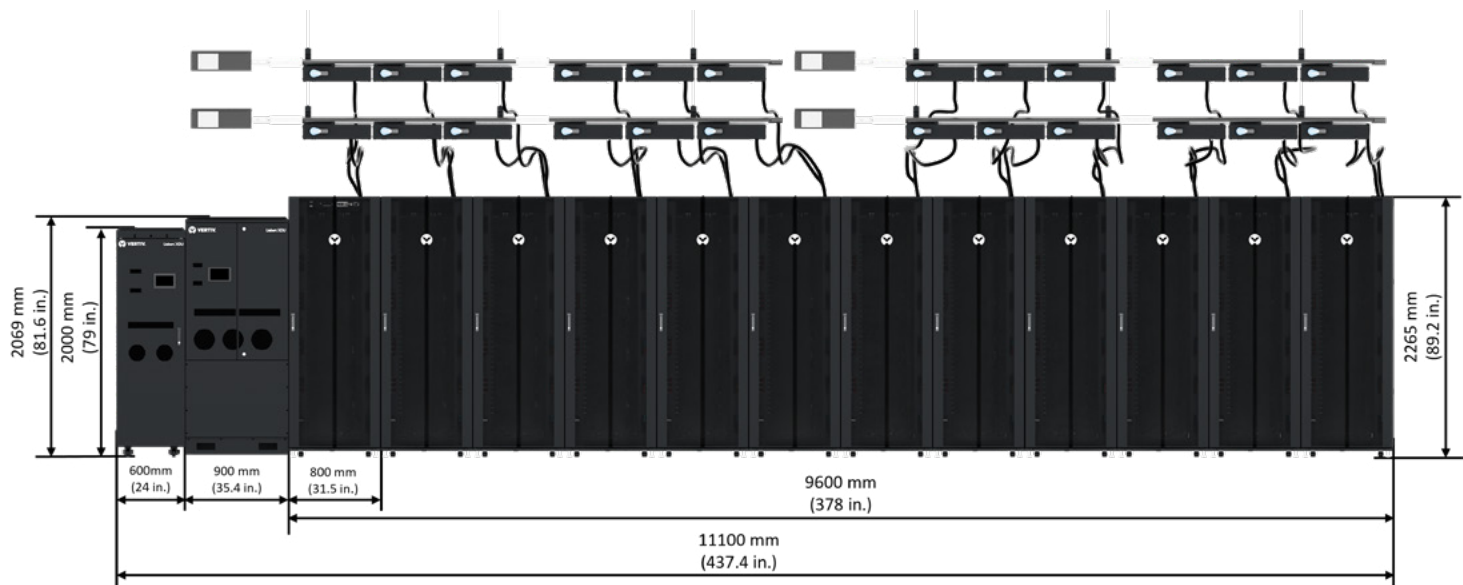


The images shown are for representation and may not be an exact representation of the product.

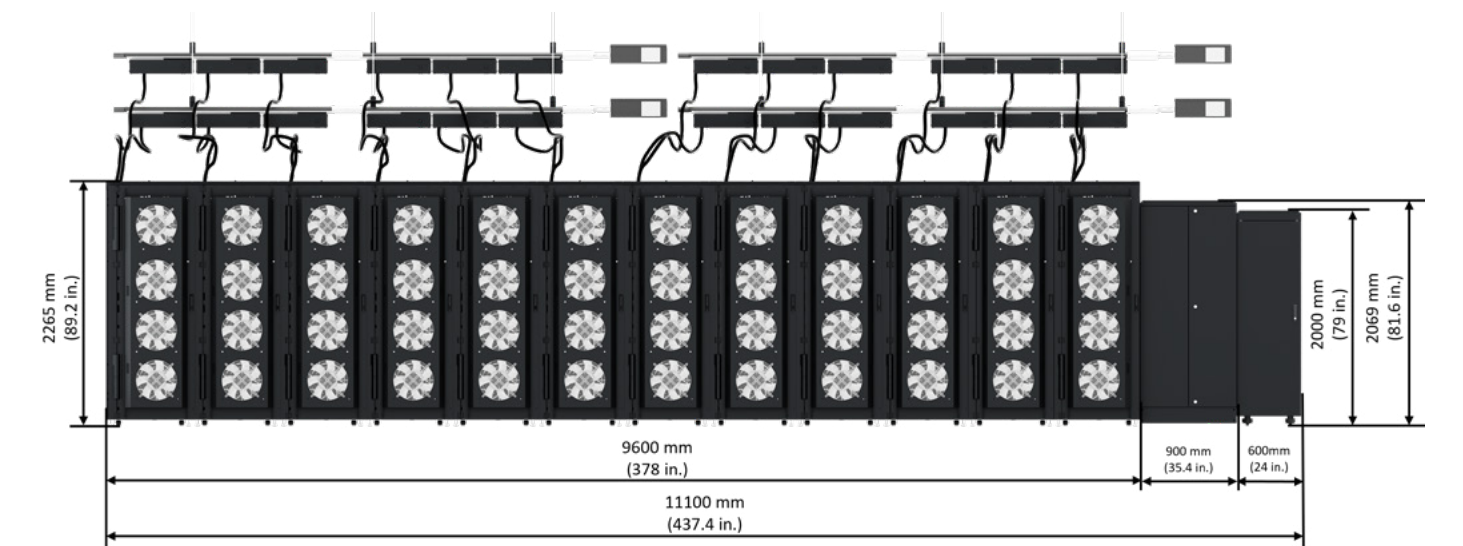
4.3 Top view



4.4 Front view



4.5 Rear view

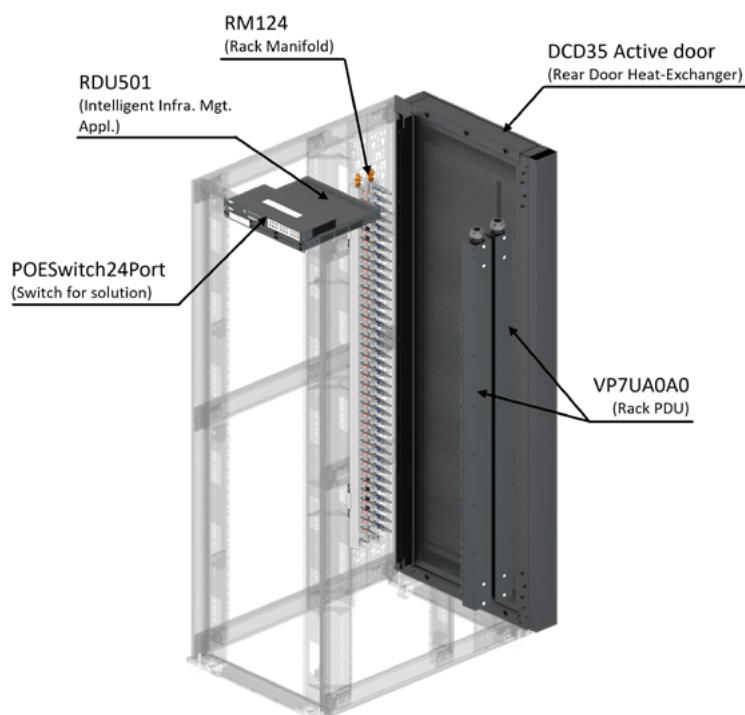


The images shown are for representation and may not be an exact representation of the product.

4.6 Side view



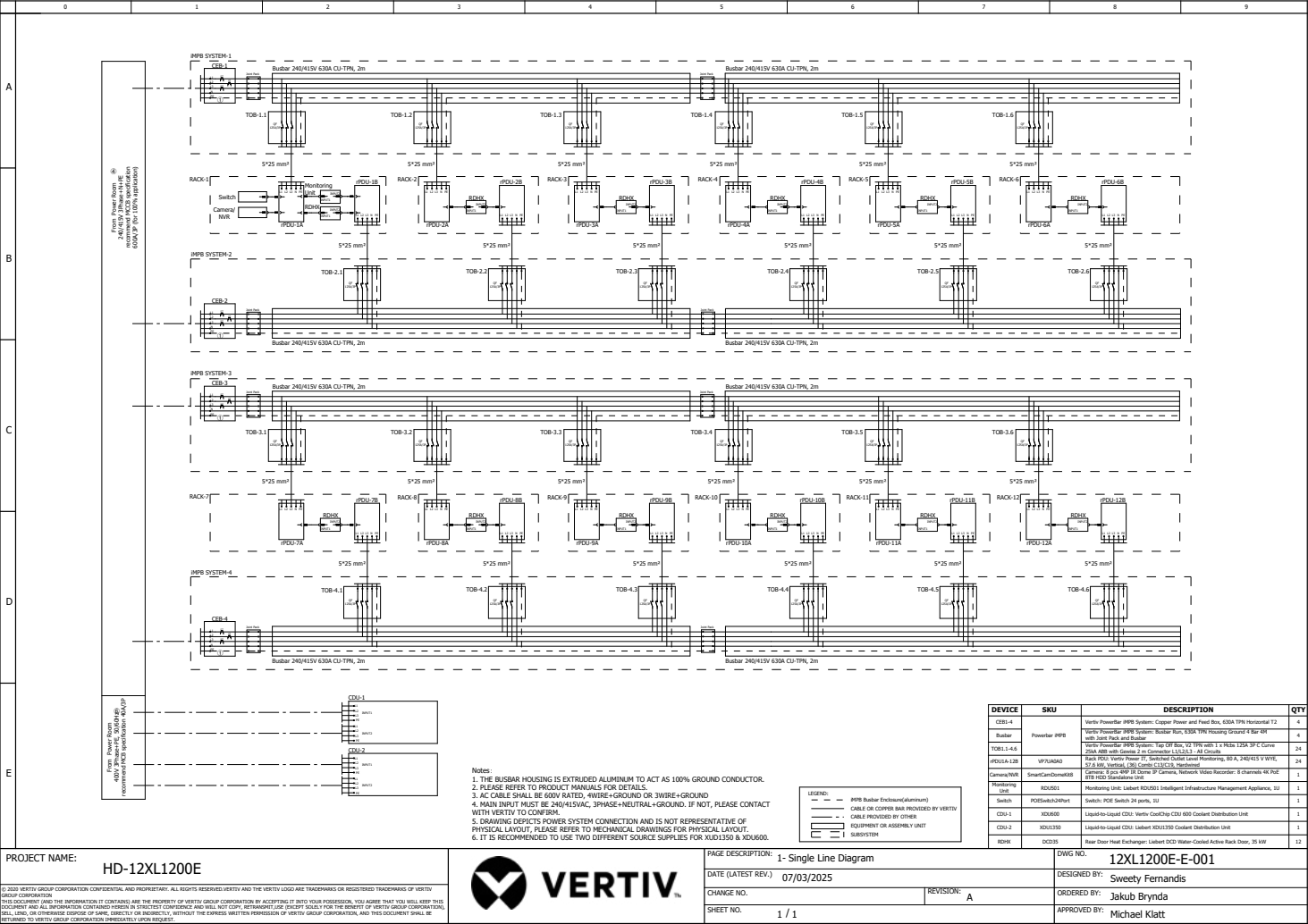
4.7 Vertiv™ Rack ISO view



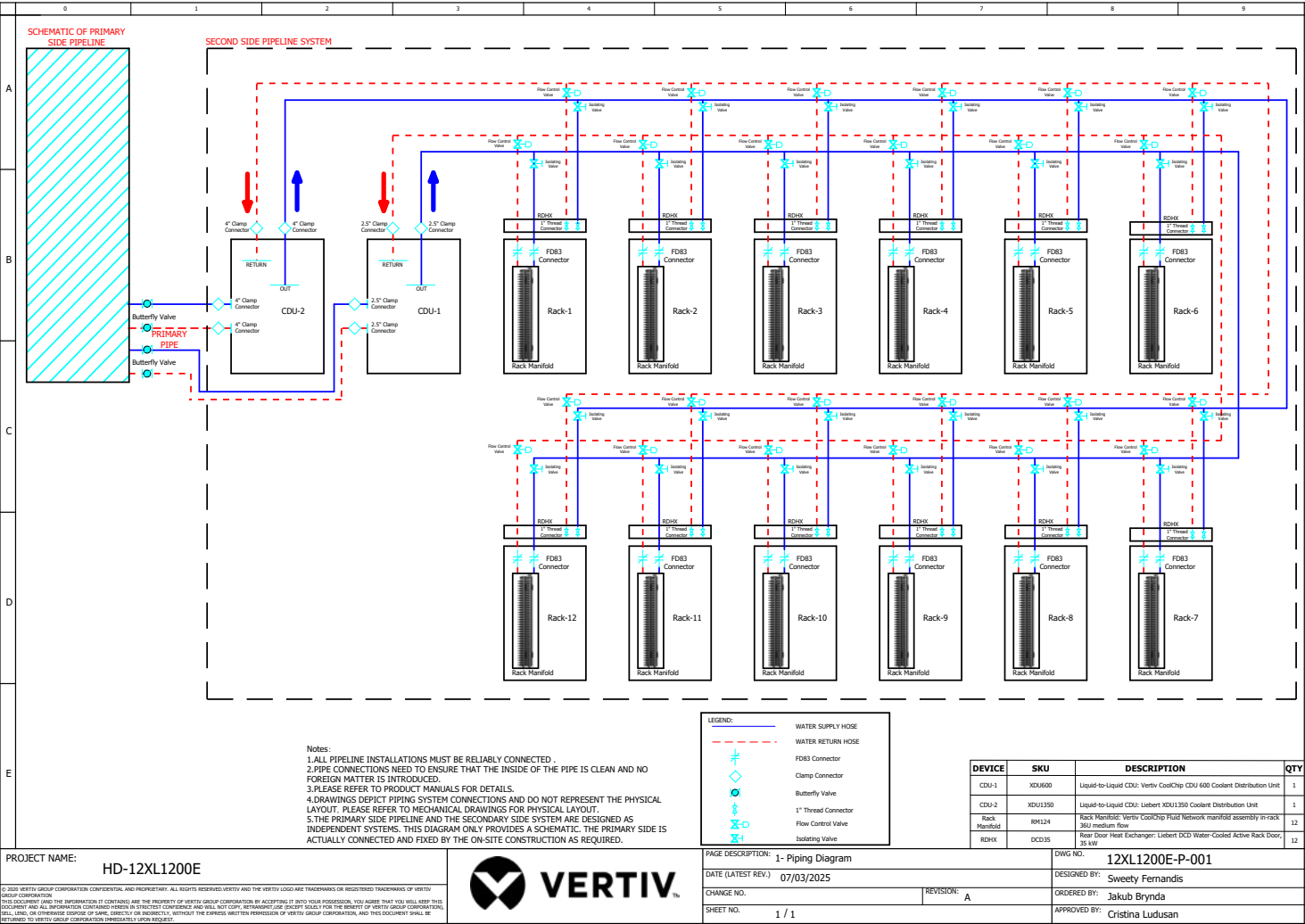
The images shown are for representation and may not be an exact representation of the product.

5. Technical description

5.1 Single line diagram



5.3 Piping diagram



6. Technical specifications

6.1 Product weight

SKU	Quantity	Weight (per SKU)	Total weight
VR3357 (Rack)	12	180 kg (397 lbs)	2160 kg (4764 lbs)
XDU600 (Coolant Distribution Unit)	1	429 kg (946 lbs)	429 kg (946 lbs)
XDU1350 (Coolant Distribution Unit)	1	700 kg (1544 lbs)	700 kg (1544 lbs)
DCD35 (Rear Door Heat-Exchanger)	12	108 kg (237 lbs)	1296 kg (2844 lbs)
RM124 (Rack manifold)	12	38 kg (83 lbs)	456 kg (996 lbs)
LT460-Z20 (Leak detector)	1	0.9 kg (2.0 lbs)	0.9 kg (2.0 lbs)
Powerbar iMPB (Busway)	4	212 kg (467 lbs)	848 kg (1868 lbs)
VP7UA002 (Rack PDU)	24	10 kg (22 lbs)	240 kg (528 lbs)
RDU501 (Monitoring)	1	10 kg (22 lbs)	10 kg (22 lbs)

6.2 Maximum static load capacity of rack

SKU	Maximum static load capacity
VR3357 (Rack)	1363 kg (3000 lbs)

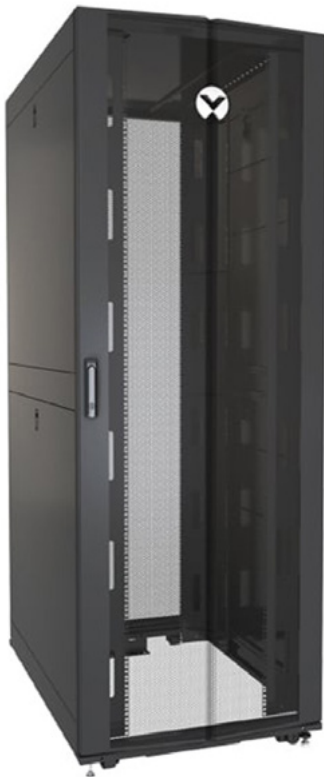
6.3 Operation & storage conditions

Operation conditions	Storage conditions
Operation temperature range: 5°C to 40°C (41°F to 104°F)	Storage temperature range: -20°C to 65°C (-4°F to 149°F)
Operation relative humidity range: 10% to 80% RH (non-condensing)	Storage relative humidity range: 5% to 93% RH (non-condensing)

7. Product specification

7.1 Vertiv™ VR3357 Rack

Standardize your deployments around the world and bring them online faster with the Vertiv™ VR rack. The Vertiv VR supports a wide variety of equipment including servers, storage, switches, routers, PDUs, UPSs, console port servers and KVM switches. The Vertiv VR is delivered ready for high density environments to serve your mission critical needs – even as they evolve and change. This rack gives you the flexibility you need with easy installation.



Key Benefits:

- Built-to-last engineering: This 48U rack is designed for rapid deployment even in high density environments with load capacities of 3,000 pounds static and 2,500 pounds dynamic.
- Fully configurable: Tool-less installation and removal of accessories and additional shelves allow you to modify this rack cabinet to suit the ever-changing needs of your network.
- 2.5 Inches more usable depth: The Vertiv VR Rack is designed to provide you around 2.5 inches more useable depth than any standard 19-inch rack cabinet.
- Dimensions: This server enclosure has dimensions of 2265mm x 800mm x 1200mm (height, width, and depth).
- Supports wide variety of equipment: This 48U server rack supports rack-based equipment including: servers, storage, PDUs, UPSs, console servers, and KVM switches.



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7.2 Vertiv™ CoolChip CDU, 600

Designed to support liquid cooling within high density environments, the Vertiv™ CoolChip CDU 600 is suitable for direct-to-chip and rear door cooling applications to offer easy, cost-effective deployment in any data center. The Vertiv CoolChip CDU utilizes a liquid-to-liquid heat exchange design, allowing you to tap into the benefits of liquid-cooled servers to more efficiently support higher rack densities while maintaining optimal system conditions.



Key Benefits:

- Secondary circuit flow of 450 l/m (19 gpm) at 2.2 bar (32 psi) external DP, up to 900 l/m (238 gpm) at 1.3 bar (19 psi) external in dual pump mode.
- Low pressure drop 2.5 in. pipe-work, components and heat exchanger.
- Two inverters, controlled via RS485 enables detailed reporting of data, status, seamless pump change-over, and dual pump running mode.
- Large heat exchanger for low "Approach Temp Diff" 600 kW at 4.0°C (7.2°F).
- Effective separation of primary/ secondary water circuits.
- All stainless-steel secondary circuit with self-filling and venting capability.
- Large dual redundant secondary filters at 50μ and primary filter at 500μ for concurrent maintainability.
- Large capacity dual redundant expansion vessels.
- Easy to install, pipe connection options including internal manifold.
- Low center of gravity helps with Seismic compliance and logistics.
- 7 in. color touchscreen Human-Machine Interface (HMI) and ARM Cortex M7 based controller.
- Communication via Modbus RTU (RS485) and TCP/IP protocols.
- Triple redundant secondary supply sensors and redundant RH sensors.
- Fully configurable for various installation options and features.
- CE, cULus and IEC compliant.



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7.3 Vertiv™ Liebert® XDU1350 Coolant Distribution Unit

Designed to support liquid cooling within high density environments, the Liebert® XDU1350 Coolant Distribution Unit is suitable for chip & rear door cooling applications to offer easy, cost-effective deployment in any data center. The Liebert XDU1350 utilizes a liquid-to-liquid heat exchange design, allowing you to tap into the benefits of liquid-cooled servers to more efficiently support higher rack densities while maintaining optimal system conditions.



Key Benefits:

- Achieve incredible efficiency in high-density environments.
- Protects secondary liquid network with strict conformance to wetted material compatibility.
- Intuitively designed for ease of deployment.
- Accommodates any facility design and with multiple cooling configurations.
- Robust design with confidence inspiring redundancy options including teaming for the most demanding applications.
- Integrated controller designed from the ground up to be easy to deploy and supports leak detection.
- Flexible support services available for installation and maintenance with same day options.



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7.4 Vertiv™ Liebert® DCD Water-Cooled Active Rack Door, 35 kW

The Liebert® DCD active chilled-water cooling unit is a highly efficient heat exchanger module that mounts on the rear of an IT rack and provides up to 35 kW of room-neutral cooling. The active fan module mounts on the Liebert DCD passive door and aids the server fans in properly removing the heat load from the high-density application. The Liebert DCD can be supplied by either the existing chilled water system or by a coolant distribution unit, such as the Vertiv™ Liebert® DCP, providing flexibility during installation.



Key Benefits:

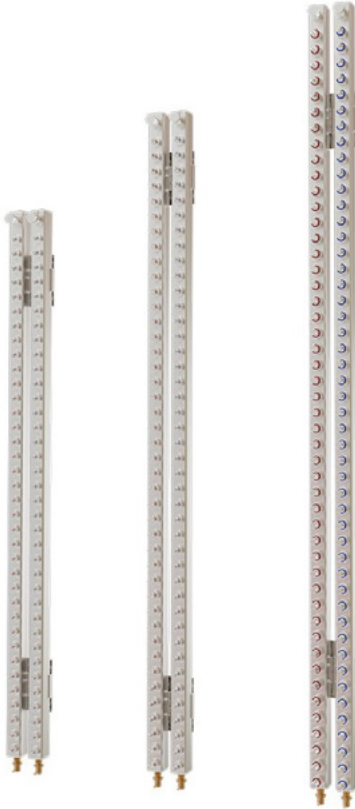
- Low energy consumption using variable speed fans to match airflow with demand provides low operational costs and high energy efficiency.
- Mounts on the rear side of the IT rack, saving valuable floorspace for additional critical IT equipment.
- Few moving parts enable a much longer product lifespan, providing high cooling availability for years.
- Multiple inlet/outlet water connection options provide flexibility during selection and installation.
- Non-condensing heat exchanger reduces the risk of damage to critical IT equipment, providing peace of mind to IT managers.
- Available with advanced monitoring controls to provide easy remote access through Modbus communication.
- Doors swing open 180°, allowing for easy access to equipment inside the rack.



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7.5 Vertiv™ CoolChip Fluid Network

The Vertiv™ CoolChip Fluid Network is an in-rack manifold that provides a reliable, clean, and effective route between server and coolant distribution unit. Mounting in the zero-U space of any industry-standard rack, the stainless-steel rack manifolds were designed with dripless quick disconnects and multiple coupling sizes for easy install and highly tailored to any deployment size.



Key Benefits:

- Meet various deployment needs with multiple configurations.
- Provide high cooling availability and efficiency with several coupling options for proper sizing.
- Universal mounting bracket speeds installation
- Assured cleanliness with vacuum brazed stainless-steel construction and factory validated precleaning process.

Main Features:

- Stainless Steel Construction provides a durable and robust product.
- Multiple Sizes and Flow Rates allow for customization of your liquid cooling deployment.
- Universal Mounting Bracket enable mounting on any industry-standard rack.
- Dripless Quick Disconnects provide quick and safe installation and service operation.
- Air Bleeder Valve eases installation complexity and increases system efficiency, maximizing the amount of cooling fluid in the circuit.
- Integrated Drain Valve allows for easy installation and maintenance.
- Top or Bottom Connections enable configuration in the field, adding flexibility to the install and application.



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7.6 Vertiv™ Liebert® LT460 Zone Leak Detection Sensors

The zone leak detection sensor modules install quickly and work simply for reliable warning of potentially hazardous moisture conditions. The supervised zone leak detector uses up to 100 feet of flexible Vertiv™ Liebert® moisture sensing cable, offering protection from unwanted leaks. Designed for use with Vertiv™ Liebert® LT500Y leak detection cable, the Vertiv™ Liqui-tect™ 460 is the ideal solution for perimeter sensing or serpentine coverage of small areas. Selectable modes of operation provide flexible alarming options and protection for the cable. Selectable alarm delays minimize false-positive conditions.



Key Benefits:

- Dual output relays can signal to a local alarm panel, a remote building management system, or to Vertiv™ Liebert® SiteScan™ Web.
- Selectable alarm delays allow reporting customization.
- Perimeter sensing or serpentine coverage of small area.

Main Features:

- Zone leak detection sensor.
- Monitors up to 100 feet of leak detection cable.
- Reports to local or centralized monitor panels.
- Installs easily.



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7.7 Vertiv™ Powerbar iMPB

Our data center customers benefit from unparalleled flexibility to adapt as their needs evolve, thanks to the innovative overhead power distribution system of the Vertiv™ PowerBar iMPB, offering seamless integration and scalable design. Supported by our robust global manufacturing network and efficient inter-regional product transfers, we effectively mitigate supply chain disruptions. This streamlined approach accelerates deployment, minimizing delays and providing smooth operations. With Vertiv's expertise, we simplify the design and integration of your entire power chain, delivering a tailored solution that sets us apart in offering unmatched, customized power solutions in the market.



Key Benefits:

- Solution is ideal for data centers of any size, having slab or raised floors, that have frequent or planned power configuration changes.
- Variety of capacity and connection configurations support optimization and adaptation over time with minimal outside support needed.
- Continuous power delivery is enabled with hot-swappable tap-off boxes having breaker protection that isolates active IT loads as well as close proximity branch breakers that support proper administration.

Ideally Suited For:

- Data centers of any size.
- Data centers with frequent or planned configuration changes.
- Single or dual-bus configurations.
- Raised and non-raised floors.



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7.8 Vertiv™ PowerIT rPDU VP7UA0A0

Upgradeable Switched Outlet Level Monitored rPDUs provide reliable power distribution to critical IT equipment while delivering individual outlet level control and a comprehensive view of outlet level power usage via remote network access. Includes environmental monitoring capabilities to obtain real-time environmental metrics.



Product Summary:

- Vertiv™ PowerIT rPDU PowerIT rPDU, Switched Outlet Level Monitoring, 80 A, 240/415 V WYE, 57.6 kW, Vertical, (36) Combination C13/C19, Hardwired, Black Powder Coat.

Key Benefits:

- Remotely reboot outlets to power cycle unresponsive IT equipment or increase runtime of critical equipment upon power failure with outlet-level control.
- Reliable power distribution with local and remote outlet-level power monitoring options offers quick access to critical power usage information down to the device level to evaluate energy usage trends and maximize uptime.
- The monitoring offers redundant power capability providing continuous supervision even during an outage. Receive alert and alarm notifications when user-specified thresholds are breached via email, SMS, and SNMP traps.
- Environmental monitoring capabilities with the addition of optional environmental sensors help users have critical infrastructure data at their fingertips to prevent climate-related equipment failure and system downtime.
- Fault-Tolerant Daisy Chaining with RSTP simplifies intelligent rPDU connectivity and secures that data is reported even when a break in the network chain occurs. Supports up to 40 rPDUs.
- Daisy-chain up to 50 devices on a single IP address and reduce deployment time with self-configuration of downstream devices.
- Provide reliable protection with a secure boot and a hardware trust anchor safeguarding critical infrastructure against unauthorized access.

7.9 Vertiv™ Liebert® RDU501

The Liebert® RDU501 is an intelligent infrastructure management solution from Vertiv that allows data center administrators to monitor environmental conditions and infrastructure appliances such as UPS, precision cooling units, generator sets, etc.

The Liebert RDU501 is a premium infrastructure gateway appliance equipped with out-of-band access to service processors as well as serial console management capabilities.



Fast Deployment:

- R 2.5D SmartSolutions Modelling with drag-and-drop interface.

Environmental Monitoring:

- Heat, Power and Assets Monitoring Dashboard.
- Thermal Management (including CRAC teamwork).
- Power Management.
- Security Management.
- Alarm and Data Reports.

IT Management Monitoring:

- Remote and local server management via IPMI 2.0 protocol
- Serial Console Management (Out-of-band access)
- Automated Startup and Shutdown of IT servers.



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