CoolChip CDU 100

Application and Planning Guide

Product Rev A

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Vertiv recommends installing a monitored fluid detection system that is wired to activate the automatic closure of field-installed coolant fluid supply and return shut off valves, where applicable, to reduce the amount of coolant fluid leakage and consequential equipment and building damage. Refer to local regulations and building codes relating to the application, installation, and operation of this product. The consulting engineer, installer, and/or end user is responsible for compliance with all applicable laws and regulations related to the application, installation, and operation of this product.

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit https://www.vertiv.com/en-us/support/ for additional assistance.

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1 Important Safety Instructions

1.1 General

Mechanical and electrical equipment such as coolant distribution units (CDUs) present potential mechanical and electrical hazards. All safety, installation, operation, and maintenance instructions must be adhered to. Any work on or use of the equipment must only be carried out by technically competent personnel who are fully trained. This product is designed to minimize all potential hazards by restricting access through unit casings, doors, and covers while equipment is operational.

Before carrying out maintenance work, ensure that:

1. Equipment is switched OFF.
2. Equipment and controls are disconnected from the electrical supply.
3. All rotating parts such as pumps and 3-way valve have come to rest.

If there is a doubt regarding safety, installation, operation or maintenance instructions, contact Vertiv for clarification and advice. See Technical Support/Service in the United States on page 23 .

1.2 Installation/Handling

Installation and operation must be conducted in accordance with local and national regulations and normal codes of good practice. When moving or lifting the product, caution must be observed to ensure the safety of personnel. Use only the appropriate lifting equipment.

1.3 Application

This product is to be used indoors only and must be only used for the application it was designed for. This product must not be used in a hazardous environment.

1.4 Warranty

Failure to comply with the Vertiv's installation, maintenance, and operation instructions may affect the reliability and performance of the unit and invalidate any warranty.

1.5 Electrical Connection

WARNING! This unit is powered by high voltage. Serious injury or death can occur. Power supplied to this product must be provided with an external means of isolation.

Electrical connections must be carried out in accordance with local and national regulations by a qualified electrician. Never make any electrical connections inside the unit or to the unit, unless the electricity supply has been switched OFF at the disconnect (isolator).

1.6 Replacement Parts

Any parts replaced during maintenance or servicing must be the same specification as those being replaced. The use of incorrect replacement parts may affect the operation or reliability of the unit and invalidate any warranty. See Technical Support and Contacts on page 23

1.7 Waste Disposal

Any waste or single use materials must be disposed of in a responsible manner and in strict adherence to local and national environmental regulations. For details, consult local environmental agencies.

1.8 Documentation

Any waste or single use materials must be disposed of in a responsible manner and in strict adherence to local and national environmental regulations. For details, consult local environmental agencies.

2 Agency

2.1 Product Standards and Approvals

Vertiv products installed and operated in compliance with this document, the operation and maintenance guide and installation and commissioning guide , conform to the Low Voltage Directive 2014/35/EU, the EMC directive 2014/30/EU and the Pressure Equipment directive 2014/68/EU. As manufactured, Vertiv products are designed to comply with an IP21 rating. This product is cULus listed for the appropriate voltage models and certificates will be made available on request (cULus certificate 60335-2-40).

2.2 RoHS 3 Compliance

Vertiv certifies that all products manufactured and supplied by Vertiv are fully RoHS compliant in accordance with EU RoHS Directives EU 2015/863.

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3 Product Description

3.1 General

This document describes the performance, application and specification of the Vertiv™ CoolChip CDU 100 coolant distribution unit (CDU).

The CoolChip CDU 100 contains a secondary closed loop circuit that provides a supply of cooling fluid to IT equipment, either through indirect cooling (such as rack mounted rear door heat exchangers), or direct cooling (such as cold plates at chip level).

The secondary circuit is a low pressure sealed system with the heat removed from the high heat density areas of IT equipment rejected to an external cooled fluid source (primary circuit) via a low pressure drop plate heat exchanger.

The secondary circuit ensures that the cooling fluid in a data center environment can be kept to a minimum volume, is closely controlled for flow, pressure and temperature (with optional condensation control) and can be accurately maintained for fluid quality (with filtration and additives).

The primary cooling source can be a chilled fluid system (either dedicated or from building system), fluid cooler, cooling tower or dry air cooler, depending on the desired secondary temperature and heat transfer duty (for more information refer to Primary (Facility) Circuit on page 12 and Secondary Circuit on page 17).

3.2 Features and Benefits

- Essential separation of the primary (facility) fluid from the IT equipment, providing low pressure, clean fluid to liquid cooled IT equipment.
- Magnetically levitated pump impeller, with no bearings or seals that could potentially fail.
- Low fluid volume in secondary loop, reducing leak risk.
- N+N secondary temperature sensors for built-in redundancy.
- Optimal hydraulic design with low pressure drop, provides maximum secondary flow up to 100 l/m at external pressure drop of 1 bar.
- Sanitary flange and clamp design, easy installation, black box swap out approach.
- Sanitary flange primary and secondary connections..
- Large surface area heat exchanger to provide high cooling capacity with low approach temperatures.
- Secondary fluid control in differential pressure control mode to suit various application requirements.
- Secondary fluid temperature controlled within ±1°C, to ensure cooling stability with variable heat load.
- Group control available for multiple CDUs, enables N+X redundancy design for larger installations.
- 7-inch color touchscreen HMI.
- Modbus RTU RS485 and TCP/IP communication with data center monitoring system for easy integration.
- Full alarm monitoring, providing real-time status of the IT equipment and the local environment.
- 750 W power consumption to provide up to 100 kW cooling capacity, high energy efficiency.
- Supports warm fluid cooling in direct contact liquid cooling applications, very low partial power usage effectiveness cooling, energy saving and operating expenses benefits for user.
- Compact size of 445 mm wide (19-inch rack mounting) x 175 mm high (4 U) X 830 mm long.
- International service team to provide professional and all-in-one services from installation, maintenance, and troubleshooting.

- Power monitor (built into the control panel with full Modbus communication to the CoolChip CDU 100 controller).
- Alarm buzzer (built on fascia panel for audible warning of an alarm condition).
- Non-return valve (required for multiple units on a common system).
- Primary return temperature sensor.
- Room temperature/humidity sensor (for condensation control).

3.3 Product Accessories

For a complete installation solution, any of the accessories in Table 3.1 below may be ordered as optional extras, if required. Please contact Vertiv for more details.

Table 3.1 Vertiv™CoolChip CDU 100 Accessories

Item	Description
1	Hose kits
2	Leak detection tapes

3.4 Vertiv™ CoolChip CDU 100 Model Number Nomenclature

Table 3.2 CoolChip CDU 100 Model Number

Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Model Number	X	D	U	1	0	0	W	A	K	P	1	4	2	0	0	0	0

Table 3.3 CoolChip CDU 100 Model Number Definitions

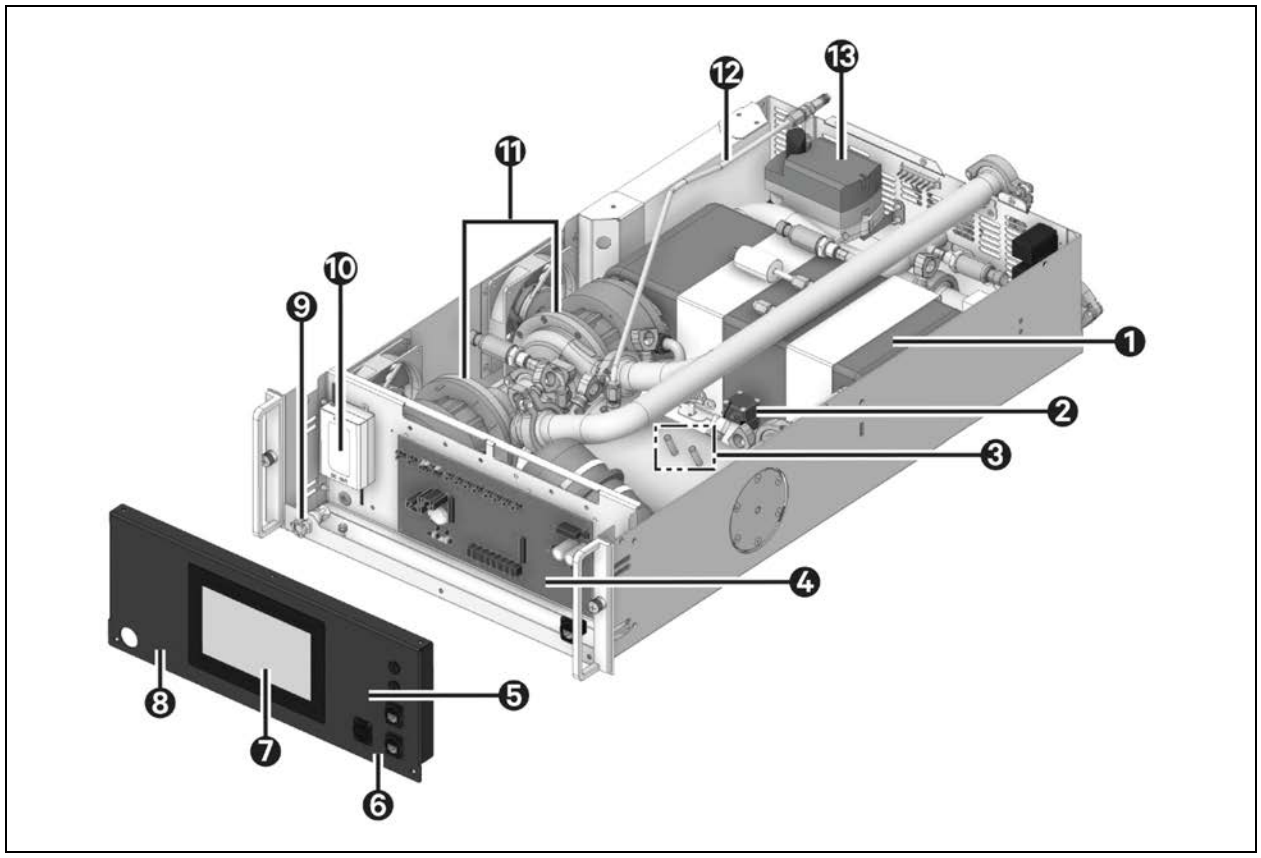
Digit	Feature	Value	Description
1,2,3	Family name	XDU	Product family
4,5,6	Unit model	100	Base model
7	Cooling Type	W	Liquid to liquid
8	Unit revision	A	Revision A
9	Voltage	K	110V-120V/60Hz
		S	200V-240V/50Hz
10	Power input	P	C14—IEC power inlet
11	Monitoring	1	Standard
12	Pressure relief valve	4	4 bar pressure relief valve
13	Secondary filtration	2	Fitted (50 micron)
14	Place holder	0	Place holder
15	Place holder	0	Place holder

Table 3.3 CoolChip CDU 100 Model Number Definitions (continued)

Digit	Feature	Value	Description
16	Place holder	0	Place holder
17	Configuration	0	Standard configuration
		S	Special feature authorization

3.5 Product Views

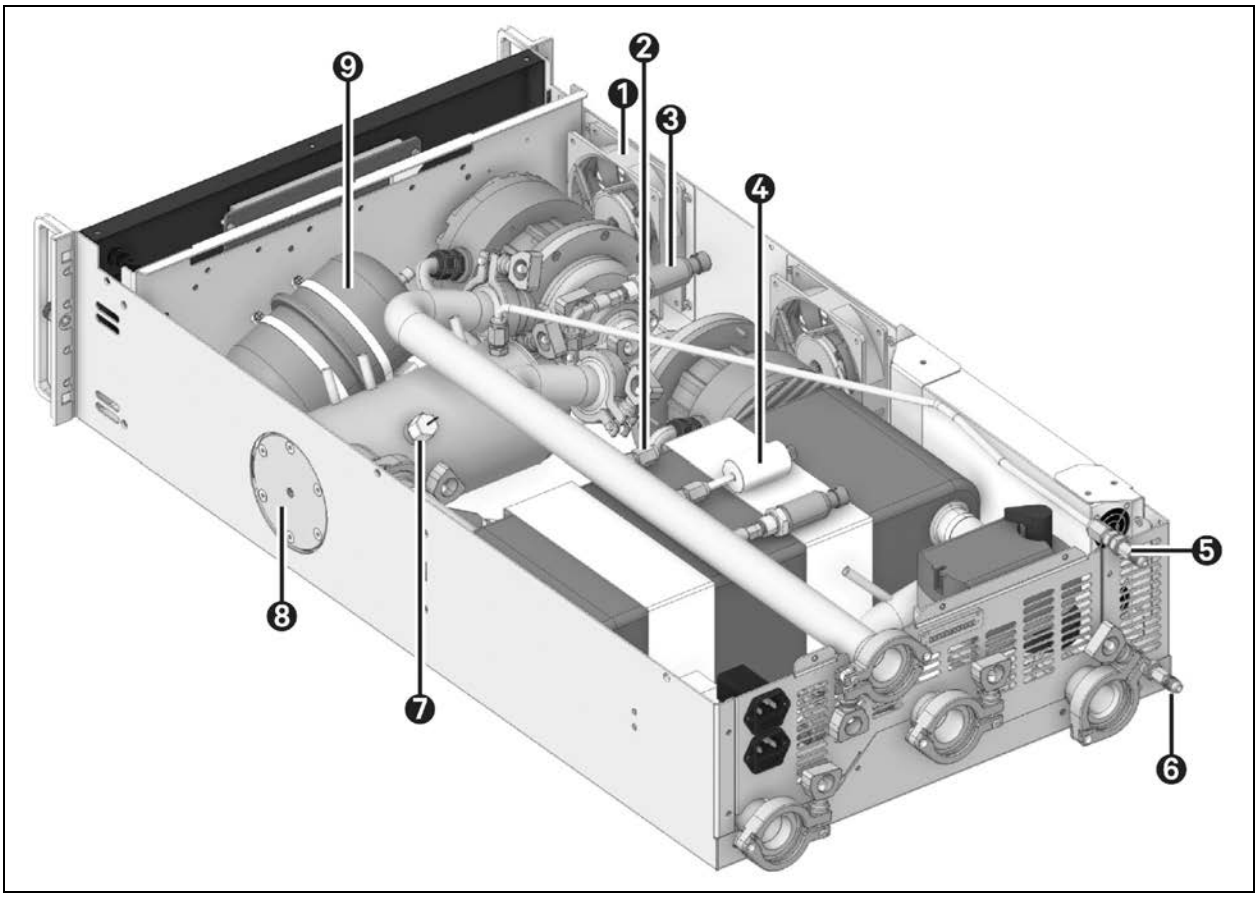
Figure 3.1 Front View of Vertiv™ CoolChip CDU 100 (Top Cover Panel Removed)



Item	Description
1	Plate heat exchanger
2	Fill pump
3	Temperature sensors
4	Control board
5	Alarm buzzer (no audible alarm, flashing bell on display screen)
6	Dual Ethernet (RJ45) and USB connection
7	Controller 7-inch touchscreen display

Item	Description
8	Removable fascia panel
9	Fill pump water connection
10	24 V DC power supply
11	Secondary circuit pumps
12	Pump 48 V DC power supply
13	Primary 3-way circuit control valve

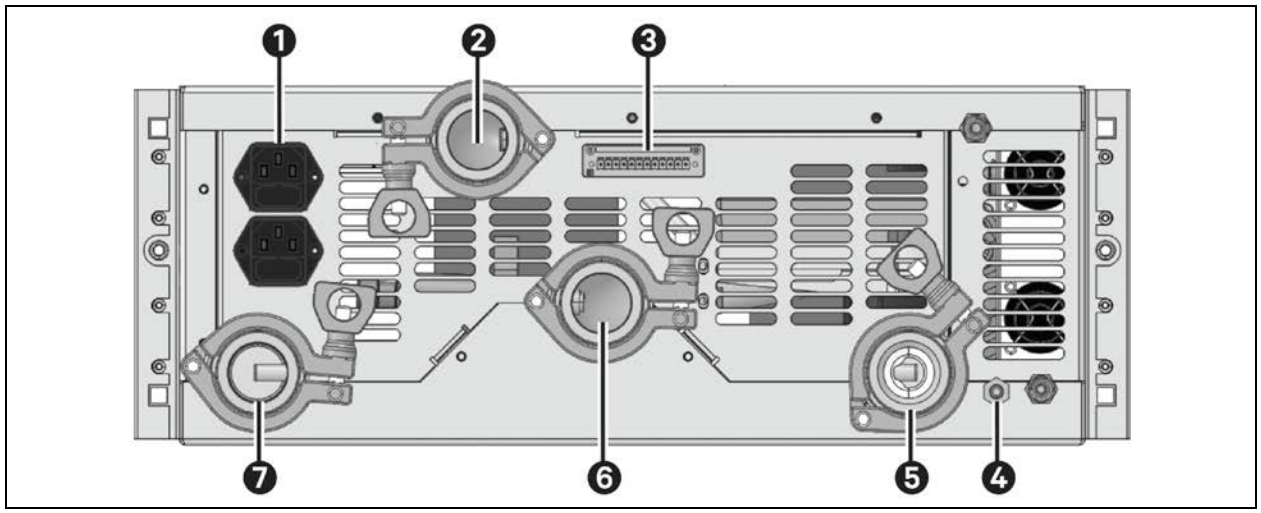
Figure 3.2 Rear View of Vertiv™ CoolChip CDU 100 (Top Cover Panel Removed)



Item	Description
1	Cooling fans
2	Pressure relief valve
3	Pressure sensors
4	Secondary flow meter

Item	Description
5	Air vent purge
6	Reservoir/Secondary circuit drain
7	Level sensor
8	Secondary filter
9	Expansion vessel

Figure 3.3 Rear View of Vertiv™ CoolChip CDU 100 (Electrical and Hose Connections)



Item	Description
1	A and B 1-phase IEC—C14 power inlet connections (factory fitted fuses)
2	Secondary circuit supply
3	Connectors for external temperature/humidity sensor, external leak detection tape RS485 and CANbus Communications
4	Pressure relief valve outlet
5	Primary circuit returnn
6	Secondary circuit return
7	Primary circuit supply

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4 Technical Data

4.1 General

Table 4.1 Dimensions and Weights

Dimensions	Height		Width		Depth	
Unit	in.	mm	in.	mm	in.	mm
Standard Cabinet	6.89	175	17.52	445	32.66	830
Shipping						
Standard Cabinet	13	330	25.60	650	51.60	1310
Weight	**Dry**		**Operating**		**Shipping**	
	lbs.	kg	lbs.	kg	lbs.	kg
Standard Cabinet	116.84	53	130.07	59	191	87

4.2 Pipe Connections

Pipe connections for both primary and secondary circuits are made at the rear of the unit.

Table 4.2 Pipe Connections for Primary and Secondary Circuits

Circuit Type	Pipe Connection
Primary (facility) circuit	1 in. or 1.5 in. Sanitary flanges
Secondary circuit	1 in. or 1.5 in. Sanitary flanges

4.3 Circuit Fluid Volumes

Pipe connections for both primary and secondary circuits are made at the rear of the cabinet and can be either top or bottom exit according to how the unit has been specified.

Table 4.3 Fluid Circuit Volumes for Primary and Secondary Circuit of the CoolChip CDU 100 Unit

Circuit Type	Fluid Circuit Volume
Primary (facility) circuit	3.4 Liters
Secondary circuit	5.7 Liters

4.4 Operation and Storage Conditions

Table 4.4 Operation and Storage Conditions

Operating Conditions	0 to 40°C (0 - 104°F)	10 to 90% RH (non-condensing)
Storage Conditions	-40 to 70°C (-40 to 158°F)	5 to 93% RH (non-condensing)
Storage Environment	Keep unit upright, covered completely (preferably in original packaging), in an indoor environment, conditioned warehouse that is protected against freezing temperatures. Keep clean (no dust), well-ventilated, non-condensing	
Storage Time	Up to 6 months. If storing longer than 6 months, consult Vertiv.	

4.5 Electrical Data

Table 4.5 Electrical Data

Parameter	Details
Supported power supplies	110V-120V/60Hz 200V-240V/50Hz
Unit full load amps	9.7 A at 115 V 4.85 A at 230 V
Unit installed load	1.116 kVA (maximum)
Typical power consumption	0.7 kW

4.6 Noise

Sound power level at 3 m is less than 55 dBA.

4.7 Primary (Facility) Circuit

Figure 4.1 on the facing page shows the maximum primary circuit pressure drop through the Vertiv™ CoolChip CDU 100 unit for plain water/

Figure 4.1 Primary Circuit Pressure Drops

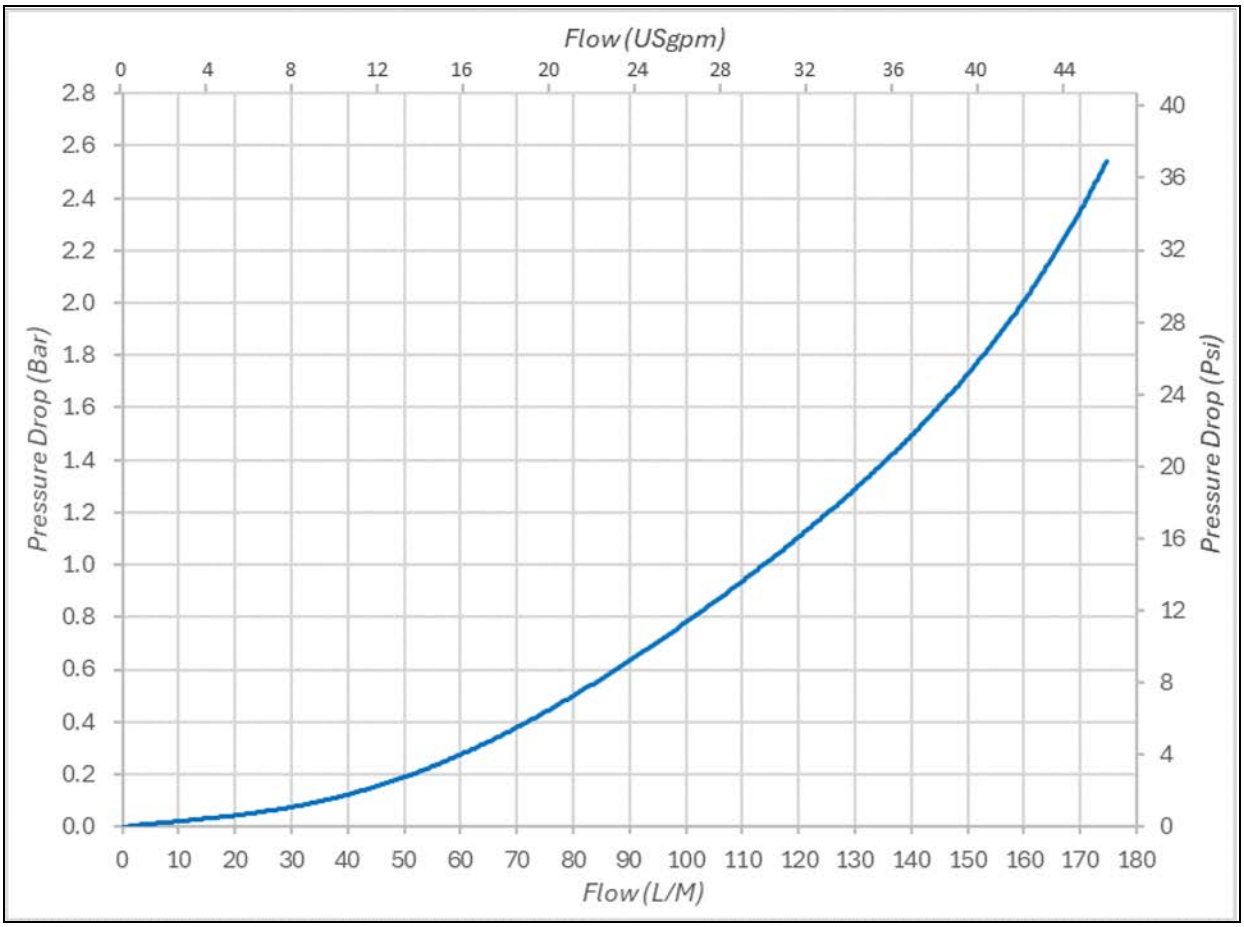


Figure 4.2 below , Figure 4.3 on the facing page and Figure 4.4 on page 16 are guide for the primary (facility) fluid flow, based on the required heat transfer at 3°C, 5°C, and 7°C, approach temperature differences (ATD), for a variety of primary inlet temps (including ASHRAE conditions). See Figure 4.3 on the facing page .

NOTE: All three primary flow/temperature graphs are shown assuming nominal secondary flow rate of 100 l/m.

For stable control, the primary fluid flow should not be more than 20% above the values illustrated.

Minimum secondary supply temperature (for example, secondary setpoint) will be the primary facility fluid temperature plus the approach temperature difference ATD .

Figure 4.2 Primary Flow and Temperature Graph for 3°C, ATD

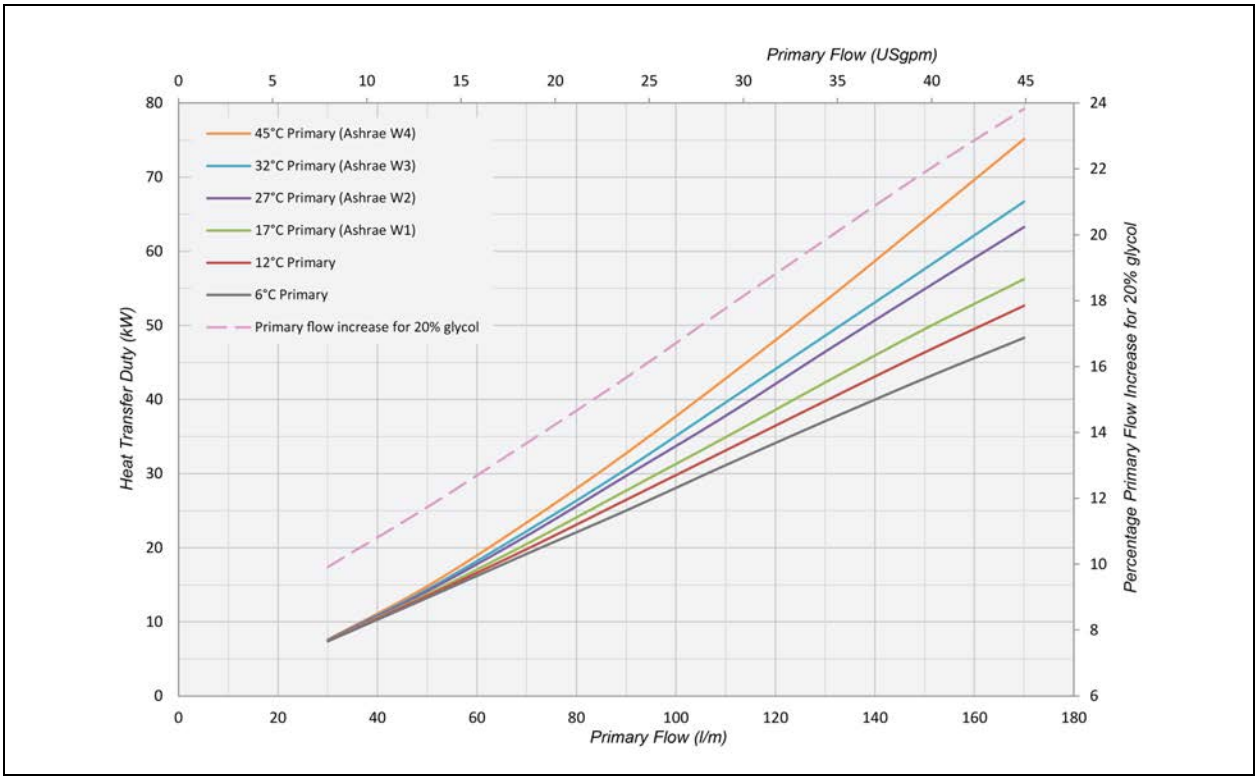
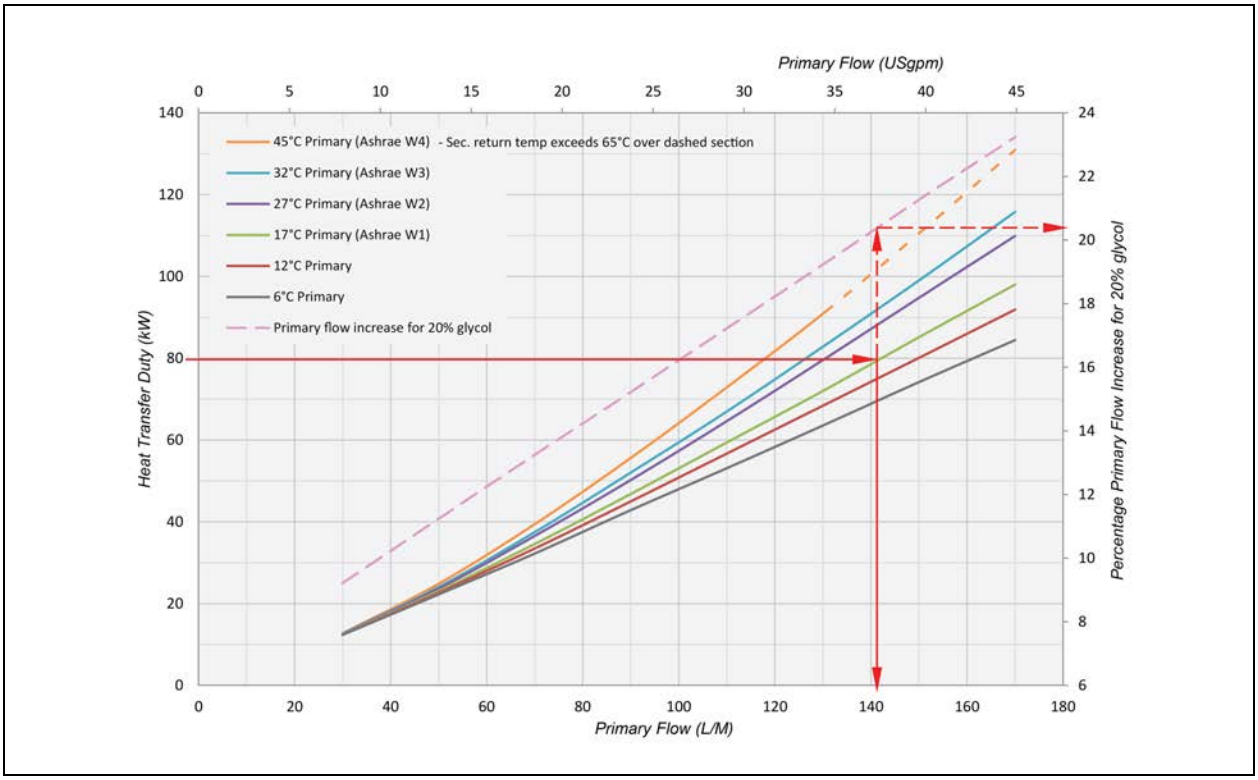
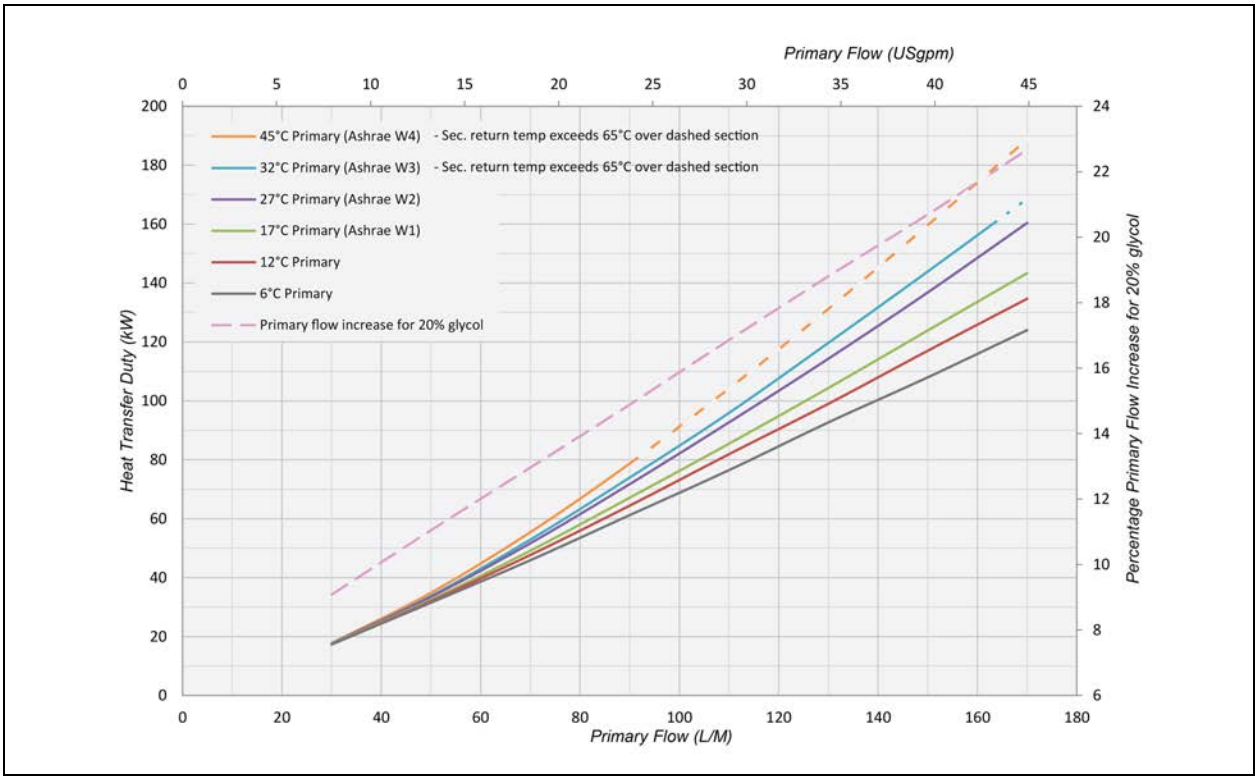


Figure 4.3 Primary Flow and Temperature Graph for 5°C, ATD



For example, if the required heat transfer (IT load) is 80 kW and the primary facility fluid temperature is 17°C, (for example a min. secondary setpoint of 22°C, for 5°C, ATD), then the minimum required primary flow will be 141 l/m (dashed red arrows in Figure 4.3 above). If primary water contains 20% glycol, then the 141 l/m flow will need to be increased by 20.4% to 169.8 l/m for the same 80 kW duty (dashed red arrows in Figure 4.3 above).

Figure 4.4 Primary Flow and Temperature Graph for 7°C, ATD



Specific duty points can be calculated by the Vertiv if required.

See Technical Support and Contacts on page 23 .

The end installer should ensure that primary fluid supplied to the Vertiv™ CoolChip CDU 100 is filtered to at least 500 microns (35 mesh).

The primary circuit of the CoolChip CDU 100 is rated for a maximum. working pressure of 10 bar. If the pressure at installation exceeds this, then arrangements should be made to fit a pressure reducing valve.

NOTE: Both primary supply and return connections should be fitted with full port isolation valves at point of installation, for maintenance purposes.

4.8 Secondary Circuit

Figure 4.5 Available Secondary External Differential Pressure

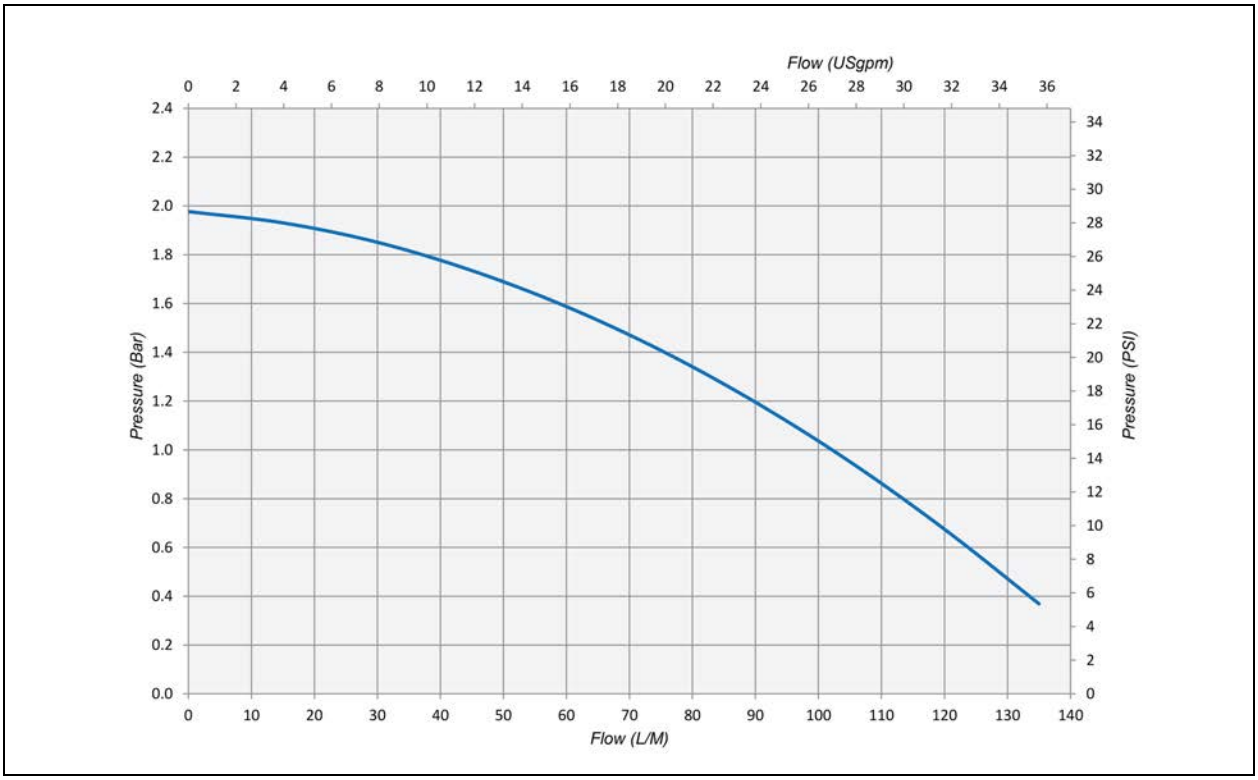
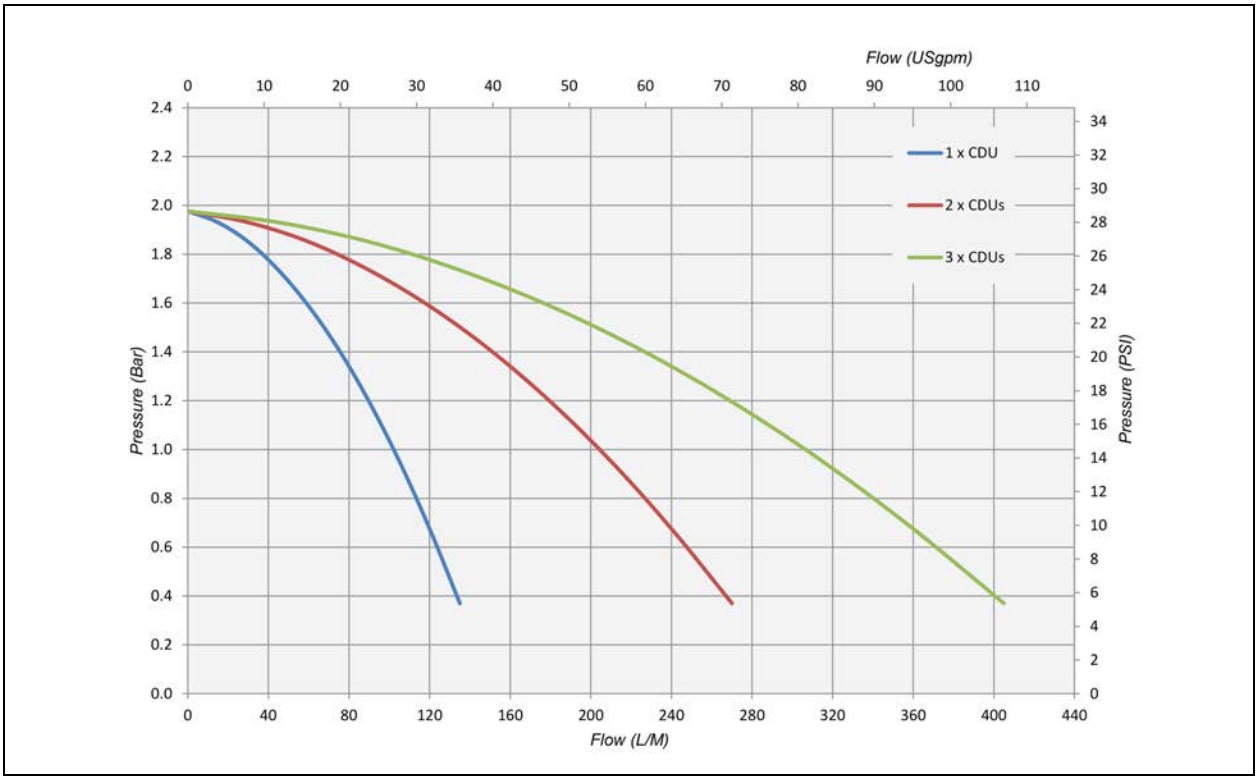


Figure 4.5 above shows the flow/pressure differential available at the secondary supply and return connections of the CoolChip CDU 100. This curve is repeated in Figure 4.6 on the next page for multiple units.

Figure 4.6 Flow and Pressure Graphs for Multiple Units in Parallel



The Figure 4.6 above shows the flow/pressure differential available at the secondary supply and return connections for multiple CDUs connected in parallel to a common manifold.

4.9 Wetted Materials

For fluid compatibility purposes, all component materials in both primary and secondary circuits are listed in Table 4.6 below and Table 4.7 on the facing page .

Table 4.6 Primary Circuit

Component	Materials
Hygienic fittings	304 or above stainless steel, EPDM seals
Pipe work	304 stainless steel (316 optional)
Machined pipe fittings	304 stainless steel (316 optional)
3-way valve	Brass DZR (body and stem), chrome plated brass DZR (ball), with PTFE seats, EPDM (O-ring seals)
Plate heat exchanger	316 stainless steel, Copper brazed
Schrader valves	Stainless steel
Pressure sensor	17-4PH (630) stainless steel
Flow meter	316 stainless steel, 316 (compression fitting)
Oyster fittings (3-way valve)	Brass DZR, EPDM (O-ring seals)

Table 4.7 Secondary Circuit

Component	Materials
Hygienic fittings	304 stainless steel, EPDM seals
Pipe work	304 stainless steel
Machined pipe fittings	304 stainless steel
Main pump	PVDF (pump housing) FPM (sealing O-ring of pump casing) PFA (impeller)
Insert non-return valve (if fitted)	Acetal (body and valve), EPDM (O-ring seals), stainless steel (spring)
Fill Pump	PPS, EPDM, Neoprene, Silicone, Nitrile, SS A2
Plate heat exchanger	316 stainless steel, Copper brazed
Schrader valves	Stainless steel
Pressure sensors	17-4PH (630) Stainless steel
Flow meter	316 stainless steel, 316 (compression fitting)
Filter	304 and 316 stainless steel, EPDM (O-ring seals)
Drain valve/air vent (Schrader valves)	Stainless steel
Drain valve/Air vent tube	304 stainless steel
Pressure relief valve	316 stainless steel, FPM O-rings
Expansion vessel	304 stainless steel (connector) butyl (membrane)
Expansion Vessel hose	Teflon (hose), S316 (connections)
Fill quick coupler and hose	Acetal (body), Buna-N (seal), 316 stainless steel (spring), FEP (hose)
Fill non-return valve	316 stainless steel, EPDM O-rings
Push-fit fittings (fill hose)	Acetal (body and valve), EPDM (O-ring seals), stainless steel (spring)
Optical level sensor	Polysulfone (body), FPM (O-ring seal)

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5 Communications

5.1 Group Control

Refer Vertiv™CoolChip CDU 100 Operation and Manitenance Guide SL-71338 for more information.

5.2 Remote Monitoring and Control

The CoolChip CDU 100 provides a RS-485 and 2 off 10/100 Ethernet communication ports for external and remote monitoring and control via customer BMS and/or DCIM and/or super computer control nodes.

RS-485 Port

MODBUS RTU is supported. The MODBUS register table includes all the important CoolChip CDU 100 data points and values.

10/100 Ethernet Ports

Each port can be configured with its own IP address or both ports can share a single IP address for failover operation in 1+1 LANs (A and B switches).

Standard TCP/IPv4 application protocols and services are supported, including:

- SNMPv2/3 (Simple Network Management Protocol)
- HTTP (web server)
- FTP (file server)
- TELNET (command line interface)
- SMTP (alarm retransmission via email)
- NTP (network time protocol)
- BACnet IP—Ethernet 10/100
- BACnet MSTP—RS485

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

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Appendix B: Submittal Drawings

Relevant submittal drawings are listed below and follow this page.

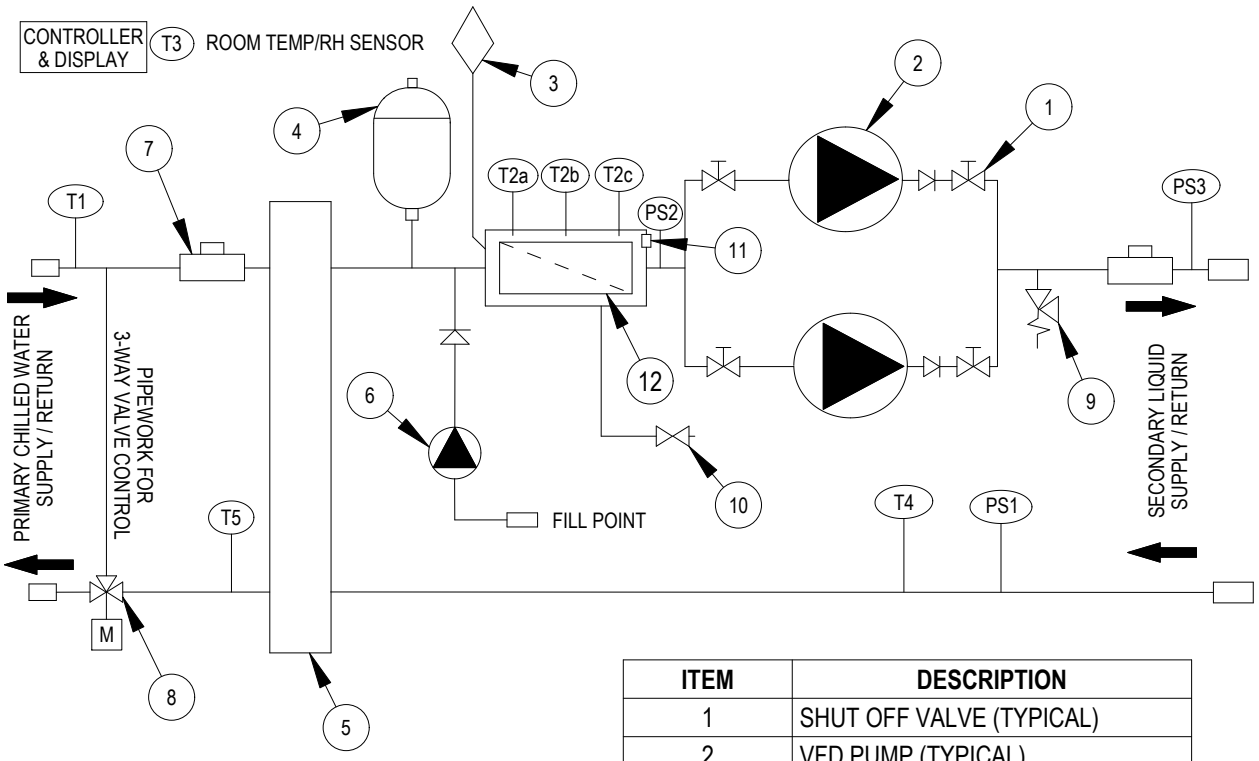
Table B.1 Submittal Drawings Contents

Document Number	Title
Piping Schematics	
20000221	CoolChip CDU 100 Piping Schematic 100 kW Unit

COOLCHIP CDU

PIPING SCHEMATIC

100 kW UNIT



FACTORY PIPING

T## TEMPERATURE SENSOR (FACTORY PROVIDED)

PS## PRESSURE SENSOR (FACTORY PROVIDED)

ITEM	DESCRIPTION
1	SHUT OFF VALVE (TYPICAL)
2	VFD PUMP (TYPICAL)
3	AUTO AIR VENT
4	EXPANSION TANK
5	BRAZED PLATE HEAT EXCHANGER
6	FILL PUMP
7	FLOW METER (TYPICAL)
8	3-WAY COOLING CONTROL VALVE
9	RELIEF VALVE
10	DRAIN VALVE
11	WATER LEVEL SENSOR
12	FILTER

NOTES:

1. Arrangement Diagram representation shown. Do not use for specific connection locations.
2. For each CoolChip CDU unit, a separate 500 micron filter is required in the facility chilled water supply from the chilled water source. The filter is field supplied and installed.
3. Unit isolation valves are required in the field piping of facility and secondary fluid connections to facilitate service. The isolation valves are field supplied and installed.

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Appendix C: Warranty and Contact Details

C.1 Limited Product and Service Warranty

Extended warranties, service, and maintenance programs are available in most locations, details available upon request. To obtain further details of limited warranty, also after sales service offerings, contact your local sales representative or technical support if you have any questions or problems during unit installation.

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Appendix D: Notes

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Appendix E: Disposal Information

NOTE: Waste materials must be disposed of in a responsible manner in line with environmental regulations.

The de-commissioning and disposal of this product should be undertaken by qualified personnel in adherence to local and national safety regulations, particularly for protection of lungs, eyes, and skin from chemicals, dust, and so on. Approved lifting gear and power tools should be used and access to the work area must be restricted to authorized personnel.

The following steps are a guide only and should be adjusted to take into account local site conditions:

1. Disconnect unit from electrical supply.
2. Drain and dispose of any heat transfer fluid through an approved recycling facility.
3. Remove unit to approved recycling facilities only.

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