CoolChip CDU070 (Liquid to Air)

Application and Planning Guide

Original Instructions

The information contained in this document is subject to change without notice and may not be suitable for all applications. While every precaution has been taken to ensure the accuracy and completeness of this document, Vertiv assumes no responsibility and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

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 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

Save These Instructions

This manual contains important instructions that should be followed during operation and maintenance of the Vertiv™ CoolChip CDU070 (Liquid to Air).

WARNING! Arc flash and electric shock hazard. Can cause serious injury or death. Building and equipment damage may also result. Disconnect all local and remote electric power supplies and wear appropriate, OSHA approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Verify with a voltmeter that power is Off. The controller does not isolate power from the unit, even in the Unit Off mode. Some internal components still require and receive power even during the Unit Off mode of the controller. The factory supplied, disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. Follow all local codes.

WARNING! Risk of electric shock. Can cause serious injury or death. Building and equipment damage may also result. Open all local and remote electric power supply disconnect switches and verify that power is off with a voltmeter before working within any electric connection enclosures. The controller does not isolate power from the unit, even in the Unit Off mode. Some internal components require and receive power even during the unit off mode of the controller.

Operation, installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Children must be supervised to ensure they do not play with this product. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.

WARNING! Risk of short circuits and electric shock. Can cause serious injury or death. Building and equipment damage can result from cut insulation or damaged wires. Can cause overheated wiring, smoke, fire, activation of fire suppression systems and EMS personnel, and loss of power to fans. Verify that all wiring connections are tight and that all wiring is contained within the junction box prior to closing and securing the cover.

WARNING! Risk of improper wire sizing/rating and loose electrical connections causing overheated wire and electrical connection terminals resulting in smoke or fire. Can cause serious injury or death. Building and equipment damage may also result. Use correctly sized copper wire only. It is recommended that the power cord for 110 to 120 V is 12 AWG or at least type 60245 IEC 53 or 57, 4 mm² and the power cord for 208 to 240 V is 14 AWG or at least type 60245 IEC 53 or 57, 2.5 mm². Verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.

WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause serious injury or death. Building and equipment damage may also result. Installation and service of this equipment should be done only by qualified personnel who have been specially trained in the installation of air conditioning equipment and who are wearing appropriate, OSHA approved PPE.

WARNING! Risk of improper moving. Can cause serious injury or death. Building and equipment damage may also result. Use only lifting equipment that is rated for the unit weight by an OSHA certified rating organization. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator. Shipping weights and unit weights are listed in the tables in **Table 4.1** on page 15. Use the center of gravity indicators on the unit to determine the position of the slings.

WARNING! Risk of top heavy unit falling over when improperly lifted or moved. Can cause serious injury or death. Building and equipment damage may also result. Read all of the following instructions and verify that all lifting and moving equipment is rated for the weight of the unit before attempting to move, lift, remove packaging from or prepare the unit for installation. Unit weights are specified in **Table 4.1** on page 15.

WARNING! Risk of unsecured unit rolling off pallet. Can cause serious injury or death. Building and equipment damage may also result. The unit is on casters. Ensure that the unit and pallet are located on a flat surface before loosening the hardware securing the unit to its shipping pallet.

CAUTION: Risk of contact with extremely hot or cold surfaces. Can cause injury. Verify that all components have reached a temperature that is safe for human contact or wear appropriate, OSHA approved PPE before working with the electric connection enclosures or unit cabinet. Perform maintenance only when the system is de-energized and component temperatures have become safe for human contact.

CAUTION: Risk of contact with sharp edges, splinters and exposed fasteners. Can cause injury. Only properly trained and qualified personnel wearing appropriate, OSHA approved PPE should attempt to move, lift, remove packaging from or prepare the unit for installation.

CAUTION: Risk of improper handling heavy and lengthy parts. Can cause injury. Building and equipment damage may also result. Cabinet panels can exceed 1.5 m (5 ft.) in length and weigh more than 15.9 kg (35 lb.). Follow relevant OSHA lifting recommendations and consider using a two person lift for safe and comfortable removal and installation of cabinet panels. Only properly trained and qualified personnel wearing appropriate, OSHA approved PPE should attempt to remove or install cabinet panels.

CAUTION: Risk of improper piping installation, leak checking, fluid chemistry and fluid maintenance. Can cause injury. Building and equipment damage may also result. Installation and service of this equipment should be done only by qualified personnel who have been specially trained in the installation of air conditioning equipment and who are wearing appropriate, OSHA approved PPE.

NOTICE

Risk of improper power supply connection. Can cause equipment damage and loss of warranty coverage.

Before connecting any equipment to a main or alternate power source (such as backup generator systems) for startup, commissioning, testing, or normal operation, ensure that these sources are properly adjusted to match the nameplate voltage and frequency of all connected equipment. In general, power source voltages should be stabilized and regulated to within ± 10% of the load nameplate nominal voltage. Also, ensure that no three phase sources are single phased at any time.

See transformer label for primary tap connections. Installer will need to change transformer primary taps if applied unit voltage is other than pre wired tap voltage.

NOTICE

Risk of improper electrical connection of three phase input power. Can cause backward pump rotation and unit damage. Service technicians should use a gauge set on the system during the initial startup to verify that the three phase power is connected properly. Three phase power must be connected to the unit line voltage terminals in the proper sequence so that the pump rotates in the proper direction. Incoming power must be properly phased to prevent pump from running backward. We recommend checking the unit's phasing with proper instrumentation to ensure that the power connections were made correctly. We also recommend verifying discharge and suction pressures during startup to ensure that the pumps are running in the correct direction.

NOTICE

Risk of piping system corrosion and freezing fluids. Can cause leaks resulting in equipment and very expensive building damage. Heat exchangers and piping systems are at high risk of freezing and premature piping corrosion. Fluids in these systems must contain the proper antifreeze and inhibitors to prevent freezing and premature piping corrosion. When the cooling unit or piping may be exposed to freezing temperatures, charge the system with coolant fluid based on the coldest ambient design temperature. Automotive antifreeze is unacceptable and must NOT be used in any fluid system. Use only coolant fluid solution that meets the requirements of recommended industry practices. Do not use galvanized pipe.

The system coolant fluid must be analyzed by a competent fluid treatment specialist before startup to establish the inhibitor and antifreeze solution requirement and evaluated at regularly scheduled intervals throughout the life of the system to determine the pattern of inhibitor depletion.

The fluid complexity and variants of required treatment programs make it extremely important to obtain the advice of a competent and experienced fluid treatment specialist and follow a regularly scheduled coolant fluid system maintenance program.

Fluid chemistry varies greatly as do the required additives, called inhibitors, that reduce the corrosive effect of the fluids on the piping systems and components.

The chemistry of the coolant fluid used must be considered, because some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation. Sediment deposits prevent the formation of a protective oxide layer on the inside of the coolant system components and piping. The coolant fluid must be treated and circulating through the system continuously to prevent the buildup of deposits and/or growth of sulfate reducing bacteria. Proper inhibitor maintenance must be performed to prevent corrosion of the system.

Consult fluid manufacturer for testing and maintenance of inhibitors.

Commercial grade coolant fluid is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the coolant fluid from which it is prepared and may become increasingly corrosive with use if not properly inhibited.

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 to reduce the amount of coolant fluid leakage and consequential equipment and building damage. The shut off valves must be sized to close off against the maximum coolant fluid system pressure in case of a catastrophic fluid leak.

NOTICE

Risk of no flow condition. Can cause equipment damage. Do not leave the water/coolant fluid supply circuit in a no flow condition. Idle fluid allows the collection of sediment that prevents the formation of a protective oxide layer on the inside of the tubes. Keep unit switched On and water/coolant fluid supply circuit system operating continuously.

NOTICE

Risk of leaking coolant fluid lines. Can cause equipment and building damage. Lines and joints must be inspected regularly. Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment. Do not locate unit directly above any equipment that could sustain water damage.

Vertiv recommends installing monitored leak detection equipment for the unit and supply and return lines.

NOTICE

Risk of a catastrophic water circuit rupture. Can cause expensive building and equipment damage.

Install an overflow drain pan under the unit with a monitored leak detection system in the pan and shutoff valves in the supply and return water lines that automatically close if water is detected by the leak detection system. The shutoff valves should be spring return and must be rated for a close off pressure that is the same as or higher than the supply water pressure. If it is not possible to install an overflow drain pan, then a monitored leak detection system should be installed in the base of the unit or under the unit to actuate the shutoff valves immediately on a leak detection signal.

The overflow drain pan should have a drain line connected to it that flows to a floor drain or maintenance sink in case of a shutoff valve or leak detection system malfunction.

NOTICE

Risk of passageway interference. Can cause unit and/or structure damage. The unit may be too large to fit through a passageway while on or off the skid. Measure the unit and passageway dimensions, and refer to the installation plans prior to moving the unit to verify clearances.

NOTICE

Risk of damage from forklift. Can cause unit damage. Keep tines of the forklift level and at a height suitable to fit below the skid and/or unit to prevent exterior and/or underside damage.

NOTICE

Risk of improper storage. Can cause unit damage.

Keep the unit upright, indoors and protected from dampness, freezing temperatures and contact damage.

NOTICE

Risk of improper control circuits. Can cause equipment damage.

When using jumpers for troubleshooting, always remove jumpers when maintenance is complete. Jumpers left connected could override controls and cause equipment damage.

1.1 General

WARNING! This product is supplied with a 1.5 bar (21.7 psi) nitrogen holding charge in the fluid circuit. The nitrogen needs to be vented during the installation process.

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 valves have come to rest.

If there is a doubt concerning safety, installation, operation, or maintenance instructions, contact Vertiv for clarification and advice. See Appendices on page 27.

1.2 Installation and 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 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 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.

The appliance shall be installed in accordance with local and national wiring regulations.

Never make any electrical connections inside the unit or to the unit unless the electricity supply has been switched OFF at the disconnect (isolator).

Disconnecting devices having a contact separation in all poles that provide full disconnection under overvoltage category III conditions for dual power supplies must be incorporated in the fixed wiring in accordance with the wiring rules.

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 Warranty Details on page 33.

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

Operation and maintenance, maintenance, and installation and commissioning documentation as well as maintenance and service records must always remain with the unit.

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 Machinery Directive 2006/42/EC and the EMC directive 2014/30/EU. As manufactured, Vertiv products are designed to comply with an IP20 rating. This product is in compliance with UL 60335.

2.2 RoHS Compliance

Vertiv certifies that this product, manufactured and supplied by Vertiv, is fully RoHS compliant in accordance with EU RoHS Directive 2011/65/EU and revised directive (EU) 2015/863.

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3 Product Description

3.1 General

This document describes the physical and electrical characteristics of the Vertiv™ CoolChip CDU070 (hereinafter referred to as the CoolChip CDU070 or the unit) for application and planning purposes.

The CoolChip CDU070 contains a secondary closed loop circuit that provides a supply of cooling fluid to IT equipment. The cooling supply is done by direct cooling (such as cold plates at chip level).

The fluid circuit is a low pressure sealed system with the heat removed from the high heat density areas of IT equipment rejected to ambient air via a low pressure drop cooling coil heat exchanger, arranged in a V-format with fan assistance provided by seven axial fans.

The fluid 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 and can be accurately maintained for fluid quality (with included filtration).

The primary cooling source is ambient air of the data center, and final heat transfer depends on the air temperature and flow rate.

- The nominal operating conditions are as follows: fluid outlet temperature is 42 °C (107.6 °F), ambient air temperature is 27 °C (80.6 °F), and the temperature difference between the coolant leaving the unit and the return air entering the coil heat exchanger (ATD, approach temperature difference) is 59°F (15°C).
- Maximum secondary fluid flow rate: 120 l/m (32 gpm).
- 60 kW to 100 kW capacity dependent on ambient operating conditions (approach temperature difference), fan speed, and fluid type.
- 1.5 inch hygienic outlet and inlet connections, compatible with PG25 or water.
- Expansion tank and integrated air vents within fluid circuit.
- Approved wetted materials for direct to chip applications.
- Fan redundancy (N+1), pump redundancy, and field replaceable.
- Designed to ASHRAE liquid cooling class W4.
- Designed to ASHRAE air cooling class A2 upper limits.
- Top and bottom fluid connection, 10 liter stainless steel fluid reservoir and integrated fill pump.
- Integrated 50 micron filters (with hot swap function).
- Maximum airflow approaching 11,100 CMH (6,533 CFM).
- Ability to implement liquid cooling solutions without the need for a primary water supply or other related infrastructure.
- Easy installation, maintenance, and retrofit pipework parts.
- Small footprint: 2300 mm x 600 mm x 1200 mm (91 in. x 24 in. x 48 in.).
- Black textured finish to blend in with computer room environment.
- International service team to provide professional and all in one services from installation to maintenance and troubleshooting.

3.2 Vertiv™ CoolChip CDU070 Model Number Nomenclature

Table 3.1 CoolChip CDU070 Model Number Base Digit Definitions

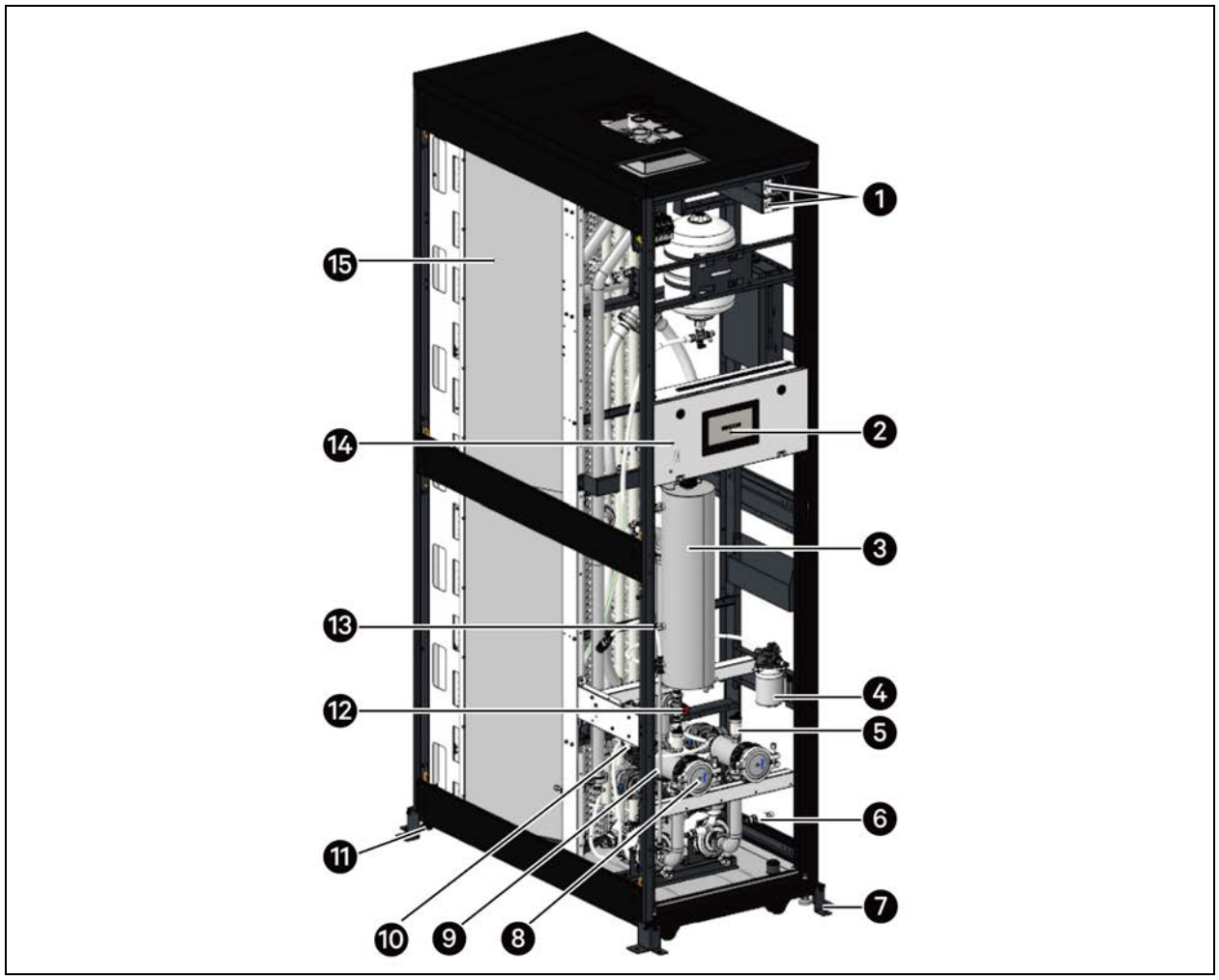
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Model #	X	D	U	0	7	0	A	B	Q	4	A	0	1	0	0

Table 3.2 CoolChip CDU070 Nomenclature Detail

Digit	Feature	Value	Description
1 to 3	Family name	XDU	Product family
4 to 6	Unit model	070	Base model
7	Cooling type	A	Liquid to air
8	Unit revision	B	Revision B
9	Voltage	Q	110 - 120 V, 208 - 240 V, 1 PH, 50/60 Hz
10	Pressure relief valve	3	3 bar pressure relief valve
		4	4 bar pressure relief valve
11	Controller	A	Standard controller
12	Connection	0	1 1/2" sanitary flange
13	Secondary filtration	1	Fitted (50 µ)
		2	Fitted (25 µ)
14	Place holder	0	Place holder
15	Configuration	0	Standard configuration
		S	Special feature authorization

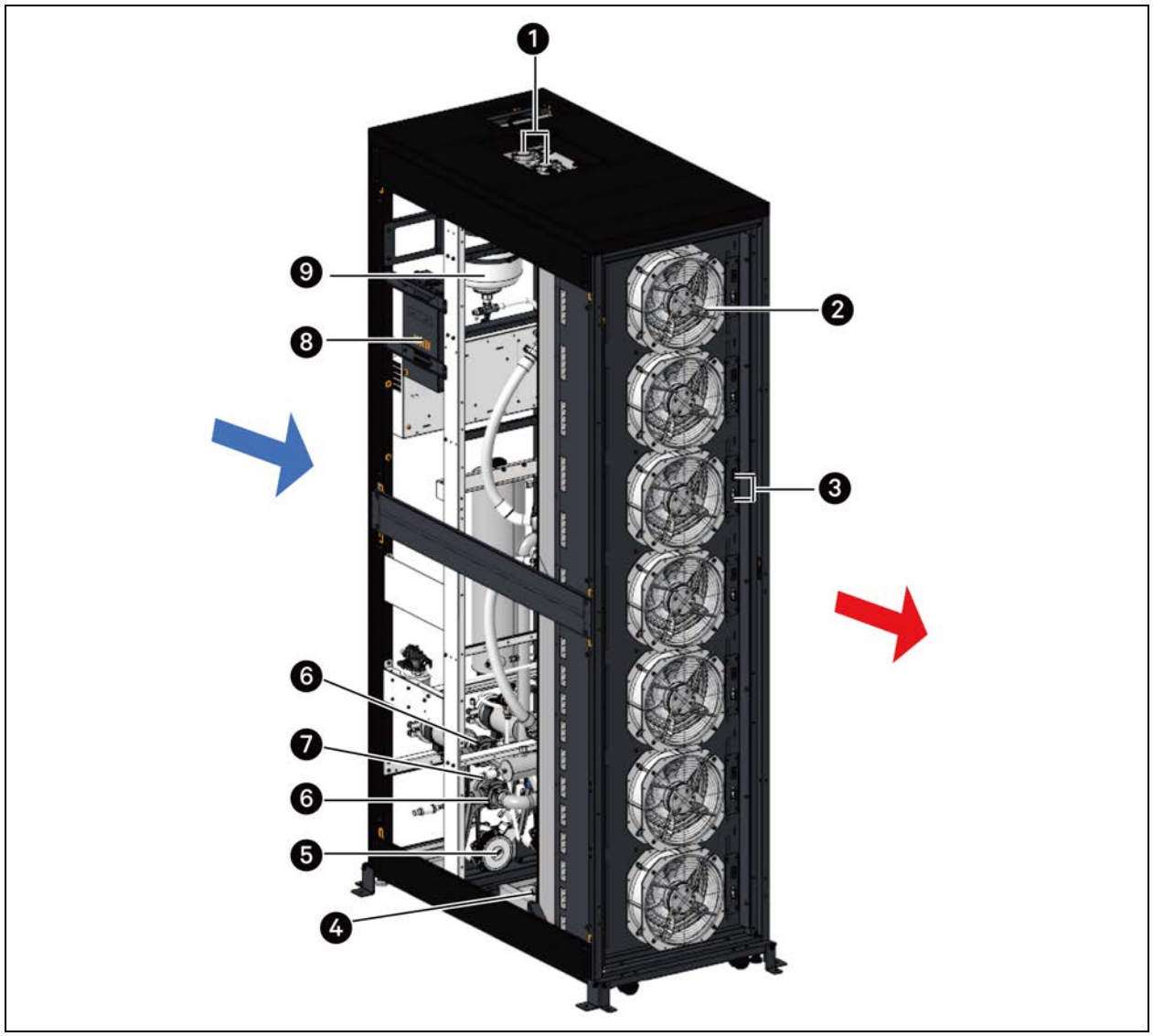
3.3 Product Views

Figure 3.1 Front View of Vertiv™ CoolChip CDU070 (Doors and Side Panels Removed)



Item	Description	Item	Description
1	Redundant 48 VDC power supply (A and B)	9	Fill wand
2	Touchscreen display	10	Fill pump P3 (System)
3	Reservoir tank (10 liters/2.6 gal)	11	Wheels and adjustable feet
4	Fill pump P4 (reservoir tank)	12	Pressure relief valve 4 bar (58 psi)
5	Automatic air vents on filter	13	Level sensors (three sensors in reservoir tank) (two sensors in pipework)
6	Pressure sensors (quantity: seven)	14	Control panel
7	Tie down bracket (front and back)	15	Cooling coil
8	Secondary fluid circuit filters 50 micron		

Figure 3.2 Rear View of Vertiv™ CoolChip CDU070 (Liquid to Air) (Doors and Side Panels Removed)



NOTE: The blue arrow indicates the cold air inlet side, and the red arrow indicates the hot air outlet side.

Item	Description	Item	Description
1	Automatic air vents (on coil headers)	6	Filter/pump isolation valves
2	Axial fans 48 VDC (quantity: seven)	7	Pressure sensor
3	Fan fuse and connector	8	Access panel to 48 VDC distribution busbar and fuses
4	Dip tray with float switch	9	Expansion vessel
5	Secondary fluid circuit pumps P1 and P2 (with built- in speed control)		

3.4 Spare Parts

It is recommended that the end user holds a kit of essential spare parts to enable the Vertiv™ CoolChip CDU070 to be kept running with minimum downtime. Any parts replaced during maintenance or servicing must be the same specification as those being replaced and should only be obtained from Vertiv. Contact local Vertiv representative for Vertiv engineered parts, see https://www.Vertiv.com/en-us/support/ or refer to Appendices on page 27.

The use of incorrect replacement parts may affect the operation or reliability of the unit and invalidate any warranty.

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4 Technical Data

4.1 Weights and Dimensions

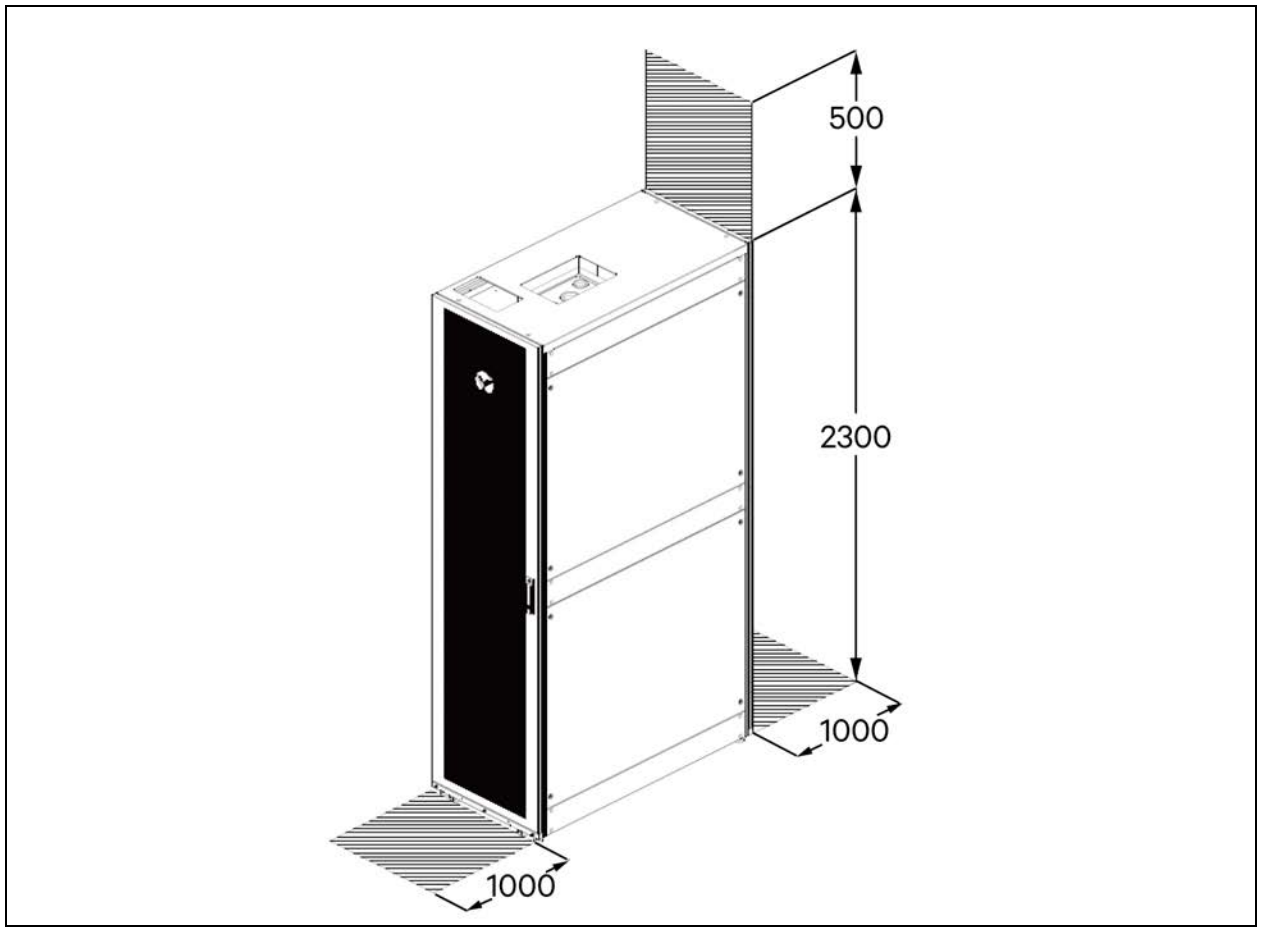
Table 4.1 Vertiv™ CoolChip CDU070 Specifications

Nominal cooling capacity	See Figure 4.5 on page 21					
Maximum flow (7X fan performance)	11,100 CMH (6,533 CFM). See Figure 4.4 on page 20					
Maximum fluid circuit flow	120 l/m (32 gpm) at 0.48 bar (4 psi), based on Figure 4.2 on page 17					
Coolant type	Water, water/propylene glycol mixture, or any compatible sensitive phase liquid					
Pump redundancy	Single pump (with rotation mode)					
Secondary coolant temperature range	10 °C to 65 °C (50 °F to 149 °F)					
Maximum power consumption	1.92 kW at maximum flow and external pressure drop (single pump)					
Maximum altitude	Below 1000 m					
Dimensions	**Width**		**Height**		**Depth**	
Unit	**mm**	**in.**	**mm**	**in.**	**mm**	**in.**
Standard cabinet	600	23.6	2,300	90.6	1,200	47.2
Shipping	1,006	39.6	2,497	98.2	1,350	53.1
Weight	**Dry**		**Operating**		**Shipping**	
Unit	**kg**	**lbs.**	**kg**	**lbs.**	**kg**	**lbs.**
Standard cabinet	386	851	434	956.8	546	1203.7
Fluid Circuit Data	**Liters**		**Gallons**			
Base unit	48		12.68			
Reservoir tank capacity	10		2.6			
Piping connection top or bottom	1.5 in. sanitary flange					
Water filtration	50 micron (Standard)*					
Fan Data	**CMH**		**CFM**			
Maximum airflow for seven-fan operation (N)	11,100		6,533			
Noise level at 10 ft (3 m)	< 72 dB(A) (sound pressure)					
*denotes 25 micron optional						

Table 4.2 Operating and Storage Conditions

Operating conditions	0 °C to 40 °C (0 °F to 104 °F), ambient 10% to 90% RH (non-condensing)
Storage conditions	-40 °C to 70 °C (-40 °F to 158 °F), 5% to 93% RH (non-condensing)

Figure 4.1 Maintenance Space (Unit: mm)



NOTE: To allow proper operation and maintenance of the unit, reserve a certain free space without any obstacles/ obstructions around the unit. Leave 1000 mm (39.4 in) at the front and rear of the unit and 500 mm (19.7 in) at the top of the unit.

4.2 Pipe Connections

Pipe connections for the fluid circuit are made in either the top or bottom of the cabinet.

The Vertiv™ CoolChip CDU070 pipe connections are 38.1 mm (1.5 in.) sanitary flanges located on the top and bottom of the unit. Flanges are fitted with stainless steel blanking caps to ensure that the pipework remains contaminant-free and to retain the nitrogen holding charge during transit. The blanking caps need to be removed for installation.

See SL-80017 Vertiv CoolChip CDU070 Installation and Commissioning Guide for further detail on piping, including schematics indicating the location of the sanitary flanges and blanking caps.

4.3 Fluid Circuit

Figure 4.2 on the facing page shows the pressure/flow differential available at the fluid supply and return connections of the CoolChip CDU070 (Liquid to Air) based on water for single pump operation.

Figure 4.2 Available Fluid External Pressure vs. Flow

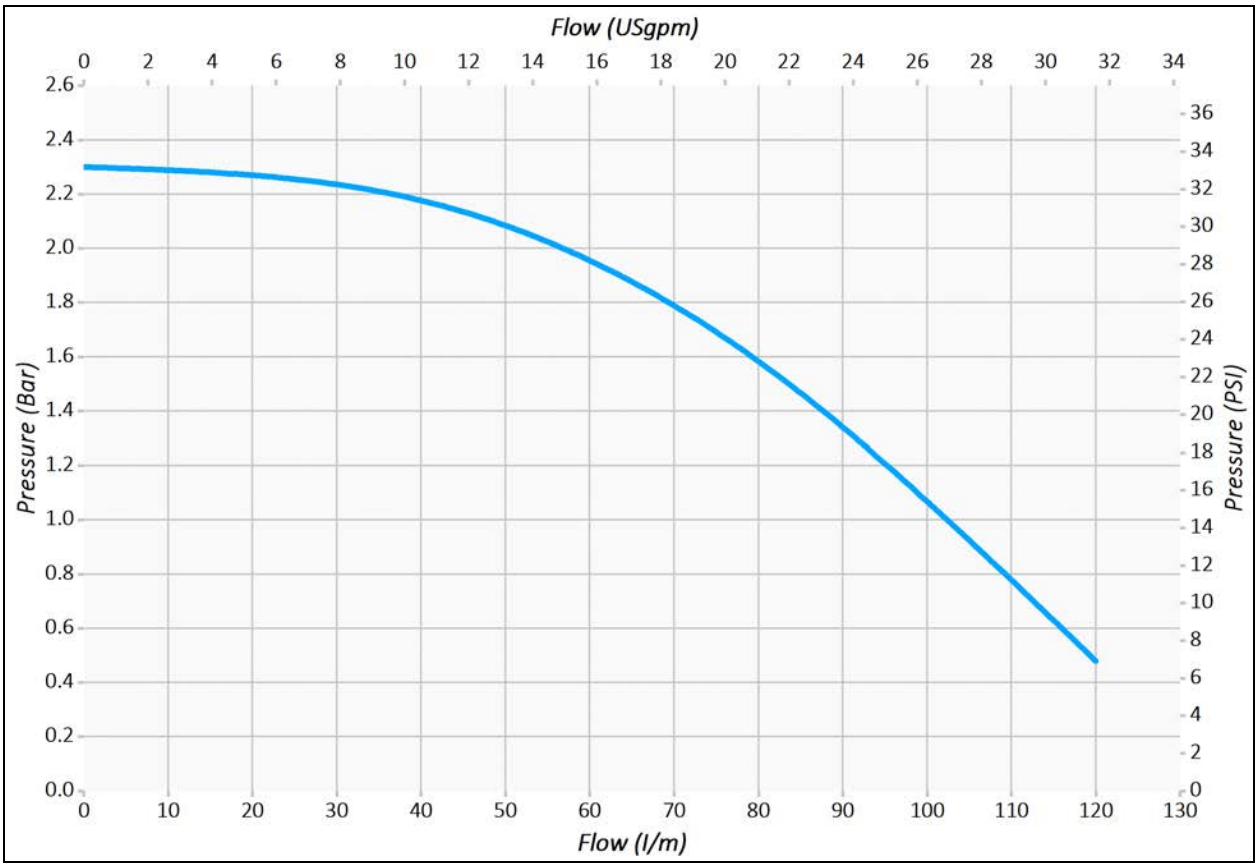
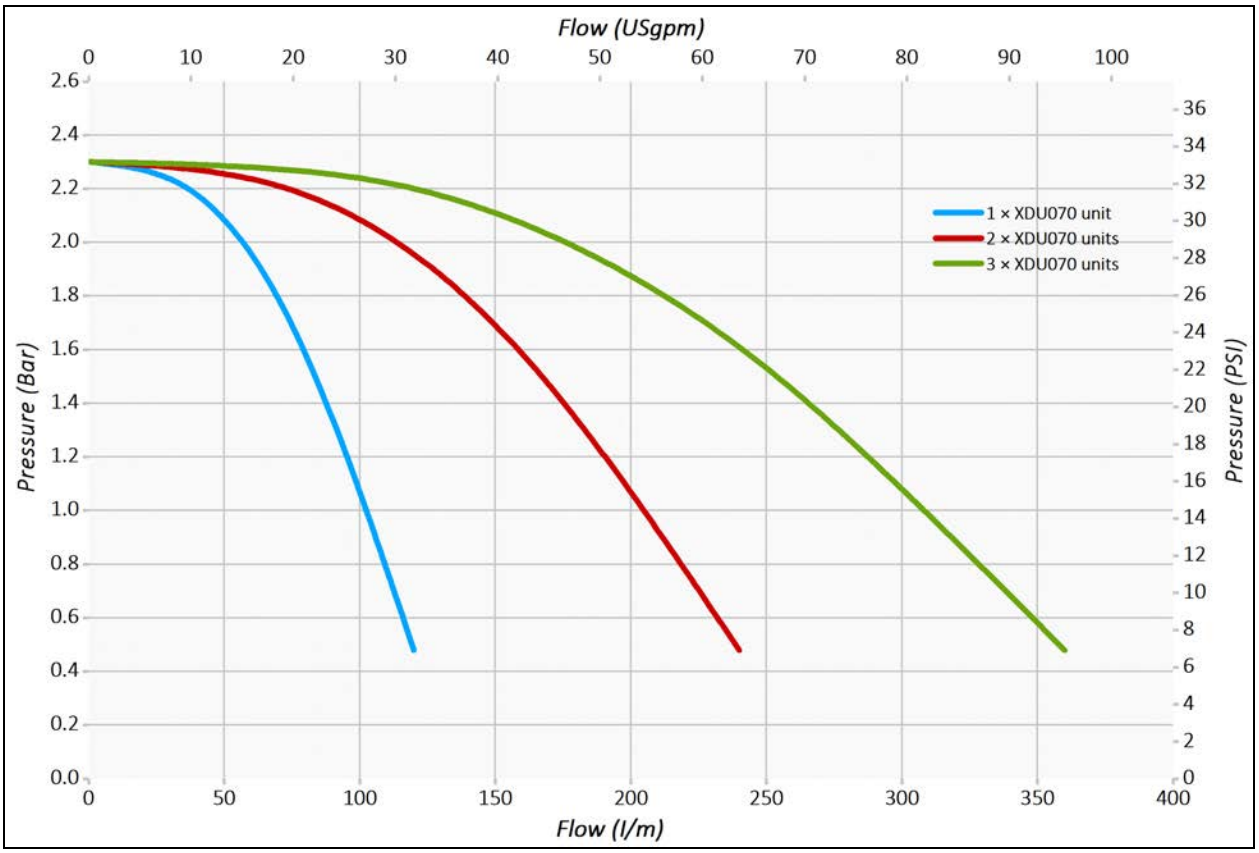


Figure 4.3 Pressure vs. Flow Graph for Multiple Units in Parallel



4.4 Electrical Data

Table 4.3 Supported Electrical Supplies

Model	CoolChip CDU070	
Rated voltage, V	110 to 120	208 to 240
Rated frequency, Hz	50/60	
FLA (Full Load Ampere), A	18	9
MCA (Minimum Circuit Ampacity), A	20	10
MOP (Maximum Overcurrent Protection), A	25	15
SCCR (Short Circuit Current Rating), KA	7.5	7.5
Dual power feeds	Standard feature	
Agency approvals and certification	CE, cULus	

NOTICE

Before connecting any equipment to a main or alternate power source (such as backup generator systems) for startup, commissioning, testing, or normal operation, ensure that these sources are properly adjusted to match the nameplate voltage and frequency of all connected equipment. In general, power source voltages should be stabilized and regulated to within ± 10% of the load nameplate nominal voltage. Also, ensure that no three phase sources are single phased at any time.

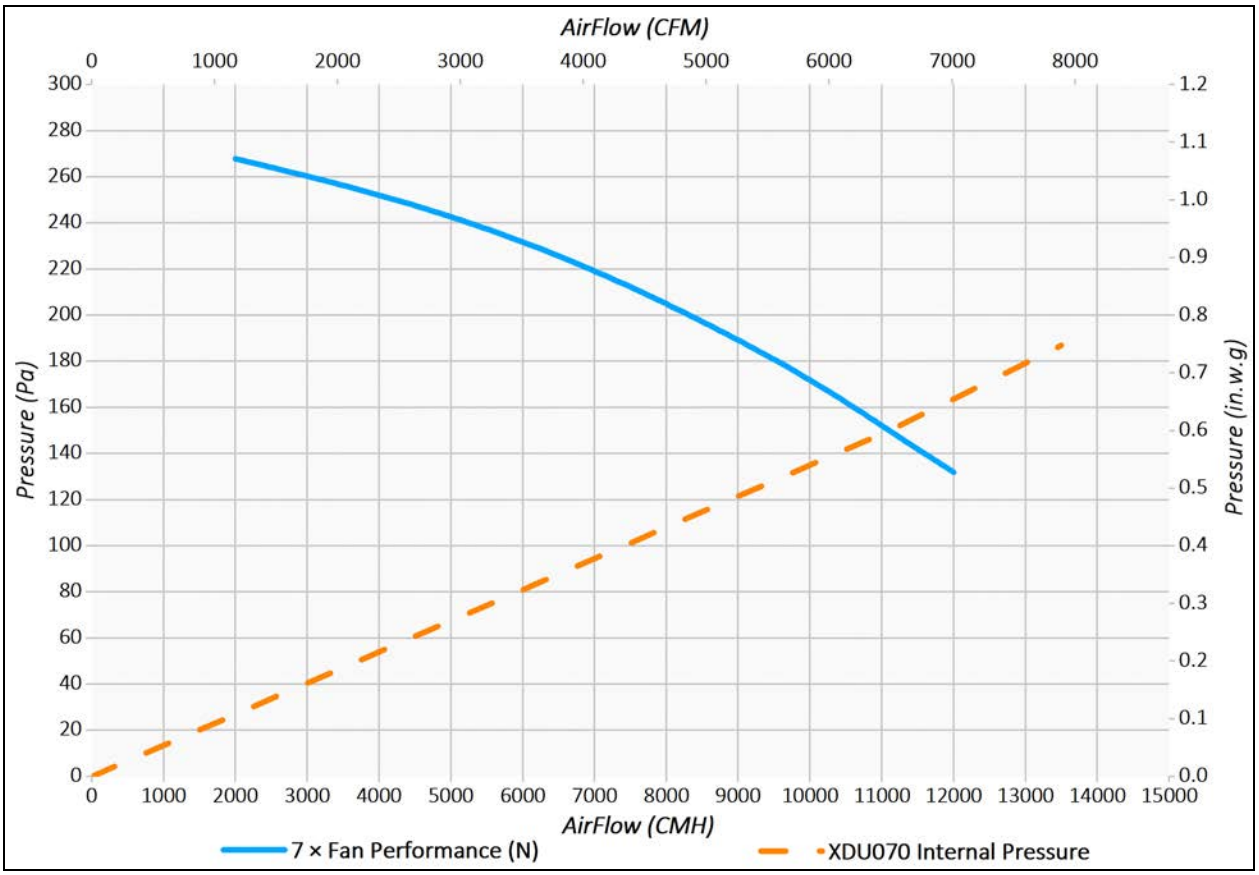
4.5 Noise

Maximum sound pressure level is 72 dB(A).

4.6 Airside

Figure 4.4 below shows the airflow performance for seven fans operating. The usable area is that shown above the orange internal pressure drop curve.

Figure 4.4 Fan Performance with Internal Pressure Drop Curve



4.7 Thermal Performance

Figure 4.5 below shows the cooling capacity performance of the Vertiv™ CoolChip CDU070 unit based on 42 °C (107.6 °F) fluid supply temperature, at three alternative fluid flow rates for a range of air inlet temperatures (room air) from 20 °C to 35 °C (68 °F to 95 °F), equating to approach temperature differences (ATDs) 22 °C to 7 °C (71.6 °F to 44.6 °F).

The lowest 60 l/m (15.85 gpm) fluid flow shows shortened graph lines as cooling capacities beyond this point results in fluid return temperatures in excess of 65 °C (149 °F), which is deemed to be the maximum limit for the IT load.

Figure 4.5 Thermal Performance for 42 °C Fluid

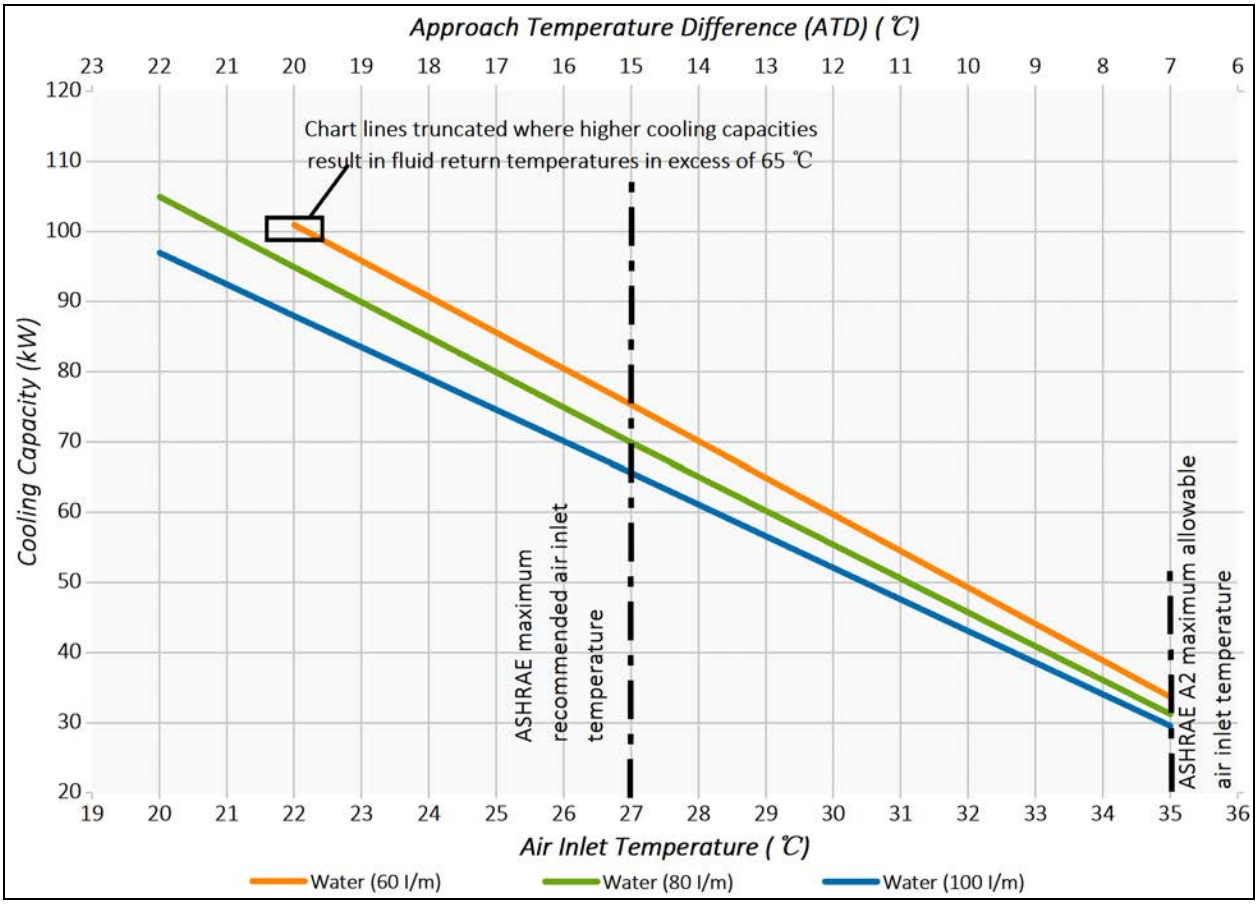


Figure 4.5 above is based on 11,100 CMH (6,533 CFM) airflow, seven fans running.

IMPORTANT! For thermal performance at more specific conditions not covered in this document, contact the Vertiv sales representative.

4.8 Wetted Materials

For fluid compatibility purposes, all component materials in the fluid circuit are listed in Table 4.4 below.

Table 4.4 Wetted Materials

Fluid Circuit	
Component	**Materials**
Hygienic fittings	304 Stainless steel, EPDM seals
Butterfly hygienic valves	• 304 Stainless steel • EPDM seals
Hygienic seals	EPDM
Pipe work	304 Stainless steel
Reservoir tank	304 Stainless steel
Machined pipe fittings	304 Stainless steel
Main pumps	• 304 stainless steel (volute) • ADC12 (motor housing) • PPS+GF (impeller) • EPDM (seal) • PPS (waterproof cover)
Insert nonreturn valve (main pumps)	• POM (body and housing) • EPDM (seal) • 304 Stainless steel (spring)
Fill pump	• Polyamide (body) • EPDM (diaphragm) • Polypropylene (collector plate)
Coil heat exchangers	• Copper • Aluminum fin
Coil hoses	• 304 Stainless steel (convoluted hose) • 304 Stainless steel (fittings)
Schrader valves	• 304 Stainless steel (body) • Stainless steel (valve core)
Pressure sensors	17-4PH (630) Stainless steel
Flow meter	• 316 Stainless steel • 316 Stainless steel (compression fitting)
Filter	• 304 Stainless steel • EPDM (O-ring seals)
Drain valves	• Nickel plated brass • Nylon 6 • EPDM (O-ring seal)

Table 4.4 Wetted Materials (continued)

Fluid Circuit	
Component	**Materials**
Automatic air vent	• 316L stainless steel (housing, nut) • Stainless steel (connecting rod) • Nylon + fiberglass (air vent cover) • PE-HD (float) • ilicon (gasket) • FVMQ (fluorosilicone rubber) (seal)
Pressure relief valve	• 316L stainless steel (housing) • Nylon + fiberglass (valve bonnet, piston) • Nylon (spring support) • Music wire (spring) • EPDM (diaphragm)
Expansion vessel	• 304 Stainless steel (connector) • EPDM (membrane)
Expansion vessel hose	• EPDM (hose) • St. steel (connections)
Fill quick coupler and hose	• Chrome plated brass (body) • Polysulfone (valve) • EPDM (seal) • St. steel (spring)
Fill nonreturn valve	• 304 stainless steel (valve body) • Stainless steel (spring) • EPDM (seal)
Fill pump hose barb fittings	Nickel plated brass
Fill pump hose	PA12
Push fit fittings (fill wand)	• Stainless steel (tube) • 304 stainless steel (filter) • HPb59 (valve body)
Ultrasonic level sensor	• Olysulfone resin (body) • EPDM (seal)

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5 Communications

5.1 Remote Monitoring Control

The Vertiv™ CoolChip CDU070 (Liquid to Air) provides an RS-485 and two 10/100 Ethernet communication ports for external and remote monitoring and control via customer BMS/DCIM/supercomputer control nodes.

RS-485 Connection

Modbus RTU is supported. The Modbus register table includes all the important CoolChip CDU070 (Liquid to Air) data points and values. See Modbus Register Tables on page 29.

10/100 Ethernet Ports

Each port can be configured with its own IP address to enable simultaneous communications with the facility BMS/DCIM and/or supercomputer control nodes.

Standard TCP/IPv4 and IPv6 secure application protocols and services are supported, including:

- SNMPv2/3 (Simple Network Management Protocol)
- HTTP/HTTPS (Web Server)
- SFTP (File Server)
- SSH (Command Line Interface)
- SMTP (Alarm Retransmission via Email)
- NTP (Network Time Protocol)
- BACnet

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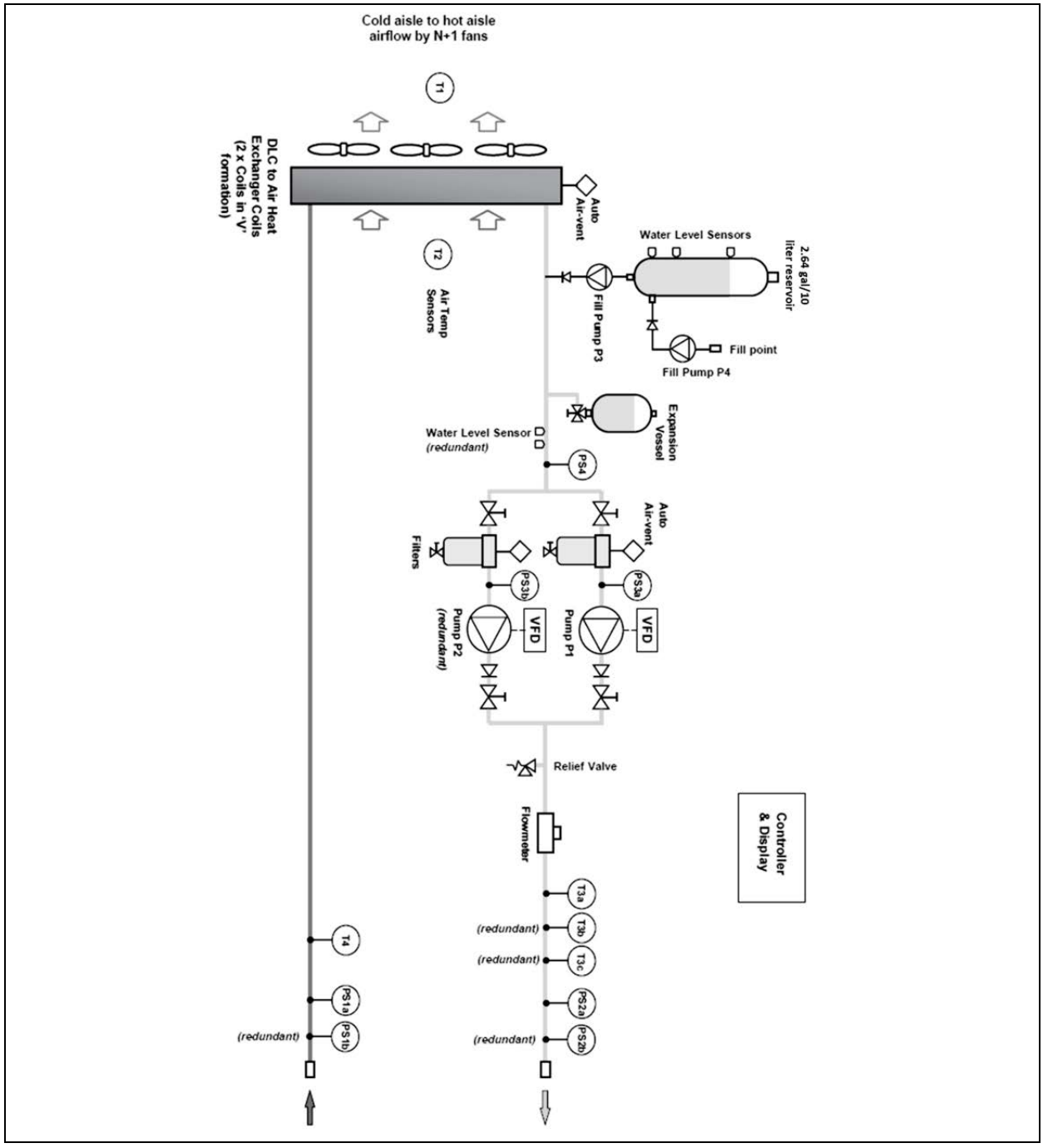
Appendices

Appendix A: Pipe Schematic



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Appendix B: Modbus Register Tables

B.1 Discrete Inputs

Table B.1 Vertiv™ CoolChip CDU070 Discrete Inputs

Register Number	Register Description	Alarm Code
1	Common Alarm (0 = Inactive, 1 = Active)	-
2	Alarm : T1 Temperature Sensor Fault	A01
3	Alarm : T2 Temperature Sensor Fault	A02
4	Alarm : T3a Temperature Sensor Fault	A03
5	Alarm : T3b Temperature Sensor Fault	A04
6	Alarm : T3c Temperature Sensor Fault	A05
7	Alarm : T4 Temperature Sensor Fault	A06
8	Alarm : PS1a Pressure Sensor Fault	A07
9	Alarm : PS1b Pressure Sensor Fault	A08
10	Alarm : PS2a Pressure Sensor Fault	A09
11	Alarm : PS3a Pressure Sensor Fault	A10
12	Alarm : PS3b Pressure Sensor Fault	A11
13	Alarm : Flow Sensor Fault	A12
14	Alarm : microSD Card Fault	A13
15	Alarm : Reservoir Tank Fluid Required	A14
16	Alarm : Reservoir Tank Empty	A15
17	Alarm : Pump 1 Fault	A16
18	Alarm : Pump 2 Fault	A17
19	Alarm : Fluid Flow Shutdown	A18
20	Alarm : Fluid Low Temp	A19
21	Alarm : Fluid High Temp	A20
22	Alarm : Fluid Leak Detected - Drip Tray	A21
23	Alarm : Fluid Over Pressure	A22
24	Alarm : Fluid Over Pressure Shutdown	A23
25	Alarm : System Low Pressure	A24
26	Alarm : Insufficient Water Level	A25
27	Alarm : Level Sensor – No Fluid Detected	A26
28	Alarm : Illegal Fluid Sensor Condition(Shutdown)	A27
29	Alarm : Sec Temp T3a Diff Fault	A28

Table B.1 Vertiv™ CoolChip CDU070 Discrete Inputs (continued)

Register Number	Register Description	Alarm Code
30	Alarm : Sec Temp T3b Diff Fault	A29
31	Alarm : Sec Temp T3c Diff Fault	A30
32	Alarm : Pump Drive 1 Comms Fault	A31
33	Alarm : Pump Drive 2 Comms Fault	A32
34	Alarm : Pump 1 Low Flow	A33
35	Alarm : Pump 2 Low Flow	A34
36	Alarm : Fan 1 Fault	A35
37	Alarm : Fan 2 Fault	A36
38	Alarm : Fan 3 Fault	A37
39	Alarm : Fan 4 Fault	A38
40	Alarm : Fan 5 Fault	A39
41	Alarm : Fan 6 Fault	A40
42	Alarm : Fan 7 Fault	A41
43	Alarm : Group Control Network Fault	A42
44	Alarm : Group Control Insufficient Units Available	A43
45	Alarm : PS1 Difference Out of Limits	A44
46	Alarm : Fluid Leak Detected - Rope	A45
47	Alarm : Secondary Filter 1 Dirty	A46
48	Alarm : Secondary Filter 2 Dirty	A47
49	Alarm : PSU A AC Fault	A48
50	Alarm : PSU B AC Fault	A49
51	Alarm : PS2b Pressure Sensor Fault	A50
52	PS2 Difference Out of Limits	A51
53	PS4 Pressure Sensor Fault	A52

Access to the Discrete Inputs table is provided by Modbus function code 02 – Read Input Status.
For all discrete input registers which contain an alarm status, a value of 1 indicates the presence of the alarm condition, whilst a value of 0 indicates the healthy (no alarm) condition.

Table B.2 Input Registers

Register Number	Description	Units	Scaling	Data Type
1	Mode 0 = not configured 1 = shutdown – remote start/stop 2 = shutdown - network 3 = full manual control 4 = standby 5 = online (running) 6 = online (filling) 7 = filling 8 = shutdown – fault 9 = group standby	n/a	1	Unsigned
2	Group Control Mode 0 = Standalone 1 = Primary 2 = Secondary 3 = Independent (due to network fault)	n/a	1	Unsigned
3	Pump 1 Speed	%	1	Unsigned
4	Pump 2 Speed	%	1	Unsigned
5	Fan Speed	%	1	Unsigned
6	Cooling Demand	%	1	Unsigned
7	Air Outlet Temperature T1	°C	0.1	Unsigned
8	Air Inlet Temperature T2	°C	0.1	Unsigned
9	Fluid Supply Temperature T3a	°C	0.1	Unsigned
10	Fluid Supply Temperature T3b	°C	0.1	Unsigned
11	Fluid Supply Temperature T3c	°C	0.1	Unsigned
12	Fluid Supply Temperature T3	°C	0.1	Unsigned
13	Fluid Return Temperature T4	°C	0.1	Unsigned
14	Fluid Return Pressure PS1a	Bar	0.01	Unsigned
15	Fluid Return Pressure PS1b	Bar	0.01	Unsigned
16	Fluid Return Pressure PS1	Bar	0.01	Unsigned
17	Fluid Supply Pressure PS2a	Bar	0.01	Unsigned
18	Fluid Supply Pressure PS2b	Bar	0.01	Unsigned
19	Fluid Supply Pressure PS2	Bar	0.01	Unsigned
20	Unit Differential Pressure (PS2 – PS1)	Bar	0.01	Unsigned

Table B.2 Input Registers (continued)

Register Number	Description	Units	Scaling	Data Type
21	Filter 1 outlet Pressure PS3a	Bar	0.01	Unsigned
22	Filter 2 outlet Pressure PS3b	Bar	0.01	Unsigned
23	Fluid Inlet Pressure PS4	Bar	0.01	Unsigned
24	Pump 1 Filter Differential Pressure (PS4-PS3a)	Bar	0.01	Unsigned
25	Pump 2 Filter Differential Pressure (PS4-PS3b)	Bar	0.01	Unsigned
26	Secondary Flow Rate	l/m	1	Unsigned
27	Secondary Duty	kW	1	Unsigned
28	Pump P1 Runtime	Hours	1	Unsigned
29	Pump P2 Runtime	Hours	1	Unsigned
30	Controller Uptime	Mins	1	Unsigned
31	System (Group) Average Secondary Differential Pressure	Bar	0.01	Unsigned
32	System (Group) Total Secondary Flow Rate	l/m	1	Unsigned
33	Controller Software Version Number Format is x.yy where x = major version number, yy = minor version number	n/a	0.01	Unsigned
Access to the Input Register table is provided by Modbus function code 04 – Read Input Registers.				

Table B.3 Coils

Register Number	Description
1	Remote Shutdown To switch on the CoolChip CDU070, write OFF. To switch off the CoolChip CDU070, write ON.
By default, the coil table is read-only. Read-write access may be enabled via P072 Write Access parameter, accessible via the touchscreen UI. Read access to the Coil table is provided by Modbus function code 01. Write access to the Coil table is provided by Modbus function code 05.	

Table B.4 Holding Registers

Register Number	Description	Units	Scaling	Data Type
1	Secondary Temperature Setpoint (P301)	°C	0.1	Unsigned
2	Secondary DP Setpoint (P203)	Bar	0.1	Unsigned
3	Secondary Flow Setpoint (P202)	l/m	1	Unsigned
By default, the holding register table is read-only. Read-write access may be enabled via the P072 Write Access parameter, accessible via the touchscreen UI. Read access to the Holding Register table is provided by Modbus function code 03 – Read Holding Registers. For write access, Modbus function code 06 - Preset Single Register is supported. An attempt to write a holding register value when read-only access is active will result in an exception code being returned.				

Appendix C: Warranty 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 local sales representative or technical support if you have any questions or problems during unit installation.

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Appendix D: Disposal Procedure

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

Decommissioning 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 etc. 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 an approved recycling facility.

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Appendix E: 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

E.1 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 16/18 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong, China

China

B2 Building, Nanshan Zhiyuan

1001 Xueyuan Avenue

Nanshan District, Shenzhen, China

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Appendix F: Notes

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Connect with Vertiv on Social Media


https://www.facebook.com/vertiv/


https://www.instagram.com/vertiv/


https://www.linkedin.com/company/vertiv/


https://www.x.com/Vertiv/

Vertiv.com | Vertiv Headquarters, 505 N Cleveland Ave, Westerville, OH 43082 USA

SL-80015_REVA_03-25