CoolChip CDU070 (Liquid to Air)

Installation and Commissioning 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 relating 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

Save These Instructions

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

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. Shipping weights and unit weights are listed in Weights and Dimensions on page 13.

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 Weights and Dimensions on page 13.

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.

See Unloading and Positioning on page 17.

WARNING! This product is supplied with a 21.7 psi (1.5 bar) nitrogen holding charge in the fluid circuit, which will need to vented during the installation process, see Fluid Circuit on page 13 for more information.

See Preparing the CoolChip CDU070 for Operation on page 21.

WARNING! This unit is powered by high voltage. Serious injury or death can occur. All electrical work must only be carried out by a suitably qualified electrician. Installation should include a locally mounted isolator/switch disconnect to enable safe maintenance of the unit (to be supplied by others).

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, optional 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.

See Power Wiring on page 27.

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 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: The Vertiv™ CoolChip CDU070 is a heavy piece of equipment and a minimum of two operatives will be required to carry out the unloading task safely. If positioned on a raised floor, adequate under floor supports should be installed to bear the weight of the unit. A minimum free area of 2 m x 6 m (6.6 ft. x 19.7 ft.) should be allowed when unloading this product from the crate.

See Unloading and Positioning on page 17.

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

Ensure all drain valves have been closed after venting nitrogen.

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

This equipment is required to be installed only in locations not accessible to the general public. Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturer's specifications.

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. 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 any maintenance work being carried out, ensure:

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

If in any doubt over anything regarding safety, installation, operation or maintenance instructions, it is essential that the manufacturer, their agent or appointed representative is consulted for clarification and advice.

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. Only the appropriate lifting equipment must be used.

WARNING! This product is supplied with a 1.5 bar (21.7 psi) nitrogen holding charge in the fluid circuit, which will need to vented during the installation process. Refer to Fluid Circuit on page 13 for more information.

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.

Electrical connections should be carried out in accordance with local and national regulations by a qualified electrician. Never make any electrical connections inside, 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 and should only be obtained from Vertiv.

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

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 documentation together with commissioning, maintenance or service records must always remain with the unit.

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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 installation and commissioning purposes.

The CoolChip CDU070 contains a secondary closed loop circuit that provides a supply of cooling fluid to IT equipment for 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 7 x 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 will be the ambient air of the data center, and final heat transfer will depend 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 PG-25 or water working fluid
- 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
- Integrated 50 micron filters (with hot swap function)
- Max airflow approaching 11,100 CMH (6,533 CFM)
- Top and bottom fluid connection, 10 liter stainless steel fluid reservoir and integrated fill pump
- Ability to implement liquid cooling solutions without the need for a primary water supply or other related infrastructure
- Easy installation, maintenance, and retrofit of 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

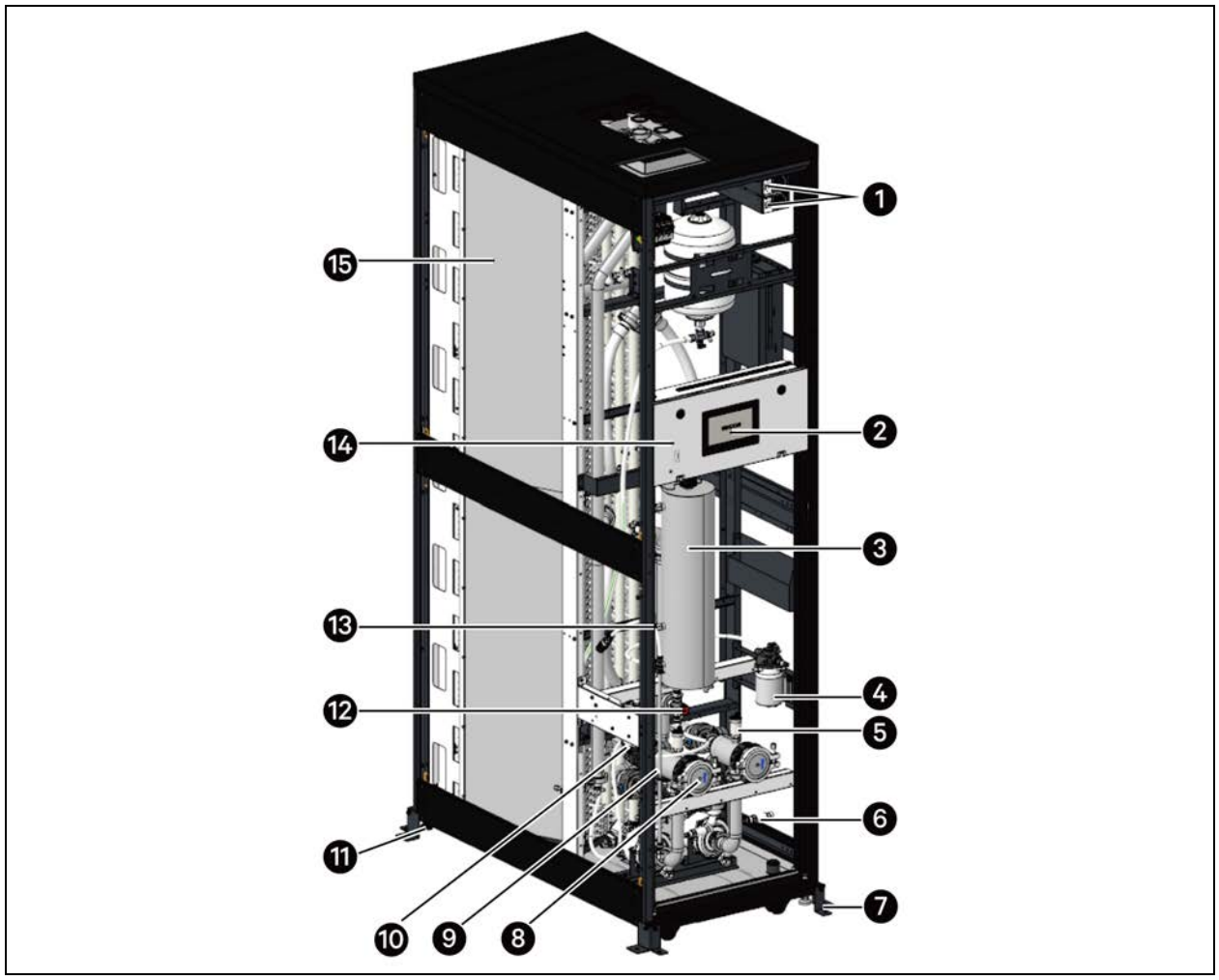
Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Model #	X	D	U	0	7	0	A	B	Q	4	A	0	1	0	0

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

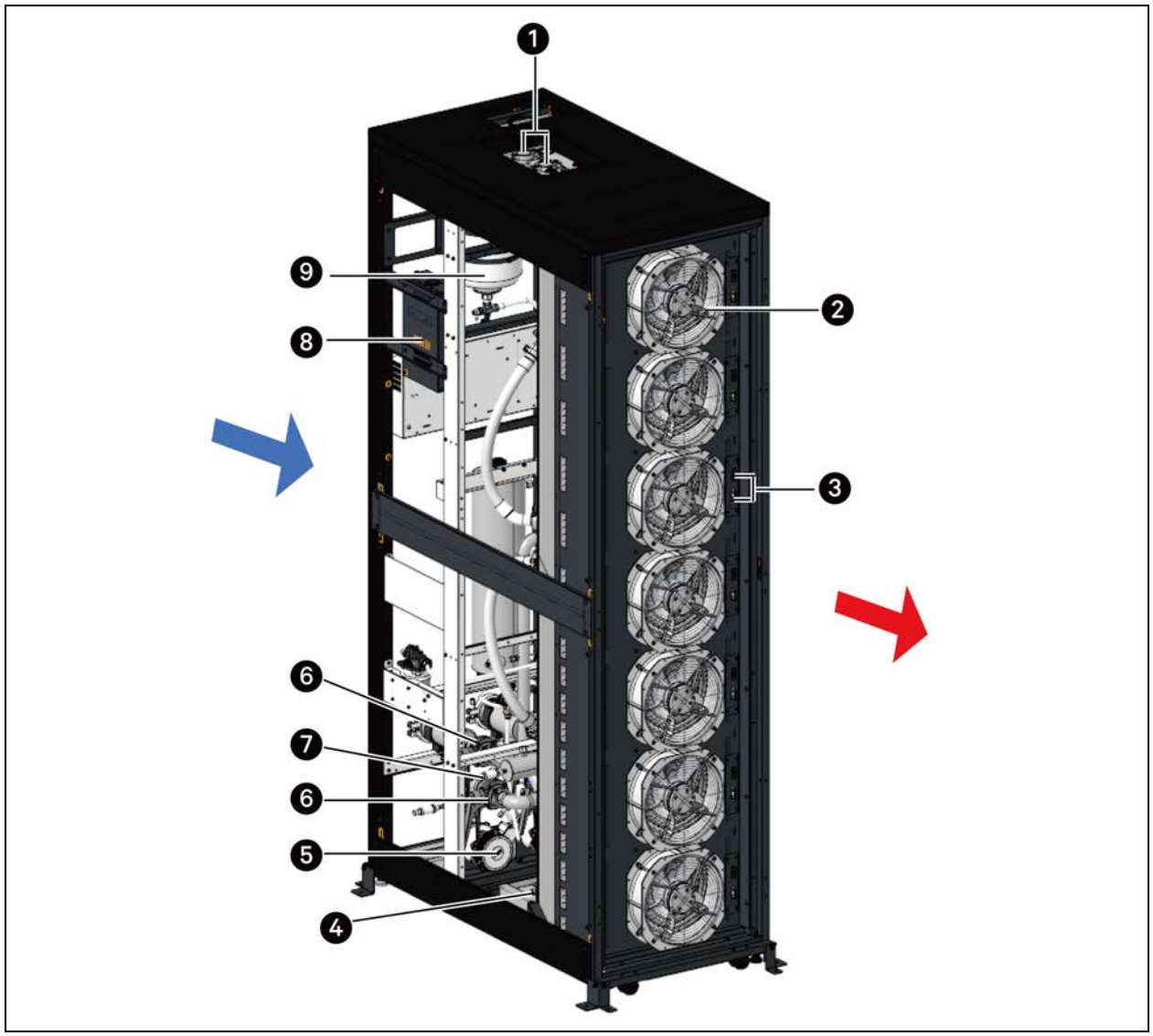
3.3 Product Views

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 (3 sensors in reservoir tank) (2 sensors in pipework)
6	Pressure sensors (quantity is 7)	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 is 7)	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)		

4 Technical Data

4.1 Weights and Dimensions

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 Cabinets	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			
Max airflow 7 Fan Operation (N)	11,100		6,533			
Noise Level at 3 m (10 ft.)	< 72 dB(A) (sound pressure)					
*denotes 25 micron optional						

4.2 Pipe Connections

Pipe connections for the secondary fluid circuit are made on either the top or bottom of the cabinet and is field fitted.

Fluid IT circuit is 38.1 mm (1.5 in.) sanitary flanges.

NOTE: Before leaving the factory, the unit is filled with nitrogen and pressurized to 1.5 bar, and the flanges are equipped with stainless steel plugs to prevent the pipes from being contaminated during transportation of the unit.

4.3 Fluid Circuit

Figure 4.1 on the next page shows the pressure/flow differential available at the fluid supply and return connections of the Vertiv™ CoolChip CDU070 based on water for single pump operation.

Figure 4.1 Available Fluid External Pressure/Flow

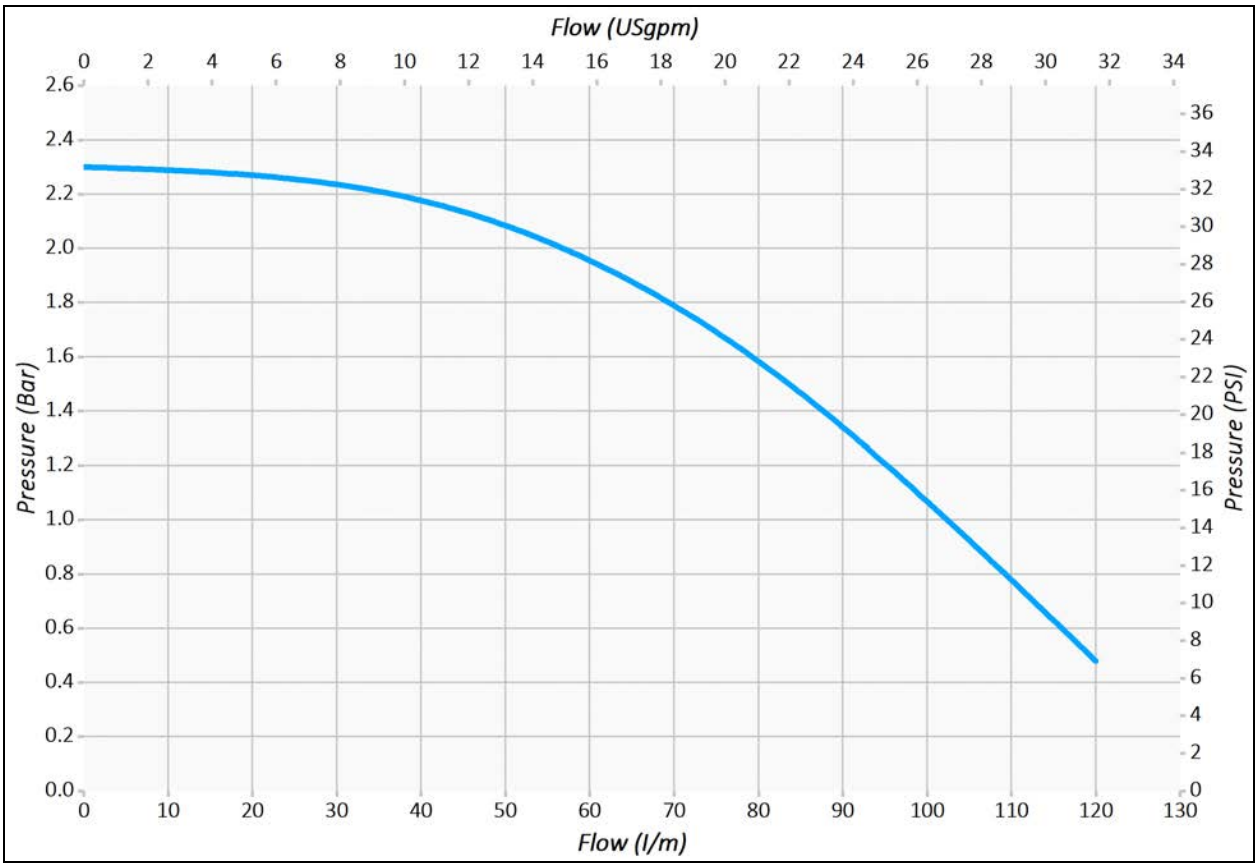
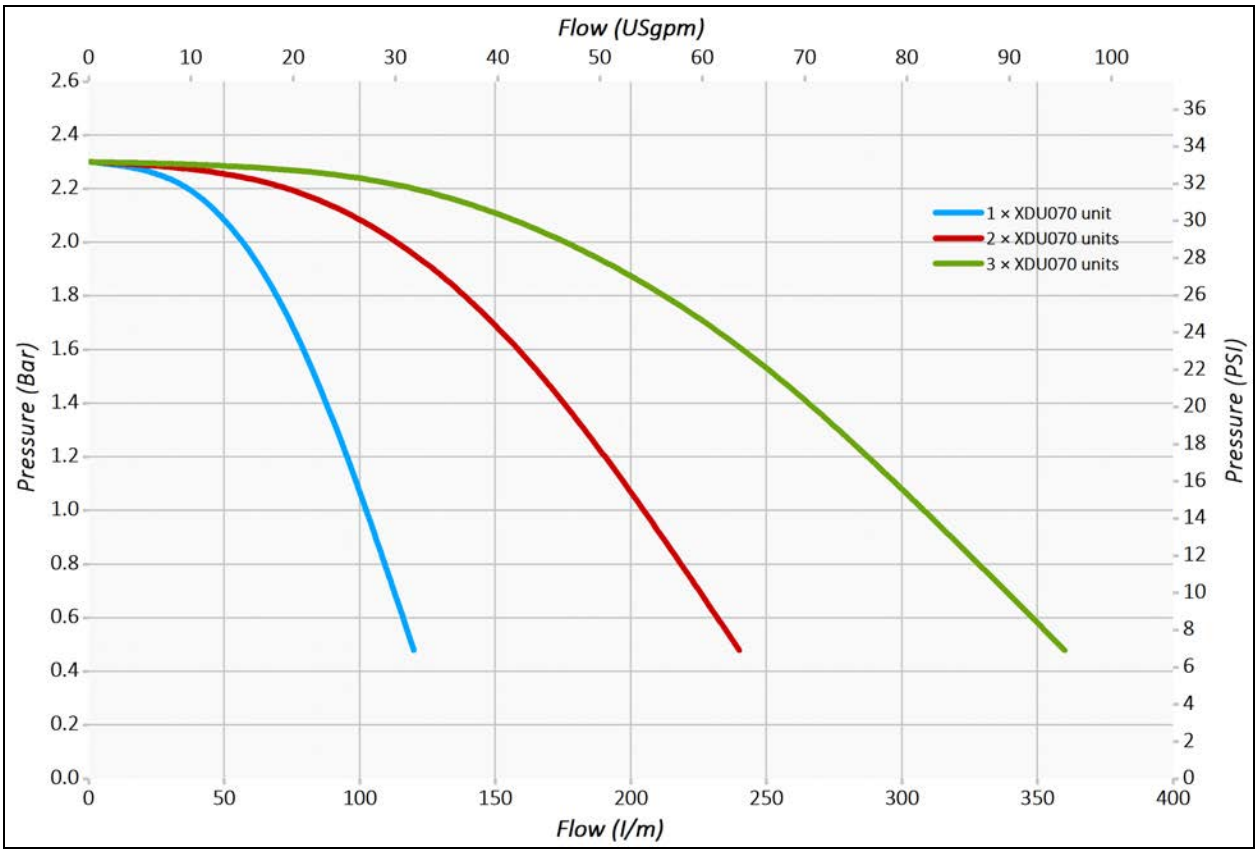


Figure 4.2 Pressure/Flow Graph for Multiple Units in Parallel



NOTE: If the Vertiv™ CoolChip CDU070 unit count is greater than eight, contact the factory for performance data.

4.4 Fluid Circuit Volume

The fluid IT circuit has a capacity of 58 liters (15.32 gallons), including a 10 liters (2.6 gallons) reservoir tank.

4.5 Electrical Data

Table 4.1 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	

4.6 Noise

Maximum sound pressure level is 72 dB(A).

5 Installation

5.1 Unloading and Positioning

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. Shipping weights and unit weights are listed in Weights and Dimensions on page 13.

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 Weights and Dimensions on page 13.

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 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 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.

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.

On arrival at the site, the Vertiv™ CoolChip CDU070 crate should be placed on a level solid surface to safely unload the unit from the crate.

Check the crate for any signs of transit damage and ensure that the tilt labels have not been activated (any serious damage must be reported to the manufacturer and shipper immediately, prior to unpacking).

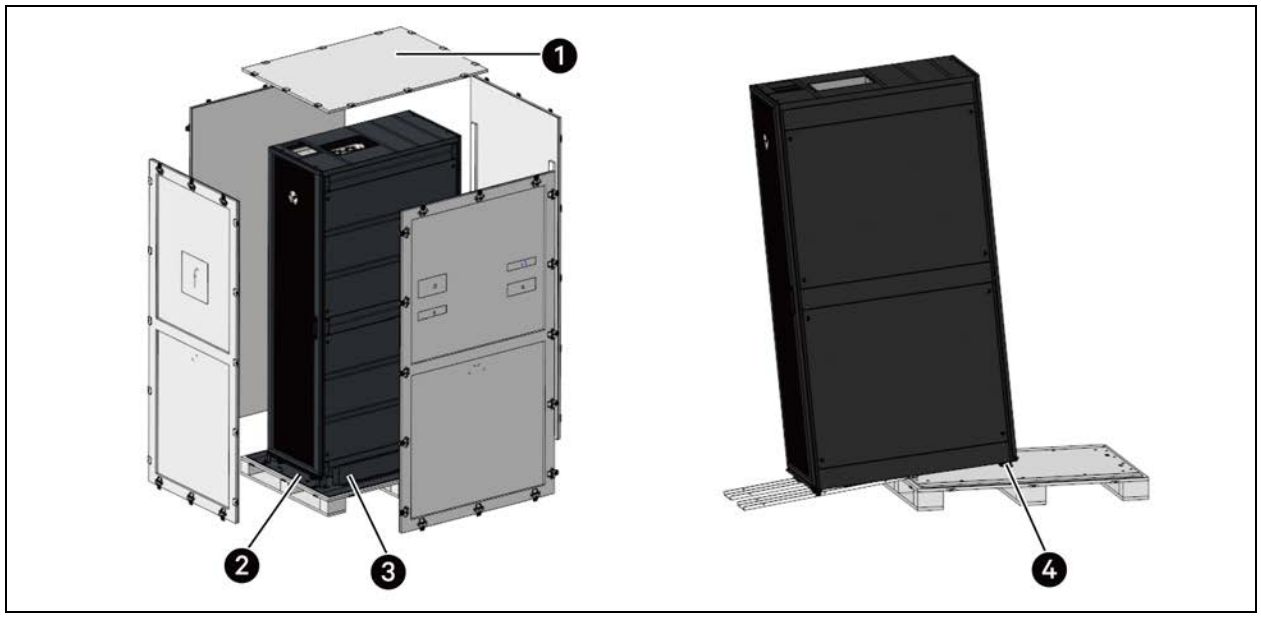
The crate has been designed with a hinge down the front panel to allow the CoolChip CDU070 to be easily wheeled off the pallet to floor level.

CAUTION: The CoolChip CDU070 is a heavy piece of equipment and a minimum of two operatives will be required to carry out the unloading task safely. If positioned on a raised floor, adequate under floor supports should be installed to bear the weight of the unit. A minimum free area of 2 m x 6 m (6.6 ft. x 19.7 ft.) should be allowed when unloading this product from the crate.

To remove the CoolChip CDU070 from the crate, follow the steps below:

1. Remove the roof panel and side panels of the crate.
2. Unscrew and remove the tie down brackets from the front and back of the unit.
3. Unscrew and remove the guide rails from both sides of the pallet. Fix the guide rails to the front of the pallet (using the removed screws).
4. Raise the four leveling feet of the unit.
5. Push the unit down along the guide rails.

Figure 5.1 Preparing to Unload the Vertiv™ CoolChip CDU070 Unit from the Crate



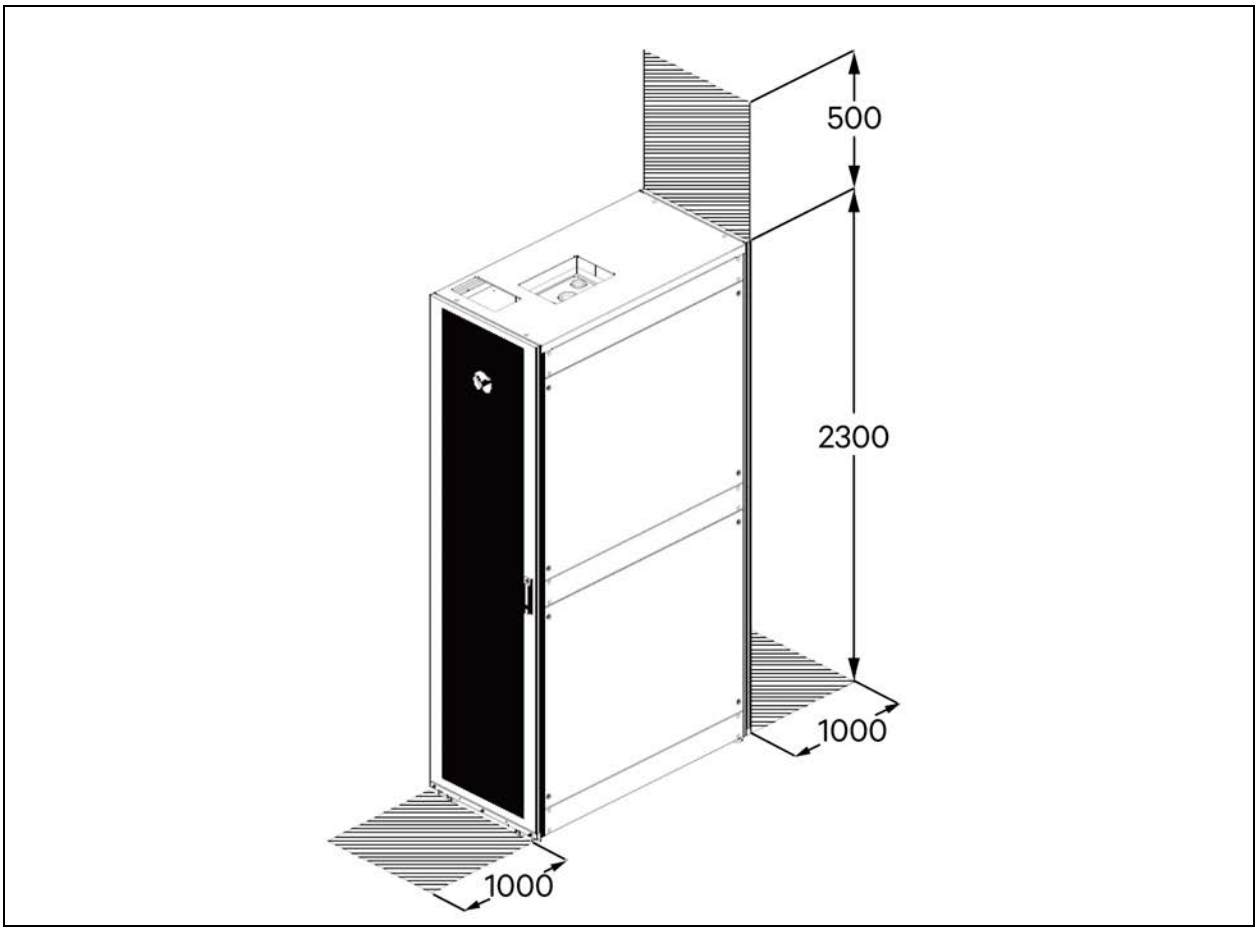
Item	Description	Item	Description
1	Crate roof panel	3	Guide rail
2	Tie down bracket	4	Leveling foot

NOTE: The maximum tilt angle when unloading and positioning is 15 °.

The CoolChip CDU070 can be maneuvered into position on the supplied load bearing wheels and once in its final location, may be secured, raised and leveled using the built-in jacking feet. The keys for the front and rear doors are supplied in a bag tied to the inside of the front door.

The CoolChip CDU070 is intended to be positioned on a smooth, level solid or raised floor.

Figure 5.2 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.

To locate items shipped loose within this unit, see below:

Table 5.1 Shipped Loose Items

Part Description	Qty	Location
Door Key	2	In the cabinet door storage bag
Drain Valve Key	1	In the cabinet door storage bag
Control panel key	2	In the cabinet door storage bag
Manual	1	In the slot below the power distribution box
Diagram	1	In the slot below the power distribution box

5.2 Preparing the CoolChip CDU070 for Operation

The CoolChip CDU070 unit is shipped with a nitrogen gas holding charge in the fluid circuit to ensure the integrity of this circuit is not compromised during transit and remains free of contamination. This holding charge (set at 1.5 bar (21.7 psi) prior to shipping) should be released before any other work is carried out on the unit, as shown in Figure 5.3 on the next page. Contact manufacturer if no gas can be heard escaping.

WARNING! This product is supplied with a 1.5 bar (21.7 psi) nitrogen holding charge in the fluid circuit, which will need to vented during the installation process. Refer to Fluid Circuit on page 13 in this document for more information.

To release the nitrogen holding charge in three drain valve locations:

1. Vent nitrogen gas from return pipework, coils and pumps using the drain valve on upper pipework Y piece.
2. Vent nitrogen gas from supply pipework and filters using either filter drain valve (it is not necessary to do both).
3. Vent nitrogen gas from reservoir tank using the drain valve at the base of the tank.
4. Use the key provided to open/close all drain valves necessary for venting nitrogen gas.

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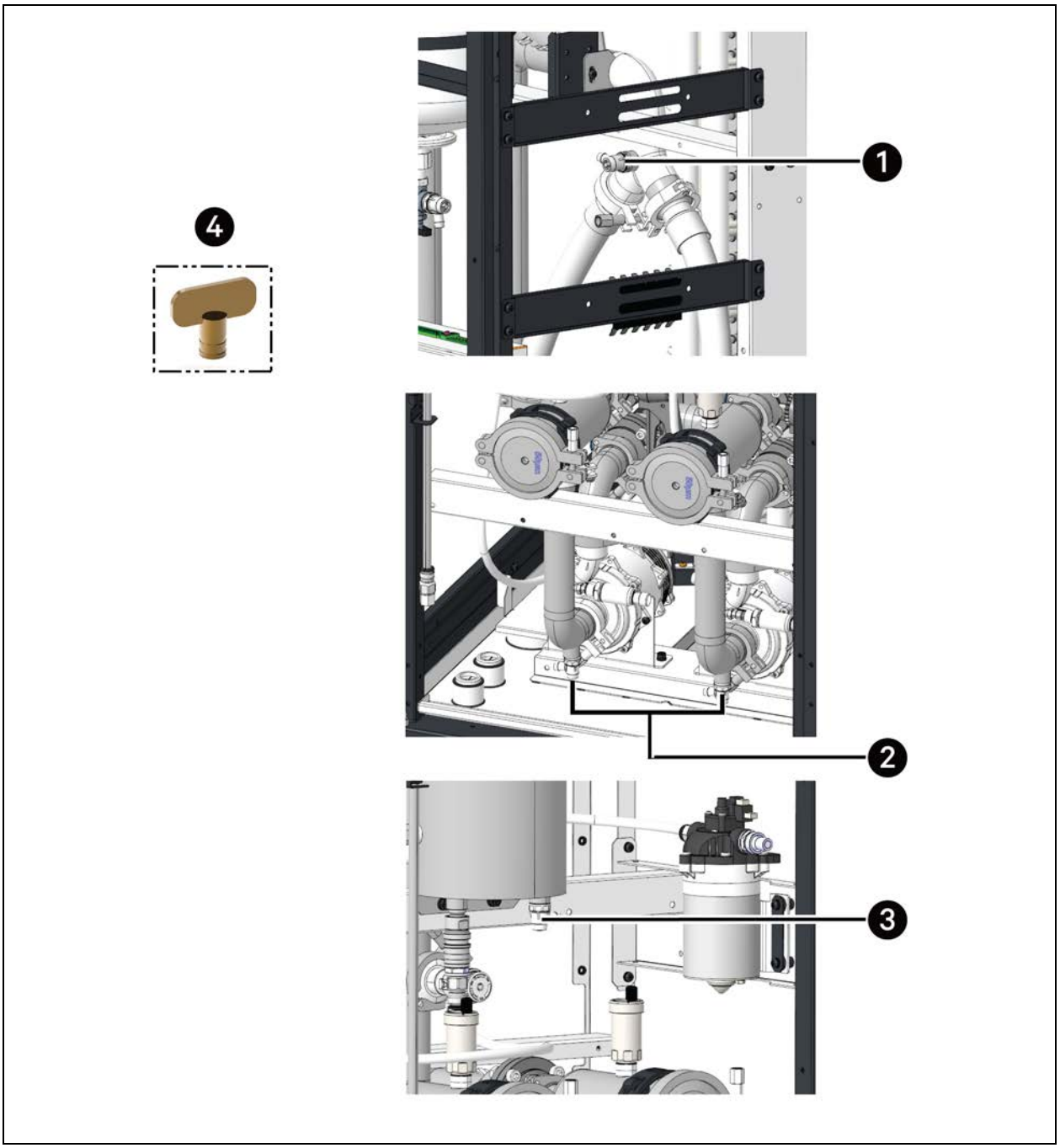
Figure 5.3 Release of Nitrogen Gas from Vertiv™ CoolChip CDU070



Item	Description	Item	Description
1	Drain valve on upper pipework Y piece	3	Drain valve at the base of the tank
2	Filter drain valves	4	Key

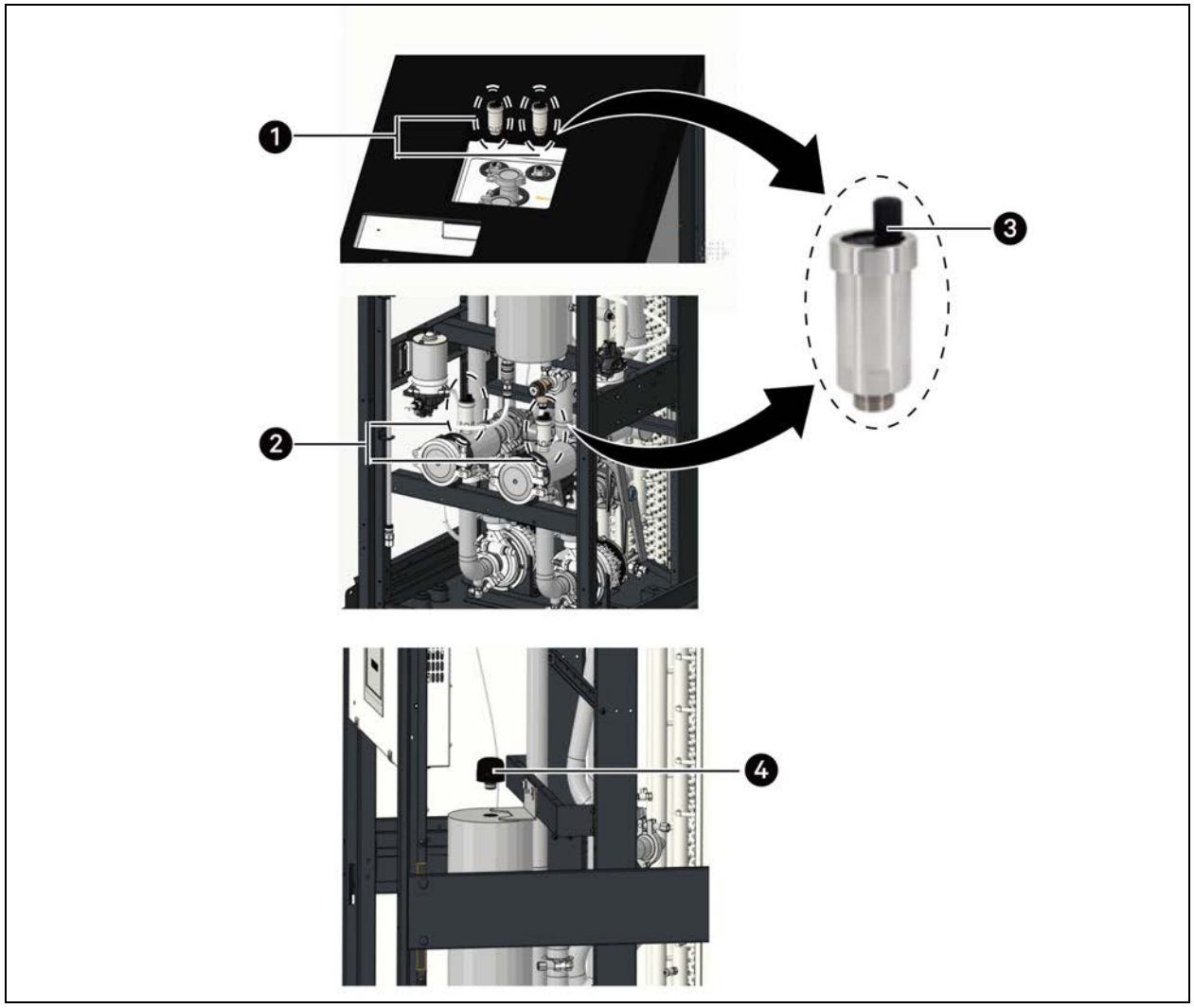
NOTICE

Ensure all drain valves have been closed after venting nitrogen.

For the four air vent valves (two at the top of the unit and two connecting to filters), rotate the air vent valve caps in counter-clockwise direction to make the valves in the open state, and then the system can release air automatically.

Make sure that the nitrogen has been released and then install the breather cap.

Figure 5.4 Preparing Vertiv™ CoolChip CDU070 Unit for Operation



Item	Description	Item	Description
1	Air vent valve at the top of the unit (two pieces)	3	Air vent valve cap
2	Air vent valve connecting to pipes (two pieces)	4	Breather cap

5.3 Pipe Connections

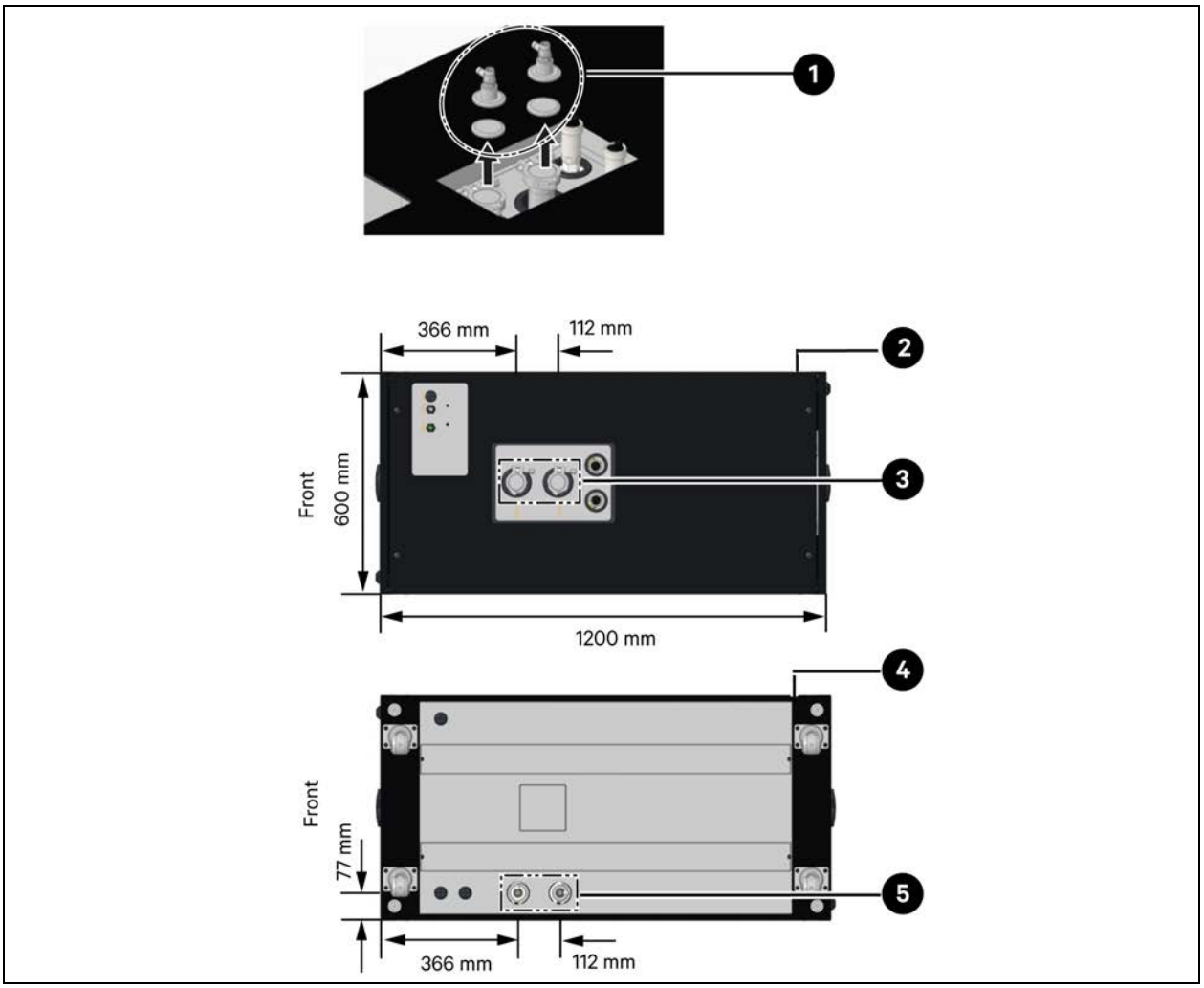
The Vertiv™ CoolChip CDU070 pipe connections are 1.5 in. (DN40) sanitary flanges (to BS4825 Pt.3) located on the top and bottom of the unit, see Figure 5.5 on the facing pageand Figure 5.6 on page 26 for locations). The flanges are fitted with stainless steel blanking caps to ensure pipework remains contaminant free during transit and for retention of the nitrogen holding charge during transit, which will need to be removed during installation.

The bottom connection banking caps are fitted with drain valves, which can be left in place if top exit pipe connections are to be made or removed and fitted to the top connections (to be used as air vents) if bottom exit pipe connections are to be made.

The flange seals supplied with the blanking caps can be reused when connecting site pipework, however it is recommended that seals are first inspected for any signs of damage.

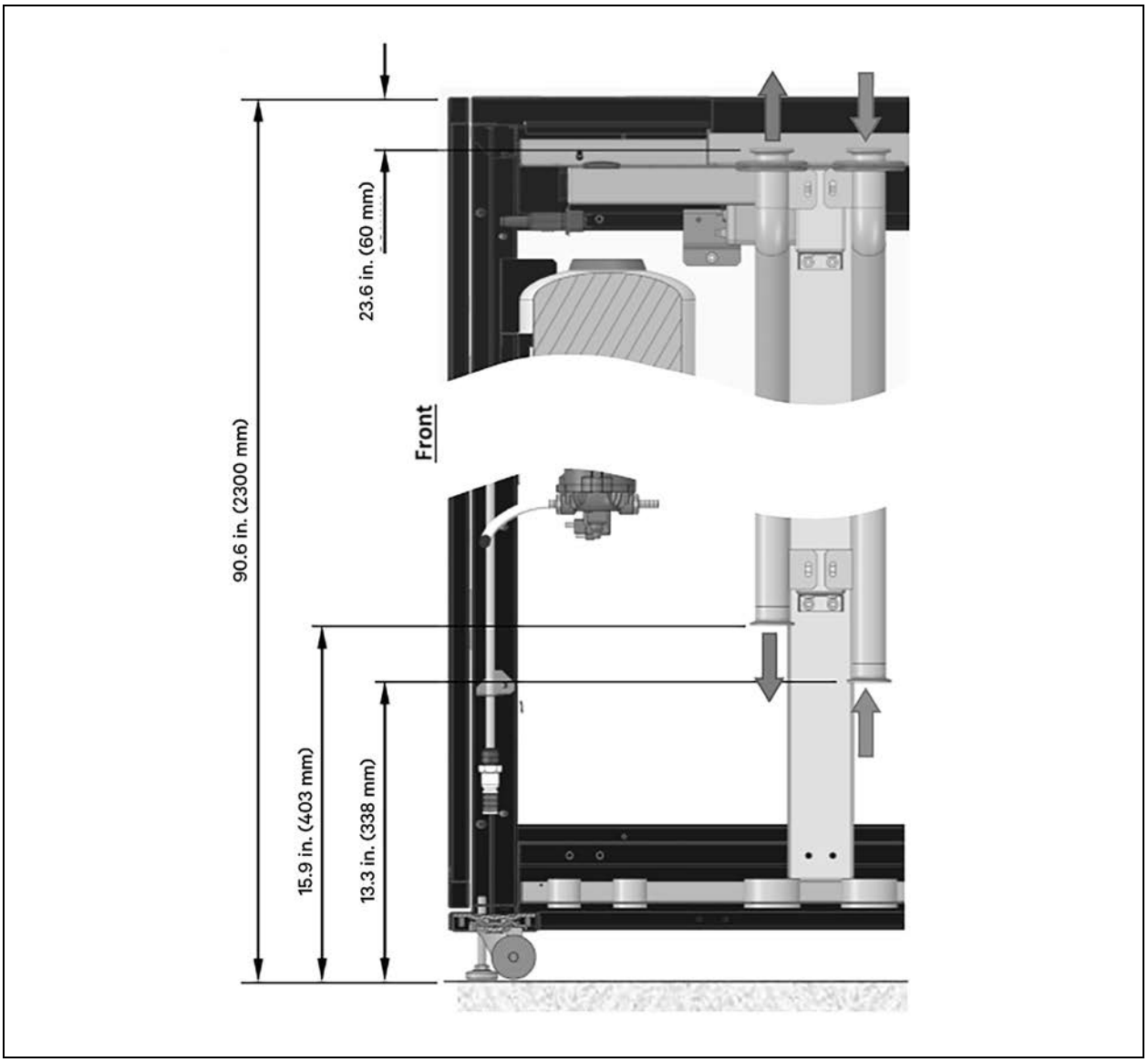
External supply and return pipework are the responsibility of the end customer and care should be taken that all pipework is adequately supported.

Figure 5.5 Fluid Circuit Connections



Item	Description	Item	Description
1	Remove blanking caps for top exit connections, or fit vents if bottom exit (only remove after nitrogen charge has been vented)	4	Underside view
2	Plan view	5	38.1 mm (1.5 in.) sanitary flange bottom exit pipe connection
3	38.1 mm (1.5 in.) sanitary flange top exit pipe connection		

Figure 5.6 Fluid Circuit Connections (Side Elevation)



5.4 Thermal Expansion

The CoolChip CDU070 is fitted with an 8-liter expansion vessel that serves the following functions:

- When filling the system to a static fill pressure, the expansion vessel provides a cushion. During the fill operation after the system air has been expelled and pressure rises above the air charge pressure over the expansion vessel, the cushion allows the pressure to gradually increase in a controlled manner to the required fill pressure.
- During normal operation, the expansion vessel is designed to hold a small amount of system fluid. This allows some fluid to be fed back into the system with minimal pressure loss if the pressure drops for any reason, such as when trapped air in the system percolates out over time through the automatic air vents.
- Spare capacity in the expansion vessel accommodates an amount of thermal expension in the system due to fluid temperature rise. This does have limitations; however, depending on the maximum expected fluid temperature and the volume of fluid in the secondary closed loop circuit.

5.5 Electrical

5.5.1 Power Wiring

WARNING! This unit is powered by HIGH VOLTAGE. Serious injury or death can occur. All electrical work must only be carried out by a suitably qualified electrician. Installation should include a locally mounted isolator/switch disconnect to enable safe maintenance of the unit (to be supplied by others).

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, optional 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 manufacturer's 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.

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.

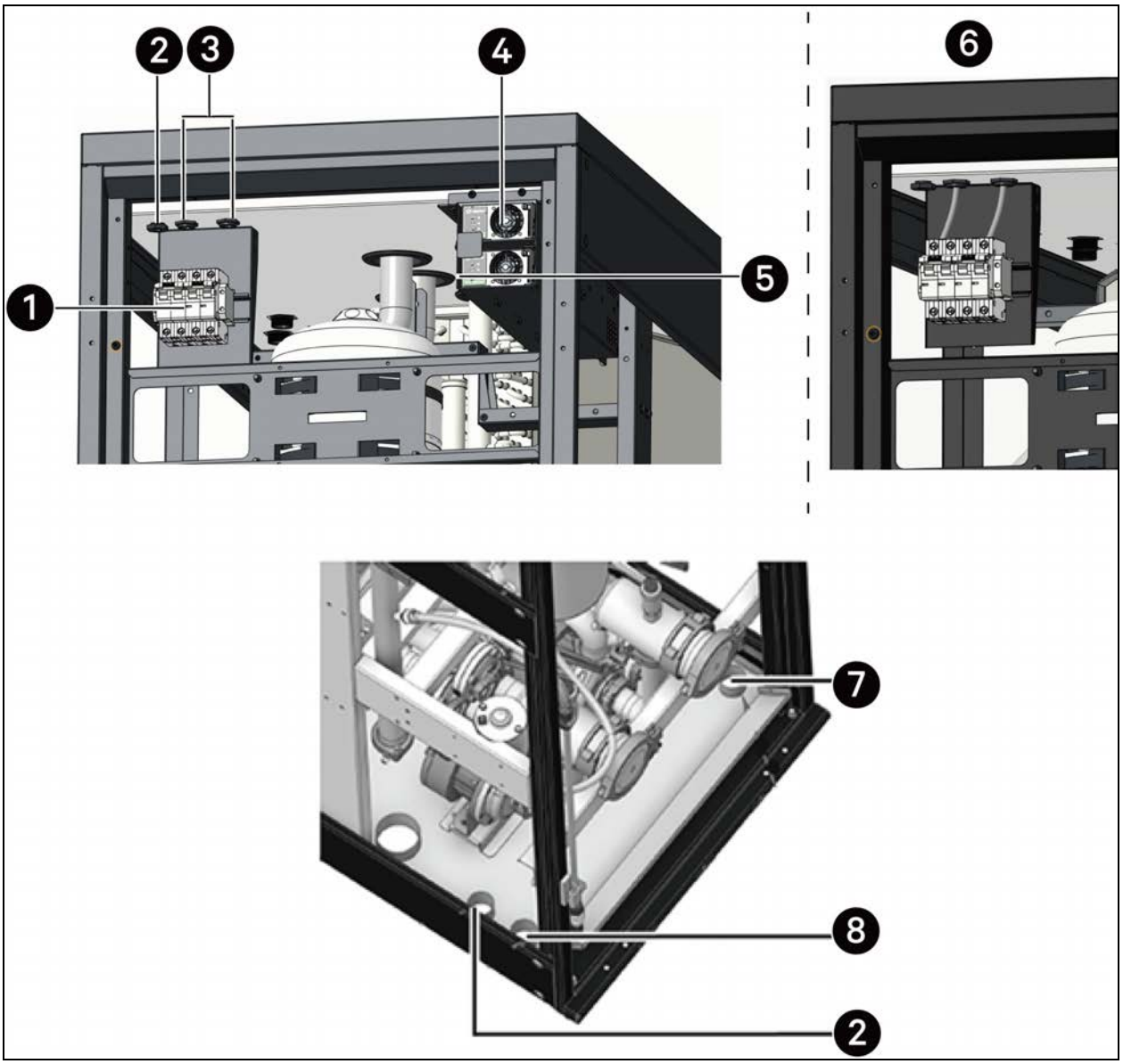
See transformer label for primary tap connections. Installer will need to change transformer primary taps if applied unit voltage is other than prewired tap voltage.

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 start up 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.

The incoming A and B power cables can be routed into the unit via the roof panel or through the base of the cabinet. The roof panel is provided with crosscut blind grommets for top cable entry and transition tubes are provided through the drip tray in the base of the unit for bottom cable entry. Bottom entry cables may be secured up the internal channels of the rack frame.

Figure 5.7 Power Cable Top/Bottom Entry and Connections (Power Supply A Connection Only Shown)



Item	Description	Item	Description
1	Circuit breaker to connect to power cable A and cable B	5	Non-removable cover
2	Comms cable entry point	6	Top entry cable routing
3	Power cable A and B entry	7	Power cable B entry point
4	Power supply module	8	Power cable A entry point

5.5.2 EMC Wiring

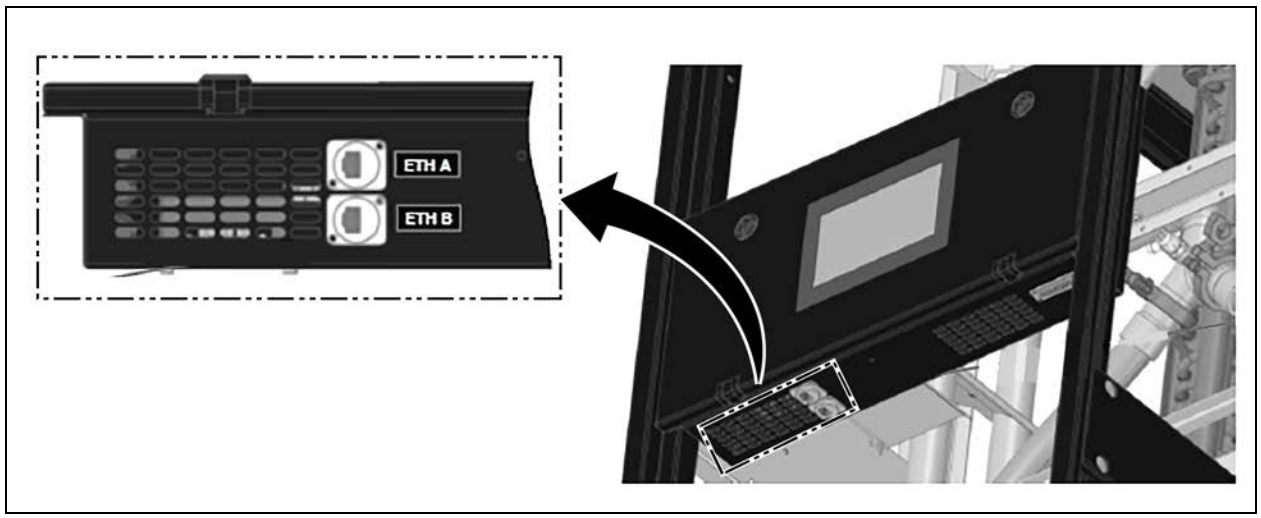
RF Earth Connection—For EMC compliance, two M6 earth studs are provided at the rear of the cabinet (one at the top and one at the bottom) for connection of a braided EMC earth strap at either point.

5.6 Communications

5.6.1 Ethernet Connections

Two Ethernet redundant communication ports (RJ45) are provided on the back of the unit control panel, labeled ETHA and ETHB. Cat5e shielded cable should be used when wiring to these ports.

Figure 5.8 Ethernet Communications



5.7 Pre-Commissioning Checks

5.7.1 Site Check

1. Inspect the site according to local safety regulations to determine the required personal protective equipment (PPE) to be worn.
2. Check that PG-25 fluid has been delivered to site.
3. Ensure that the site contact is aware of the location of the Vertiv™ CoolChip CDU070 power supplies A and B.

5.7.2 Mechanical Installation Check

1. Confirm that the Vertiv™ CoolChip CDU070 has been successfully unloaded from its crate and thoroughly inspected for damage, paying particular attention to external cabinet panels and water circuit pipe work.
2. Verify that the CoolChip CDU070 has been positioned and secured in the correct location.
3. If the unit has bottom power and communications cable entry, confirm that floor tiles have been cut away as required, ideally fitted with brush strip grommets to allow cables to run neatly from the under floor void.
4. Check that cable baskets, cable trays, drip trays, etc. have been installed to provide adequate support for the hoses routed above the unit.

5. Confirm sufficient space has been allowed at the front, rear and top side of the unit to fully open the access doors.
6. Ensure the unit has been raised and leveled with the jacking feet into its final permanent position and tie down brackets have been secured to the floor front and back (if required).

5.7.3 Electrical Installation Check

WARNING! Arc flash and electric shock hazard. Open all local and remote electric power supply disconnect switches, verify with a voltmeter that power is off and wear appropriate, OSHA approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. 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. 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. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Follow all local codes.

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturer's specifications. 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 electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturer's specifications. 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! This unit is powered by HIGH VOLTAGE. Serious injury or death can occur. All electrical work must only be carried out by a suitably qualified electrician.

1. Check that the voltage available at the connection points to the Vertiv™ CoolChip CDU070 unit meet the power requirements for both supply A and B.
2. Ensure power cables are adequately supported and clipped into position.
3. Confirm that all electrical connections are tight.
4. Confirm any required external peripheral alarms/sensors are correctly fitted.

5.7.4 Secondary Fluid Specification

The fluid used in the secondary circuit should be water or PG 25 coolant with inhibitors heat transfer fluid for the cooling application. If you have questions regarding which coolant to use, contact Vertiv Support.

Failure to use proper water treatment can result in decreased system performance and reliability due to corrosion, scaling, fouling and microbiological growth.

Suitable secondary circuit heat transfer fluid can be provided by the CDU supplier on request.

6 Commissioning

6.1 Unit Configuration

Prior to running the Vertiv™ CoolChip CDU070, check the controller configuration to ensure the unit is set up according to the site requirements. Most settings are pre-configured however, some may need to be adjusted as below. Turn power ON to the unit in order to make adjustments.

- **Set Date and Time**—Go to Setup screen > Date. Adjust the date as required, followed by the date format using Date Format (P021), if required. Go to Setup screen > Time to set the time to the current local time. Daylight Saving (P022) and Network Time Protocol (P023 and P024) which can also be set if required. Setting the Date and Time is important as it helps in future the analyzing log files.
- **Communications**—See Setup menu for group control CANbus communication. Refer to the Communications section in SL-80015 Vertiv CoolChip CDU070 Application and Planning Guide.

NOTICE

The CR2032 battery is not provided with the unit and must be purchased locally by the user. (The main controller PCB is compatible with a CR2032 coin cell battery, which serves the sole purpose of maintaining the real-time clock during a power outage. Its absence typically does not affect the overall operation of the unit. The touchscreen display PCB also has a battery slot, but no battery installation is required for this PCB.)

6.1.1 Fluid Circuit

6.1.2 Pipework Connections

1. Check the external manifold pipework has been correctly flushed (especially if any hot works have been carried out).
2. Verify that newly fitted external pipework and connections, including any hoses have been tested for leaks using an appropriate pressure testing method and ensure certification can be provided.
3. Check that all external pipes have been correctly and neatly routed from the CoolChip CDU070 to the system.
4. Confirm that external pipework has been adequately supported and all fixings are tight.

6.1.3 Circuit Filling

NOTICE

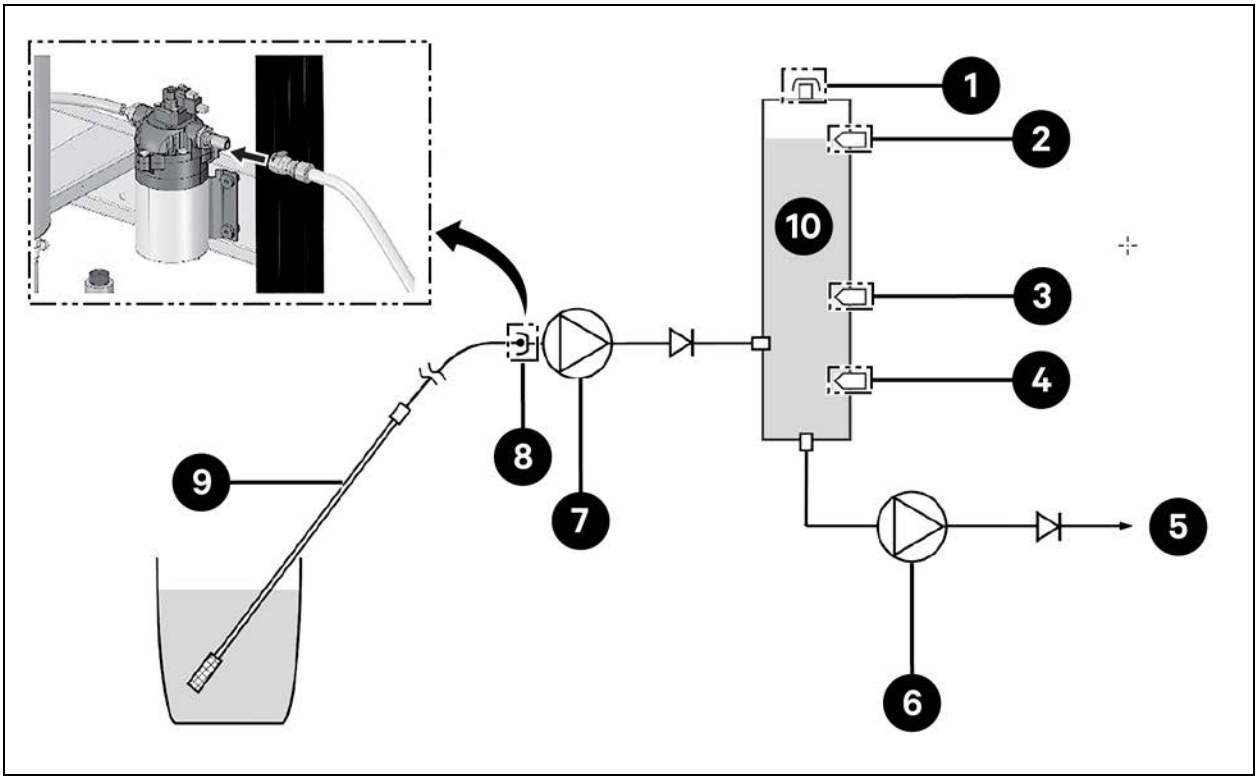
When filling and running the fluid circuit, the operator should be fully conversant with the operation of the CoolChip CDU070. Refer to SL-80016 Vertiv CoolChip CDU070 Operation and Maintenance Guide for more information.

1. Position the container of cooling fluid in front of the CoolChip CDU070.
2. Rotate the automatic air vent valve on the filter and coil header in counter-clockwise direction to ensure it is in the unscrewed state.
3. Ensure all drain valves are closed.
4. Ensure that any external valves between the CoolChip CDU070 and the system are open.
5. Remove the fill wand and insert into the container of cooling, then connect the fill wand hose to the fill pump P4 quick release coupling. See Figure 6.1 on the next page for storage location.

NOTICE

This operation is specifically limited to charging the unit. Operation to the manifold in the system loop are not included within this scope. For any additional requirements, contact Vertiv.

Figure 6.1 Fill Pump Operation



Item	Description	Item	Description
1	Breather	6	Fill pump P3 (automatic start/stop to maintain system pressure setpoint
2	High level (full)—Fill pump P4 disabled when wet and enabled when dry	7	Fill pump P4 (manual start/stop and automatic stop when reservoir tank full)
3	Low level (water required)—Alarm A14 (reservoir tank fluid required)	8	Self sealing quick connect
4	Very low level (empty)—Alarm A15 reservoir tank empty and fill pump P3 disabled	9	Fill wand connected to fill pump P4 when reservoir tank needs to be replenished
5	Vertiv™ CoolChip CDU070 circuit	10	10 liters (2.6 gal.) reservoir tank
NOTE: Fill pumps P3 and P4 interlocked to prevent both running at the same time.			

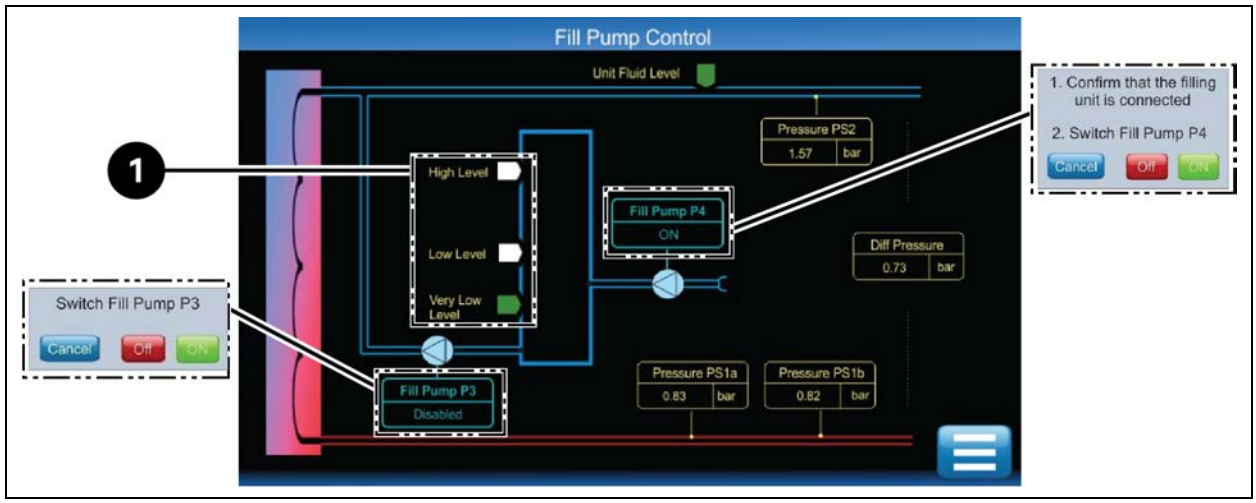
6. Log on to the controller with the service access code. Go to the Service screen and select Fill Pump Control.
7. Select Fill Pump P4 followed by ON. The fill pump will then start pumping the cooling fluid into the unit reservoir tank at the rate of approx. 4 l/m. (1.1 gpm).
8. The reservoir level sensors can be monitored during the filling process while in the Fill Pump Control screen. The sensor condition will change from white to green as fluid reaches each sensor level. Reservoir capacity is 10 liters (2.6 gals.).

9. Ensure the fluid container with the fill wand does not run dry during this process. Fill pump P4 will switch OFF automatically when the reservoir tank is full or can be manually switched OFF at any time using the OFF command shown in Figure 6.2 below.

NOTICE

Fill pumps P3 and P4 are interlocked, so they cannot run at the same time, that is when pump P4 is running P3 displays as Disabled and when pump P3 is running P4 displays as Disabled.

Figure 6.2 Fill Pump Control Screen (for Fill Pumps P4 and P3)



Item	Description
1	Level indicators change from white to green when wet

10. After reservoir tank is full, it can be emptied into the Vertiv™ CoolChip CDU070 system using fill pump P3. Select fill Pump P3 followed by ON.

NOTICE

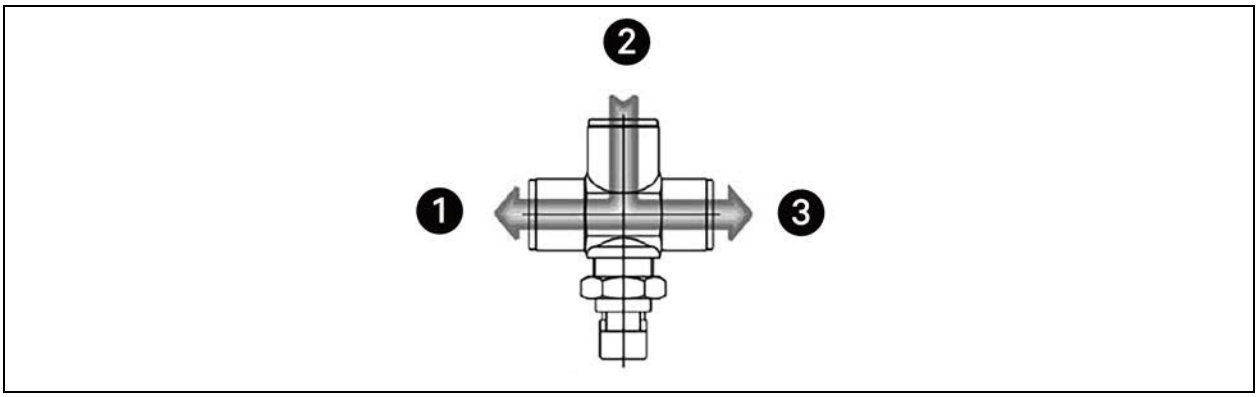
While the system is filling, open the vent on the expansion vessel valve as shown in Expansion Vessel Venting on the next page.

11. Fill pump P3 will switch OFF automatically when the reservoir tank reaches the very low level sensor or can be manually switched OFF at any time using the OFF command.
12. Repeat the process of filling the reservoir tank with pump P4 then pumping reservoir contents into the system with pump P3 until fill pump P3 stops automatically when system static fill pressure is greater than or equal to 1.0 bar (14.5 psi). The system pressure (PS1a and PS1b) can be monitored on the Fill Pump Control screen shown in Figure 6.2 above, or on the Home screen.
13. Once the system is at the required static fill pressure, go back to fill pump P4 and ensure that the reservoir tank is fully topped up.
14. Leave the fill wand connected and in the container as more fluid will be required as air is expelled from the system during the initial operation.

6.1.4 Expansion Vessel Venting

1. While the system is filling, the hose leading to the expansion vessel should be manually vented. Set the handle on the 3-way valve located on the underside of the expansion vessel to the middle position as shown in Figure 6.3 below.

Figure 6.3 Valve Handle

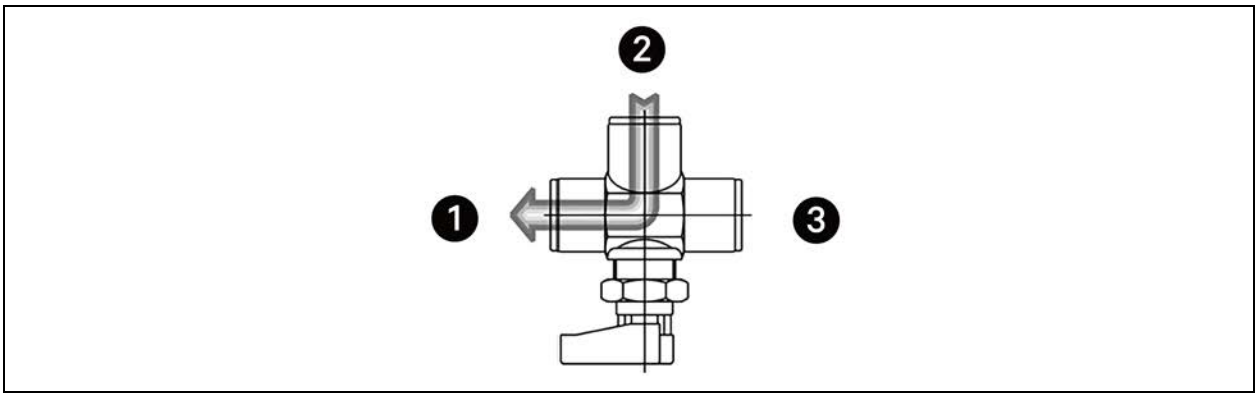


Item	Description	Item	Description
1	System	3	Water drain valve
2	Expansion tank		

Commissioning position—Valve handle set to connect expansion vessel to both system and drain valve, allowing trapped air in system to be vented out through drain valve during the filling process.

2. Crack open the drain valve (using the key provided) to allow trapped air to vent. Close the drain valve as soon as fluid starts to emerge (the hose provided may be used to avoid fluid spillage in the unit).
3. Once the drain valve is closed, set the valve handle as shown in the figure below for normal system operation.

Figure 6.4 Valve Handle Set in Normal Operating Position



Item	Description	Item	Description
1	System	3	Water drain valve
2	Expansion tank		

Normal operating position—Valve handle set to connect expansion vessel to system pressure.

6.2 Fluid Circulation

6.2.1 Low Speed Circulation

After the initial fill process, the fluid should be circulated at a low flow rate initially to enable trapped air in the system to vent via the automatic air vents.

Set the unit up for Flow Control by going to the Configuration screen / Pump Control / Control Type (P201), select flow (see SL-80016 Vertiv CoolChip CDU070 Operation and Maintenance Guide for more information). Start the unit by pressing the green start icon on the Home screen of the display. Pump P1 will start and ramp up to deliver a speed not exceeding 50%. During this operation, the fans at the rear of the unit will also be running at a minimum 15% fan speed.

The unit should run for approximately 30 minutes at this reduced pump speed to gently circulate the fluid.

NOTICE

The minimum pump speed is 30%, and the default flow may not be achieved if it requires the pump to operate below this speed depending on system impedance.

Once the period of reduced flow circulation has been completed, it is recommended that each pump is ramped up to full speed for a few minutes to check maximum flow operation, which can be carried out by using the overrides function.

To adjust the pump speed with the Overrides function:

Go to the Logon screen and enter the service access code, then go to the Service menu and select Overrides. Select Pump P1 (S101) and set to 100% speed operation, followed by the OK button.

NOTICE

The display will show the following icon  on the Home screen while the override function is active. If there is no touchscreen interaction for 15 minutes (default) or more, the controller will revert to full automatic mode.

Check the unit and the system for leaks. Check the pump for any abnormal noise.

NOTICE

When the pump is running at increased speed, the fill pressure at PS1 may drop and the fill pump P3 may automatically re-activate again.

Set pump P1 speed back to 0% and repeat for operation pump P2 by selecting pump P2 (S102) and set to 100% speed operation, followed by the OK button.

Check pump for any abnormal noise.

NOTICE

Pumps P1 and P2 are interlocked, so it is not possible to run both pumps together in overrides.

Once operation of both pumps has been deemed satisfactory, the override setting may be set back to 0% for automatic control.

Stop the unit using the Start/Stop icon on the Home screen.

6.2.2 Normal Circulation

The unit should now be set back to DP control by going to the Configuration screen > Pump control > Control type (P201) and selecting DP.

Start the unit again and check that the operational pump ramps up to the pre-set DP setpoint 0.9 bar (12.3 psi) default.

Check that the flow delivered at this DP is the required 70 l/m (18.5 gpm) ± 3 l/m (0.79 gpm). If not, then go to the

Configuration screen > Differential Setpoint (P203) and adjust the DP setpoint up or down until the correct flow rate is achieved.

6.3 Fan Operation

During the fluid flow checks carried out in see section Fluid Circulation on the previous page and while there is no thermal load on the unit, the fans will be running at a minimum 15% of full fan speed.

It is recommended that the fans are checked for full speed operation by using the Overrides function as before.

To adjust the fan speed with the Overrides function:

1. Go to the Service menu and select Overrides. Select the fan speed (S105) and enter a speed of 50%, followed by the OK button.
2. Allow fans to ramp up to speed and check that all fans are running with no abnormal noise.
3. Adjust speed to 100% and check again that all fans are running with no abnormal noise.
4. Set override fan speed back to 0% for automatic control.

6.4 Subsequent Filling

Once the unit is commissioned, check that the reservoir tank is full before disconnecting the fill wand and placing it back in its storage location. If the reservoir tank is not full, repeat the filling process see in section Circuit Filling on page 33.

During normal operation, if the system requires topping up with fluid, then this will happen automatically with fill pump P3 taking fluid from the 10 liters (2.6 gal.) reservoir tank. When level drops in the reservoir there is a two stage A14 - reservoir tank fluid required and A15 - reservoir tank empty alarm process.

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

Thermal Management Products

1-800-543-2378

Channel Products

1-800-222-5877

AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N. Cleveland Ave.

Westerville, OH 43082, USA

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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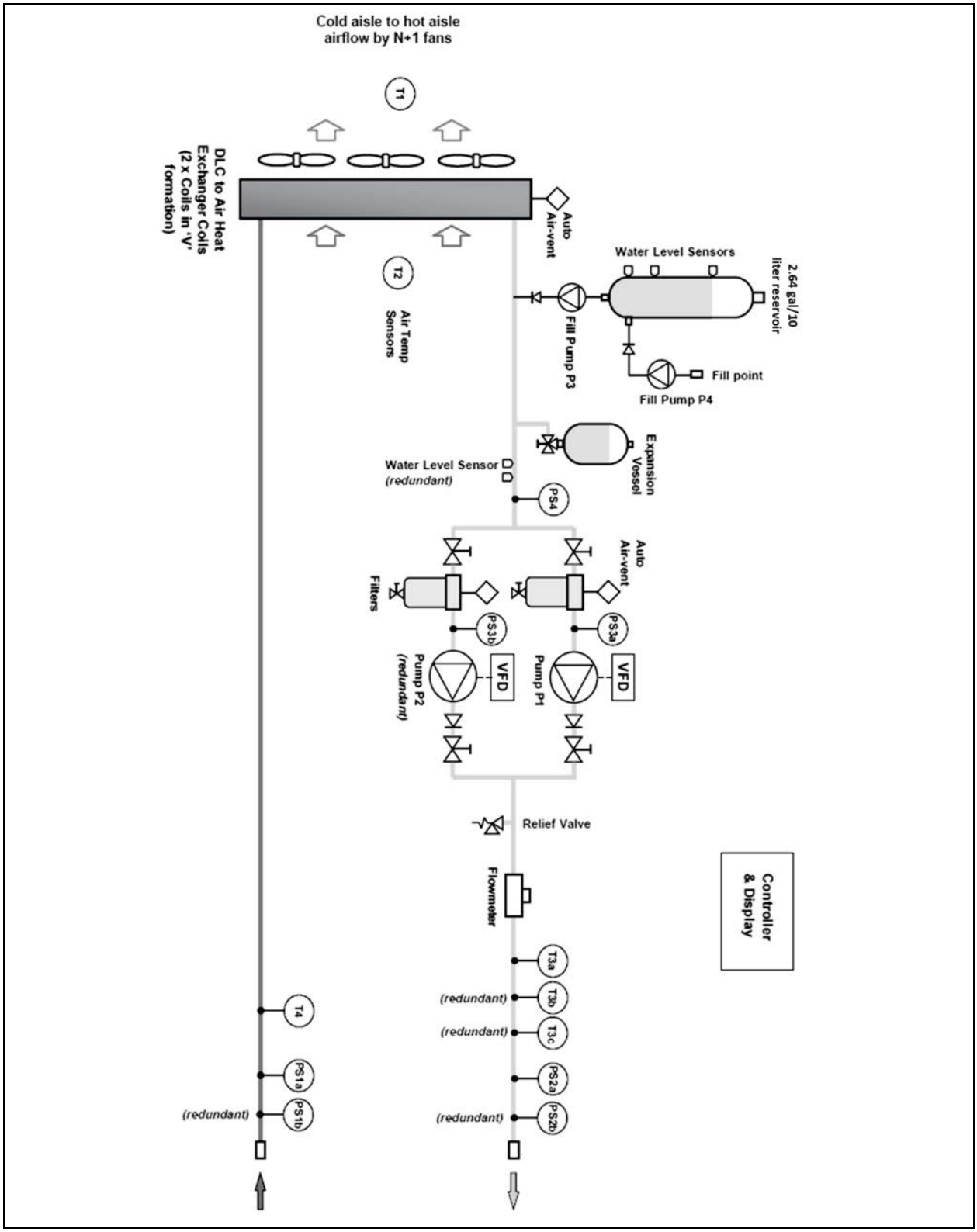
Appendix B: Piping Schematic



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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 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, 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 approved recycling facilities only.

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