VERTIV.

CoolChip CDU 600

Installation and Commissioning Guide

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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 relation to the application, installation, and operation of this product. The information contained in this document must be used in conjunction with the Operation and Maintenance Guide and the Application and Planning Guide for the CoolChip CDU 600.

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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 Information

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during operation and maintenance of the Vertiv™ CoolChip CDU 600.

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. Refer to unit electrical schematic.

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 .

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' 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 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.

Insert CSA-certified or UL-listed bushings into holes and/or knockouts used to route wiring through metal panels to protect the wire insulation from contact with sheet metal edges.

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 and verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.

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 . 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 **CDU 600 Specifications 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 is 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 5 ft. (1.5 m) in length and weigh more than 35 lb. (15.9 kg). 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.

Prior to connecting any equipment to a main or alternate power source (for example back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. 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 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 start up 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 corrosion. Refer to Technical Data on page 15 for details concerning storage conditions. 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 start up 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. In multiple unit teams, allow standby units to enter the rotation automatically or schedule regular manual rotations.

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.

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 water supply. Can reduce humidifier efficiency or obstruct humidifier plumbing.

Do not use a hot water source. It will cause deposits that will eventually block the fill valve opening.

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

Mechanical and electrical equipment such as coolant distribution units (CDUs) present potential mechanical and electrical hazards. Adhere to all safety, installation, operation, and maintenance instructions. Any work on or use of the equipment should be carried out and/or supervised by personnel trained and qualified to work on this type of equipment by Vertiv. This product is designed to minimize all potential hazards by restricting access through unit casings, doors and covers while equipment is operational. Before performing any maintenance work, ensure the following:

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

If in doubt regarding safety, installation, operation or maintenance instructions, consult the manufacturer for clarification and advice.

1.2 Installation/Handling

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

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 the tables in **CDU 600 Specifications on page 15** **.**

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 **CDU 600 Specifications on page 15** **.**

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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.

1.3 Application

This product is for indoor use only and must be used only for the application it was designed for in consultation with Vertiv. This product must not be used in a hazardous environment.

The flow sensor is for indication only, it is not used for any control or alarm functions nor should it be depended on for consequential actions. Differential pressure is the principle means of PQ control for both a single unit and in group operation. Instrumentation and reporting in this aspect is accurate and reliable.

1.4 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.

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. Refer to unit electrical schematic.

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 .

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' 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.

NOTICE

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

Prior to connecting any equipment to a main or alternate power source (for example back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. 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.

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).

1.5 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.

1.6 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.

1.7 Documentation

The Application and Planning Guide, Operation and Maintenance Guide, Installation and Commissioning Guide, maintenance, and 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 Low Voltage directive 2014/35/EU, the EMC directive 2014/30/EU and the Pressure Equipment directive 2014/68/EU. As manufactured, Vertiv products are designed to comply with an IP21 rating. This product is in conformance with UL1995.

2.2 ROHS 3 Compliance

Vertiv certifies that this product, manufactured and supplied by Vertiv, is fully RoHS compliant in accordance with EU RoHS Directive EU 2015/863.

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3 Product Description

3.1 General

This document describes the performance, possible configurations, application, and specification of the Vertiv™ CoolChip CDU 600.

The CoolChip CDU 600 contains a secondary closed loop circuit that provides a supply of cooling fluid to equipment based on differential pressure, either through indirect cooling (rack mounted rear door heat exchangers) or direct cooling (cold plates at chip level).

The secondary circuit is a low pressure sealed system that removes heat from the downstream equipment and rejects to an external cooled water source (primary circuit) via low pressure drop plate heat exchangers. The secondary circuit ensures that the cooling fluid in the secondary network can be kept to a minimum volume, is closely controlled for flow, pressure, and temperature (with condensation control) and can be accurately maintained for fluid quality(with filtration and additives).

The primary cooling source can be a chilled water system (either dedicated or from building system), fluid cooler, cooling tower or dry air cooler, depending on the desired secondary temperature and heat transfer duty. Refer to the Application and Planning Guide. For more information, contact a Vertiv Sales Representative.

3.2 Product Views

Figure 3.1 Front View CoolChip CDU 600 (Doors, Roof, and Side Panels Removed)

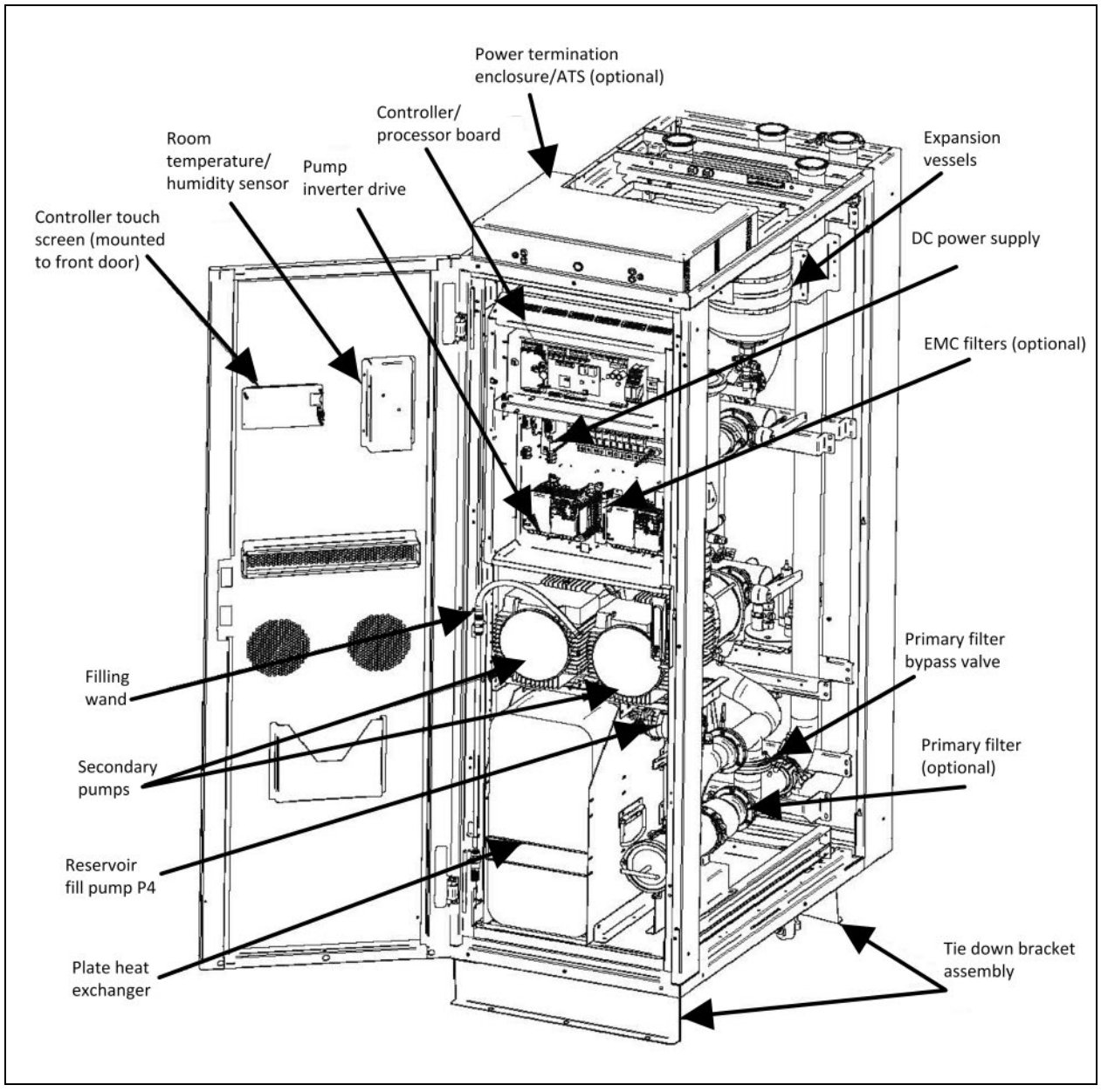
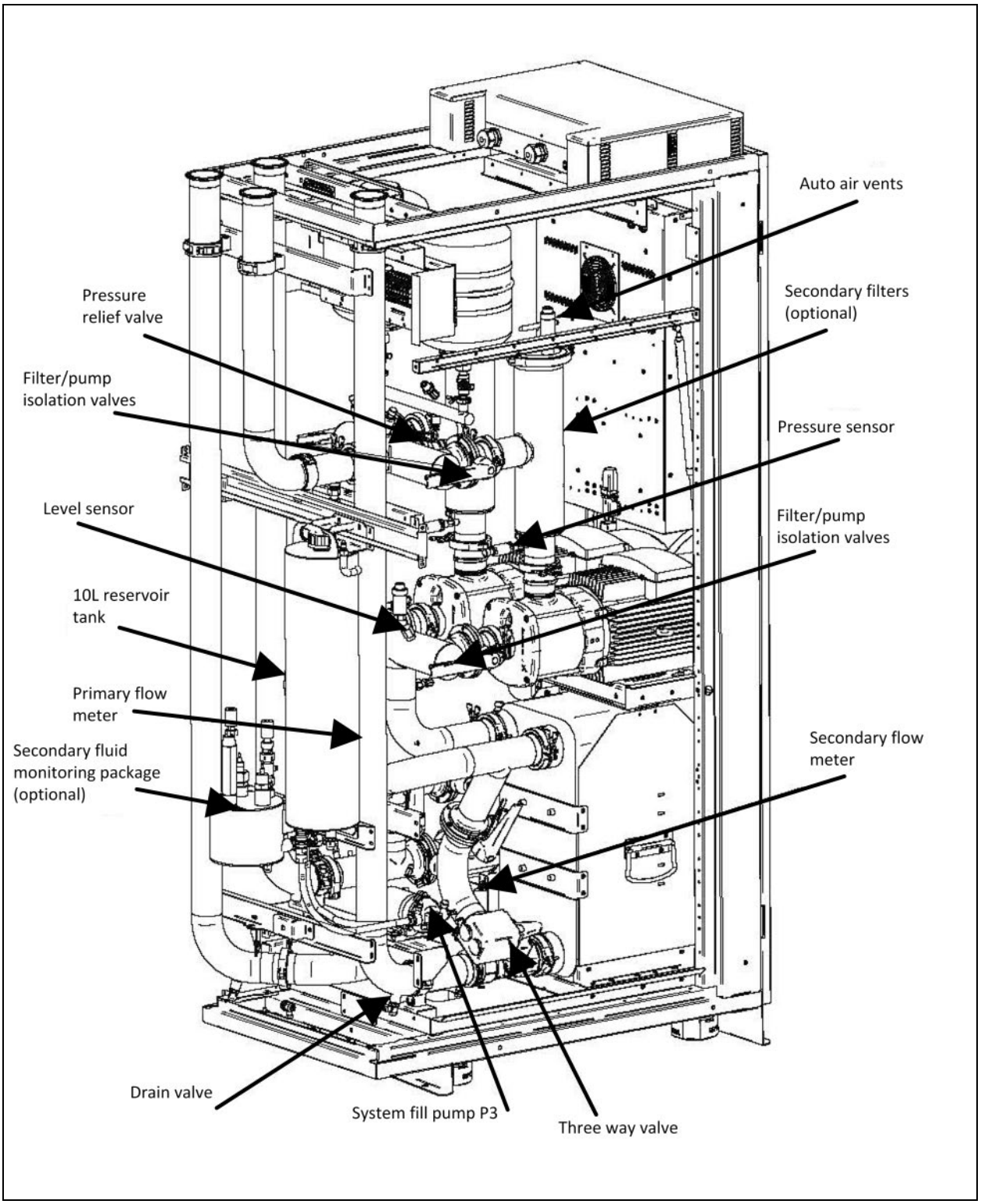


Figure 3.2 Rear View of CoolChip CDU 600 (with Bottom Exits and Secondary Tails)



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4 Technical Data

4.1 General

Table 4.1 CDU 600 Specifications

Specification	Detail
Dimensions:	600 mm wide
	1200 mm deep
	2000 mm high
Shipping Dimensions:	1000 mm wide
	1300 mm deep
	2240 mm high
Weight Dry:	480kg max.
Shipping Weight:	630 kg max
Weight Operational:	550 kg max. (including 10 liter reservoir tank)
Operating Conditions:	5° to 40 °C (ambient), 10 to 80%RH (non-condensing)
Storage Conditions:	2° to 65 °C, 5 to 95%RH (non-condensing)
Storage Environment:	Keep unit vertically upright, covered completely (preferably in original packaging), in an indoor environment, conditioned warehouse that is protected against freezing temperatures. Keep clean (no dust), well-ventilated, non-condensing.
Storage Time:	Less than 6 months.
Maximum Flow, Single Pump Operation:	450 l/m at 2.25 bar (119 gpm at 33 psi) external pressure drop
Maximum Flow, Dual Pump Operation:	900 l/m at 1.3 bar (238 gpm at 19 psi) external pressure drop
Secondary Coolant Type:	Water, water/glycol
Primary Coolant Type:	Water, water/glycol

4.2 Pipe Connections

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

Table 4.2 CoolChip CDU 600 Pipe Connections

Primary (Facility) Circuit:	2-1/2" Sanitary flanges, top or bottom exit
Secondary Circuit:	2-1/2" Sanitary flanges, top or bottom exit OR 6-way manifold system with factory fitted 1" hose barb connection

4.3 Pressure Limitations

Table 4.3 CoolChip CDU 600 Primary and Secondary Pressure Limitations

Primary (Facility) Circuit:	10 bar maximum working pressure
Secondary Circuit:	3, 4, 5, or 6 bar maximum working pressure (depending on PRV rating)

4.4 Circuit Fluid Volumes

Table 4.4 CoolChip CDU 600 Primary and Secondary Circuit Fluid Volumes

Primary (Facility) Circuit and Options:	32.9 liters, basic
	3.9 liters for filter
Secondary Circuit (Maximum)	Twin pump: 48.0 liters

4.5 Electrical Data

Definitions:

FLA: Full load ampere

MCA: Minimum circuit ampacity

MOP: Maximum overcurrent protection

Table 4.5 Supported Electrical Supplies, Twin Pump CDU 600

Electrical Supply	FLA, MCA, MOP	With ATS	Without ATS
400v (±10%) 50/60Hz (±3Hz)	FLA	17A	17A
	MCA	25A	23A
	MOP	30A	30A
480V (±5%) 60Hz (±3Hz)	FLA	14.7A	14.7A
	MCA	22A	21A
	MOP	30A	25A

Table 4.6 Electrical Load and Consumption Single and Twin Pump Operation

	Single Pump	Twin Pump
Maximum Power Consumption:	4.5kW	9kW
Short Circuit Current Rating (SCCR):	65kA	

NOTE: It is expected that the CoolChip CDU is connected to a UPS for backup power in case of a power outage. Please speak with your Vertiv representative to ensure the UPS is sized properly.

4.6 Noise

Table 4.7 CoolChip CDU 600 Noise Data

Sound Power Level at 3m:	<55dBA

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5 Installation

5.1 Unloading and Positioning

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 the tables in **CDU 600 Specifications on page 15** **.**

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 **CDU 600 Specifications 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 is located on a flat surface before loosening the hardware securing the unit to its shipping pallet.

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 5 ft. (1.5 m) in length and weigh more than 35 lb. (15.9 kg). 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.

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. See Table 4.1 on page 15

The CoolChip CDU 600 crate should be placed on a level solid surface upon arrival at site so that the unit can be safely unloaded from the crate.

Check the crate for any signs of transit damage and ensure the tilt labels have not been activated. Prior to unpacking, serious damage must be reported to Vertiv immediately.

Maneuver the unit into position on the load bearing wheels (supplied). When in its final location, secure, raise, and level using the built-in jacking feet.

Keys for the front and rear doors are supplied in a bag tied to the inside of the front door.

When the crate is at floor level, remove the protective bubble wrap. Inspect the unit for transit damage. Report any damage to Vertiv immediately and prior to installation.

Space must be allowed at the front and rear of the unit in excess of 36 in. (915mm) to allow access doors to be fully opened. Ensure 36 in. (913.4 mm) clearance above unit for service to the power termination enclosure.

The crate has been designed with a hinge down front panel to allow the CoolChip CDU 600 to be easily wheeled off the pallet to floor level. See Figure 5.1 on the facing page .

CAUTION: The CoolChip CDU 600 is a heavy piece of equipment and a minimum of two persons is required to carry out the unloading task safely. If the CDU 600 is positioning on a raised floor, adequate under floor supports should be installed to bear the weight of the unit. A minimum free area of 6' X 20' (2m X 6m) is required to unload the product from the crate.

Figure 5.1 Unloading XDU600 from Crate

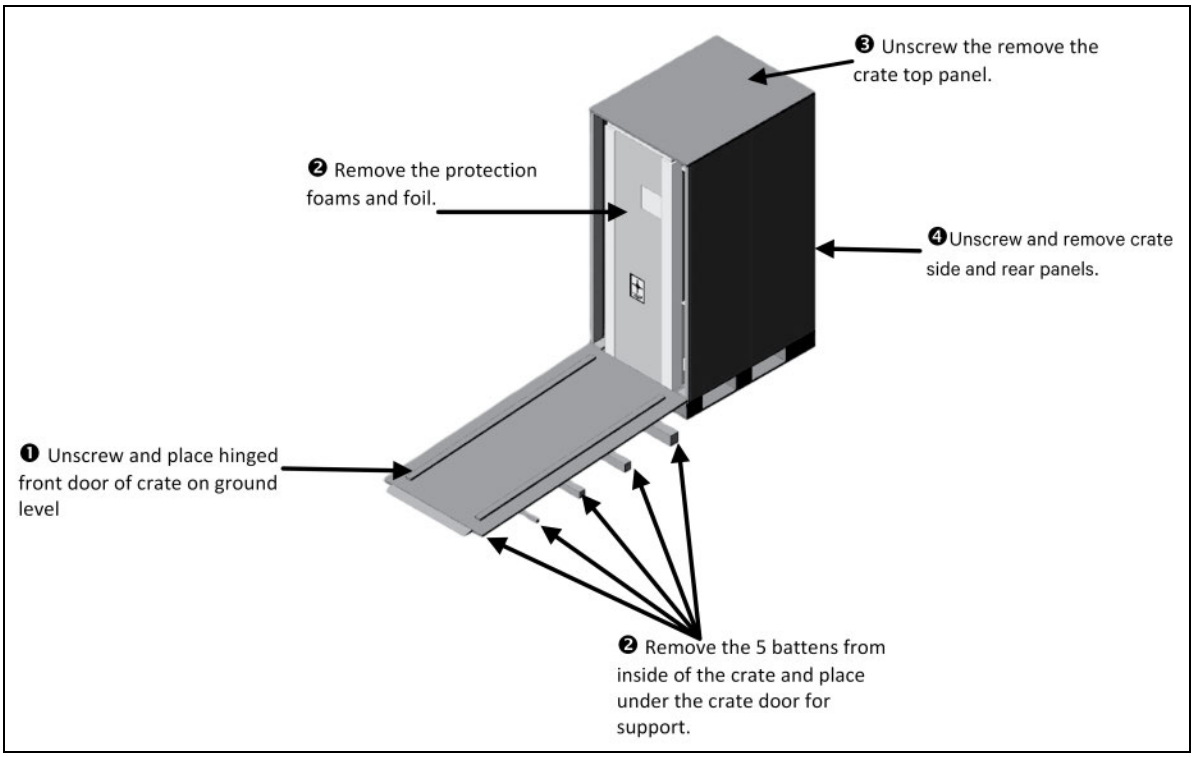
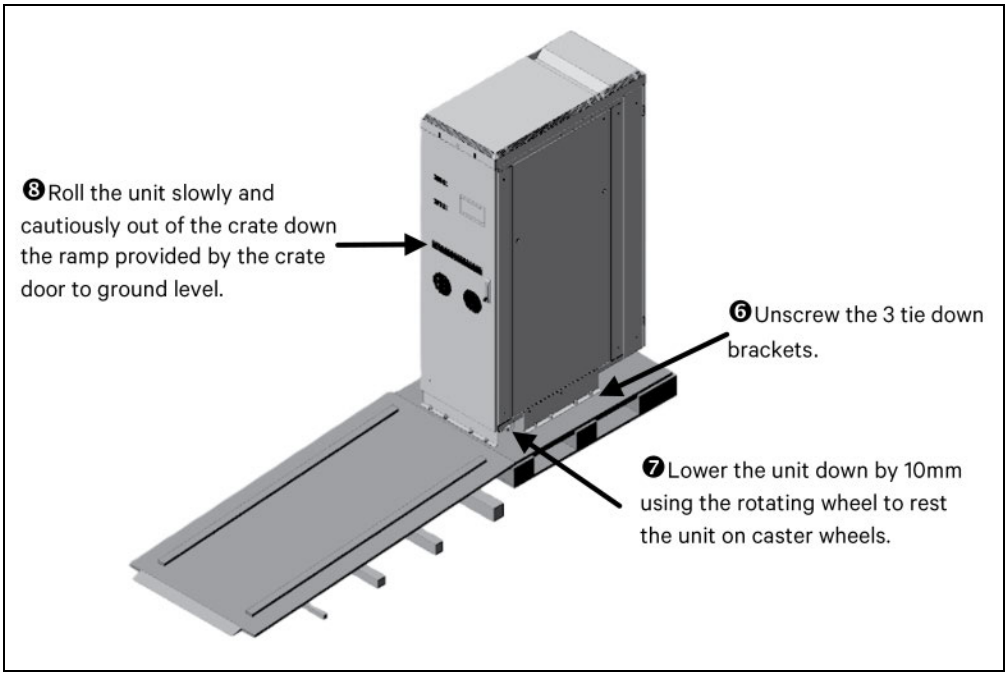


Figure 5.2 Unloading XDU600 from Crate



5.2 Preparing CoolChip 600 for Operation: Holding Charge

The CoolChip CDU 600 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 should be released through the Schrader valve before any other work is carried out on the unit.

5.3 Piping

The CDU is intended to be positioned on a smooth, level floor. Overhead field piping should be fitted by the installer with high point air vents to remove air during filing and commissioning. These maybe manual or automatic style vents. Automatic vents should not be placed in lines overhead of cabinets containing sensitive electronics or other electrical equipment.

Bottom exit pipework should have at least 20 in. (500 mm) of clear under floor space for connection to a manifold system. If the CoolChip CDU 600 has bottom exit pipework, provisions should be made to cut away the floor tiles as required to allow pipework to run to/from the CoolChip CDU 600 under the floor.

External isolation valves should be fitted by the installer to both supply and return pipes, as close as possible to the CoolChip CDU 600 for maintenance purposes and care should be taken that all inter connecting pipework to/from the CoolChip CDU 600 is adequately supported, as the CoolChip CDU 600 is not designed for any external pipe loads. Suitable flexible connections should be fitted as determined by engineer of record.

5.4 Primary Connections

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 leaking chilled 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. Fluid 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.

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

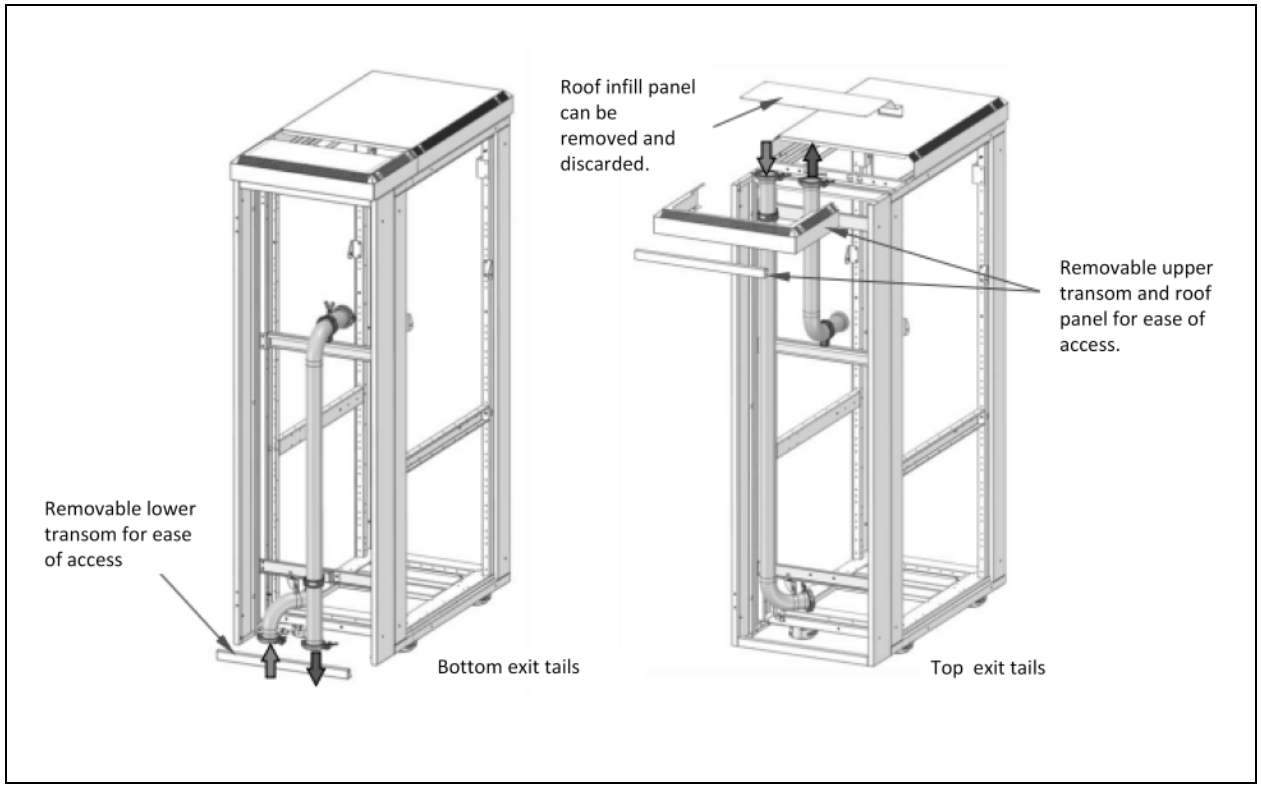
The primary circuit fluid is to be supplied by the end user and is outside the scope of this product.

Primary connections for the CDU 600 are 2-1/2" (DN65) sanitary flanges (to BS4825 Pt.3 or equivalent with 77.5 mm diameter flange).

The flanges are fitted with stainless steel blanking caps to ensure pipework remains contaminant free during transit. Blanking caps will need to be removed for installation. Ensure that all sanitary flange clamps are torqued to 5 Nm during the installation process.

The CoolChip CDU 600 primary connections are located at the rear of the unit and can be configured for bottom or top exit from the cabinet as shown in Figure 5.3 below which is specified at time of order.

Figure 5.3 Primary Circuit Connections



External isolation valves should be fitted by the installer to both supply and return pipes as close as possible to the CoolChip CDU 600 for maintenance purposes. Care should be taken that all interconnecting pipework to/from the CoolChip CDU 600 is adequately supported, as the CoolChip CDU 600 is not designed for any external pipe loads.

NOTE: All primary circuit pipework and components should be insulated to protect against condensation.

5.5 Secondary Connections

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 leaking chilled 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. Fluid 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.

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.

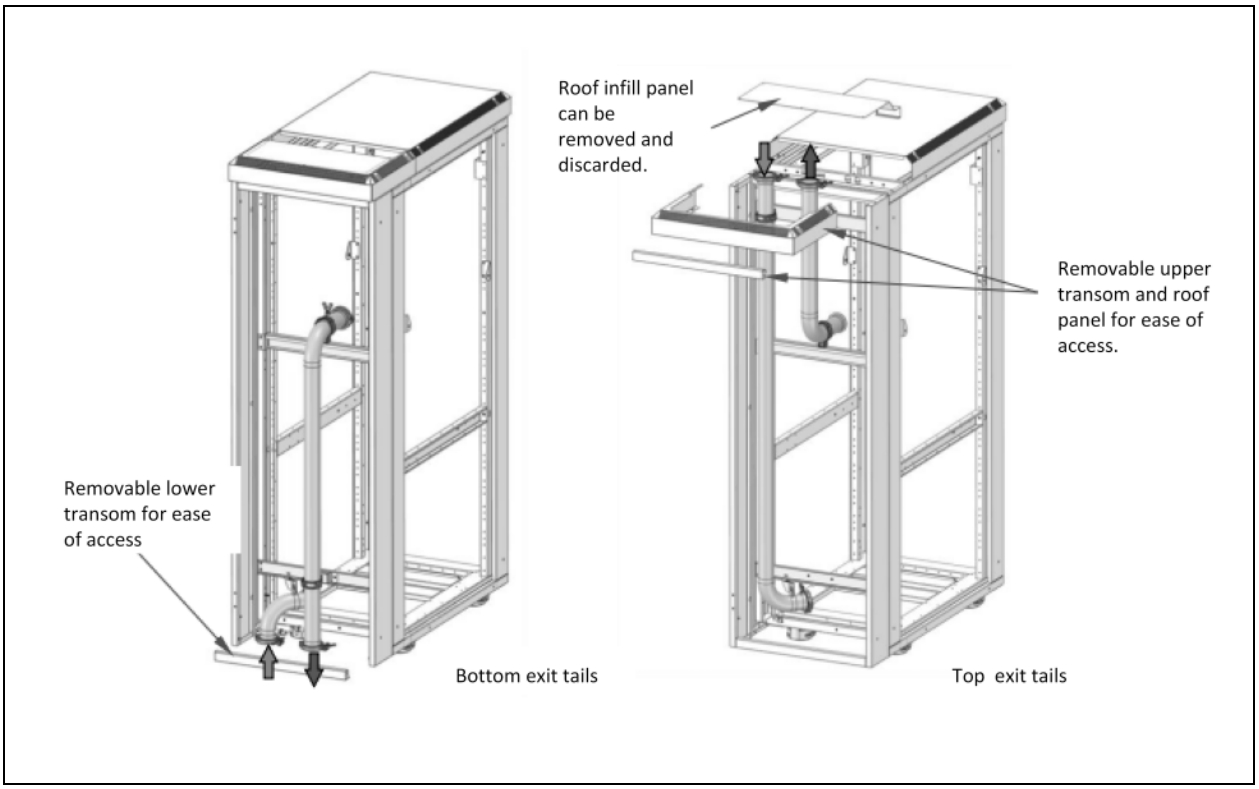
The CoolChip CDU 600 secondary connections are 2-1/2" (DN65) sanitary flanges (to BS4825 Pt.3 or equivalent with 77.5 mm diameter flange).

The flanges are fitted with stainless steel blanking caps to ensure pipework remains contaminant free during transit. Blanking caps will need to be removed for installation. Ensure that all sanitary flange clamps are torqued to 5 Nm during the installation process.

The CDU 600 secondary connections are located at the rear of the unit and can be configured for bottom or top exit from the cabinet as illustrated, which should be specified at time of order. Alternatively, a 6-way manifold can be fitted.

External isolation valves should be fitted by the installer to both supply and return pipes as close as possible to the CDU 600 for maintenance purposes. Care should be taken that all inter-connecting pipework to/from the CDU 600 is adequately supported, as the CDU 600 is not designed for any external pipe loads.

Figure 5.4 CDU 600 Secondary Circuit Connections



5.6 Thermal Expansion

The CoolChip CDU 600 is fitted with 2 x 8 litre expansion vessels and have these functions:

- To provide a cushion when filling the system to a static fill pressure. During the fill operation after the system air has been expelled and pressure rises above the air charge pressure over the expansion vessels, the cushion allows the pressure to rise gradually in a controlled manner to the required fill pressure.
- During normal operation, the expansion vessels are design to hold a small amount of system fluid. This allows some fluid to be fed back into the system with minimal pressure loss should pressure go down for any reason, such as trapped air in the system percolates out over time through the automatic air vents.
- Spare capacity in the expansion vessels accommodate an amount of thermal expansion 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 fluid network.

The expansion vessel is factory pressurized at .8 bar. Contact a Vertiv representative to determine if additional expansion vessels will be required.

5.7 Electrical

5.7.1 Power Wiring

WARNING! This unit is powered by high voltage. Serious injury or death can occur. All electrical work must be carried out only by a qualified engineer.

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. Refer to unit electrical schematic.

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 .

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' 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 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.

Insert CSA-certified or UL-listed bushings into holes and/or knockouts used to route wiring through metal panels to protect the wire insulation from contact with sheet metal edges.

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 and verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.

NOTICE

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

Prior to connecting any equipment to a main or alternate power source (for example back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. 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 power supply connection. Can cause equipment damage and loss of warranty coverage.

Prior to connecting any equipment to a main or alternate power source (for example back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. 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.

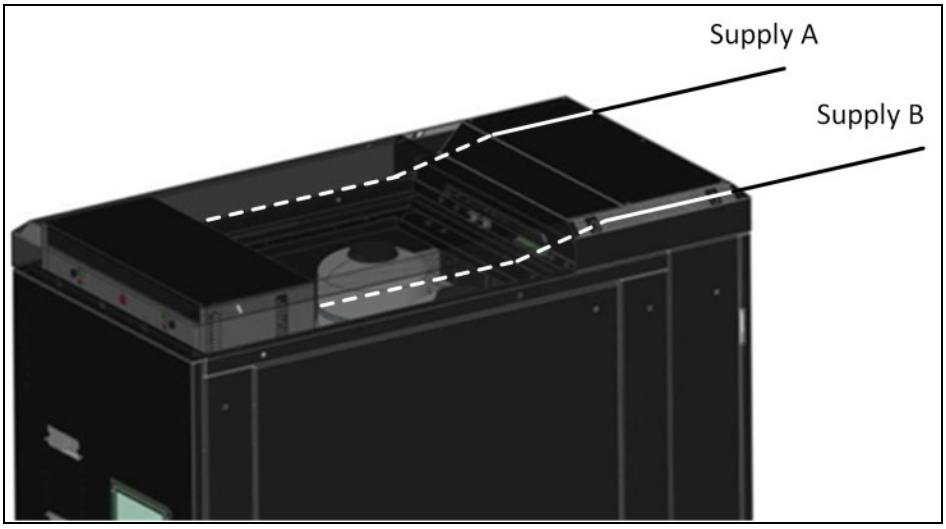
NOTICE

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 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 start up to ensure that the pumps are running in the correct direction.

Incoming power cables can be routed into the unit via the floor void or through the cabinet rear roof panel. See Figure 5.5 below .

If no automatic transfer switch (ATS) has been specified, there will be just one power cable, which should follow the route of Supply A.

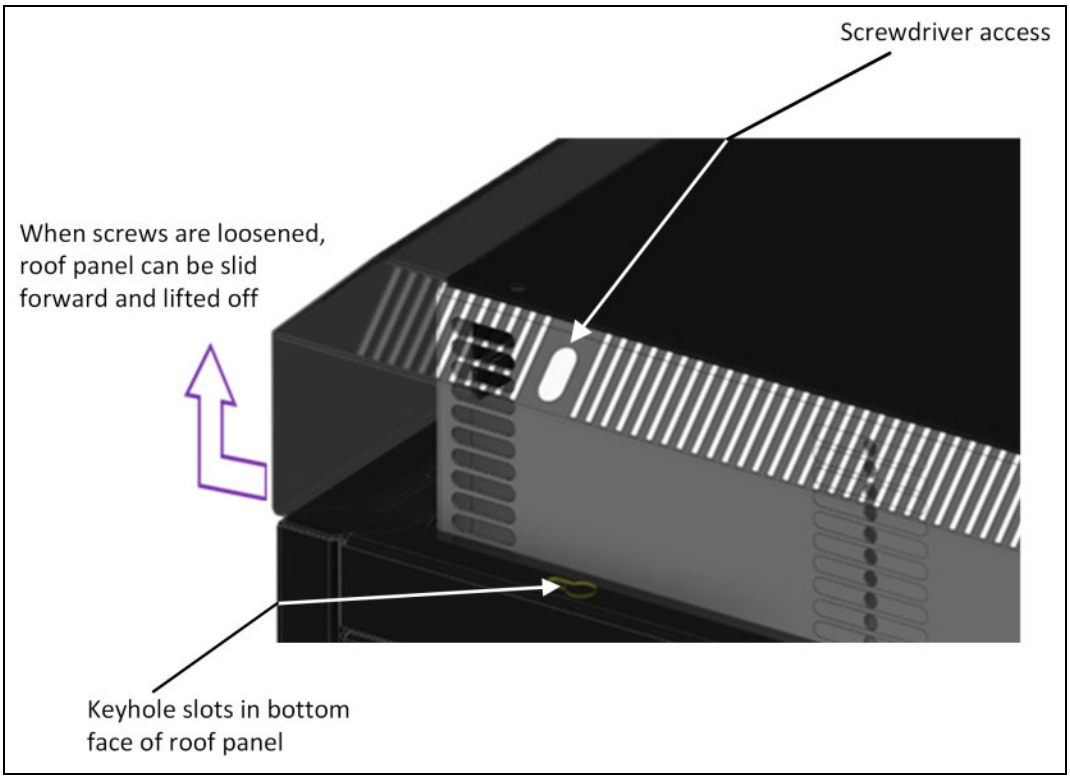
Figure 5.5 Power Cable Route—Top Entry



The enclosure in the front roof section of the cabinet contains either terminals for a single incoming power supply (if no ATS has been specified) or terminals for both A and B supplies with additional components if an ATS was specified as part of the overall unit configuration. For a 5kA unit, upstream protection must be provided by the end user in the form of fuses or breakers in accordance with the electrical load data stipulated on the wiring diagram and in accordance with local regulations.

Access to the power cable termination enclosure will require removal of the front roof panel. The front and rear roof panels are held in place with 4 x M4 screws. Screwdriver access to these screws is shown in Figure 5.6 on the facing page

Figure 5.6 Roof Panel Removed



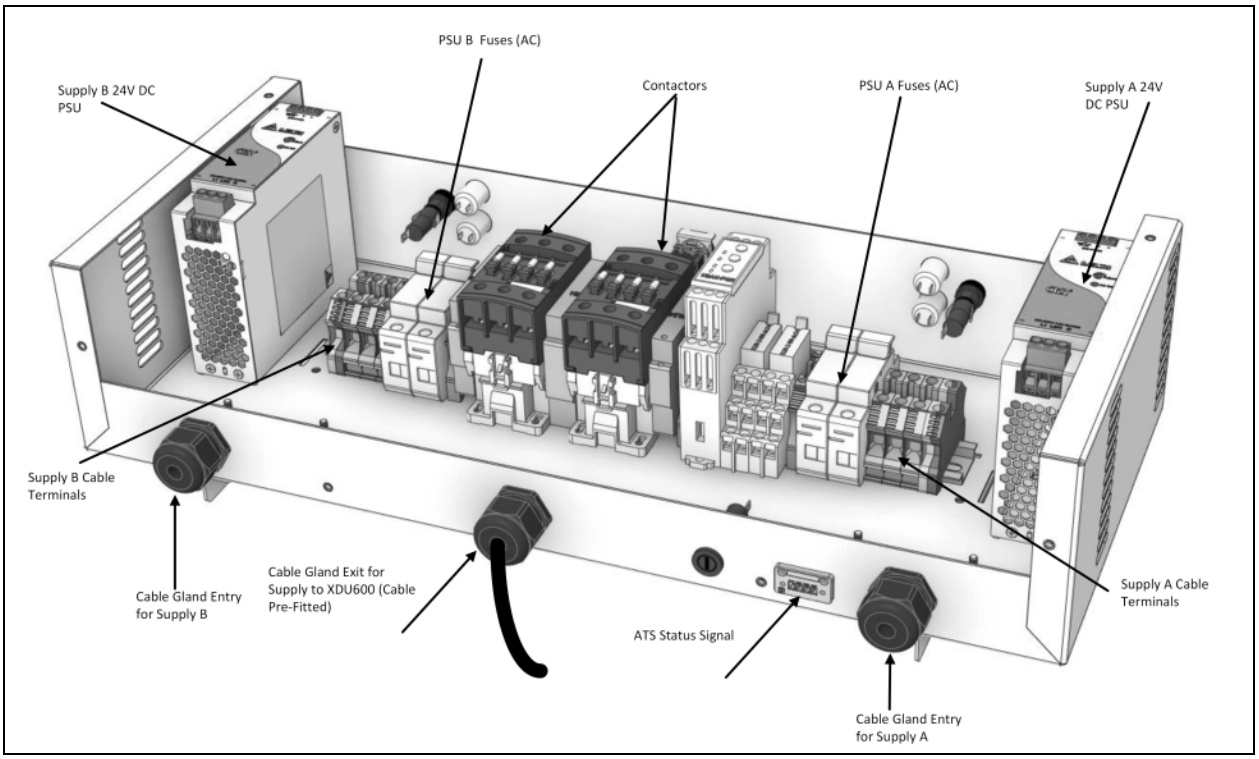
NOTICE

It is not necessary to completely remove the roof panel retaining screws. There are keyhole slots in the bottom face of the roof panel, so screws may be loosened but left in place when removing the panel.

The ATS enclosure has 2 x 32 mm cable glands on the rear face to accept 1 -21 mm (27/64" - 13/16") diameter power cables for supplies A and B.

See Figure 5.7 on the next page or front panel operation and for manual supply A and supply B changeover simulation.

Figure 5.7 Automatic Transfer Switch

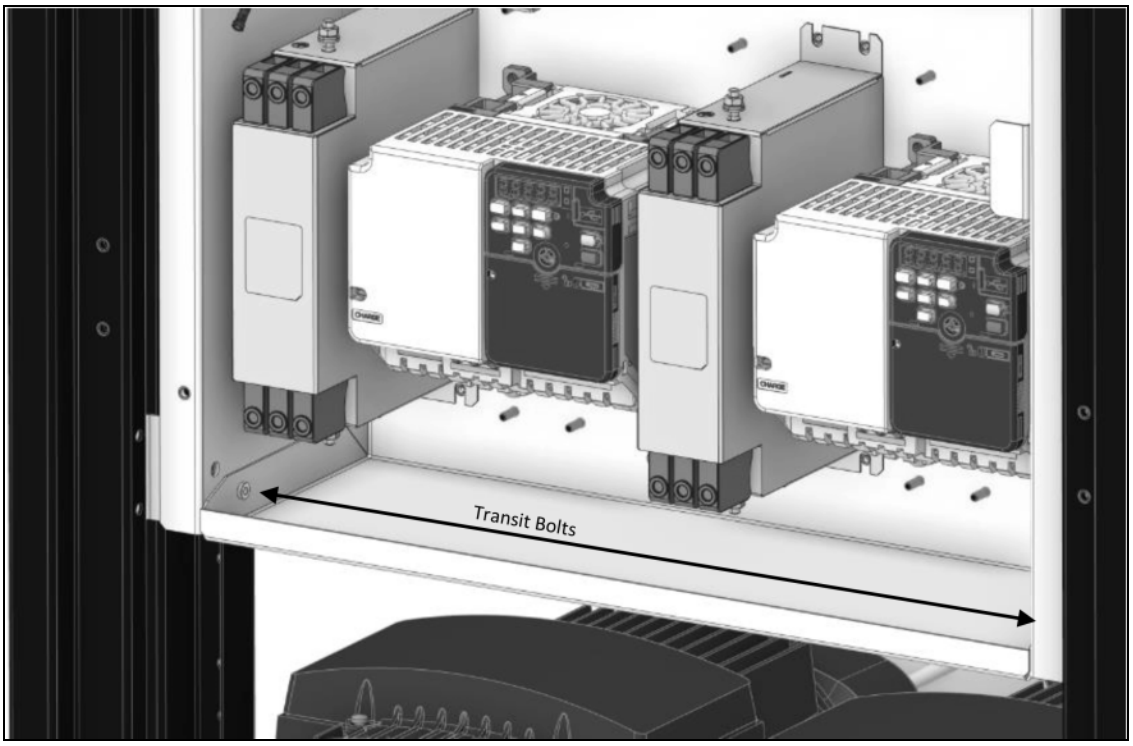


There is also a 4-way connector on the back of the enclosure used for an ATS status signal to the CoolChip CDU 600 (pre-wired at factory).

The electrical panel is divided into two compartments. The upper section is dedicated to low voltage for controls and the lower section is for mains power and has a door interlock disconnect/isolater to remove power prior to opening. Both sections require an 8mm triangular key to open (unit is provided with cabinet keys).

During installation, two M6 bolts holding the control panel in position during transit should be removed as shown in Figure 5.8 on the facing page . This will allow the control panel to be hinged up on gas struts for improved access during routine service periods, without the need to shut down the unit.

Figure 5.8 Removal of Transit Bolts



The CoolChip 600 CDU units are configured for the required voltage option stated in Electrical Data on page 16 . This is specified at the time of order. Check data plate information for compatibility before installation.

5.7.2 EMC Wiring

RF earth connection for EMC compliance is two M6 earth studs provided at the rear of the cabinet (one at the top and one at the bottom) to connect a braided EMC earth strap at either point.

5.7.3 Controls Wiring

Terminals 13 and 14 on SK9 is a volt-free contact for alarm remote indication. This is configurable as normally open (default) or normally closed.

A leak detection tape can be connected to terminals 15 and 16 on SK9 for leak detection under the floor. See **Figure 5.9** on page 36 for the location of SK9.

5.8 Pre-Commission Checks

5.8.1 Site Check

Ensure the site contact has made preparation for incoming Vertiv Service Representative to be on the premises.

1. Check whether the site requires protection equipment such as safety boots.
2. Check that deionized water (biocide and corrosion inhibitors required) or PG-25 has been delivered to the site.
3. Ensure that the site contact is aware of the CoolChip CDU 600 power supply fuse circuit board and circuit breakers.

4. Ensure that the site is aware of the location of the primary chiller and building services cold water supply and the associated isolation valves.

5.8.2 Mechanical Installation Check

1. Confirm that the CoolChip CDU 600 has been successfully unloaded from its crate and thoroughly inspected for damage. Pay particular attention to external cabinet panels and fluid circuit pipe work.
2. Check that the CDU 600 has been positioned and secured in the correct location.
3. If the unit has bottom exit pipework or manifold and hoses, confirm that floor tiles have been cut away as required and ideally fitted with brush strip grommets to allow hoses or pipes to run neatly into the underfloor void.
4. Check that cable baskets, cable trays, drip trays, etc have been installed to provide adequate support for the hoses or manifold.
5. Ensure all secondary fluid network piping and facility water supply piping is installed and ready for CoolChip CDU 600 commissioning.
6. Confirm that sufficient space has been allowed at the front and rear of the unit to fully open the access doors.
7. Ensure that the unit has been raised and leveled with the jacking feet into its final permanent position.

5.8.3 Electrical Installation Check

1. Confirm that the CoolChip CDU 600 is suitable for the site supply voltage.
2. Check that the CDU 600 has been connected to power supply routed through the ATS enclosure 32mm cable glands.
3. Verify that the rating of the circuit breaker/fuses supplying the CDU 600 meets the specification and rating indicated in the latest wiring diagram.
    a. If this rating differs from the CDU 600 specification, note the specification and confirm acceptability.
4. Check and record the voltage available across each of the 3 phases meets the CDU 600 model requirements.
5. If the CDU 600 is in a different location to the IT racks, confirm the remote room temperature/RH sensor has been installed on a wall adjacent to the data racks at a height of approximately 1.8m (72") using the correct extension cable.
6. Confirm any required external peripheral sensors are correctly fitted.

NOTICE

The main controller PCB is fitted with a type CR2032 coin battery. The sole purpose of this battery is to maintain the real time clock in the event of power down and its absence will not generally affect the overall operation and running of the unit.

Although the touchscreen display also has a receptacle for a battery, there is no requirement to fit one to this PCB.

5.8.4 Primary Fluid Specification

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 corrosion. Refer to Technical Data on page 15 for details concerning storage conditions. 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 start up 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.

The CoolChip CDU 600 is designed for use with a primary fluid supply from a chilled water system (either dedicated or from building system), fluid cooler, cooling tower or dry air cooler. A 20% glycol concentration will give frost protection to approx. -9°C (16°F). If a higher concentration of glycol is used, then the cooling capacity of the unit may have to be de-rated (contact Vertiv for advice).

It is the responsibility of the installer to make sure all fluid in contact with the heat exchanger is filtered to a level of at least 500 micron, if the optional primary filter internal to the CDU 600 was not specified at time of order.

5.8.5 Secondary Fluid Specification

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 corrosion. Refer to Technical Data on page 15 for details concerning storage conditions. 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 start up 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.

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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.

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Vertiv recommends installing a monitored fluid-detection system that is wired to activate the automatic closure of field-installed coolant fluid supply and return shut-off valves 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.

The fluid used in the secondary circuit is to be either PG-25 heat transfer fluid or particulate free deionized water, treated with suitable corrosion inhibitors and biocides for the cooling application.

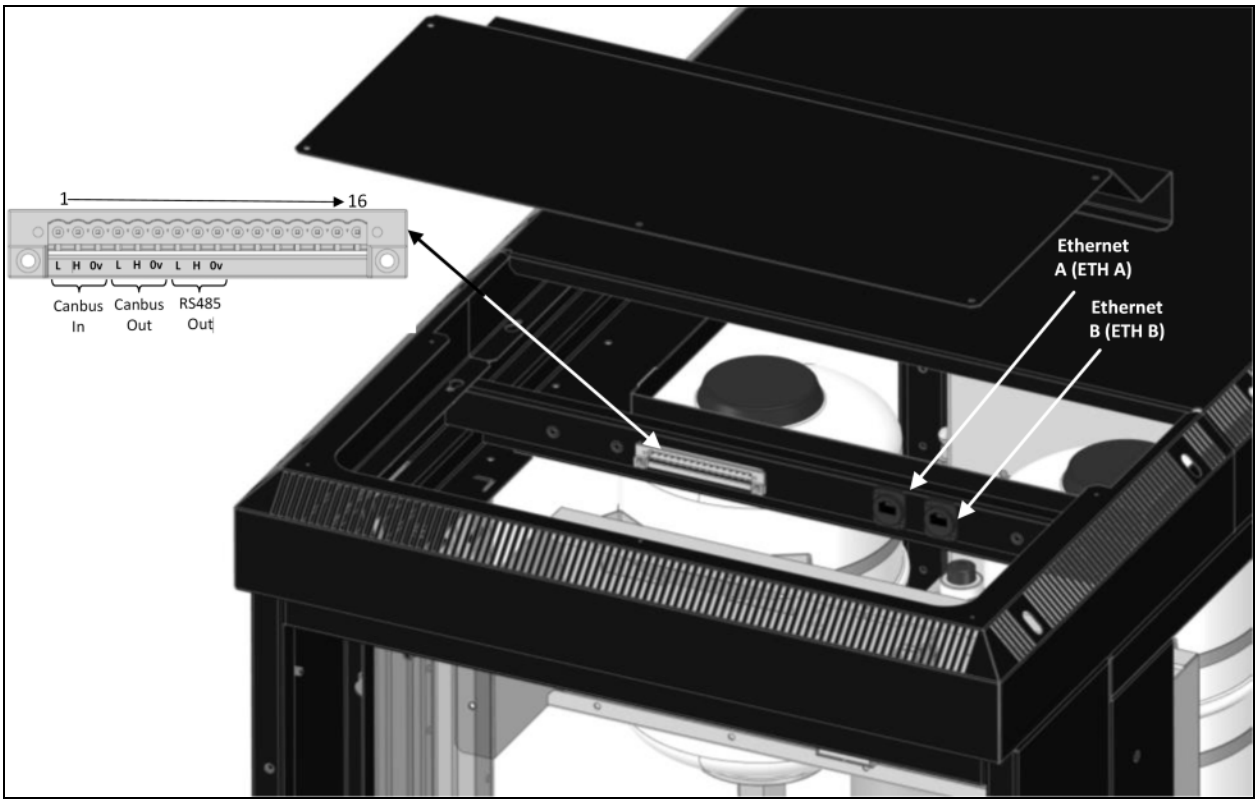
Failure to use proper water treatment can result in decreased system performance and reliability due to corrosion, scaling, fouling and microbiological growth and may invalidate the unit warranty.

5.9 Communications

5.9.1 Ethernet Communications

Two Ethernet redundant communication ports (RJ45) are provided at the top and rear of the unit: ETH A and ETH B. Use Cat5e shielded cable when wiring to these ports. Connector SK9 is also in the same location for RS485 Modbus communication and CANbus in/out for group control communication.

Figure 5.9 Communication Options and Locations



5.9.2 Group Control

Group control needs to be implemented only if there is more than one CoolChip CDU 600 unit per system installation.

It is recommended that CANbus and unit setup for group control is carried out only after the CDU 600 units have been commissioned as standalone units.

See the Operation and Maintenance Guide for further information.

6 Commissioning

6.1 Unit Configuration

Prior to running the CoolChip CDU 600, the configuration should be checked to ensure the unit is set up according to the site requirements.

- **Date and time.** See Setup menu, Date and Time. Set as the time required for the location. Set the Date Format (P021) and Daylight Saving (P022). Alternatively, you can enable NTP Synchronisation (P023) along with associated parameters.
- **DP Control.** See Configuration menu, Pump Control or DP (201). This controls the pump speed according to the required differential pressure.
- **DP Setpoint.** See Configuration menu/Differential Setpoint (P203). This will set the required differential pressure to be achieved.

NOTICE

Leave the DP setpoints at the default values initially. Then set these at the final states of commissioning.

- **Over Pressure Action.** See Configuration menu, Pump Control, Over Pressure Action (P212)/Alarm, Alarm + Shutdown. This will either keep the secondary supply temperature at a fixed temperature or allow it to rise if there is a danger of condensation.
- **Leak Detection.** See Configuration menu, Leak Detection—Flood Tray (601) and Leak Detection—Underfloor (P602)/Alarm or Shutdown and Alarm.
- **Power Failure Option.** See Configuration menu, Miscellaneous, Power Power Failure Options (P904)/Run or Standby. This determines if the unit automatically re-starts or remains in standby after a power outage.
- **Coolant.** See Configuration menu, Coolant, Secondary Loop Coolant Type (P1101), Water or PG25 and Configuration menu, Primary Loop Coolant Type (P1102), Water or PG25. These selections ensure accurately reported flow rates from the flow sensors.

6.2 Primary Circuit

6.2.1 Primary Pipework Installation

1. Confirm that the newly installed primary pipework has been flushed to remove particles larger than 500 microns.
2. Confirm that the installed primary circuit pipework has been fitted with valves for unit isolation and maintenance.
3. Check supply/return connections are correctly installed.
4. Check that all pipe joints are tight.
5. Verify that newly fitted primary pipework and connections have been leak tested.
6. Check that all primary circuit pipework, hoses, and valves have been insulated as per installation requirements.
7. Check that the external primary circuit has the means to vent air from the system either automatically (preferable) or manually.
8. Verify that the fluid leak detection is properly installed around all units.

6.2.2 Primary Fluid Supply

1. If the primary fluid supply is from a dedicated chiller, confirm that the chiller has been fully commissioned at least 24 hours before the CoolChip CDU 600 was commissioned.
2. Check that the primary fluid supply has been connected to the CoolChip CDU 600 primary fluid circuit.
3. Confirm that the primary fluid supply is available.
4. Confirm that there are no potential issues with low flow switches in the primary fluid circuit.
5. If the CoolChip CDU 600 is specified without an internal filter, confirm that the correct specification external filter has been fitted.
6. Verify that the primary fluid supply is fully operational and is providing sufficient flow rate/temperature at <10 bar pressure, as per the original installation specifications.

NOTICE

Although the primary circuit is rated for up to 10 bar, the pressure sensors are rated 1 bar to 8 bar so they may not register the full primary pressure.

6.2.3 Primary Bypass Valve

The CoolChip CDU 600 is supplied with a 3-way modulation cooling valve.

NOTICE

Fluid to/from the primary fluid supply is reasonably constant with 3-way valve operation.

6.2.4 Primary Circuit Filling

1. Open the supply and return valves fitted in the pipework connected to the CoolChip CDU 600 unit to allow the primary circuit within the cabinet to gently fill from the primary fluid supply. If the optional internal primary filter is fitted, check that the filter valves are open and that the filter bypass valve is closed.
2. Check the circuit for leaks.

NOTICE

Check that the installed primary fluid supply system has an automatic fluid make up facility and that filling the CDU 600 unit will not result in the fluid system (chiller) shutting down due to loss of fluid.

6.2.5 Primary Flow Setup

NOTICE

Before attempting to monitor and adjust the primary circuit flow, the operator should be fully conversant with the operation of the CoolChip CDU 600. See the Operation and Maintenance Guide for further information.

1. For optimum performance, the primary fluid flow should be set to match the required heat load transfer according to the primary inlet temperature and level of glycol. See the Operation and Maintenance Guide for further information.
2. If the fluid flow is below the necessary requirement, there will be insufficient cooling and the load temperatures will start to rise. If there is too much flow, then temperature control could become unstable.
3. An external means of restricting or bypassing the excessive primary flow should be site provided and fitted, if needed, in the external pipework.
4. To adjust the primary flow rate:

a. Set the controller to Overrides.
b. Adjust Cooling Valve to 100% to force the cooling valve to open fully for maximum flow through the heat exchanger.
c. Go to the Status screen or Home screen view to view the primary flow rate.

5. Adjust the external valve to regulate the flow through the CDU to the required approximate setting.

6.3 Secondary Circuit

6.3.1 Secondary Pipework Connections

1. Check that the external secondary fluid network supply/return connections are correct (not backwards).
2. Check that the drip tray has been installed in the correct location, if applicable.
3. Check the site-installed secondary fluid network has been flushed down to the particle level needed for application, especially if any hot works have been carried out.

NOTE: Vertiv does not recommend use of the CDU for flushing external secondary external pipework.

4. Verify that the secondary fluid network and CoolChip CDU 600 connections including hoses have been tested for leaks using an appropriate pressure testing method and ensure certification can be provided.
5. Check the leak detection tape, if applicable, has been installed into drip trays.
6. If an internal manifold has been fitted, check that hoses have been cut to the correct size to allow sufficient length to ensure supply/return pipes will run smoothly from the manifolds to/from racks without kinking and are adequately supported.
7. Check that all hose ends have been adequately labeled to ensure correct identification. For example, flow/return and rack/IT load served.
8. Confirm that the final connections of hoses to the CoolChip CDU 600 internal manifolds (if fitted) and racks are tight.

6.3.2 Unit Secondary Circuit Filling

NOTICE

When filling and running the secondary circuit, the operator must be fully familiar with operating the CoolChip CDU 600. See the CoolChip CDU 600 Operation and Maintenance Guide for further information.

1. Position the container of pre-treated deionzed water or PG-25 in front the CDU 600.
2. Ensure that all automatic air vent bleed screws are loose but not removed. These screws are located at the top of each filter housing and on the pump inlet header.
3. Ensure that all drain valves are closed.
4. Insert the filling wand into the container of fluid and then connect fill wand hose to the fill pump P4 quick release coupling. See Figure 6.1 on the next page .
5. Log onto the controller with the Service access code. Go to the Service screen and select Fill Pump Request.
6. Select Fill Pump P4 and then ON. The fill pump will start pumping the fluid into the unit reservoir tank at the rate of approximate rate of 4 liters per minute.
7. The reservoir level sensors can be monitored during the filling process while in the Fill Pump Control screen. See Figure 6.2 on the next page .

8. Ensure that the fluid container with the filling 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 as shown in Figure 6.2 below .

NOTICE

Fill pumps P3 and P4 are interlocked and cannot run at the same time. When pump P4 is running, P3 shows as Disabled. When pump P3 is running, P4 shows as Disabled.

Figure 6.1 Fill Pump Operation

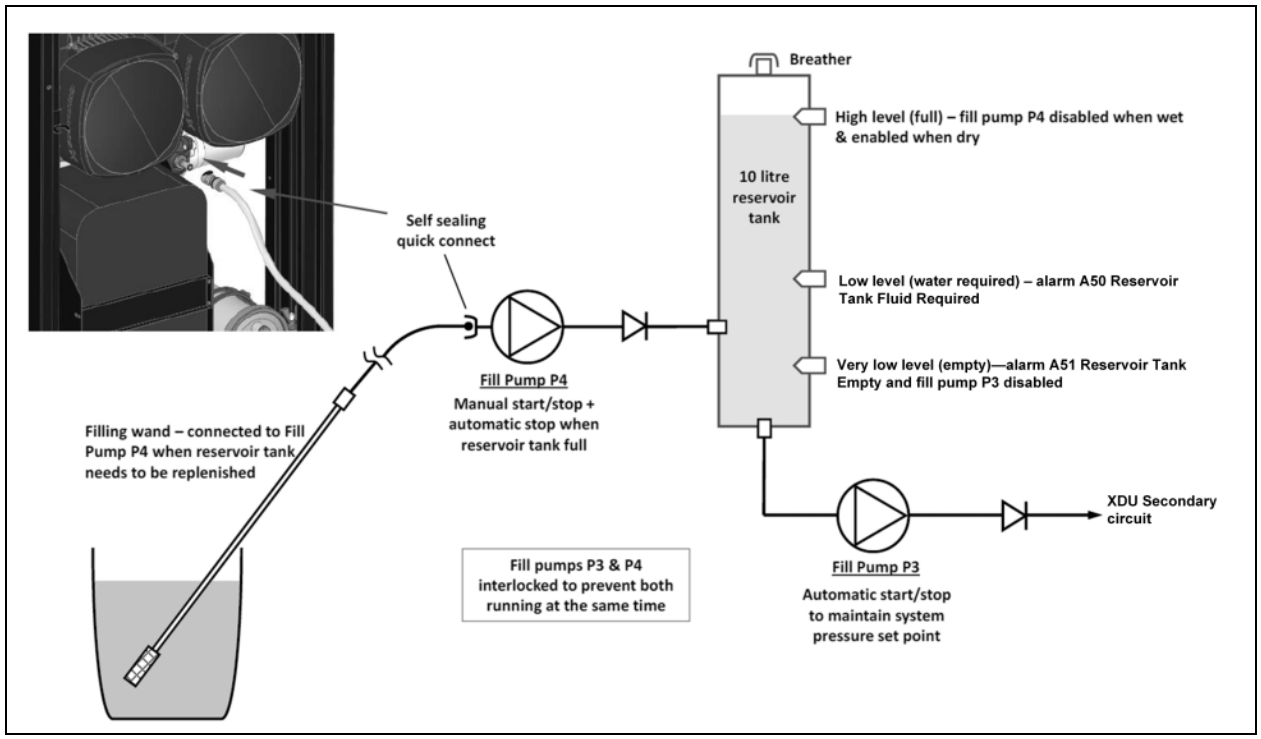
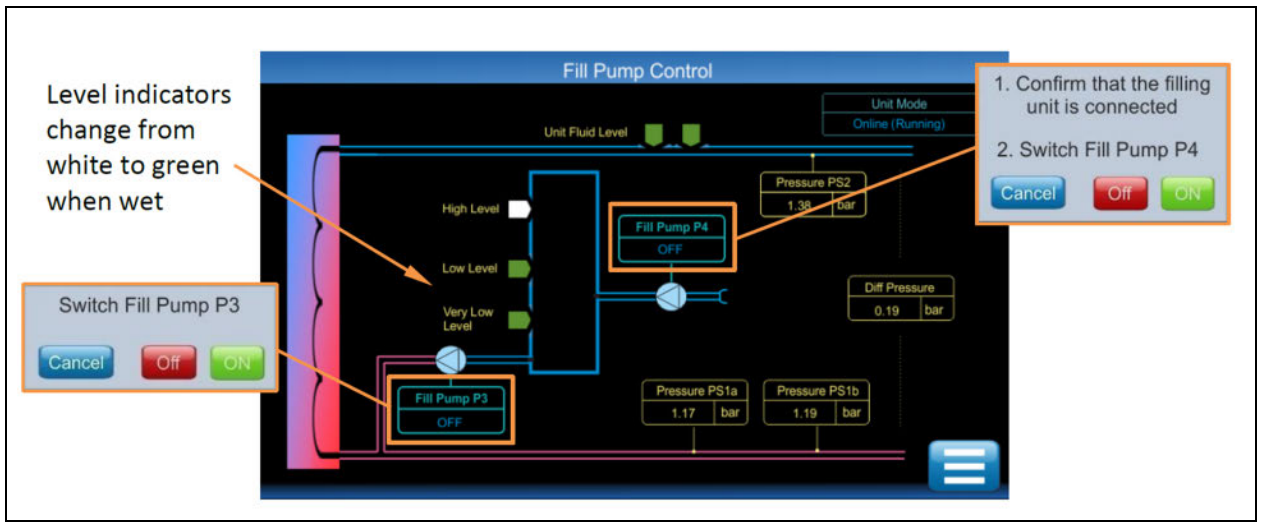


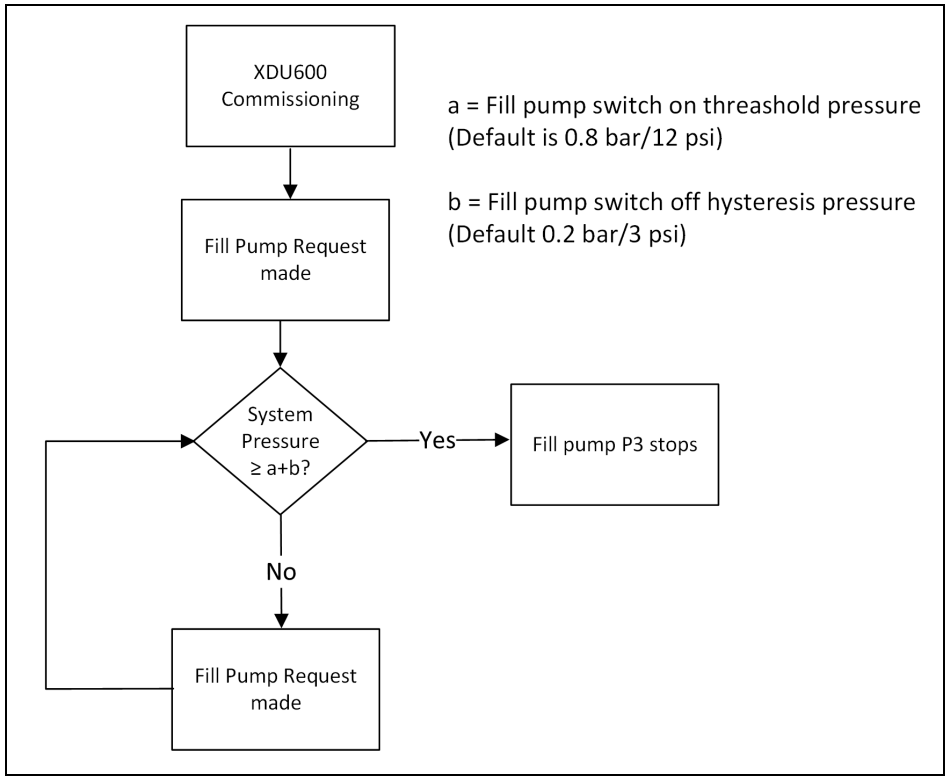
Figure 6.2 Fill Pump Control Screen for Fill Pump P3 and P4



9. After the reservoir tank is full, it can be emptied into the CoolChip CDU 600 system using fill pump P3. Select Fill pump P3 and then ON.
10. Fill pump P3 will switch OFF automatically when the reservoir tank reaches the very low-level sensor or it can be manually switched OFF at any time using the OFF command.
11. Repeat the process of filling the reservoir tank with pump P4 when pumping reservoir contents into the system with pump P3 until fill pump P3 stops automatically when system static fill pressure is ≥ 1.0 bar. The system pressure (PS1a and PS1b) can be monitored on the Fill Pump Control screen as shown in Figure 6.2 on the previous page
12. 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.
13. Leave the filling wand connected and in the container as more fluid will be required as air is expelled from the system during the initial operation.

Figure 6.3 below shows the unit pressure monitoring and fill pump P3 control during system filling operation as part of commissioning (unit offline).

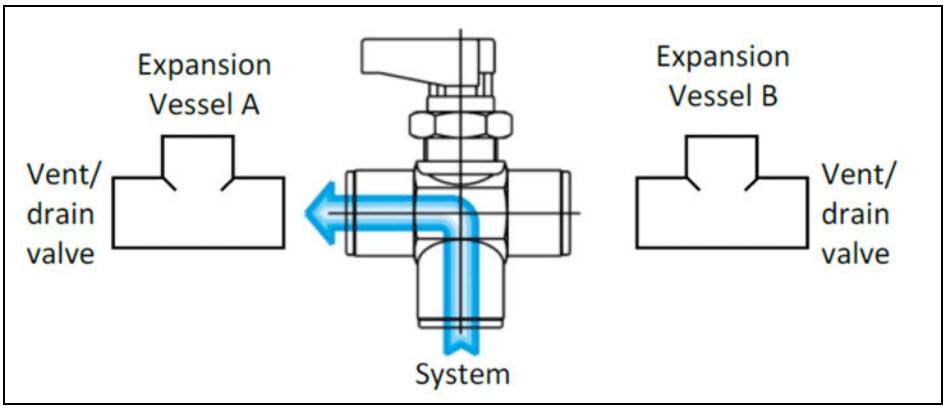
Figure 6.3 Pressure Monitoring and Filling Operation Fill Pump 3



6.3.3 Expansion Vessel Venting

1. While the system is filling, the common feed hose and pipework leading to the expansion vessels should be manually vented. Set the handle on the 3-way valve between the expansion vessels to vessel A as shown Figure 6.4 on the next page .

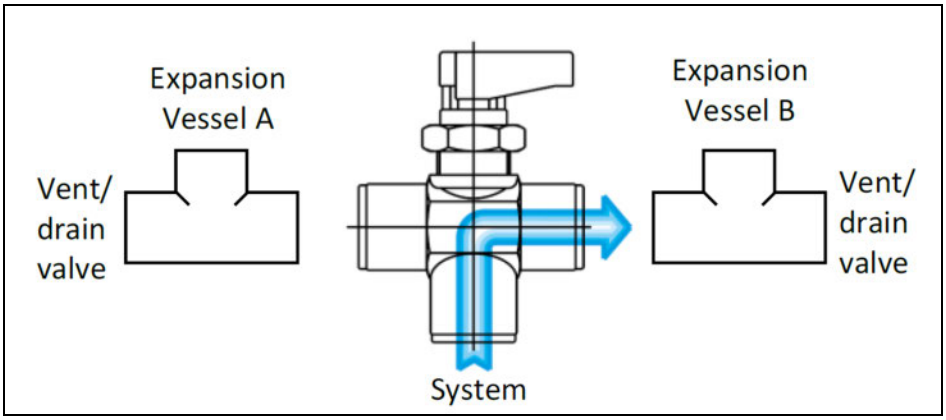
Figure 6.4 3-Way Valve Handle Set to Expansion Vessel A



The commissioning/maintenance position of the valve handle is set to vessel A for venting during commissioning (via drain valve) or to leave expansion vessel A in service while expansion vessel B is drained for air pressure check/adjustment without losing system pressure. '

2. Open the vent value using the key provided to allow trapped air to vent. See Figure 6.7 on the facing page . Close the drain valve as soon as fluid starts to emerge. The hose provided may be used to avoid fluid spillage in the unit. It is recommended that during venting, the drain valve is swivelled so that hose barb connection is pointing upwards to ensure all air is purged and again for # 3 .
3. After the drain valve is closed, set the valve handle as shown in Figure 6.5 below to vent expansion vessel B. The released air quality will be small as the main feed hose has already been vented in # 2

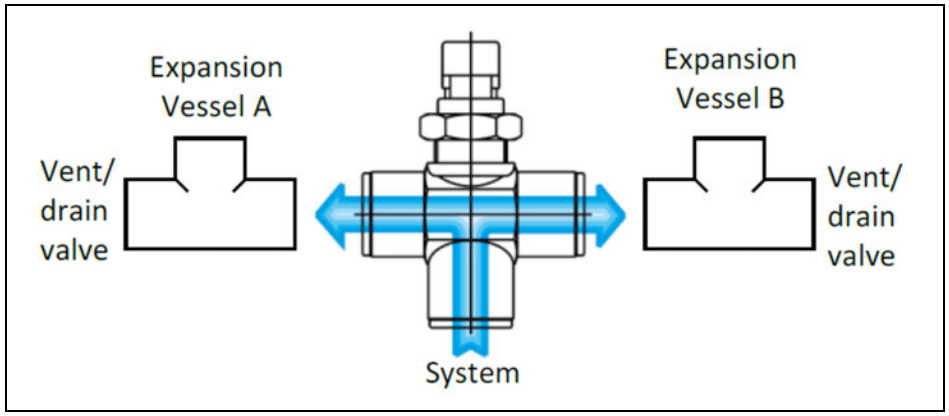
Figure 6.5 3-Way Valve Handle Set to Expansion Vessel B



The commissioning/maintenance position of the valve handle is set to expansion vessel B for venting during commissioning (via the drain valve) or to leave the expansion vessel B in service while expansion vessel A is drained for air pressure check/adjustment, without losing system pressure.

4. After venting is complete, set the valve handle to the center position for normal operation.

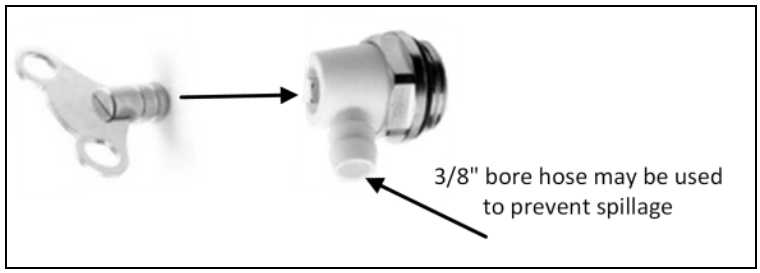
Figure 6.6 3-Way Valve Handle Set to Normal Operation



Normal operating position is when the valve handle is set to the center position to connect both expansion vessels to system pressure.

While the system is filling, any trapped air in the expansion vessel supply hose and pipes can be manually vented at the vent valves that are located under each vessel. See Figure 6.7 below

Figure 6.7 Vent Valve (with Key)



6.4 Pump Rotation

After the initial fill process, the pump rotation direction should be checked.

Start the unit by pressing the green start icon on the Home screen of the display. (Refer to the CoolChip CDU 600 Operation and Maintenance Guide.) If the setpoints are set to default, then the pumps run at reduced speed. Switch unit off again at the display and observe fan rotation at the end of each pump. Rotation should be anti-clockwise. If the direction is clockwise then invert 2 phases of the electrical supply connection.

WARNING! This unit is powered by high voltage. Serious injury or death can occur. All electrical work must be carried out only by a qualified engineer.

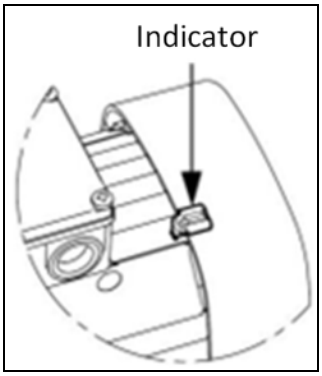
WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause serious injury or death. Building and equipment damage may also result. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning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

NOTICE

Risk of improper 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 start up to ensure that the pumps are running in the correct direction.

Pumps are fitted with a direction indicator flag that is located on the fan cowl. If the flag is black, then rotation is correct. If the flag is white and the pump is running clockwise (reverse). For this to be effective, pumps need to be running at or close to full speed.

Figure 6.8 Indicator Flat (Located on Fan Cowl)



6.5 Unit Low Speed Circulation

It is advisable to continue running the unit at a reduced pump speed to gently circulate the fluid, enabling any trapped air to vent out through the auto air vents. If the setpoints have been left at the default values, then this will happen nautrally as these values have been deliberately set quite low. Manually vent the expansion vessels at the Schrader points.

To adjust the pump speed with the Override function, start the unit in normal automatic mode. Allow the pump speeds to settle at the default DP setpoint. See Overrides and Full Speed Operation on the facing page .

NOTICE

The minimum allowable pump speed is 15%. This enables adequate motor fan cooling and the default DP may not be achieved if it requires the pump to operate below this speed, depending upon system impedance.

Leave the unit running like this for approximately 30 minutes. This allows any trapped air to vent.

NOTICE

While the main pump is running, the fill pressure at PS1 may drop as air is purged from the system and the fill pump automatically re-activates.

6.6 Overrides and Full Speed Operation

After a period of reduced speed running, the pump speeds can be ramped up to full 100% speed to determine full DP maximum. performance available. Ideally the system should be a complete installation with all IT load circuits connected.

To ramp up pump speeds to 100%, follow these steps:

1. Go to the Logon screen and enter the Service code.
2. Go to the Service menu and select Overrides.
   - Select either Pump 1 Speed or Pump 2 speed.
   - Enter the desired speed as a percentage of full 60Hz operation.
   - Select OK.
   - If the unit is configured for Twin Pump Control, repeat for the second pump.

The entire time that this function is operational, the following icon is displayed on the Home screen.

IMPORTANT! The controller reverts back to full automatic mode if there is no interaction with the touchscreen for 15 minutes (default).

After all air has been expelled from the system and the CDU 600 maximum performance has been achieved, pump operation can be set back to automatic control. To return to automatic control:

1. Go to Overrides and set the pump speed to 0%. This puts the control back into automatic mode.
2. Set the required final flow rate or DP in the Configuration menu, Pump Control, Differential Pressure Setpoint (P203).

6.7 Full Manual Control

Access Full Manual Control from the Service screen when logged on at the Engineering level.

Use Full Manual Control to control one or more outputs in total isolation from the automatic operation of the rest of the unit.

Full Manual Control puts the unit into a dumb mode where all outputs are inactive unless they are manually set. All alarm conditions are ignored.

This function is typically not used during commissioning. Full Manual Control is typically used for fault finding.

IMPORTANT! If the units was previously running in Automatic mode, the unit will completely shut down when placed in Full Manual Control.

6.8 Subsequent Filling

After the unit is fully commissioned, ensure that the reservoir tank is filled to the maximum level. Refer to Figure 6.2 on page 40 and then disconnect the filling wand and return to the storage location on the left hand cabinet corner post.

The reservoir tank contains approximately 10 liters of fluid. This allows the unit to self fill while unattended in the event of a minor water loss or when remaining trapped air is purged out of the system.

Reservoir tank status should be inspected regularly during service visits and refilled, if required, through manual activation of fill pump P4. Refer to Unit Secondary Circuit Filling on page 39

Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

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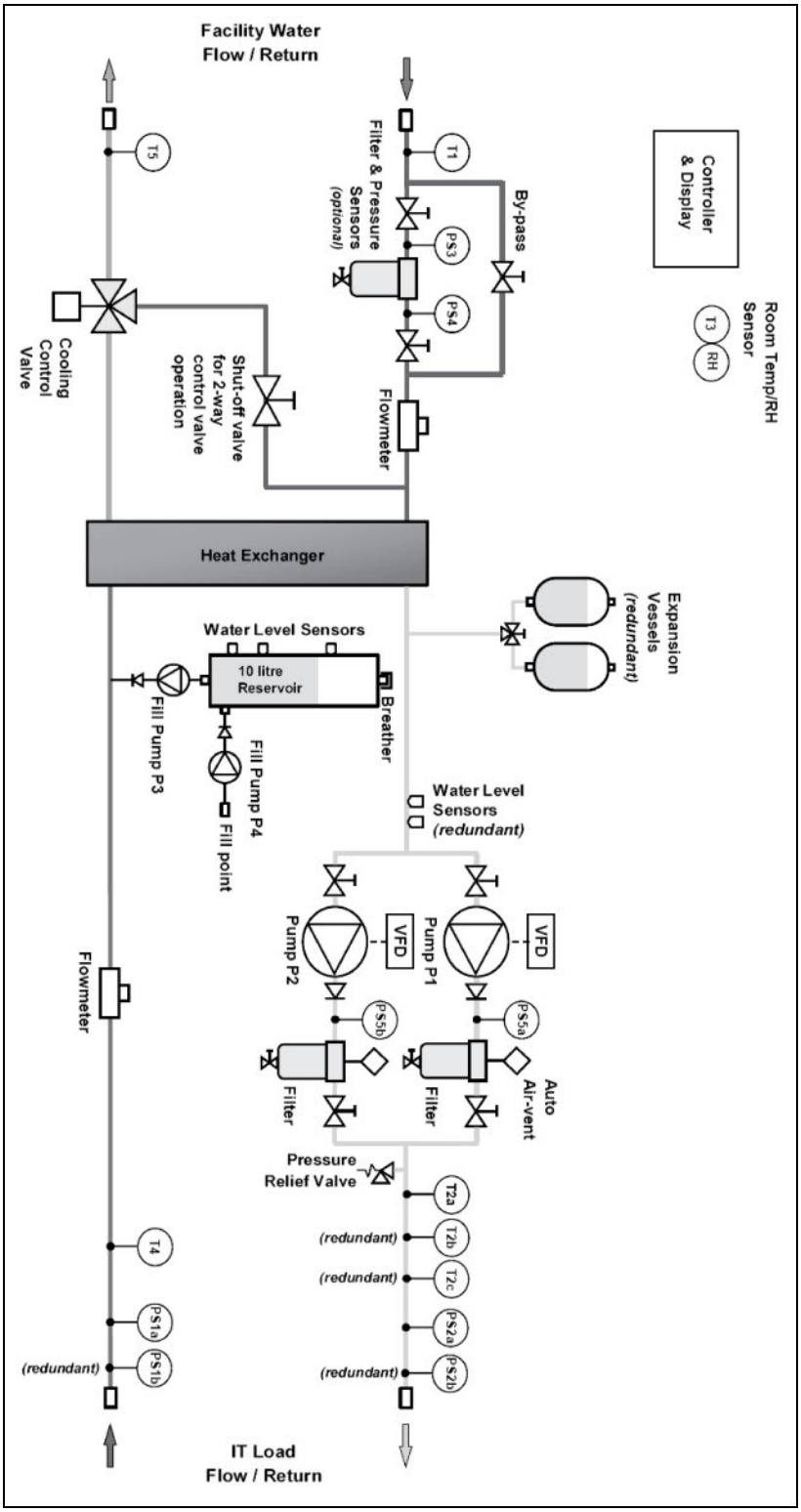
Appendix B: Piping Schematic

Figure B.1 Piping Schematic



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Appendix C: Notes

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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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