



CoolChip CDU 600

Application and Planning 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. This information contained in this document must be used in conjunction with the Installation and Commissioning Guide and the Operation and Maintenance 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 application information pertaining to the 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. 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 model 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 wiring, piping, moving, lifting and handling. Can cause serious injury or death. Building and equipment damage may also result. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE.



WARNING! Risk of improper moving. Can cause serious injury or death. Building and equipment damage may also result. Use only lifting equipment that is rated for the unit weight by an OSHA-certified rating organization. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator. Shipping weights and unit weights are listed in **Table 4.1** on page 19 Use the center of gravity indicators on the unit to determine the position of the slings.



WARNING! Risk of top heavy unit rolling 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 listed in **Table 4.1** on page 19 .



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 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 electrical 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 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 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 19. 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 shutoff valves must be sized to close off against the maximum coolant fluid system pressure in case of a catastrophic fluid leak.

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 storage. Can cause unit damage. See **Table 4.1** on page 19

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

NOTICE

Risk of improper control circuits. Can cause equipment damage.

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

1.1 General

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



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 **Table 4.1** on page 19 .



WARNING! Risk of top heavy unit rolling 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 listed in **Table 4.1** on page 19 .



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.

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.

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.

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.



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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.



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CAUTION: 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.

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 [Primary \(Facility\) Circuit](#) on page 21 and [Secondary Circuit](#) on page 21 for more information.

3.2 Features and Benefits

- Essential separation of the primary (facility) fluid from the IT equipment, providing low pressure, clean fluid to liquid cooled IT equipment.
- Low fluid volume in secondary loop, reducing leak risk.
- N+N pumps, inverters, expansion vessels, pressure and temperature sensors for built-in redundancy.
- Large pipe diameter and optimal hydraulic design with low pressure drop, provides maximum secondary flow up to 450 l/m at 2.25 bar (119 gpm at 33 psi) external pressure drop with single pump operation or up to 900 l/m at 1.3 bar (238 gpm at 19 psi) external pressure drop with twin pump operation (without filtration).
- Sanitary flange and clamp design, easy installation, maintenance and retrofit of pipework parts. .
- Connection options available for top or bottom pipe exit or secondary manifold connection, giving application flexibility.
- Large surface area heat exchanger to provide high cooling capacity with low approach temperatures.
- Secondary fluid control in differential pressure control mode to suit various application requirements.
- Secondary fluid temperature controlled within $\pm 1^{\circ}\text{C}$, to ensure cooling stability with variable heat load.
- Group control available for up to 16 CDUs via CANbus, enables N+X redundancy design for larger installations.
- Modbus RTU RS485, BACnet, and TCP/IP communication with data center monitoring system for easy integration.
- Full alarm monitoring, providing real-time status of the IT equipment and the local environment.
- Data, alarm and system logging over the full product lifetime to onboard SD card (minimum size 4GB).
- 4.5kW power consumption (single pump running mode) to provide up to 700kW cooling capacity at 7°C approach temp. difference, providing high energy efficiency.
- Supports warm fluid cooling in direct contact liquid cooling applications, very low partial PUE cooling, energy saving and operating expenses benefits for user.
- Small footprint (600x1200mm), 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 trouble shooting.

3.3 Configuration Options

The CoolChip CDU 600 units are configured with

- Twin (redundant) pumps as standard.
- Primary/secondary filtration options.
- Primary and secondary top/bottom connections and secondary manifold ready (ready to accept an external manifold across the rear of the CDU).
- 10L stainless steel reservoir.

See [Product Model Nomenclature](#) below

Flexible hoses for the primary and secondary connections with 2-1/2 in. sanitary flanges can be provided if required to suit site requirements.

The Manifold Ready secondary connection option allows for a supply/return manifold system. See **Figure 3.3** on page 17

3.3.1 Product Model Nomenclature

The CoolChip CDU 600 has a 29-digit model nomenclature configuration. The first seven digits are XDU0600.

Of the next 18 digits of the nomenclature, Digit 26 is used for an ETO, and the last three digits are factory digits. Refer to **Table 3.1** below

Table 3.1 CoolChip CDU 600 Model Number Digit Summary

Digit	Description
Digits 1 - 7	XDU0600 (Unit family)
Digit 8	Model Revision: A: Model A
Digit 9	Voltage Selection: Q: 400V, 50/60Hz (Europe and Asia), 3 phase A: 480V 60Hz (USA), 3 phase
Digit 10	Automatic Transfer Switch (ATS) 0: Standard power termination enclosure 1: Power termination enclosure with ATS
Digit 11	Controller A: Standard controller
Digit 12	Communication 1: Protocol: Modbus, BACnet, SNMPV2/V3, HTTP(S), webserver, NTP, SSH-CLI, SFTP
Digit 13	Display: 7: 7-in. touchscreen display

Table 3.1 CoolChip CDU 600 Model Number Digit Summary (continued)

Digit	Description
Digit 14	Secondary Circuit Fluid Monitoring: 0: None A: PH + conductivity (0-10,000 us/cm range) + turbidity (0-100 NTU)
Digit 15	Pump Configuration: 2: 2 Pumps
Digit 16	EMC Filter 1: Standard EMC filter 2: No EMC filter
Digit 17	Primary Connection from Facility T: Top connection B: Bottom connection
Digit 18	Primary filtration 0: None 1: Factory fitted (500 micron)
Digit 19	Primary Control Valve H: Standard 3-way valve
Digit 20	Secondary Connection to Equipment T: Top connection B: Bottom Connection M: 6-way manifold header with 1-1/4 in. ball valve supply/double regulating valve return with factory fitted 1-in. hose barb
Digit 21	Secondary Filtration 0: None 1: Factory fitted (50 microns) 2: Factory fitted (25 microns)
Digit 22	Pressure Relief Valve--Secondary Circuit 3: 3 bar pressure relief valve 4: 4 bar pressure relief valve 5: 5 bar pressure relief valve 6: 6 bar pressure relief valve
Digit 23	Reservoir N: SS reservoir with 3 stage fluid level detection
Digit 24	Packaging S: Seaworthy

Table 3.1 CoolChip CDU 600 Model Number Digit Summary (continued)

Digit	Description
Digit 25	SCCR 0: 65kA
Digit 26	ETO
Digits 27 through 29	Factory digits

For a complete installation solution, the following accessories may be ordered as optional extras. Please contact Vertiv for details.

Table 3.2 CoolChip CDU 600 Accessories

Description	Fitted
Leak Detection Tape	Site fitted
2½" St. Steel Connection Hose Set.	Site fitted

3.4 Product Views

NOTE: These model images are provided for reference only.

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

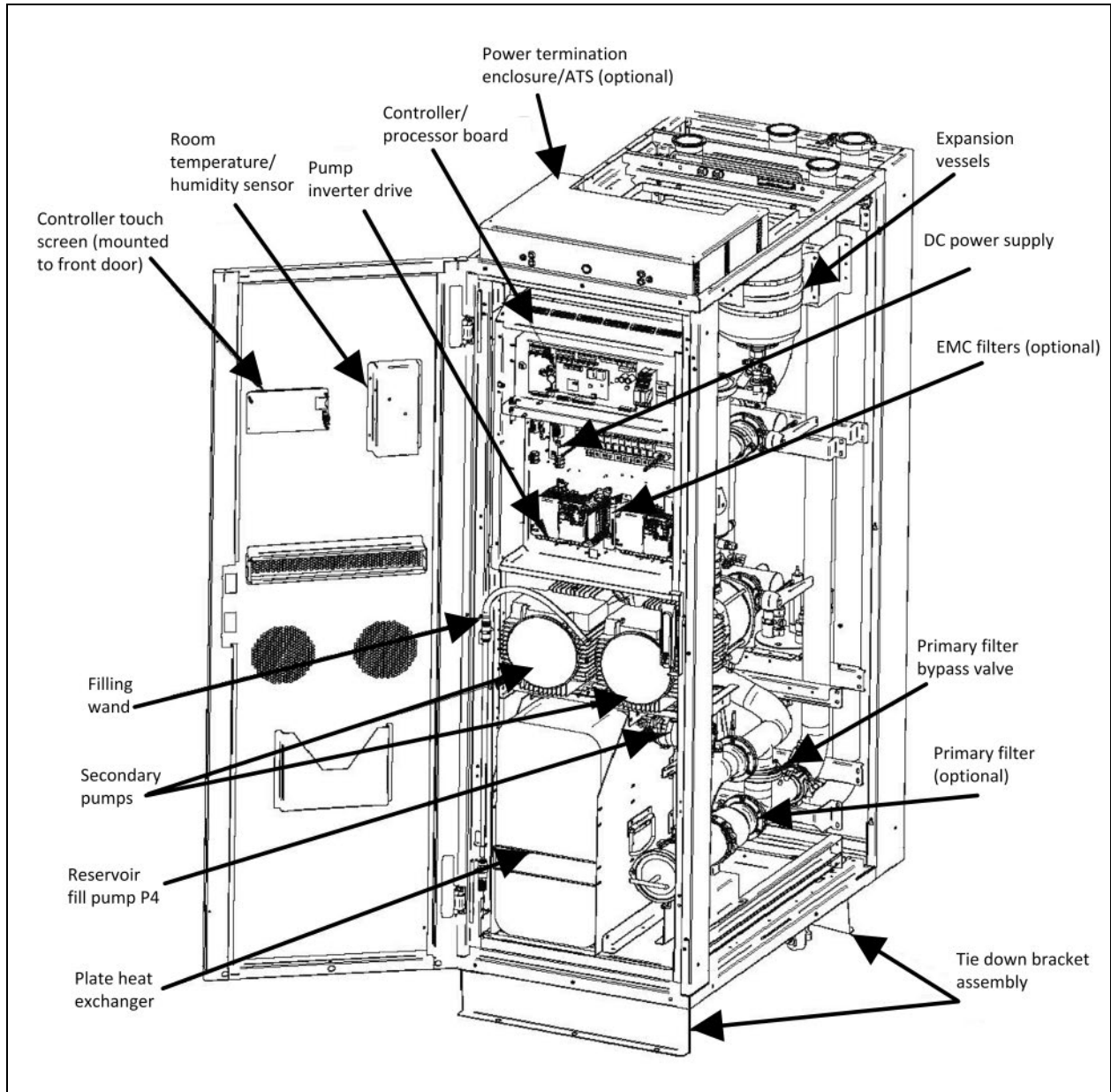


Figure 3.2 Rear View of CoolChip CDU 600 (with Bottom Primary and Secondary Connection Tails)

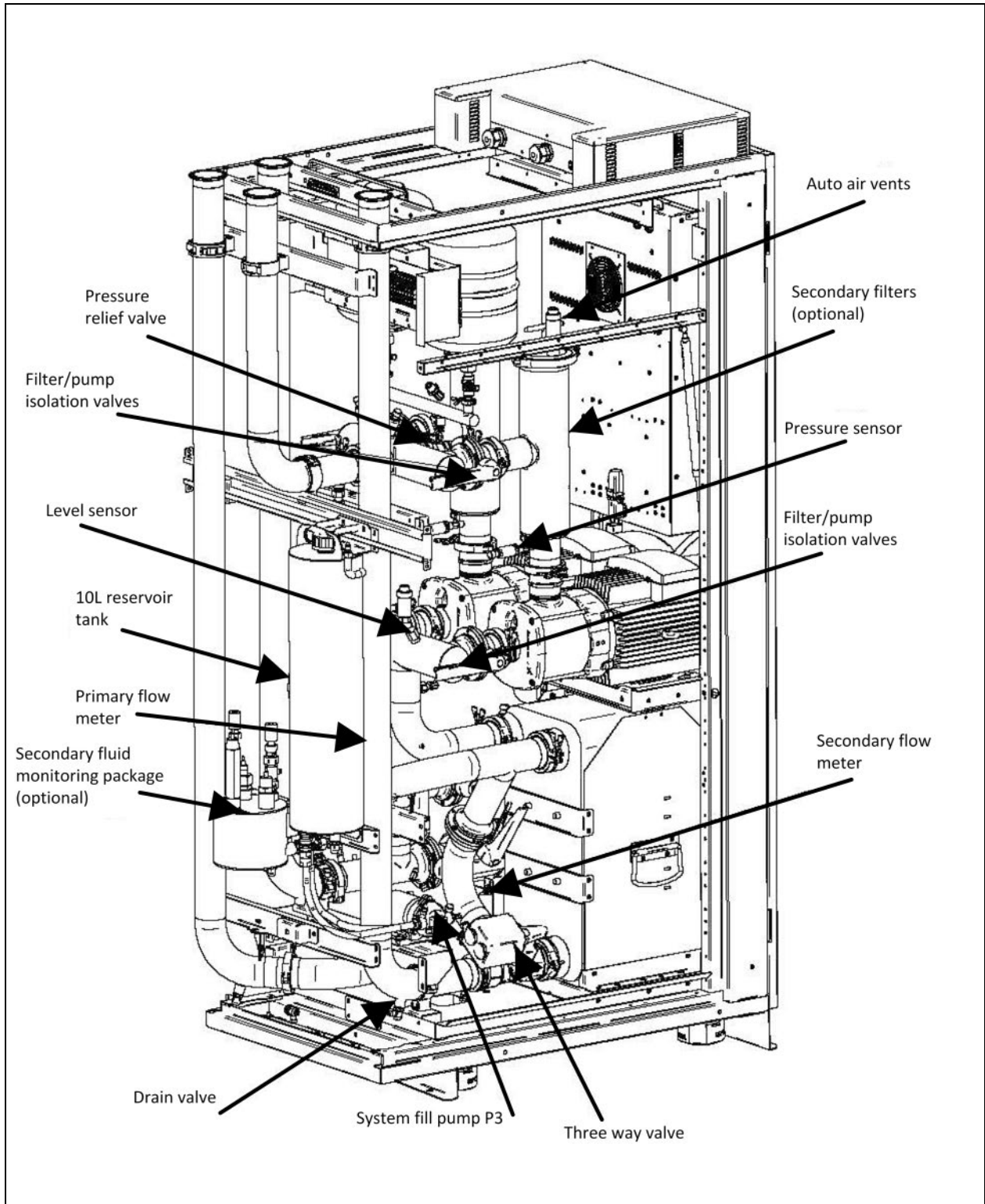
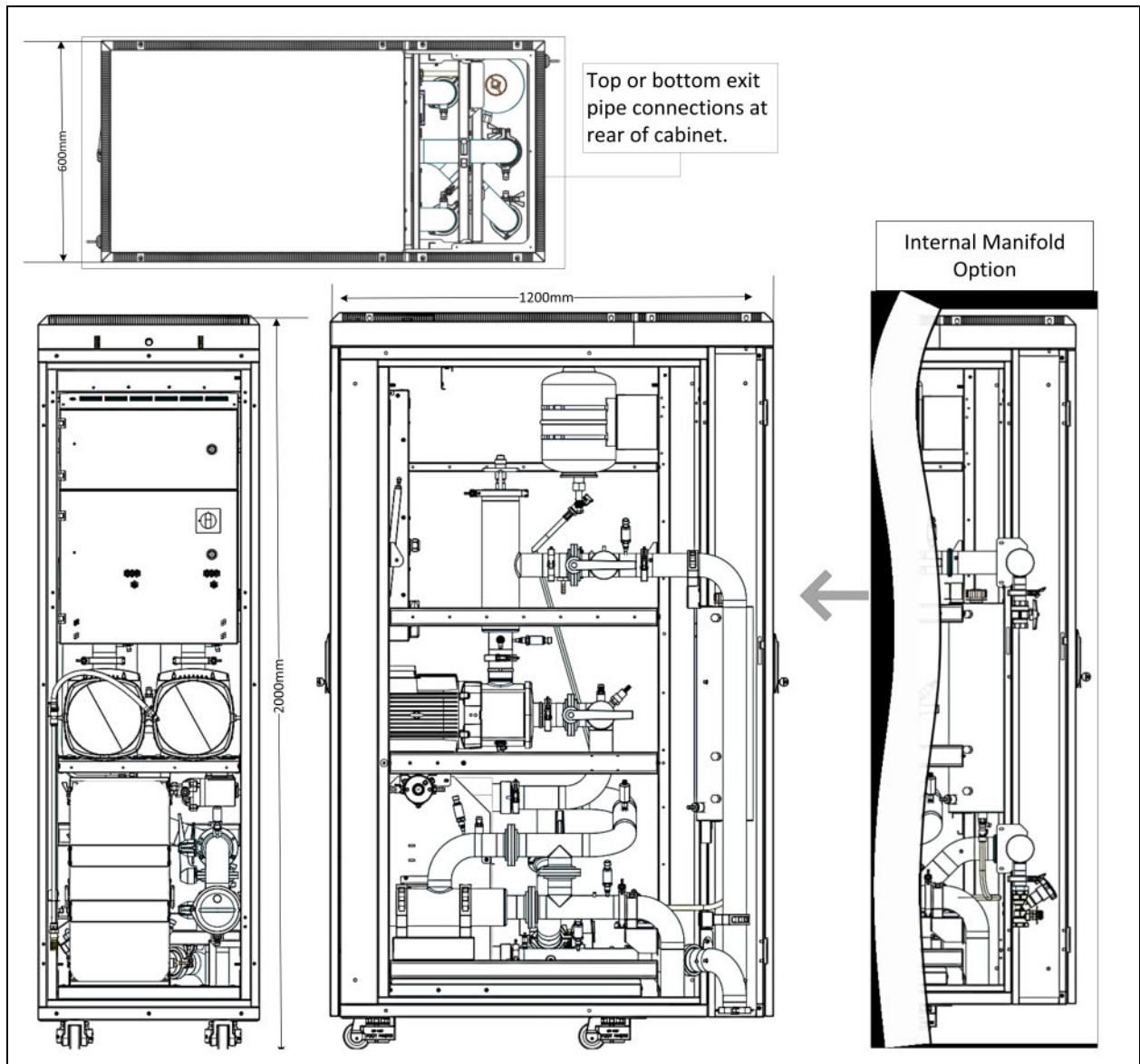


Figure 3.3 CoolChip CDU 600 Dimensions



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4 Technical Data

4.1 General

Table 4.1 CoolChip 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:	Up to 6 months. If storing longer than 6 months, please consult Vertiv.
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 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 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 CoolChip 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

Table 4.5 Supported Electrical Supplies, Twin Pump CoolChip CDU 600 (continued)

Electrical Supply	FLA, MCA, MOP	With ATS	Without ATS
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
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 that the UPS is sized properly.

4.6 Noise

Table 4.7 Sound Power Level

Sound Power Level at 3m:	<55dBA
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4.7 Primary (Facility) Circuit

To ensure responsive control of the secondary supply temperature, the CDU must be supplied with the primary flow rate and temperature appropriate to the heat load and level of glycol.

Excess primary flow reduces the effective range of movement of the control valve, potentially restricting fine control, and possibly leading to instability of the secondary supply temperature. An external means of restricting or bypassing excessive primary flow should be provided by the customer in the external pipework.

NOTE: Contact a Vertiv representative regarding specific application performance calculations.

Both the primary inlet and return connections should be fitted with full bore isolation valves at point of installation for maintenance purposes.

The CoolChip CDU 600 can be specified with a factory fitted primary filter with a screen size of 500 microns/35 mesh. See [Configuration Options](#) on page 12. If this option is not specified, then alternative arrangement need to be made for a similar level of filtration to be provided at point of installation.

The primary circuit of the CoolChip CDU 600 is rated for a maximum working pressure of 10 bar. If the pressure at installation exceeds this, then arrangements need to be made to fit a pressure reducing valve.

4.8 Secondary Circuit

NOTE: Both inlet and secondary return connections should be fitted with full bore isolation valves at point of installation for maintenance purposes.

Secondary pipework components must be clean and free of debris and organic matter. Clean water must be used in assembly operations, and any residual water blown out and the pipework dried before filling with the secondary fluid to be used.

If load banks are to be used in commissioning and site-acceptance tests, the load banks must be clean and free of debris and organic matter. The fluid circuit can be protected by use of:

1. A filter appropriate to the intended use (refer to the ITE cooling system manufacturer for further advice).
2. An external heat exchanger to separate the load bank circuit from the secondary pipework

Threaded joints must not be sealed with polytetrafluoroethylene tape as particles from the tape may enter the fluid stream and cause clogging. Instead, a thread sealant must be used to seal threaded fittings.

Overhead secondary field piping should be fitted by the installer with high point air vents to remove air during filing and commissioning. These may be manual or automatic style vents. Automatic vents should not be placed in lines overhead of cabinets containing sensitive electronics or other electrical equipment.

4.9 Wetted Materials

For fluid compatibility purposes, all component materials in both the primary and secondary circuits are listed in **Table 4.8** below and **Table 4.9** below

Table 4.8 Primary Circuit Wetted Materials

Component	Materials
Hygienic fittings	316 stainless steel EPDM seals
Butterfly hygienic valves	316 stainless steel, EPDM seals
Pipe work	SS304 stainless steel
Machined pipe fittings	316 stainless steel
3-way cooling valve	Brass DZR (body), stainless steel (ball and stem), with PTFE seats and EPDM (O-ring seals)
Plate heat exchanger	304 Stainless Steel, copper brazed (316 optional)
Schrader valves	Stainless steel body, stainless steel valve insert
Pressure sensors	17 4PH (630) stainless steel
Flow meter	316 stainless steel, 316 compression fitting
Filter	304 and 316 stainless steel, EPM (O-ring seals)
Drain valves	Nickel plated brass, nylon 6, EDPM (O-ring seals)

Table 4.9 Secondary Circuit Wetted Materials

Component	Materials
Hygienic fittings	316 Stainless steel, EPDM seals
Butterfly hygienic valves	316 Stainless steel, EPDM seals
Pipe work	SS304 stainless steel
Machined pipe fittings	304 stainless steel
Main pump(s)	304 stainless steel, EPDM (O-ring seals), silicon carbide/silicon carbide (mechanical seal)

Table 4.9 Secondary Circuit Wetted Materials (continued)

Component	Materials
Insert non-return valve	Acetal body and valve, EPDM (O-ring seals), stainless steel spring
Fill pump	Polyamide body, EPDM diaphragm, polypropylene collector plate
Plate heat exchanger	304 stainless steel, copper brazed
Schrader valves	Stainless steel body, stainless steel valve insert
Pressure sensors	17-4PH 630 stainless steel
Flow meter	316 stainless steel, 316 compression fitting
Filter	304 and 316 stainless steel, EPDM (O-ring seals)
Drain valves	Nickel plated brass, nylon 6, EPDM (O-ring seals)
Automatic air vent	Brass body, stainless steel spring, expanded polythene float, polyacetal vacuum breaker, polyphenylene oxide leaver/cap, NBR seals
Pressure relief valve	Nickel chrome plated body, stainless steel spring
Expansion vessel	304 stainless steel connector, EPDM membrane
Exp. vessel hose	EPDM hose, stainless steel connections
Fill quick coupler and hose	Acetal body, Buna-N seal, 316 stainless steel spring
Fill non-return valve	304 stainless steel body, NBR seal, stainless steel spring
Push-fit fittings (fill hose)	Acetal copolymer body, nitrile seal
Optical level sensor	Stainless steel and glass body, EPDM (O-ring seal)

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5 Communications

5.1 Remote Control Monitoring

The CoolChip CDU 600 provides an RS-485 and 2 off 10/100 Ethernet communication ports for external and remote monitoring and control via BMS, DCIM, and/or supercomputer control nodes.

5.2 RS-485 Port

Supported protocols:

- BACNET MSTP. Refer to [CoolChip CDU 600 BACnet Object List](#) on page 31 for further details.
- MODBUS RTU. Refer [CoolChip CDU 600 MODBUS Register Table](#) on page 35 for further details.

5.3 10/100 Ethernet Ports

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

- Simple Network Management Protocol (SNMPv2/3)
- HTTPs (web server)
- SSH Console (command line transfer)
- SFTP (secure file transfer)
- MODBUS IP
- BACnet IP
- NTP (network time protocol)

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

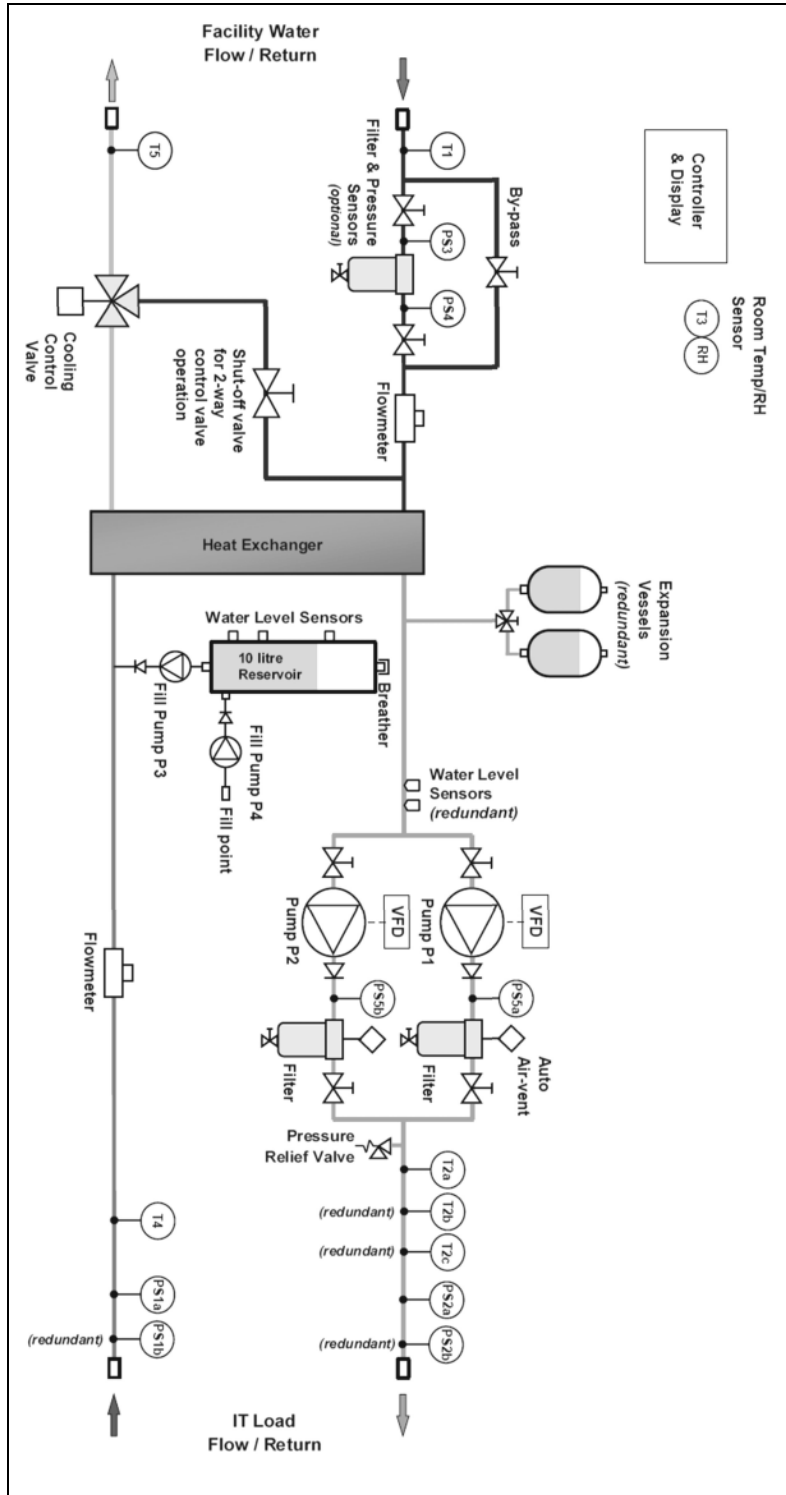
3108 Gloucester Road, Wanchai

Hong Kong

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Appendix B: Piping Schematic

Figure B.1 Piping Schematic



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Appendix C: CoolChip CDU 600 BACnet Object List

Table C.1 Binary Values

Instance Number	Object Name
200	Unit Common Alarm
201	Alarm A01: T1 Temperature Sensor Fault
202	Alarm A02: T2a Temperature Sensor Fault
203	Alarm A03: T2b Temperature Sensor Fault
204	Alarm A04: T2c Temperature Sensor Fault
205	Alarm A05: T3 Temperature Sensor Fault
206	Alarm A06: T4 Temperature Sensor Fault
207	Alarm A07: T5 Temperature Sensor Fault
208	Alarm A08: RH Relative Humidity Sensor Fault
209	Alarm A09: PS1a Pressure Sensor Fault
210	Alarm A10: PS1b Pressure Sensor Fault
211	Alarm A11: PS2a Pressure Sensor Fault
212	Alarm A12: PS2b Pressure Sensor Fault
213	Alarm A13: PS3 Pressure Sensor Fault
214	Alarm A14: PS4 Pressure Sensor Fault
215	Alarm A15: PS5a Pressure Sensor Fault
216	Alarm A16: PS5b Pressure Sensor Fault
217	Alarm A17: Secondary Flow Meter Sensor Fault
218	Alarm A18: Primary Flow Meter Sensor Fault
219	Alarm A19: microSD Card Fault
220	Alarm A20: P1 Inverter Fault
221	Alarm A21: Inverter 1 Communications Error
222	Alarm A22: P1 Inverter Low Flow
223	Alarm A23: P2 Inverter Fault
224	Alarm A24: Inverter 2 Communications Error
225	Alarm A25: P2 Inverter Low Flow
226	Alarm A26: Valve Fault
227	Alarm A27: Primary Fluid Low Flow
228	Alarm A28: Primary Fluid No Flow
229	Alarm A29: Primary Filter Dirty
230	Alarm A30: Primary Fluid Low Temp

Table C.1 Binary Values (continued)

Instance Number	Object Name
231	Alarm A31: Primary Fluid High Temp
232	Alarm A32: Secondary Fluid Low Temp
233	Alarm A33: Secondary Fluid High Temp
234	Alarm A34: Leak - Unit
235	Alarm A35: Leak - Under floor
236	Alarm A36: PS1 Difference Out Of Limits
237	Alarm A37: PS2 Difference Out Of Limits
238	Alarm A38: Secondary Over Pressure
239	Alarm A39: System Low Pressure
240	Alarm A40: Insufficient Fluid Level
241	Alarm A41: Level Sensor – No Fluid Detected
242	Alarm A42: Illegal Fluid Sensor Condition
243	Alarm A43: Group Control Network Fault
244	Alarm A44: Group Control Insufficient Units Available
245	Alarm A45: Secondary Filter 1 Dirty
246	Alarm A46: Secondary Filter 2 Dirty
247	Alarm A47: Secondary Temperature T2a Diff Fault
248	Alarm A48: Secondary Temperature T2b Diff Fault
249	Alarm A49: Secondary Temperature T2c Diff Fault
250	Alarm A50: Reservoir Tank Fluid Required
251	Alarm A51: Reservoir Tank Empty

Table C.2 Multi-State Values

Instance Number	Object Name	Data Values
100	Unit Mode	0 = Not Configured 1 = Tank Filling 2 = Shutdown—Network 3 = Full Manual Control 4 = Standby 5 = Online (Running) 6 = Online (Filling) 7 = Filling 8 = Shutdown—Fault 9 = Group Standby
101	Group Control Mode	0 = Standalone 1 = Primary 2 = Secondary 3 = Independent (due to network fault)
102	Automatic Transfer Switch (ATS) Status	0 = No ATS 1 = On A, B Available 2 = On A, B Not Available 3 = On B (A Not Available)

Table C.3 Analogue Values¹

Instance Number	Object Name	Units	Access
0	Pump 1 Speed	%	RO
1	Pump 2 Speed	%	RO
2	Cooling Demand	%	RO
3	Control Valve Demand	%	RO
4	Control Valve Feedback	%	RO
5	Primary Supply Temperature T1	°C/°F	RO
6	Secondary Supply Temperature T2a	°C/°F	RO
7	Secondary Supply Temperature T2b	°C/°F	RO
8	Secondary Supply Temperature T2c	°C/°F	RO
9	Secondary Supply Temperature T2	°C/°F	RO
10	Room Temperature T3	°C/°F	RO
11	Room Relative Humidity RH	°C/°F	RO
12	Dew Point DW	°C/°F	RO
13	Secondary Return Temperature T4	°C/°F	RO
14	Primary Return Temperature T5	°C/°F	RO

Table C.3 Analogue Values¹ (continued)

Instance Number	Object Name	Units	Access
15	Secondary Return Pressure PS1a	bar/psi	RO
16	Secondary Return Pressure PS1b	bar/psi	RO
17	Secondary Return Pressure PS1	bar/psi	RO
18	Secondary Supply Pressure PS2a	bar/psi	RO
19	Secondary Supply Pressure PS2b	bar/psi	RO
20	Secondary Supply Pressure PS2	bar/psi	RO
21	Secondary Differential Pressure (PS2 – PS1)	bar/psi	RO
22	Primary Filter Inlet Pressure PS3	bar/psi	RO
23	Primary Filter Outlet Pressure PS4	bar/psi	RO
24	Primary Filter Differential Pressure (PS3 – PS4)	bar/psi	RO
25	Primary Flow Rate	lpm /US gpm	RO
26	Secondary Flow Rate	lpm /US gpm	RO
27	Secondary Duty	kW	RO
28	Primary Duty	kW	RO
29	Temperature Setpoint	°C/°F	RO
30	Secondary Filter 1 Inlet Pressure PS5a	bar/psi	RO
31	Secondary Filter 2 Inlet Pressure PS5b	bar/psi	RO
32	Secondary Filter 1 Differential Pressure (PS5a – PS2)	bar/psi	RO
33	Secondary Filter 2 Differential Pressure (PS5b – PS2)	bar/psi	RO
34	System (Group) Average Secondary Differential Pressure	bar/psi	RO
35	System (Group) Total Secondary Flow Rate	lpm /US gpm	RO
36	Pump 1 Input Power	kW	RO
37	Pump 2 Input Power	kW	RO
38	Number of Active Alarms	—	RO
39	P301 Cooling Setpoint	°C/°F	RW
40	P203 DP Setpoint	bar/psi	RW
41	P202 Flow Setpoint	lpm /US gpm	RW

¹Notes:

- Units of measurement (SI or Imperial) are configurable via Setup --> MODBUS and BACnet --> BACnet --> P079 Units.
- Access: RO: Read Only, RW: Read Write

Appendix D: CoolChip CDU 600 MODBUS Register Table

Table D.1 Discrete Inputs

Instance Number	Object Name	CoolChip CDU 600 Alarm Code
1	Common Alarm	—
2	Alarm : T1 Temperature Sensor Fault	A01
3	Alarm : T2a Temperature Sensor Fault	A02
4	Alarm : T2b Temperature Sensor Fault	A03
5	Alarm : T2c Temperature Sensor Fault	A04
6	Alarm : T3 Temperature Sensor Fault	A05
7	Alarm : T4 Temperature Sensor Fault	A06
8	Alarm : T5 Temperature Sensor Fault	A07
9	Alarm : RH Relative Humidity Sensor Fault	A08
10	Alarm : PS1a Pressure Sensor Fault	A09
11	Alarm : PS1b Pressure Sensor Fault	A10
12	Alarm : PS2a Pressure Sensor Fault	A11
13	Alarm : PS2b Pressure Sensor Fault	A12
14	Alarm : PS3 Pressure Sensor Fault	A13
15	Alarm : PS4 Pressure Sensor Fault	A14
16	Alarm : PS5a Pressure Sensor Fault	A15
17	Alarm : PS5b Pressure Sensor Fault	A16
18	Alarm : Secondary Flow Meter Sensor Fault	A17
19	Alarm : Primary Flow Meter Sensor Fault	A18
20	Alarm : microSD Card Fault	A19
21	Alarm : P1 Inverter Fault	A20
22	Alarm : Inverter 1 Communications Error	A21
23	Alarm : P1 Inverter Low Flow	A22
24	Alarm : P2 Inverter Fault	A23
25	Alarm : Inverter 2 Communications Error	A24
26	Alarm : P2 Inverter Low Flow	A25
27	Alarm : Valve Fault	A26
28	Alarm : Primary Fluid Low Flow	A27
29	Alarm : Primary Fluid No Flow	A28
30	Alarm : Primary Filter Dirty	A29
31	Alarm : Primary Fluid Low Temp	A30

Table D.1 Discrete Inputs (continued)

Instance Number	Object Name	CoolChip CDU 600 Alarm Code
32	Alarm : Primary Fluid High Temp	A31
33	Alarm : Secondary Fluid Low Temp	A32
34	Alarm : Secondary Fluid High Temp	A33
35	Alarm : Leak - Unit	A34
36	Alarm : Leak - Under Floor	A35
37	Alarm : PS1 Difference Out Of Limits	A36
38	Alarm : PS2 Difference Out Of Limits	A37
39	Alarm : Secondary Over Pressure	A38
40	Alarm : System Low Pressure	A39
41	Alarm : Insufficient Fluid Level	A40
42	Alarm : Level Sensor – No Fluid Detected	A41
43	Alarm : Illegal Fluid Sensor Condition	A42
44	Alarm : Group Control Network Fault	A43
45	Alarm : Group Control Insufficient Units Available	A44
46	Alarm : Secondary Filter 1 Dirty	A45
47	Alarm : Secondary Filter 2 Dirty	A46
48	Alarm : Secondary Temperature T2a Diff Fault	A47
49	Alarm : Secondary Temperature T2b Diff Fault	A48
50	Alarm : Secondary Temperature T2c Diff Fault	A49
51	Alarm : Reservoir Tank Fluid Required	A50
52	Alarm: Reservoir Tank Empty	A51
53 ¹	Alarm: Auxiliary Input Module Communications Fault	A52
54 ¹	Alarm: Secondary Fluid Quality – Turbidity Sensor Fault	A53
55 ¹	Alarm: Secondary Fluid Quality – PH Sensor Fault	A54
56 ¹	Alarm: Secondary Fluid Quality – Conductivity Sensor Fault	A55
57 ¹	Alarm: Secondary Fluid Quality – Turbidity Out of Limits	A56
58 ¹	Alarm: Secondary Fluid Quality – PH Out of Limits	A57
59 ¹	Alarm: Secondary Fluid Quality – Conductivity Out of Limits	A58
Access to the Discrete Inputs table is provided by the MODBUS function code 02 — Read Input Status.		
1. Available on firmware versions 2.0 and above.		

Table D.2 Input Registers

Register Number	Description	Units	Scaling	Data Type
1	Mode: 0 = Not Configured 1 = Tank Filling 2 = Shutdown—Network 3 = Full Manual Control 4 = Standby 5 = Online (Running) 6 = Online (Filling) 7 = Filling 8 = Shutdown—Fault 9 = Group Standby	n/a	1	Unsigned
2	Group Control Mode: 0 = Standalone 1 = Primary 2 = Secondary 3 = Independent (due to network falt)	n/a	1	Unsigned
3	Pump 1 Speed	%	1	Unsigned
4	Pump 2 Speed	%	1	Unsigned
5	Cooling Demand	%	1	Unsigned
6	Control Valve (Cooling) Demand	%	1	Unsigned
7	Control Valve Feedback	%	1	Unsigned
8	Primary Supply Temperature T1	°C	0.1	Signed
9	Secondary Supply Temperature T2a	°C	0.1	Signed
10	Secondary Supply Temperature T2b	°C	0.1	Signed
11	Secondary Supply Temperature T2c	°C	0.1	Signed
12	Secondary Supply Temperature T2	°C	0.1	Signed
13	Room Temperature T3	°C	0.1	Signed
14	Room Relative Humidity RH	% RH	0.1	Unsigned
15	Dew Point DW	°C	0.1	Signed
16	Secondary Return Temperature T4	°C	0.1	Signed
17	Primary Return Temperature T5	°C	0.1	Signed
18	Secondary Return Pressure PS1a	bar	0.01	Signed
19	Secondary Return Pressure PS1b	bar	0.01	Signed
20	Secondary Return Pressure PS1	bar	0.01	Signed

Table D.2 Input Registers (continued)

Register Number	Description	Units	Scaling	Data Type
21	Secondary Supply Pressure PS2a	bar	0.01	Signed
22	Secondary Supply Pressure PS2b	bar	0.01	Signed
23	Secondary Supply Pressure PS2	bar	0.01	Signed
24	Secondary Differential Pressure (PS2 – PS1)	bar	0.01	Signed
25	Primary Filter Inlet Pressure PS3	bar	0.01	Signed
26	Primary Filter Outlet Pressure PS4	bar	0.01	Signed
27	Primary Filter Differential Pressure (PS3 – PS4)	bar	0.01	Signed
28	Primary Flow Rate	l/m	1	Unsigned
29	Secondary Flow Rate	l/m	1	Unsigned
30	Secondary Duty	kW	1	Unsigned
31	Temperature Setpoint	°C	0.1	Signed
32	Pump P1 Runtime	hours	1	Unsigned
33	Pump P2 Runtime	hours	1	Unsigned
34	Secondary Filter 1 Inlet Pressure PS5a	bar	0.01	Signed
35	Secondary Filter 2 Inlet Pressure PS5b	bar	0.01	Signed
36	Secondary Filter 1 Differential Pressure (PS5a – PS2)	bar	0.01	Signed
37	Secondary Filter 2 Differential Pressure (PS5b – PS2)	bar	0.01	Signed
38	Controller Software Version Number Format is x.yy: where x = major version number, yy = minor version number	n/a	0.01	Unsigned
39	Controller Up Time	min	1	Unsigned
40	System (Group) Average Secondary Differential Pressure	bar	0.01	Signed
41	System (Group) Total Secondary Flow Rate	l/m	1	Unsigned
42	Primary Duty	kW	1	Unsigned
43	Pump 1 Input Power	kW	0.1	Unsigned
44	Pump 2 Input Power	kW	0.1	Unsigned
45	Automatic Transfer Switch (ATS) Status 0 = no ATS 1 = On A, B available 2 = On A, B not available 3 = On B (A not available)	n/a	1	Unsigned
46 ²	Secondary fluid quality -- turbidity	NTU	1	Unsigned

Table D.2 Input Registers (continued)

Register Number	Description	Units	Scaling	Data Type
47 ²	Second Fluid Quality -- PH	PH	0.01	Unsigned
48 ²	Secondary Fluid Qualityh -- Conductivity	uS/cm	1	Unsigned

Access to the Input Register table is provided by MODBUS function code 04 – Read Input Registers.

² Available on firmware versions 2.0 and above.

Table D.3 Coils

Register Number	Description
1	Remote Shutdown <ul style="list-style-type: none"> To switch on the CDU write OFF. To switch off the CDU write ON.

- By default, the coil table is read-only.
- Read-write access may be enabled via P072 Write Access parameter, accessible via the touchscreen UI.
- Read access to the Coil table is provided by MODBUS function code 01 – Read Coil Status.
- Write access to the Coil table is provided by MODBUS function code 05 – Write Single Coil.

Table D.4 Holding Registers

Register Number	Description	Units	Scaling	Data Type
1 ²	Secondary Temperature Setpoint (P301)	°C	0.1	Unsigned
2 ²	Secondary DP Setpoint (P203)	bar	0.1	Unsigned
3 ²	Secondary Flow Setpoint (P202)	l/m	1	Unsigned

² Available on firmware versions 2.5 and above.

By default, the holding register table is read-only. Read-write access may be enabled via the P072 Write Access parameter, accessible via the touchscreen UI.

Read access to the Holding Register table is provided by MODBUS function code 03 – Read Holding Registers.

For write access, MODBUS function code 06 - Preset Single Register is supported.

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Appendix F: 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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