VRC Self-Contained Rack Cooler

User Manual

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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/ or https://www.vertiv.com/en-emea/support/ for additional assistance.

TABLE OF CONTENTS

1 Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Vertiv™ VRC self-contained rack cooler. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should move, install or service this equipment. Any operation that requires opening doors or equipment panels must be carried out only by properly trained and qualified personnel.

Adhere to all warnings, cautions, notices and installation, operating and safety instructions on the unit and in this manual. Follow all installation, operation and maintenance instructions and all applicable national and local building, electrical and plumbing codes.

To identify the unit model and serial number for assistance or spare parts, locate the identification label on the unit. A warning label on the front and back panels reminds users that:

- the unit restarts automatically.
- the main switch must be opened before opening the internal compartments for any operation.

WARNING! Only trained and qualified personnel must be allowed to install, maintain, and operate the unit.

WARNING! The sharp edges, sharp angles of the object, and bare buckle can result in severe 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.

WARNING! Risk of unit falling over. Improper handling can cause equipment damage, injury or death. Read all the guidelines pertaining to the system before unpacking, moving, lifting or installing the components. Read the labels on the unit carefully to understand the safety measures prior to handling the containment.

WARNING! Risk of electric shock. Can cause injury or death. Open all local and remote electric power-supply disconnect switches and verify that power is Off with a voltmeter before working within the condensate pump electrical connection enclosure. The Liebert® 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 Liebert® controller.

WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA- approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "Unit Off" mode of the controller. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.

WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and 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! Do not power on the unit until authorized technical personnel have confirmed that the unit connections are correct.

WARNING! Risk of improper wire sizing/rating and loose electrical connections. Can cause overheated wire and electrical connection terminals resulting in smoke, fire, equipment and building damage, injury or death. 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! During the operation of the precision air conditioner, very high voltage may be present in the equipment. Adhere to all of the notes and warnings marked on the equipment or contained in this manual, which may otherwise lead to an injury or fatality.

WARNING! Only qualified maintenance personnel can operate and handle the equipment. All maintenance and operation must follow the local laws, especially the regulations about the electric power, refrigeration, and production.

WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly.

WARNING! Risk of hair, clothing and jewelry entanglement with high speed rotating fan blades. Can cause equipment damage, serious injury or death. Keep hair, jewelry and loose clothing secured and away from rotating fan blades during unit operation.

WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death. 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 contact with extremely hot and/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 within 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.

WARNING! Certain circuits carry lethal voltages. Only professional technicians are allowed to maintain the unit. Extra precautions should be taken when troubleshooting a live unit. Be particularly careful troubleshooting with the unit's power switched on.

WARNING! If jumpers are used for troubleshooting, make sure to remove the jumpers after troubleshooting. If the connected jumpers are not removed, they may bypass certain control functions causing damage to the equipment.

CAUTION: The center of gravity of the unit is inclined, therefore, when moving the unit adjust the bearing position of the forklift or hand pallet truck.

CAUTION: Comply with the manufacturer's instructions before and during maintenance. Failure to observe this will result in the warranty becoming void. Adherence to the safety instructions is mandatory to ensure personnel safety and prevent any environmental impact apart from equipment damage. Unsuitable components will impede equipment performance and may cause equipment shutdown. Therefore, Vertiv recommends the use of Vertiv OEM or Vertiv-approved components.

CAUTION: Switch off the unit and then switch off the power input during equipment maintenance. Switch off the equipment power unless the testing devices need power.

CAUTION: Avoid touching or having skin contact with the residual gas and oils in the compressor. Wear long rubber gloves to handle contaminated parts. The air conditioning system contains refrigerant. The release of refrigerant is harmful to the environment.

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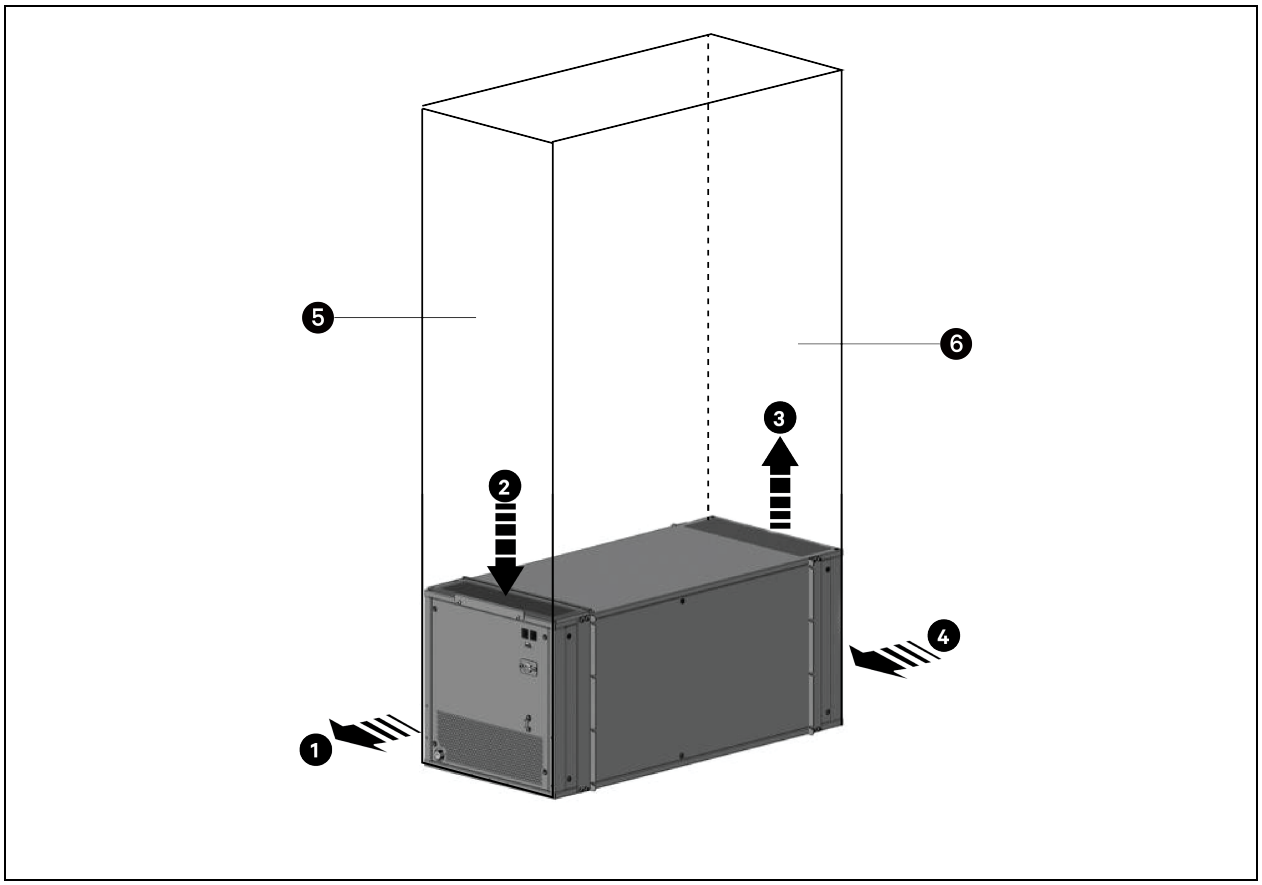
2 Product Overview

The VRC Self-Contained Rack Cooler is a compact, rack mounted precision cooling unit, integrated with the evaporator and the condensing unit. It is designed for the 19" EIA server rack and is easy to install. The cooling capacity varies from 25% to 100%, about 0.9 kW to 3.5 kW. The VRC1 series include the following models: VRC100, VRC101 and VRC102B.

Figure 2.1 Appearance of VRC Self-Contained Rack Cooler

The cooling unit is installed at the bottom of the rack, providing cold air to the servers and receiving hot air from the rear side of the rack.

Figure 2.2 Airflow of VRC Self-Contained Rack Cooler



Item	Description	Item	Description
1	Condenser air outlet	4	Condenser air inlet
2	Evaporator return air	5	Rear side of the rack
3	Evaporator supply air	6	Front side of the rack

2.1 Model Nomenclature

Table 2.1 VRC Self-contained Rack Cooler Model Number Digit Definitions

Digit	Variable	Description of Variable
1 2 3	VRC	Vertiv™ Rack Cooler
4	1, 2, 3	1 = Self Contained Cooling Module 2 = Split System Evaporator 3 = Split System Condensing Unit
5	0, 5	0 = Standard Unit 5 = Low Ambient Unit
6	0, 1, 2	0 = 120 V, 1 Ph, 60 Hz 1 = 208/230 V, 1 Ph, 60 Hz 2 = 230 V, 1Ph, 50/60 Hz
7	Blank, or B, C, ..., Z	Blank = the first version B, C, ..., Z = the further product revisions

2.2 Name Plate

Figure 2.3 Name Plate of UL Model

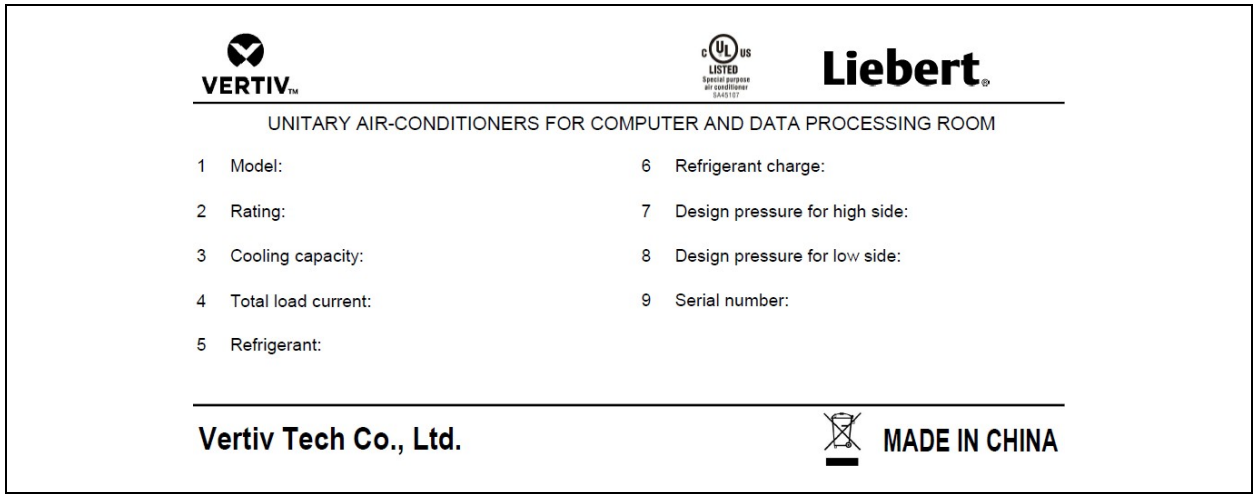
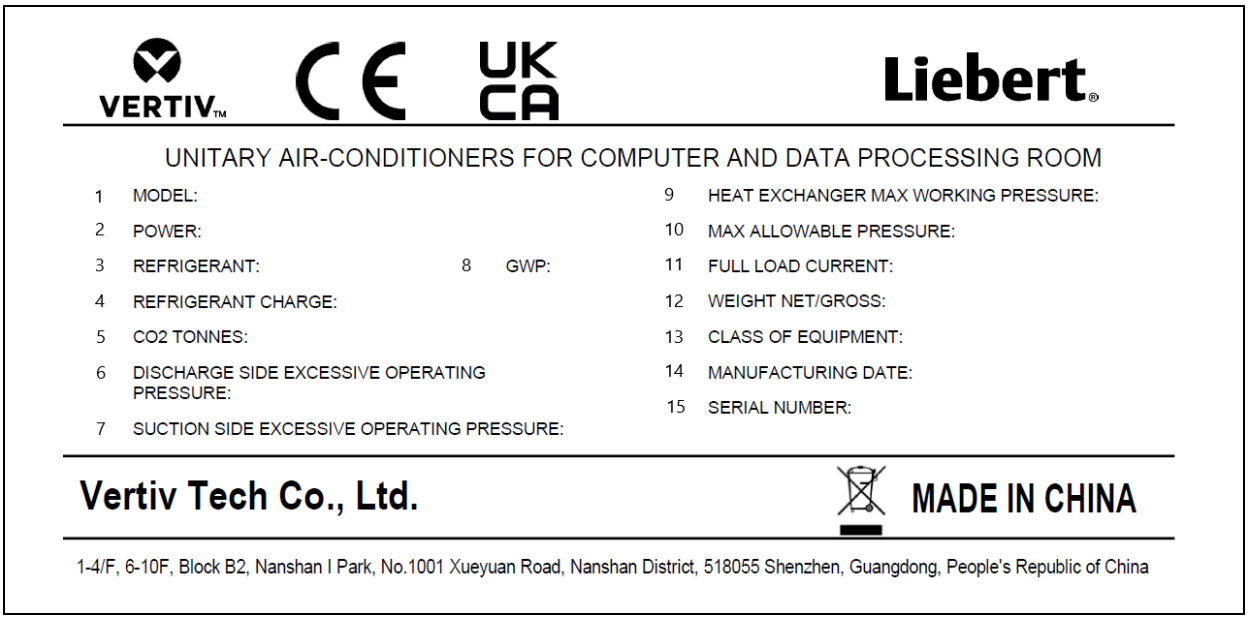


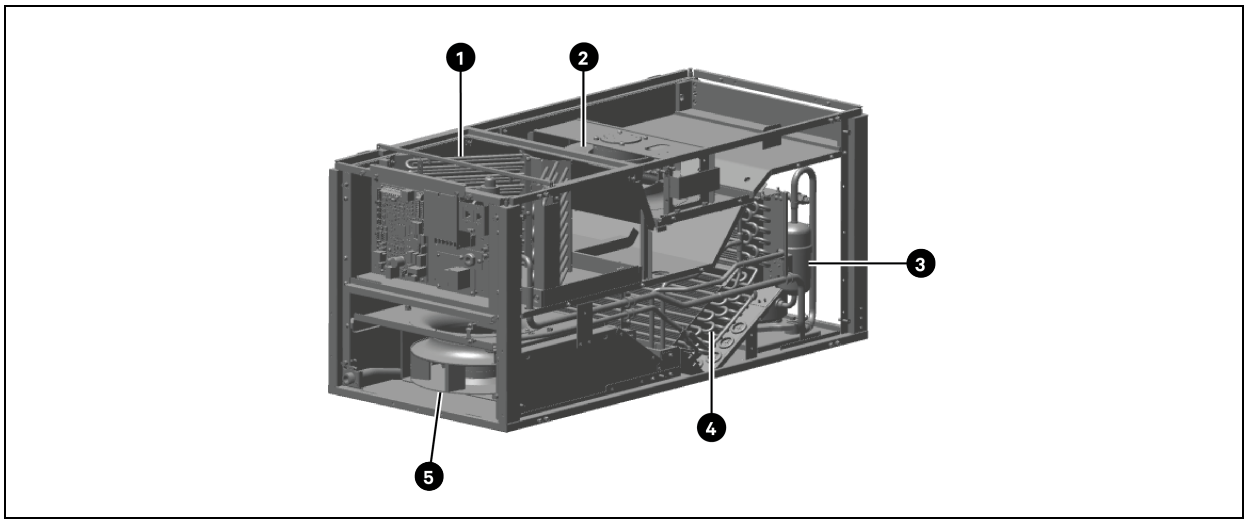
Figure 2.4 Name Plate of CE Model



2.3 Components

The major components of the cooling unit include the evaporator coil, evaporator EC fan, electronic expansion valve, compressor, condenser coil, and condenser fan.

Figure 2.5 Components



Item	Description	Item	Description
1	Evaporator	4	Condenser
2	Evaporator EC fan	5	Condenser AC fan (for VRC100 and VRC101) or condenser EC fan (for VRC102B)
3	Compressor		

2.3.1 Evaporator Coil

The V shaped evaporator coil provides maximum surface area for heat transfer. The sensible heat ratio (SHR) is higher than 0.9. The coil is made of copper tubes with aluminum fins.

2.3.2 Condensate Drain Tray

The metal condensate drain tray is placed under the coil assembly. It collects the condensate water from the coil surface.

2.3.3 Evaporator EC Fan

The evaporator EC fan delivers high airflow rates and has a smooth speed variation. It works in synchronization with all the system components to deliver precise output capacity.

Figure 2.6 Evaporator EC Fan

2.3.4 Electronic Expansion Valve

The electronic expansion valve monitors temperature and pressure signals to maintain precise adjustment of the refrigerant flow.

Figure 2.7 Electronic Expansion Valve

2.3.5 Compressor

The variable speed rotary compressor works with R410A refrigerant. It varies the cooling output capacity based on cooling demands.

Figure 2.8 Compressor

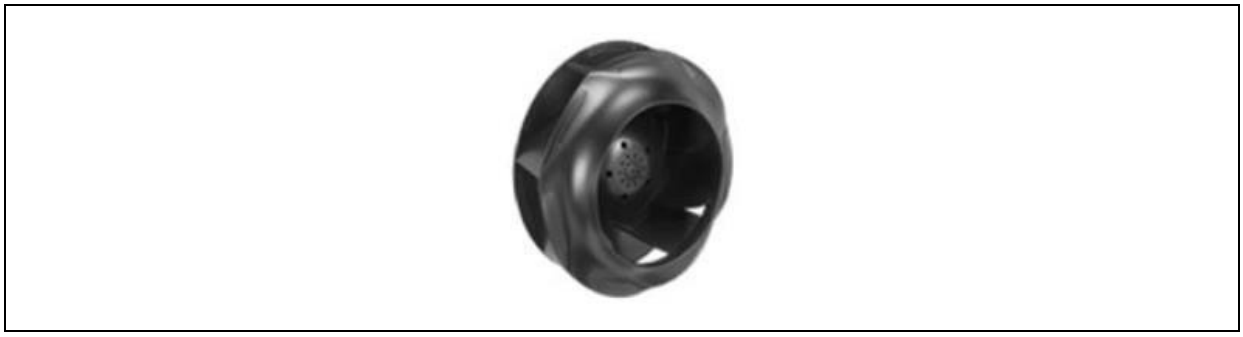
2.3.6 Condenser Coil

The L-shaped condenser coil is designed for a maximum contact area. It is made of copper tubes with aluminum fins.

2.3.7 Condenser Fan

The condenser fan varies its speed with the condensing pressure. AC fan is used for VRC100 and VRC101, and EC fan is used for VRC102B.

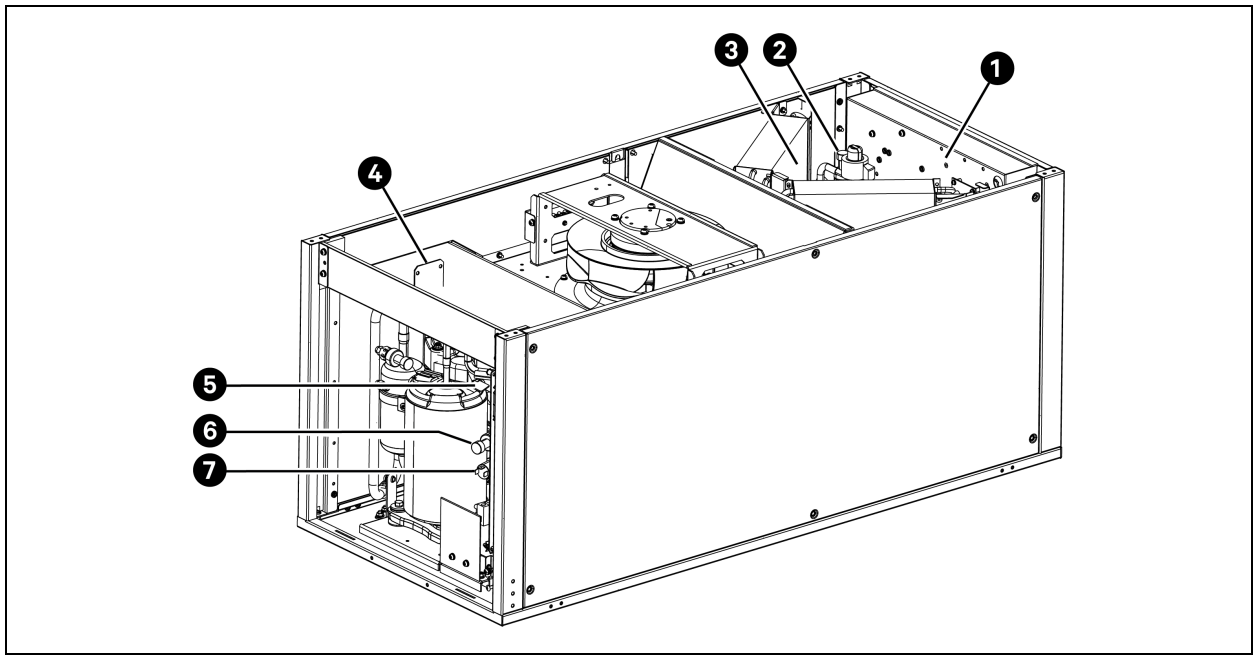
Figure 2.9 Condenser Fan



2.3.8 Sensors and Switch

The following figure shows the position of the sensors and switch in the unit.

Figure 2.10 Sensors and Switch in the Unit



Item	Description	Item	Description
1	Return air temperature sensor	5	Discharge temperature sensor
2	Low pressure transducer	6	High pressure switch
3	Suction temperature sensor	7	High pressure transducer
4	Supply air temperature sensor		

2.4 Technical Specifications

Table 2.2 Technical Specifications

Parameters	Specification		
Model	VRC100	VRC101	VRC102B
Certification	UL484	UL484	CE (EN 60335-1; EN 60335-2-40; EN 55014-1; EN 55014-2; EN 61000-3-2; EN 61000-3-3; EN 50581)
Cooling capacity kW	3.3	3.3	3.3
Air volume m3/h (CFM)	750 (441)	750 (441)	750 (441)
Maximum power input kW	1.63	1.86	1.86
Full load amperage A	16.5	13	11.5
Dimensions (without package) W x D x H mm (in.)	442 x 978 x 439 (17.4 x 38.5 x 17.28)		
Input type	Power cord (3.2 m) with NEMA 5-20P	Power cord (3.2 m) with NEMA L6-20P	IEC 60320 C20 inlet + interconnection cable (3.0 m) IEC 60320 C19 to C20

Table 2.2 Technical Specifications (continued)

Parameters	Specification		
Voltage Vac	L+N+G, 120 Vac	L1+L2+G, 208 Vac/230 Vac	L+N+PE, 230 Vac
Frequency Hz	60		50/60
Color	EG7021 (Black)		
System protection grade	IP20 (IEC 60529)		
Net weight kg (lb)	72 (158.7)		74 (163.1)
Gross weight kg (lb)	134 (295.4)		
Noise level dB(A)	< 66		

NOTE: The capacity value is measured under the following conditions: the indoor dry-bulb temperature is 35°C (95°F), the indoor wet-bulb temperature is 20.6°C (69°F), and the outdoor temperature is 35°C (95°F).

Maximum Cooling Capacity below shows the maximum cooling capacity of the unit when it is installed on the bottom of the rack.

Table 2.3 Maximum Cooling Capacity

Maximum Capacity		Temperature of Condenser Inlet Air		
		29.4 °C (85 °F)	35 °C (95 °F)	40 °C (104 °F)
Temperature of evaporator return air	29.4 °C (85 °F)	3.1 kW	2.6 kW	2.2 kW
	35 °C (95 °F)	3.4 kW	3.3 kW	2.8 kW
	40 °C (104 °F)	3.6 kW	3.5 kW	3.1 kW

Maximum Capacity		Temperature of Condenser Inlet Air		
		25 °C (77 °F)	30 °C (86 °F)	35 °C (95 °F)
Temperature of evaporator supply air	19 °C (66 °F)	3.3 kW	3.2 kW	3.1 kW
	21 °C (70 °F)	3.5 kW	3.4 kW	3.3 kW
	23 °C (73 °F)	3.6 kW	3.5 kW	3.4 kW

Minimum Cooling Capacity below shows the minimum cooling capacity of the unit when it is installed on the bottom of the rack.

Table 2.4 Minimum Cooling Capacity

Minimum Capacity		Temperature of Condenser Inlet Air		
		29.4 °C (85 °F)	35 °C (95 °F)	40 °C (104 °F)
Temperature of evaporator return air	29.4 °C (85 °F)	0.90 kW	0.88 kW	0.86 kW
	35 °C (95 °F)	0.92 kW	0.90 kW	0.88 kW
	40 °C (104 °F)	0.94 kW	0.92 kW	0.90 kW

Minimum Capacity		Temperature of Condenser Inlet Air		
		25 °C (77 °F)	30 °C (86 °F)	35 °C (95 °F)
Temperature of evaporator supply air	19 °C (66 °F)	0.89 kW	0.88 kW	0.87 kW
	21 °C (70 °F)	0.90 kW	0.89 kW	0.88 kW
	23 °C (73 °F)	0.91 kW	0.90 kW	0.89 kW

NOTE: The cooling capacity might be reduced if the unit has the heat rejection duct installed.

NOTE: The unit has two control modes: supply air control mode and return air control mode. It is recommended to use return air control mode when the unit works in an open environment, and use supply air control mode when the unit works in an enclosed cabinet.

NOTE: The supply air temperature setpoint ranges from 18 °C (64.4 °F) to 23 °C (73.4 °F). The recommended setpoint is 21 °C (69.8 °F).

NOTE: When the unit is used in an enclosed cabinet, the heat load should be evenly placed in the cabinet and the unused rack position should be covered with blank plates.

3 Pre-Installation

WARNING! Only trained and qualified personnel must be allowed to install, maintain, and operate the unit.

WARNING! The sharp edges, sharp angles of the object, and bare buckle can result in severe 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.

WARNING! Risk of unit falling over. Improper handling can cause equipment damage, injury or death. Read all the guidelines pertaining to the system before unpacking, moving, lifting or installing the components. Read the labels on the unit carefully to understand the safety measures prior to handling the containment.

CAUTION: The center of gravity of the unit is inclined, therefore, when moving the unit adjust the bearing position of the forklift or hand pallet truck.

3.1 Moving the Packaged Unit

Keep the packaged unit upright and do not place it outdoors. Transport the packaged unit with a forklift or pallet jack. When using a forklift or pallet jack, make sure that the forks (if adjustable) are spread to the widest allowable distance that is suitable for the pallet length and can fit under the pallet.

Figure 3.1 Dimensions of the Packaged Unit

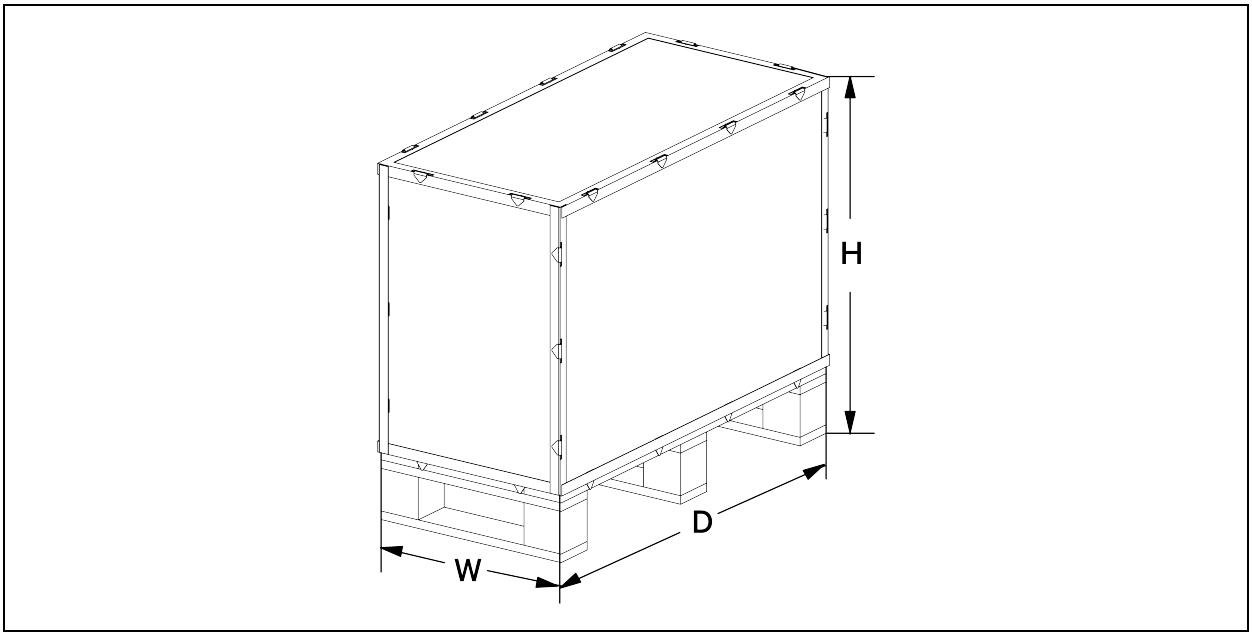
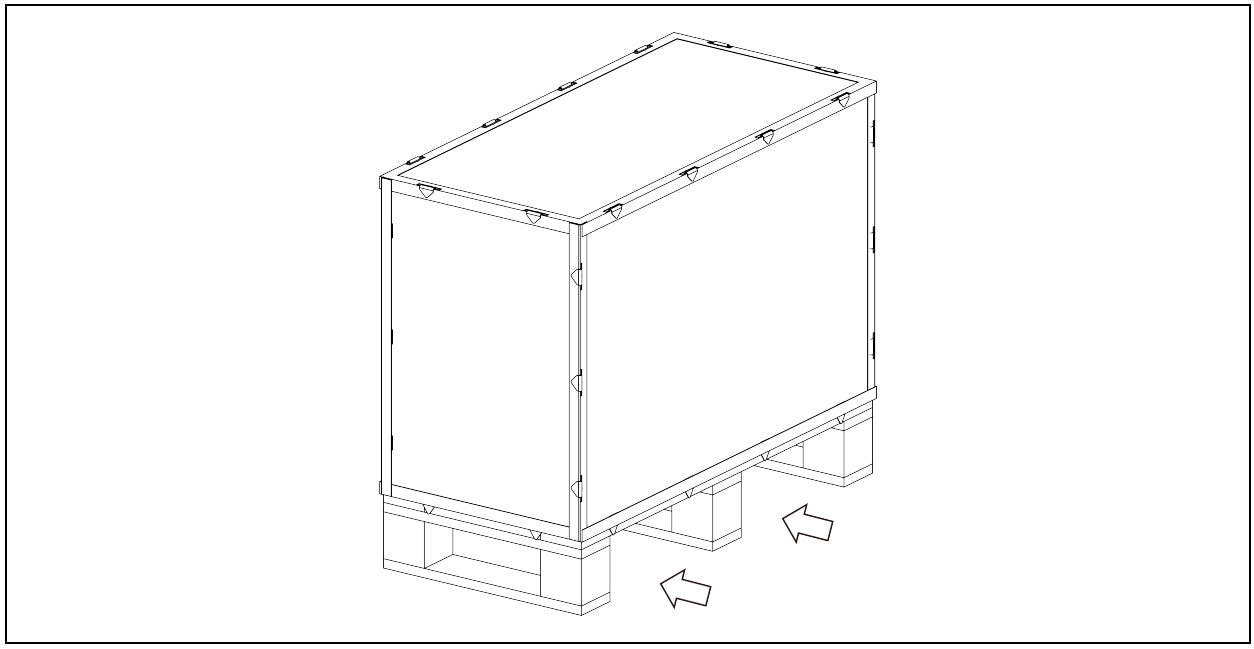


Table 3.1 Dimensions and Weight of the Packaged Unit

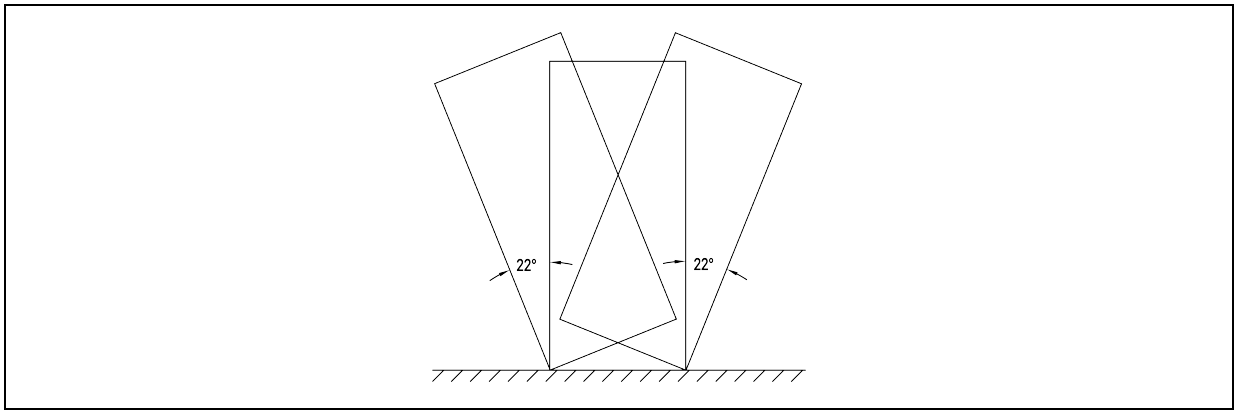
Packaging Material	Dimensions mm (in.)			Weight with Package kg (lb)
Wood case	H	W	D	
	900 (35.4)	730 (28.7)	1170 (46.1)	134 (295.4)

Figure 3.2 Inserting Forks in This Direction



When moving the packaged unit, align the fork arms with the center of gravity and do not tilt the unit more than 22 degrees any direction to prevent it from falling over.

Figure 3.3 Not Tilting the Unit More Than 22 Degrees



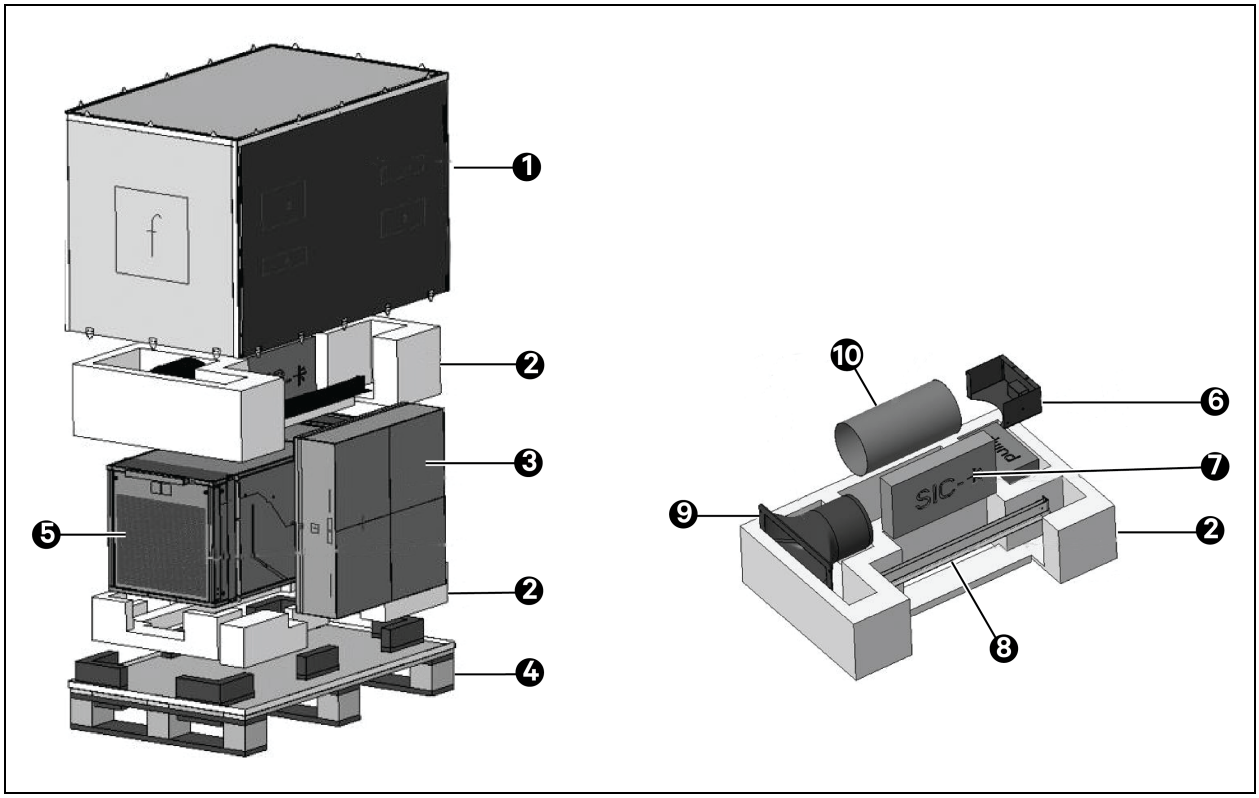
3.2 Unpacking the Unit

To unpack the unit:

1. Pull straight the latches on the wooden box using a claw hammer.

2. Remove the wooden case.
3. Put the EPE and the ceiling tile kit aside.
4. Remove the unit from the wooden pallet and place it to its installation site.

Figure 3.4 Unpacking the Unit



Item	Description	Item	Description
1	Wooden case	6	Pump bracket (pump is pre-installed)
2	EPE	7	SIC card
3	Ceiling tile kit	8	L-shape mounting rail
4	Wooden pallet	9	Transition part
5	VRC self-contained rack cooler	10	Duct

NOTE: Packing materials of the unit are recyclable. Retain the packing materials for further use or dispose them appropriately according to local and national codes and regulations.

Table 3.2 Accessories

Item		Quantity
Ceiling tile kit	Ceiling tile	1
	Ceiling filter	1
Drainage kit	Condensate pump kit	1
	Condensate pump bracket	1
	Condensate water pipe (7.5 m (24.6 ft))	1

Table 3.2 Accessories (continued)

Item		Quantity
Display kit	Display	1
	Display cable (10 m (32.8 ft))	1
	Display cable (0.5 m (1.6 ft))	1
Fittings	M6 cage nut	20
	M5 x 12 Torx center screw	10
	M5 x 12 Torx pan head screw	10
	M6 x 12 Torx pan head screw	20
	Contact washer for M5 x 12 pan head screw	10
Transition part		1
Flex duct (3.8 m (12.5 ft))		1
Duct clamp		2
L-shape mounting rail kit		2
SIC card kit		1
Evaporator filter		1
Cable tie 100 x 2.5		5
USB converter cable		1
Lifting strap		2
IEC 60320 C19 to C20 interconnection cable (3.0 m (9.8 ft)) (for VRC102B only)		1
User manual		1

Figure 3.5 Fittings

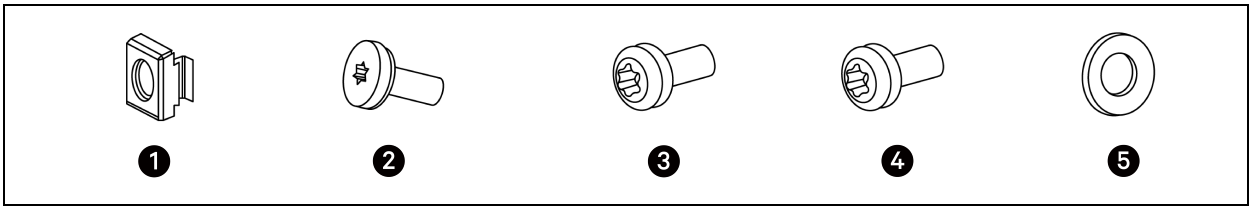


Table 3.3 Fittings

Item	Description	Usage	Quantity
1	M6 cage nut	Used with M6 pan head screws to tighten pillars	20
2	M5 center screw	Used to fasten the L-shape rails	10
3	M5 pan head screw	Used to fasten the transition part	10
4	M6 pan head screw	Used to install the unit	20
5	Contact washer	Used together with the M5 pan head screw	10

3.3 Customer-Prepared Materials

Circuit breakers should be prepared by customers. Choose the circuit breakers by referring to the full load amperage listed in Technical Specifications on page 10 .

3.4 Environment Requirements

Note the following when placing the unit:

- Choose a location far away from flame or any heat source.
- Avoid direct sun light, erosive gases, and organic solvents.
- Avoid narrow areas which can affect the airflow.
- Do not install the unit in an outdoor environment.
- Install the unit in racks with good thermal insulation. Install blanking panels in unoccupied U spaces to avoid hot air recirculation.

3.4.1 Operating Environment

The operating environment requirements for the unit are specified in Table 3.4 below

Table 3.4 Operating Environment

Item	Requirements
Ambient temperature	Indoor: 18 °C to 40 °C (64.4 °F to 104 °F) Heat rejection air: 0 °C to 40°C (32 °F to 104 °F)
Ambient humidity	17% to 60%
Altitude	<1000 m (3,280 ft.). For every 1000 m (3,280 ft.) increase in elevation, the evaporation temperature drops by 0.5 °C (0.9 °F) and the net cooling capacity drops by 7%

3.4.2 Storage Environment

The storage environment requirements for the unit are specified in Table 3.5 below .

Table 3.5 Storage Environment

Item	Requirements
Storage environment	Clean (without dust)
Ambient humidity	< 95% RH @40 °C (104 °F)
Ambient temperature	-40 °C to 70 °C (-40 °F to 158 °F)
Storage time	The total shipment and storage time should not exceed six months. Otherwise, the performance needs to be re-calibrated

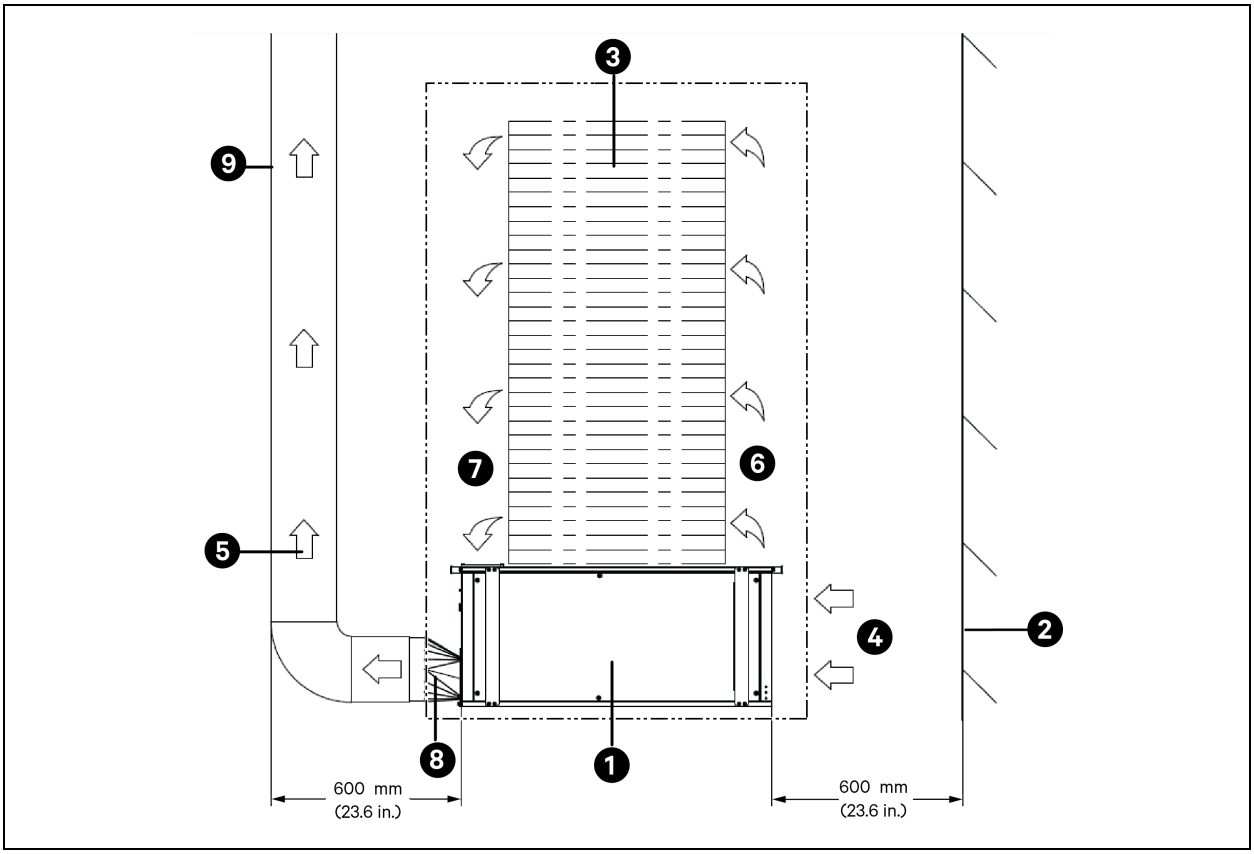
3.4.3 Installation and Maintenance Space Requirement

It is recommended to install the unit inside the rack at the bottom U space. To install and maintain the unit, the distance from the front door of the rack to the wall or to other obstacles must be greater than 1050 mm (41.3 in.).

3.4.4 Condenser Airflow Space Requirement

To leave sufficient space for the inlet and outlet of condenser air, the space in front of and behind the unit should be equal to or larger than 600 mm (23.6 in.).

Figure 3.6 Condenser Airflow Space Requirement



Item	Description	Item	Description
1	VRC self-contained rack cooler	6	Cold air from evaporator to servers
2	Wall	7	Hot air from servers to evaporator
3	Servers in the rack	8	Transition part
4	Condenser air inlet	9	Flexible duct
5	Condenser air outlet		

3.5 Inspection

Inspect the unit before installation.

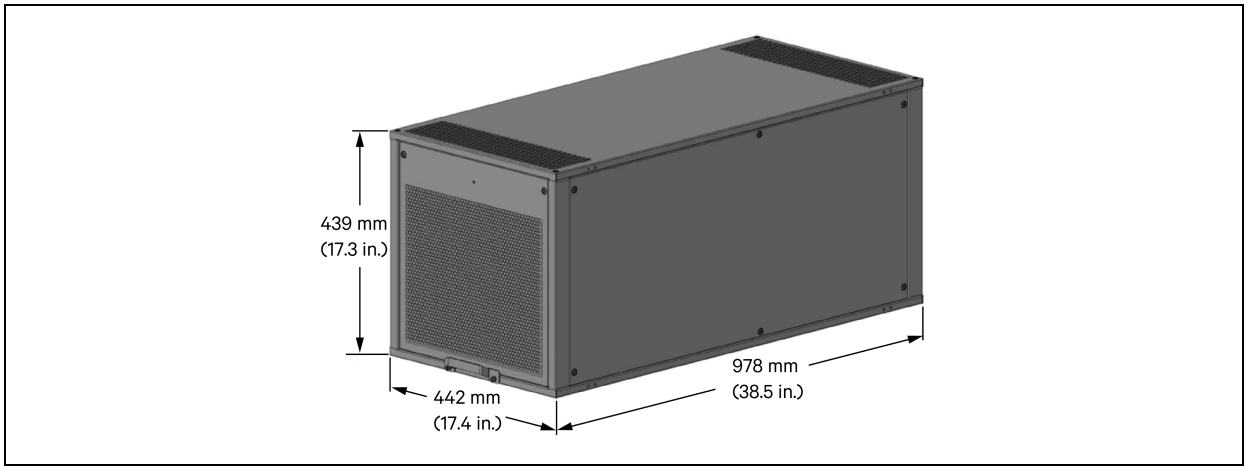
- The unit is pre-charged with refrigerant and lubricating oil. Check that there is no refrigerant leak or oil leak.
- Check against the packing list. Immediately report any missing or damaged parts to the carrier.

4 Mechanical Installation

4.1 Unit Dimensions and Overall View

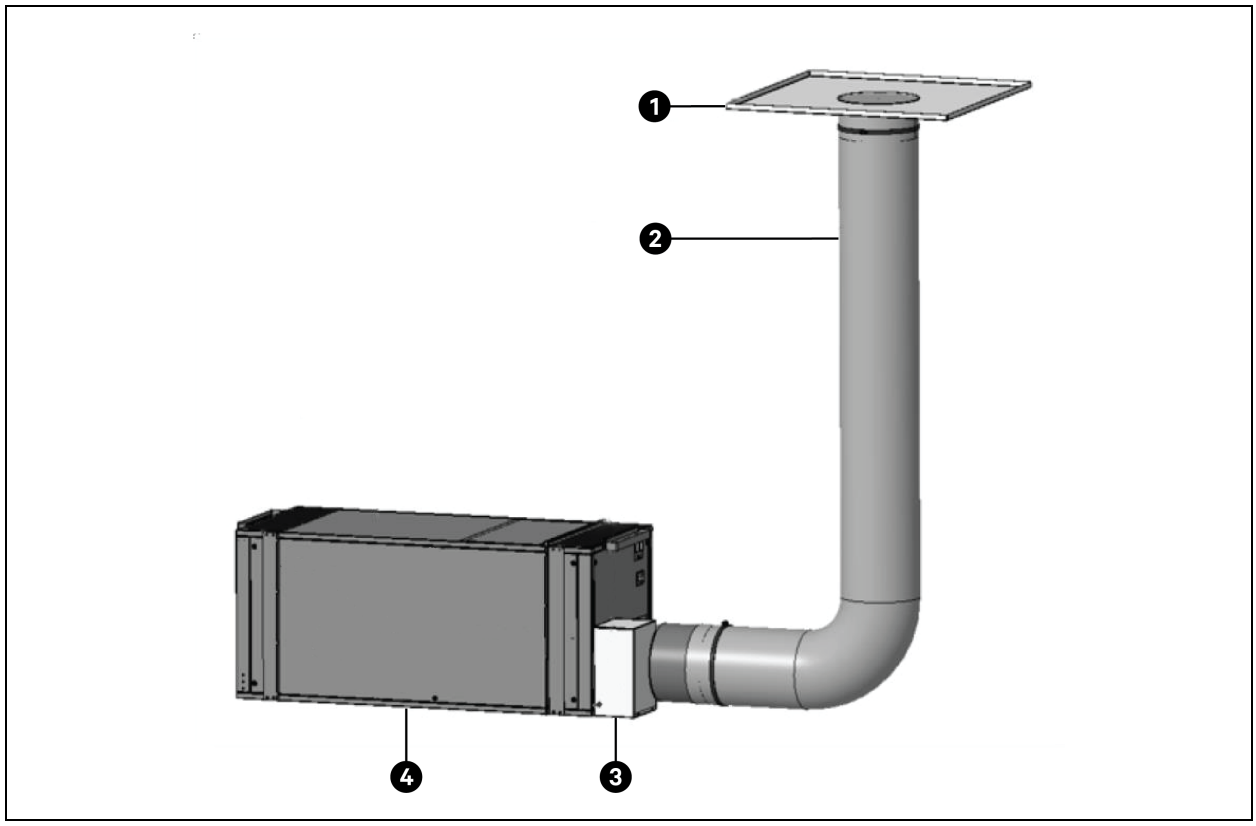
The dimensions of the unit are shown in Figure 4.1 below .

Figure 4.1 Unit Dimensions



The overall view of the unit is depicted in Figure 4.2 on the next page . The hot air generated by condenser is discharged through the transition part and the duct to the ceiling. The condensate water is drained by the pump.

Figure 4.2 Overall View of the Unit



Item	Description	Item	Description
1	Ceiling tile unit	3	Condensate pump
2	Flex duct maximum length = 3.8 m (12.5 ft)	4	VRC self-contained rack cooler

4.2 Installing the Unit in the Rack

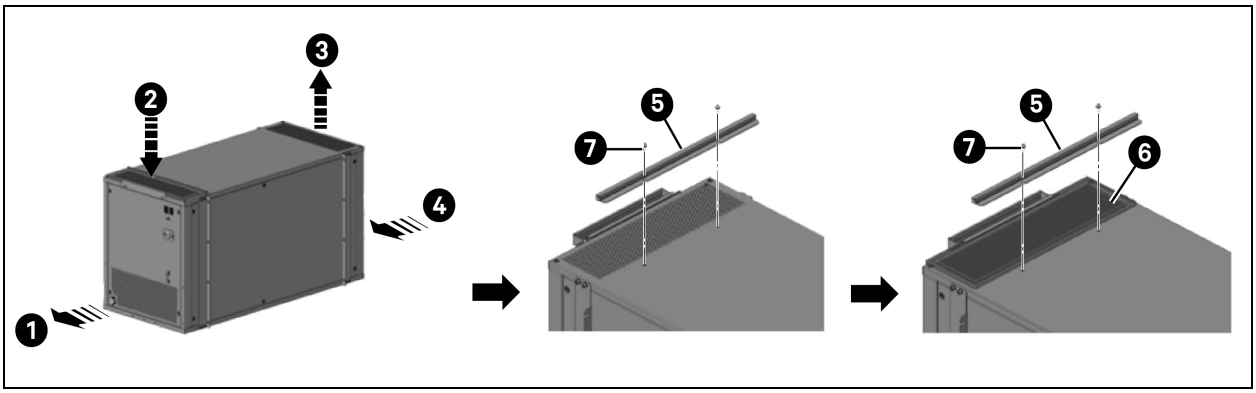
The installation process includes mounting the unit in the rack, installing accessories, installing the condensate pump, and connecting the duct.

4.2.1 Mounting the Unit in the Rack

Before mounting the unit in the rack, you need to install the evaporator filter. To install the filter:

1. Loosen the screws and remove the bracket.
2. Place the filter on the evaporator return air side.
3. Install the bracket on the filter with the screws removed from the first step.

Figure 4.3 Installing the Evaporator Filter



Item	Description	Item	Description
1	Condenser air outlet	5	Bracket
2	Evaporator return air	6	Filter
3	Evaporator supply air	7	Screw
4	Condenser air inlet		

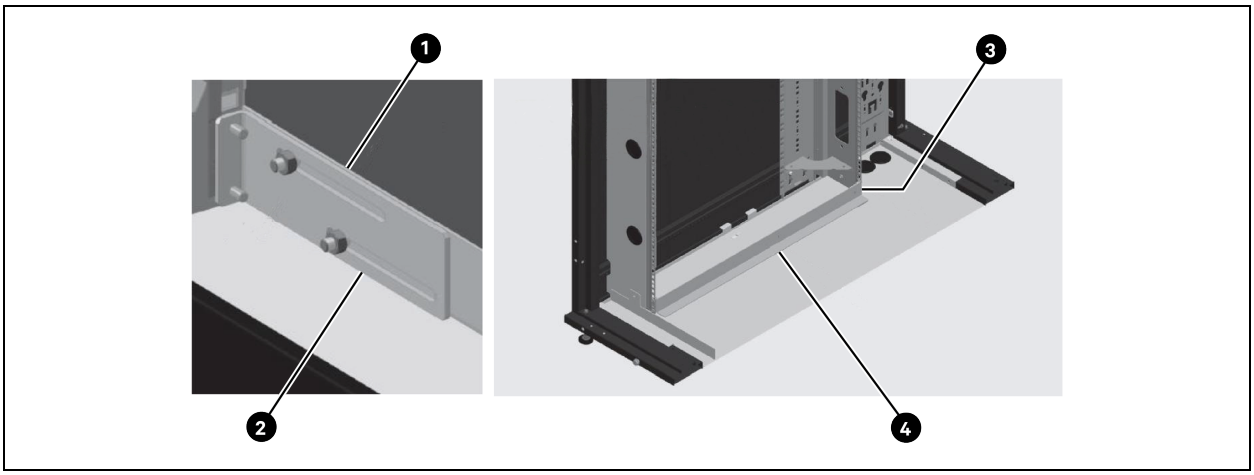
To mount the unit in a 4-post rack:

NOTE: To mount the unit in a 2-post rack, you need to purchase the accessory 2POSTRMKITVRC.

1. Install two L-shaped rails in the rack.

   Each L-shape rail consists of a long front rail and a slotted rear bracket. The flanges of each of the front rails should be on the bottom and pointing toward the center of the rack. Slip the slots in the rear rail bracket over the pressed studs in the front rail part. Loosely fasten with nuts. Fasten the ends of the front rails and rear brackets to the uprights using center screws M5x12 T20. Torque = 4.0 Nm (2.95 lb-ft). Once in place, tighten the nuts on the front rail part studs. Torque = 5.6 Nm (4.13 lb-ft).

Figure 4.4 Installing L-shaped Rails



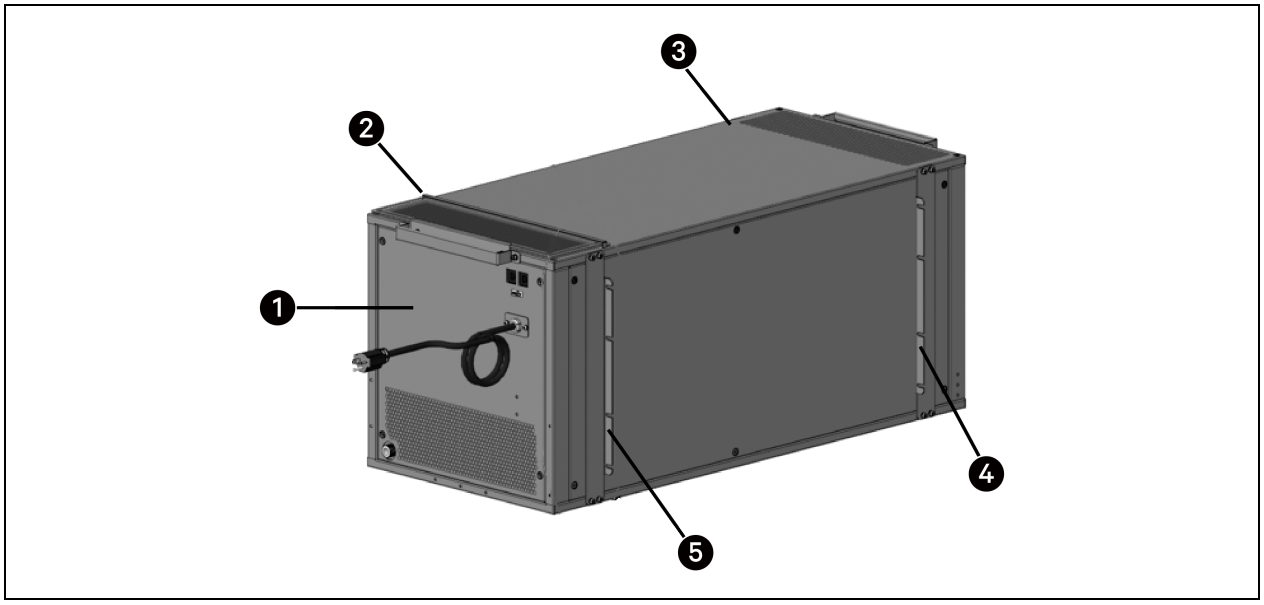
Item	Description		
1	Front rail part	3	VRC rear left bracket
2	Slotted rear bracket	4	VRC front left rail
Note: The cross section of the vRack is shown for illustrative purposes			

2. Dismantle the C-pillar and D-pillar from the rear side.

NOTE: The position of the pillars is shown in Side View below .

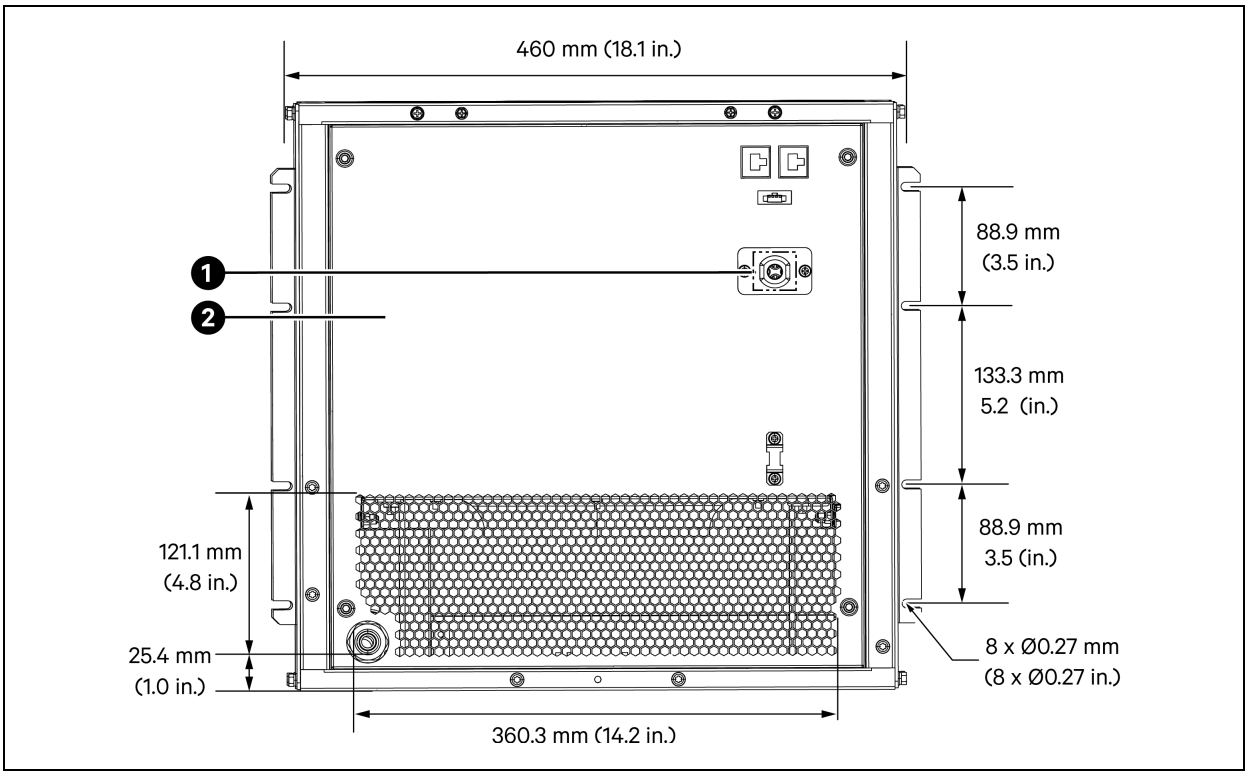
- **The distance between A-pillar and C-pillar (or between B-pillar and D-pillar) is 737 mm (29 in.).**
- **The distance between C-pillar and D-pillar is 460 mm (18.1 in.).**

Figure 4.5 Side View



Item	Description	Item	Description
1	Rear side	4	A-pillar
2	D-pillar	5	C-pillar
3	B-pillar		

Figure 4.6 Rear View



Item	Description
1	Strain relief bushing
2	Electrical access panel

3. Use two lifting straps and the handles of the unit to slide the unit into the rack from the front side, till the B- pillar and the A-pillar are completely flushed against the rack 19-inch profiles. The distance from front rail to front door is 121 mm (4.76 in.).

Figure 4.7 Lifting Straps

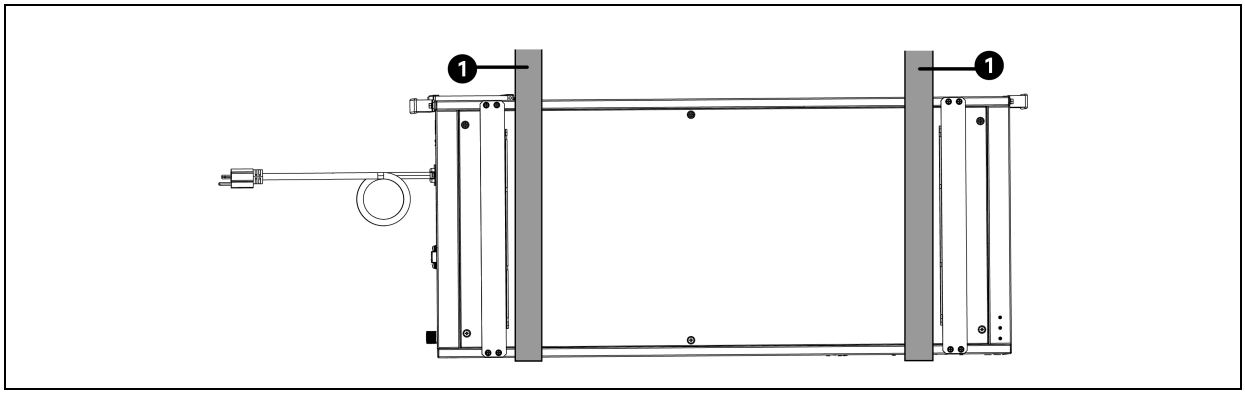
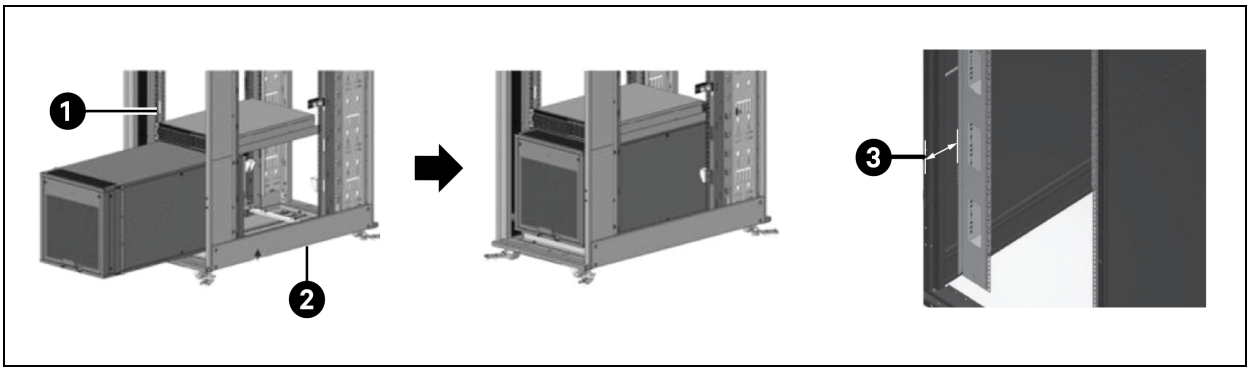


Figure 4.8 Mounting the Unit in the Rack



Item	Description	Item	Description
1	Profile	3	Distance from front rail to front door = 121 mm (4.76 in.)
2	Rack		

4. The distance between A-pillar and C-pillar (or between B-pillar and D-pillar) is 737 mm (29 in.). If the rack space is suitable, then install the C-pillar and D-pillar back again onto the unit body casing. If not, then only install A-pillar and B-pillar.
5. Firmly secure A-pillar, B-pillar, C-pillar and D-pillar on the rack column with two M6 x 12 screws (fastened with cage nuts) per pillar. Torque = 5.6 Nm (4.13 lb-ft).

NOTE: Ensure that the installation direction of pillars is correct. And ensure the unit is installed horizontally, otherwise high-water level alarms may be triggered incorrectly.

4.2.2 Installing Accessories

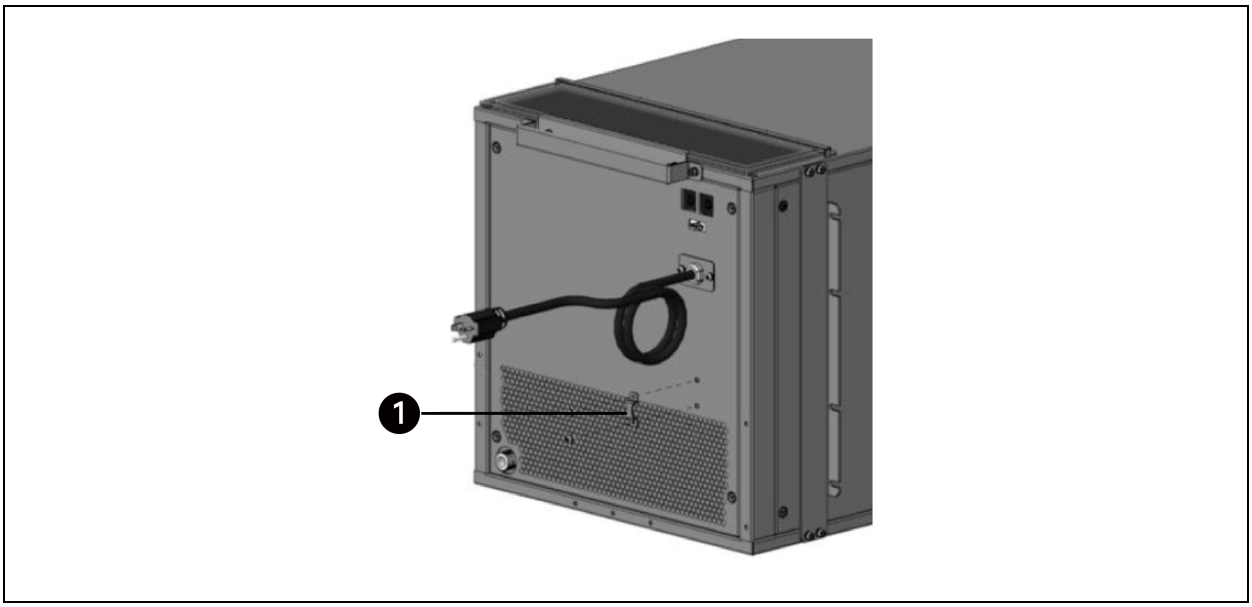
If the hot air from the condenser needs to be extracted from the room and discharged at a suitable pre-determined location, you can install the air duct on the unit. The air duct is provided as an accessory and shipped with the unit.

If a gravity drain is not possible, you can use the condensate pump. The condensate pump kit is provided as an accessory and shipped with the unit.

Removing the Power Cable Clamp from the Unit

The power cable clamp is used to secure the power cable during transportation. Remove the power cable clamp before installing the accessories.

Figure 4.9 Removing the Power Cable Clamp

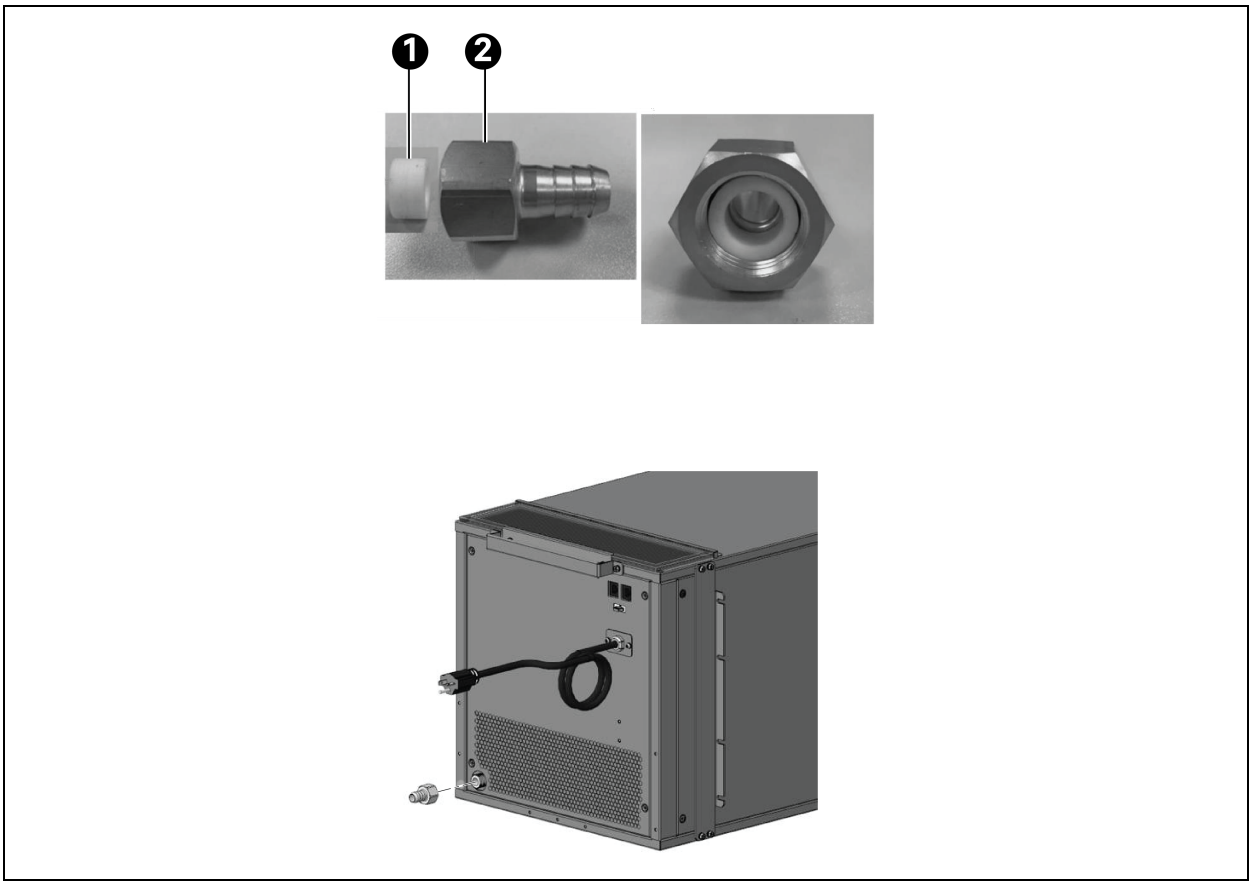


Item	Description
1	Power cable clamp

Installing the Drain Fitting on the Unit

Fasten the drain fitting to the drain port of the unit. The drain fitting contains a sealing block which is used for preventing the water leaking from the drain fitting port. Make sure the sealing block is installed tightly.

Figure 4.10 Installing the Drain Fitting

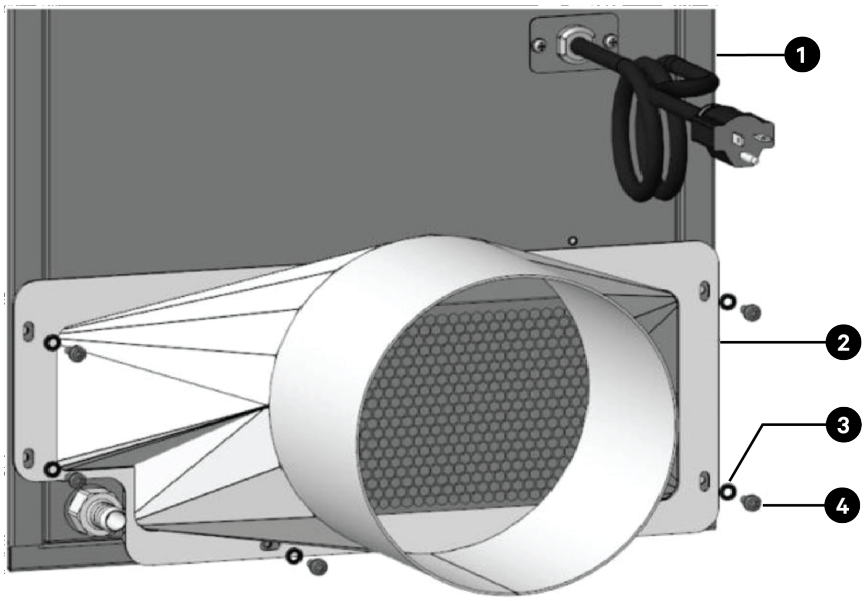


Item	Description
1	Drain fitting sealing block
2	Drain fitting

Installing the Transition Part on the Unit

Install the transition part on the condensing air discharge side with six M5 x 12 pan head screws and six M5 contact washers. Torque = 4.0 Nm (2.95 lb-ft).

Figure 4.11 Installing Transition Part

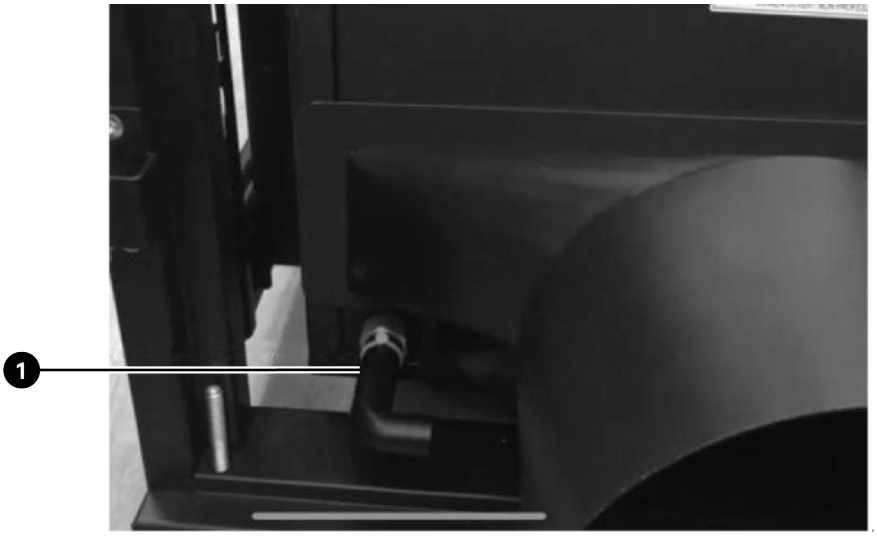


Item	Description	Item	Description
1	VRC self-contained rack cooler	3	M5 contact washer (six pieces)
2	Transition part	4	M5 x 12 pan head screw (six pieces)

Connect the L-shaped Pipe to the Drain Fitting

Connect the L-shape pipe to the drain fitting and fasten the connection with a cable tie.

Figure 4.12 Connecting the L-shaped Pipe to the Drain Fitting

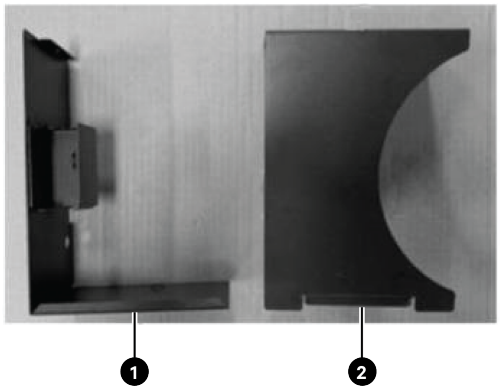


Item	Description
1	L- shaped pipe, ID =16 mm (5/8")

4.2.3 Installing the Condensate Pump

The condensate pump bracket includes two parts: bracket 1 and bracket 2. The pump has been pre-installed on bracket 1 in factory.

Figure 4.13 Pump Brackets

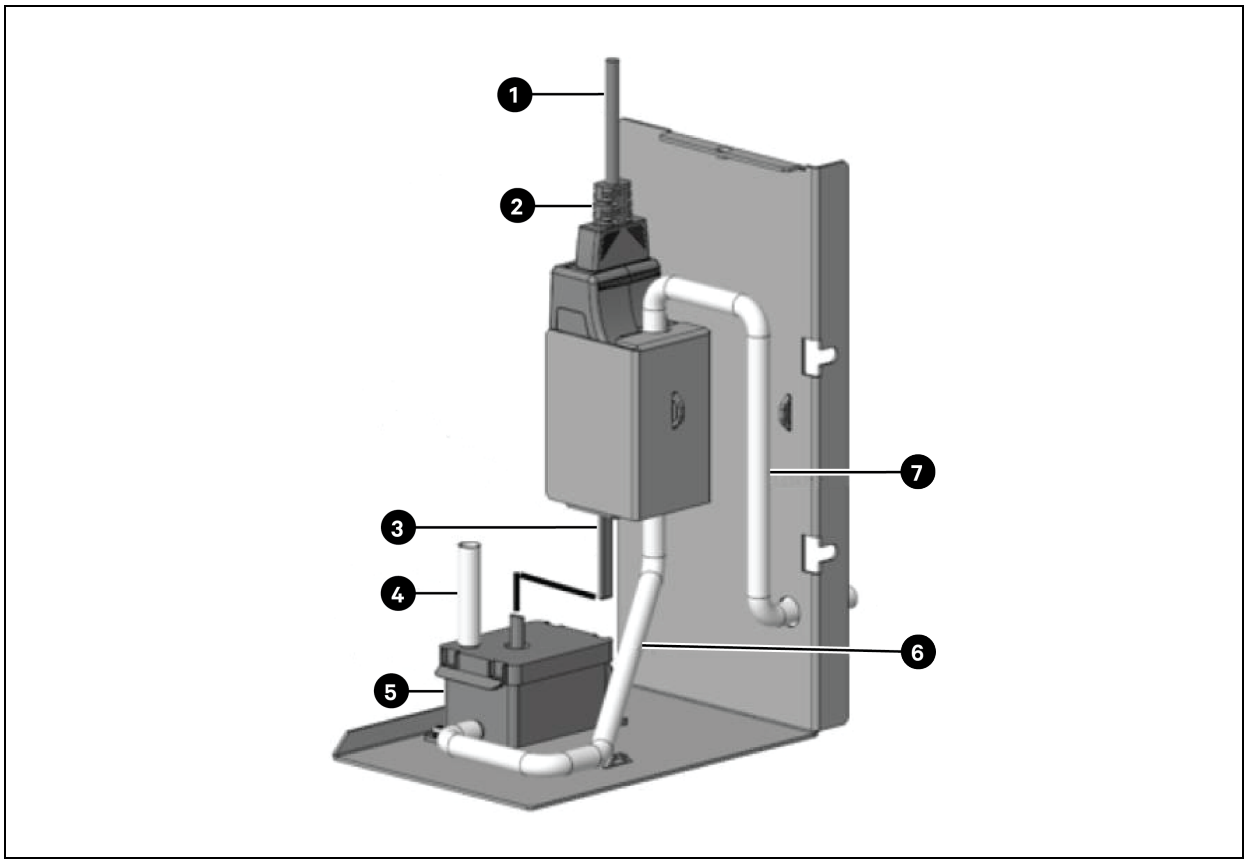


Item	Description
1	Bracket 1
2	Bracket 2

To install the condensate pump:

1. Loose the screw and remove bracket 2 from bracket 1.

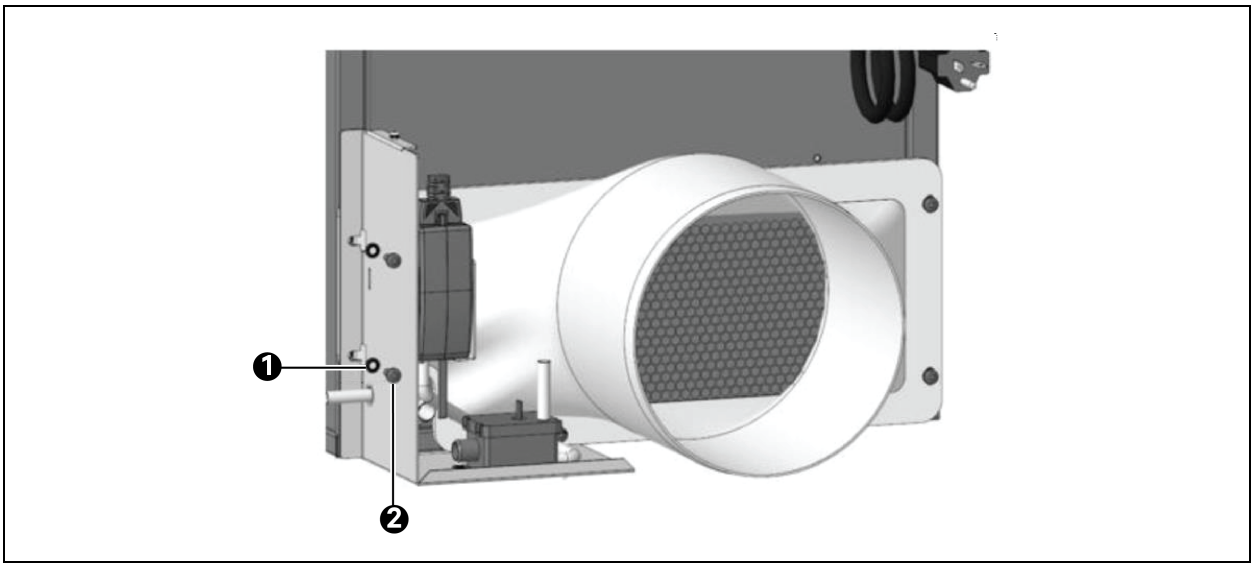
Figure 4.14 Pump Pre-installed on Bracket 1



Item	Description	Item	Description
1	Pump power cable	5	Reservoir
2	Pump	6	Pipe 2 ID = 6 mm (1/4 in.), L=300mm (11.8 in.)
3	Communications cable for pump	7	Pipe 3 ID = 6 mm (1/4 in.)
4	Pipe 1 ID =6 mm (1/4 in.), L = 60 mm (2.4 in.)		

2. Install bracket 1 on the condenser air outlet side with two M5 x 12 pan head screws and contact washers. Torque = 4.0 Nm (2.95 lb-ft).

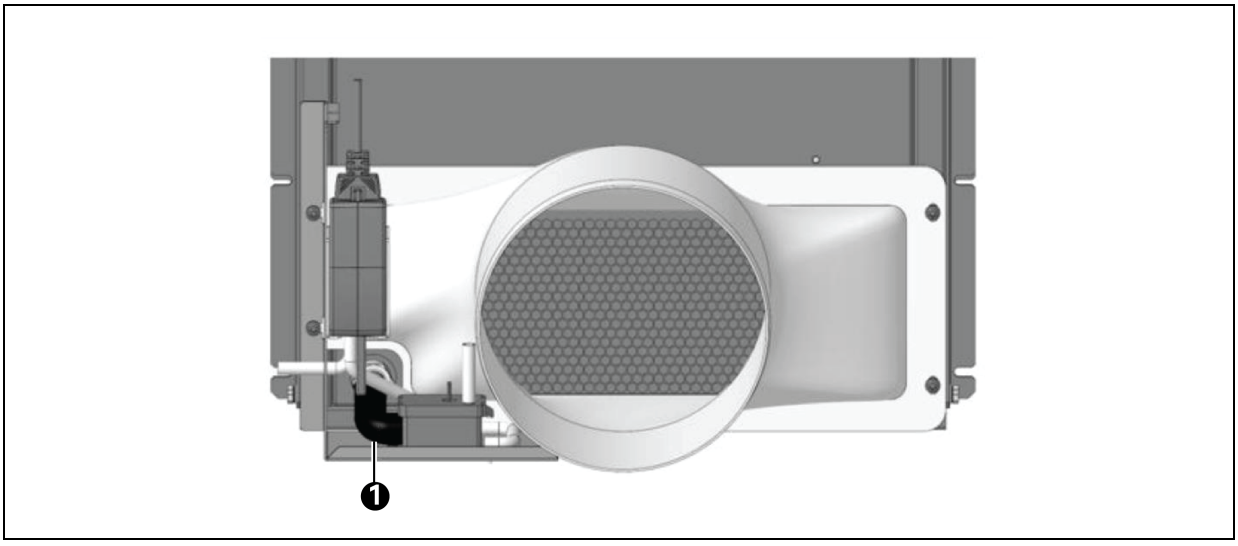
Figure 4.15 Installing Bracket 1 on the Unit



Item	Description
1	Contact washers for M5 x 12 pan head screws (two pieces)
2	M5 x 12 pan head screws (two pieces)

3. Connect the L-shaped pipe and the reservoir. Use a cable tie to fix it.

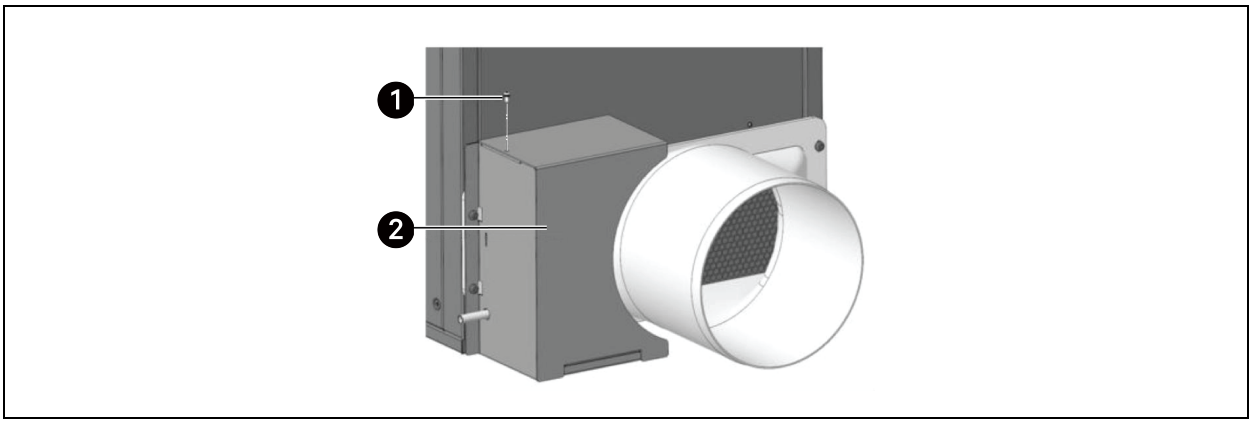
Figure 4.16 Connecting the L-Shaped Pipe and the Reservoir



Item	Description
1	Fixing with a cable tie

4. Install bracket 2 on bracket 1 with an M5 screw. Torque = 4.0 Nm (2.95 lb-ft).

Figure 4.17 Installing Bracket 2



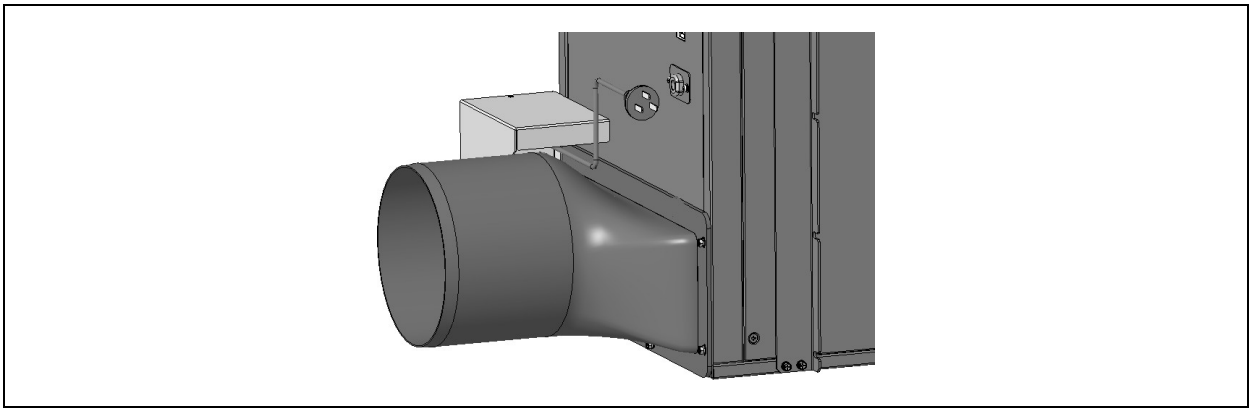
Item	Description
1	M5 screw
2	Bracket 2

A condensate water pipe (7.5 m (24.6 ft)) is provided as an accessory. It can be used to extend drainage lines.

Figure 4.18 Anti-siphoning Device and Condensate Water Pipe

The pump power plug can be pulled out from the gap between the pump bracket and the transition part. If the condensate pump is not powered through rPDU in vRack, the pump must be protected by a 1 A inline fuse upstream.

Figure 4.19 Pulling Out the Pump Power Plug



The pump power plugs for different models are listed in Table 4.1 on the next page .

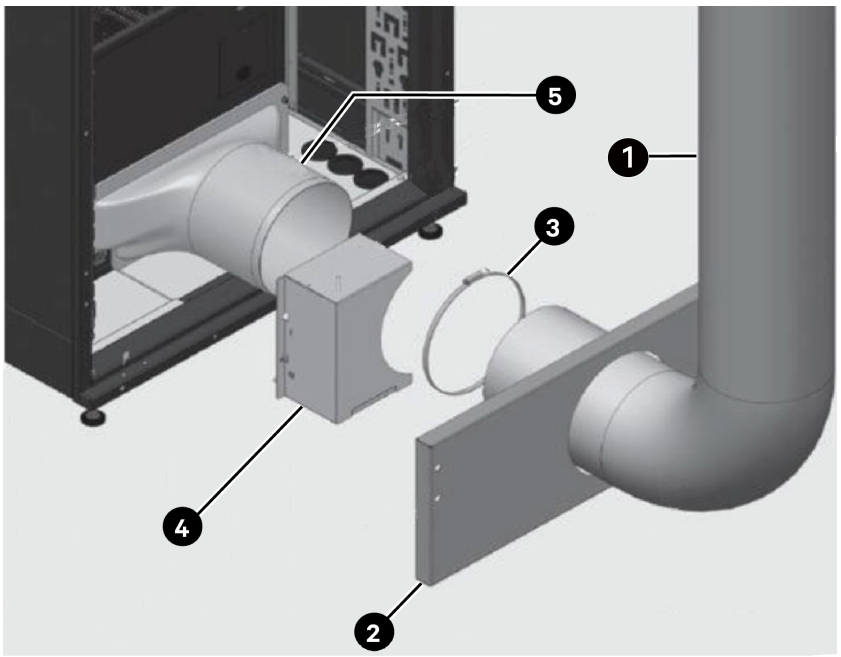
Table 4.1 Pump Power Plug

Unit Model	Plug	Rating
VRC100	NEMA 5-20	20 A, 125 Vac
VRC101	IEC60320 C14	10 A, 250 Vac
VRC102B	IEC60320 C14	10 A, 250 Vac

4.2.4 Connecting the Duct

The total length of the cylindrical part of the transition part is 100 mm (3.94 in.). The minimal overlapping of duct and transition part should not be less than 90 mm (3.54 in.). Make sure the clamping force is sufficient.

Figure 4.20 Connecting the Duct and Transition Part



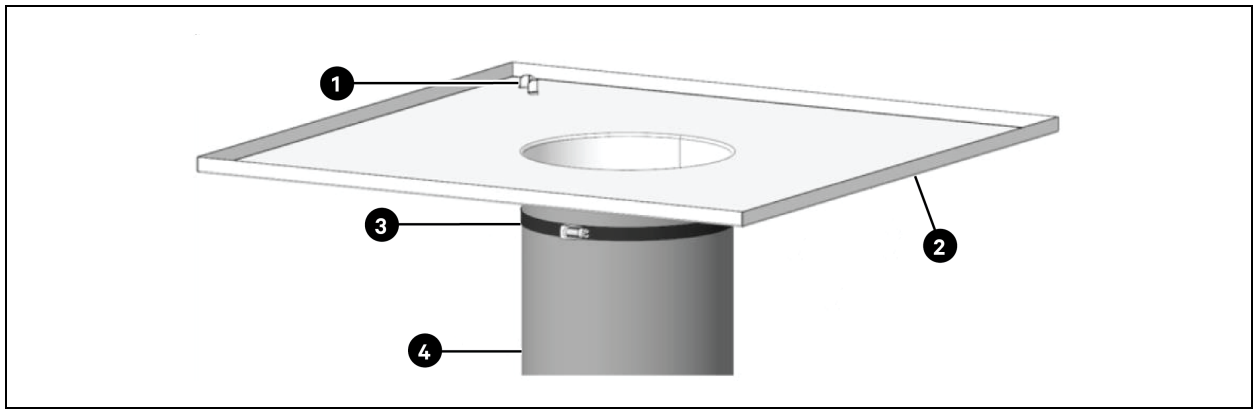
Item	Description	Item	Description
1	Air duct PN: 27140303	4	Condensate pump PN: 02092419
2	Plinth	5	Transition PN: 21121507
3	Pipe clamp PN: 63128710		

NOTE: Before connecting the duct, pass the air duct through the rear cabinet plinth.

Connecting the Duct to the Ceiling Tile

Connect the duct to the ceiling tile and fasten the connection with a clamp. The overlap of duct and transition part should not be less than 90 mm (3.54 in.). Make sure the clamp is tight enough.

Figure 4.21 Connecting the Duct and Ceiling Tile



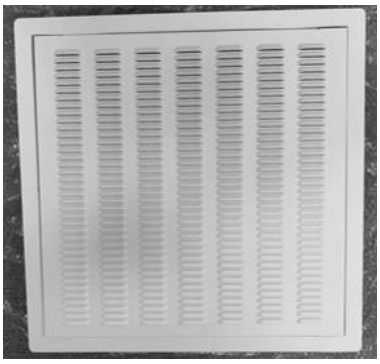
Item	Description	Item	Description
1	A hook for construction	3	Clamp PN: 63128710
2	Ceiling tile for air outtake PN:21243048	4	Flex air duct PN: 27140303

NOTE: The hook on the ceiling tile can help fasten the ceiling tile to the ceiling.

Installing the Ceiling Filter

A ceiling filter is provided as an accessory. It can be installed in a 2' x 2' ceiling tile at the air inlet of the equipment room.

Figure 4.22 Ceiling Filter



4.3 Installation Checklist

Table 4.2 Installation Checklist

Item	Results
Sufficient space is reserved for maintenance	
All the fittings are tightly connected	
The unit is installed correctly. The supply air is provided to the cold aisle at the front of the unit and the hot air is drawn to the return air inlet at the back of the unit	

Table 4.2 Installation Checklist (continued)

Item	Results
Foreign materials (such as shipping materials, removed structural materials, tools, etc.) in and around the equipment are removed	
The condensate drain pipe is connected	

5 Electrical Installation

WARNING! Arc flash and electric shock hazard. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is Off and wear appropriate, OSHA- approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. The Liebert® controller does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "Unit Off" mode of the controller. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.

WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and 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 electric shock. Can cause injury or death. Open all local and remote electric power-supply disconnect switches and verify that power is Off with a voltmeter before working within the condensate pump electrical connection enclosure. The Liebert® 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 Liebert® controller.

WARNING! Do not power on the unit until authorized technical personnel have confirmed that the unit connections are correct.

WARNING! Risk of improper wire sizing/rating and loose electrical connections. Can cause overheated wire and electrical connection terminals resulting in smoke, fire, equipment and building damage, injury or death. 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.

5.1 Installation Notes

NOTE: All power and control wiring and ground connections must be in accordance with the National Electrical Code and local codes.

- Refer to the nameplate for full load current and electrical requirements. The wire sizes should meet the local wiring standards and regulations.

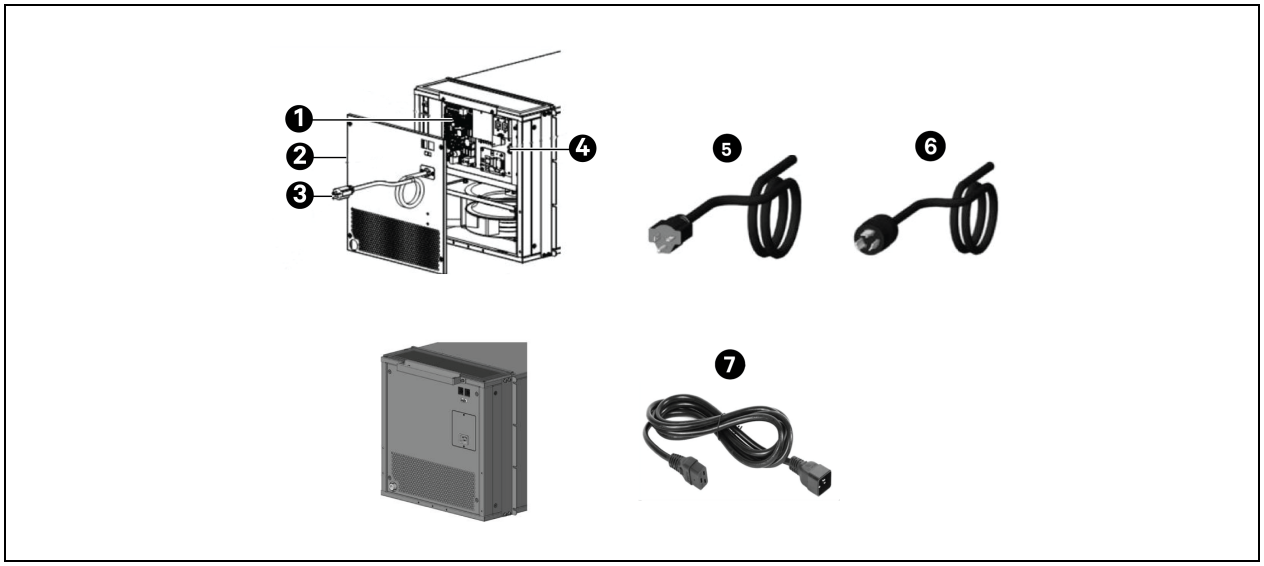
- **The main power supply must be consistent with the power supply (120 Vac ± 10%, 1 Ph, 60 Hz or 208 Vac ± 10%, 1 Ph, 60 Hz or 230 Vac ± 10%, 1 ph, 50/60 Hz) indicated on unit nameplate.**
- **Power cord is a Y-type connection. If the power cord is damaged, it must be replaced by professional personnel.**
- **Before performing any electrical work, use a voltmeter to measure the power supply voltage and make sure that the power supply has been switched off.**
- **The unit needs to be installed with screws, rails and others to avoid shaking during the start-up and running process.**
- **Disconnect the rated circuit breaker from the power supply.**

5.2 Connecting Power Cables

5.2.1 Connecting Power Cable for the Unit

The electrical box is located at the back of the unit. For VRC100 and VRC101, the power cord with plug has been connected to the unit in factory. For VRC102B, the IEC 60320 C19 to C20 interconnection cable (3.0 m (9.8 ft)) is provided as an accessory. Connect the cable between VRC102B and the power supply of the site.

Figure 5.1 Electrical Box and Power Cable

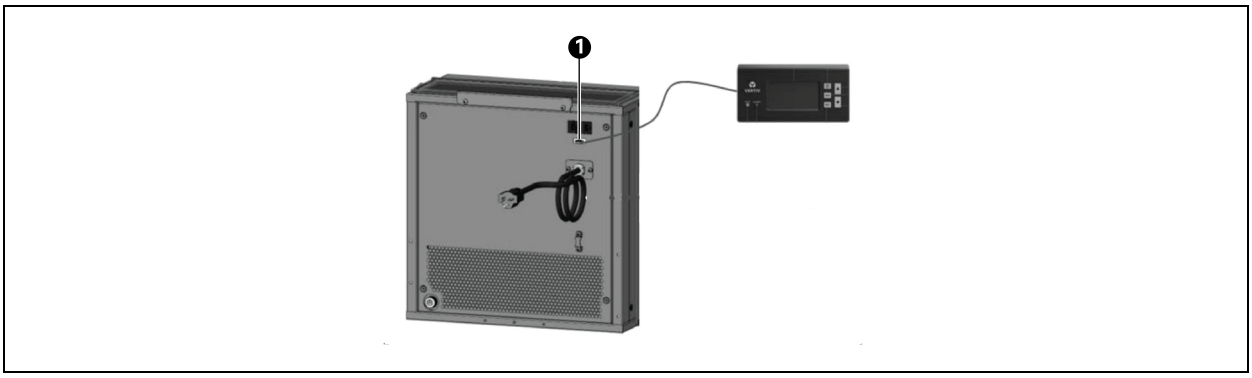


Item	Description	Item	Description
1	Electrical box	5	5-20P for VRC100
2	Back plate	6	L6-20P for VRC101
3	Power plug	7	IEC 60320 C19 to C20 interconnection cable (3.0 m (9.8 ft)) for VRC102B
4	3PIN terminal		

5.2.2 Connecting Power Cable for the Display

The power cable for the display has two lengths: 0.5 m and 10 m. Choose the appropriate cable and connect it between the display and the unit.

Figure 5.2 Connecting Power Cable for the Display



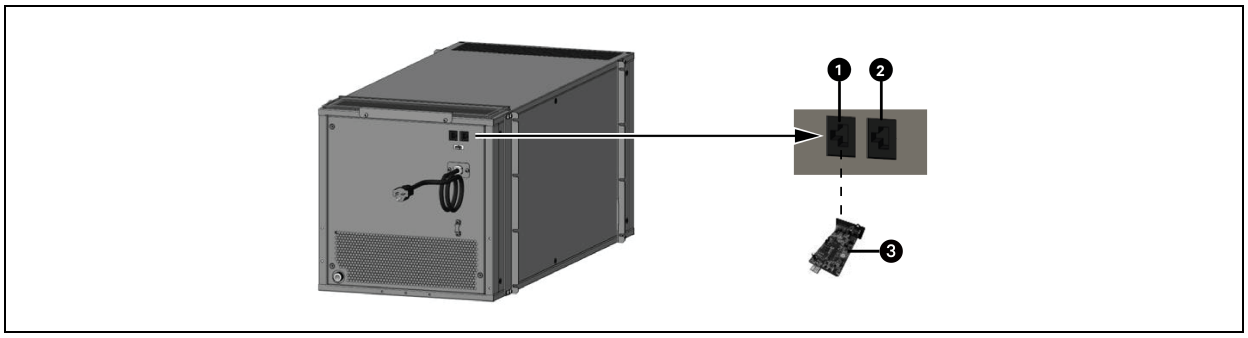
Item	Description
1	Socket for plugging in the power cable for display

5.2.3 Connecting Communications Cables

There are two RJ45 ports on the unit for communication with third-party monitoring systems. The RS485-1 (with 12 V power supply) can be connected with the SIC card monitoring kit. For details, see SIC Field Instructions. The RS485-2 is reserved; it can be used for communication with Vertiv rPDU.

NOTE: The reserved port cannot support two active Modbus RTUs simultaneously.

Figure 5.3 Connecting Communications Cables



Item	Description	Item	Description
1	RS485-1 (connecting to SIC card)	3	SIC card
2	RS485-2 (reserved)		

Table 5.1 Communications Port Description

RJ45 Pin Number	RS485-1	RS485-2
1	12 V	NC
2		
3	NC	NC

Table 5.1 Communications Port Description (continued)

RJ45 Pin Number	RS485-1	RS485-2
4	GND	GND
5		
6	NC	NC
7	D+	D+
8	D-	D-

5.3 Installation Checklist

Table 5.2 Installation Checklist

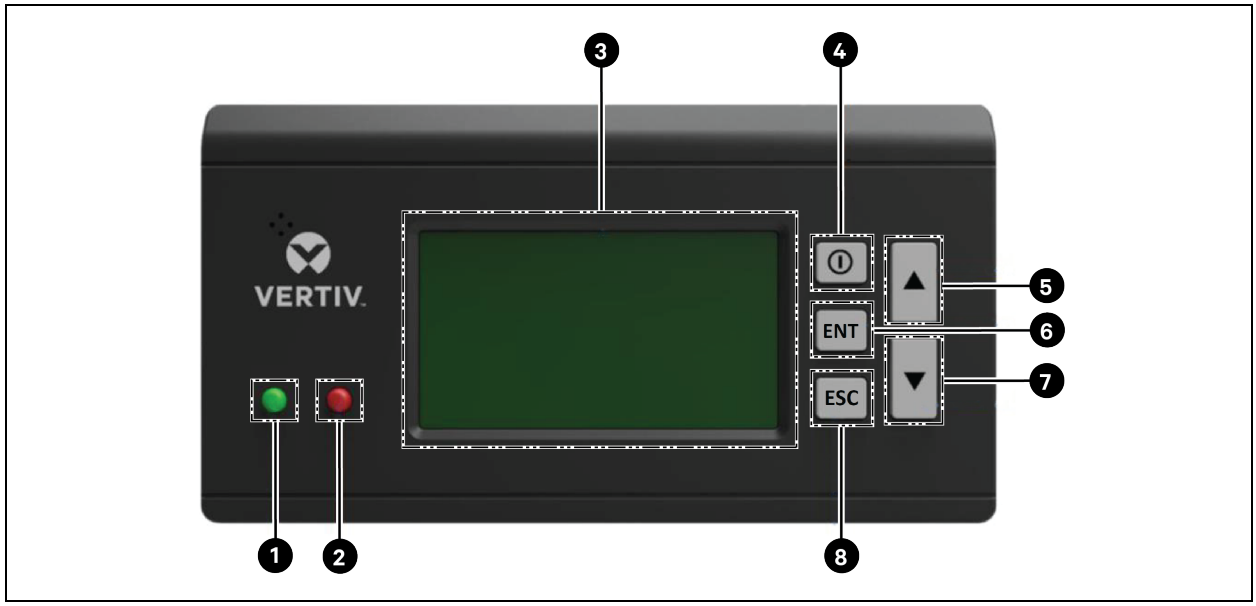
Item	Result
The power supply voltage meets the rated voltage on the unit nameplate	
The system electric loop has no open circuit or short circuit	
There is no open circuit or short circuit in the electrical connections	
The power cable and grounding cable to the air-break switch are connected	
The rating of the circuit breaker or fuse is correct	
The communications cables are tightly connected	
All the cables connections are fastened appropriately, with no loose screws	

6 Display Operation

6.1 Display

The display is made up of two indicators, a back-lit LCD screen, and function buttons.

Figure 6.1 Appearance of the Display



Item	Description	Item	Description
1	Run indicator	5	Up button
2	Alarm indicator	6	Enter button
3	LCD screen	7	Down button
4	ON/OFF button	8	Escape button

Table 6.1 Function Buttons

Button	Function
ON/OFF button	Switch on/off the display by pressing and holding it for three seconds
ENT button	• Enter the selected menu screen • Validate the value set for a parameter
ESC button	• Exit the current menu and return to the home screen or the previous menu • Abort parameter change • Mute the alarm sound
Up button	• Move the cursor up or increase the parameter value • For a toggle selection: scroll through the options • For a multi-screen menu: scroll up the screen
Down button	• Move the cursor down or decrease the parameter value • For a toggle selection: scroll through the options • For a multi-screen menu: scroll down the screen

6.2 Operation

After powering on the unit, you need to choose the display language (Chinese or English). Then the home screen is displayed, as shown in Figure 6.2 below .

Figure 6.2 Home Screen

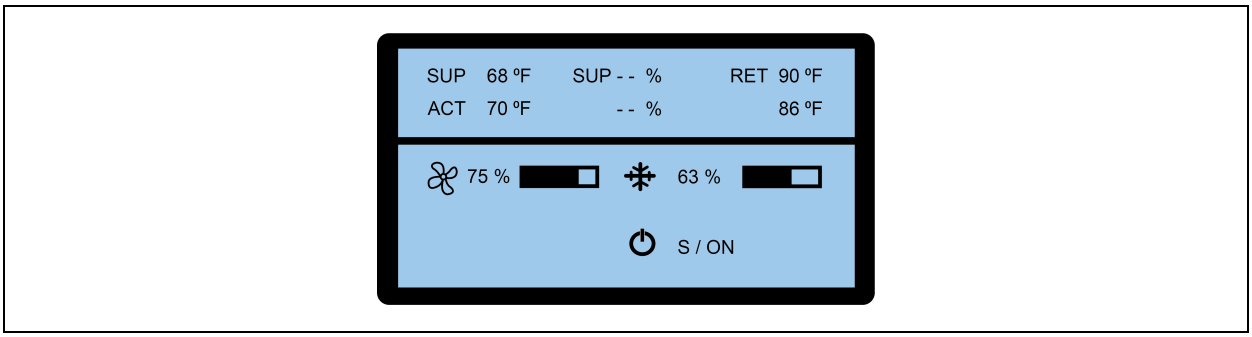


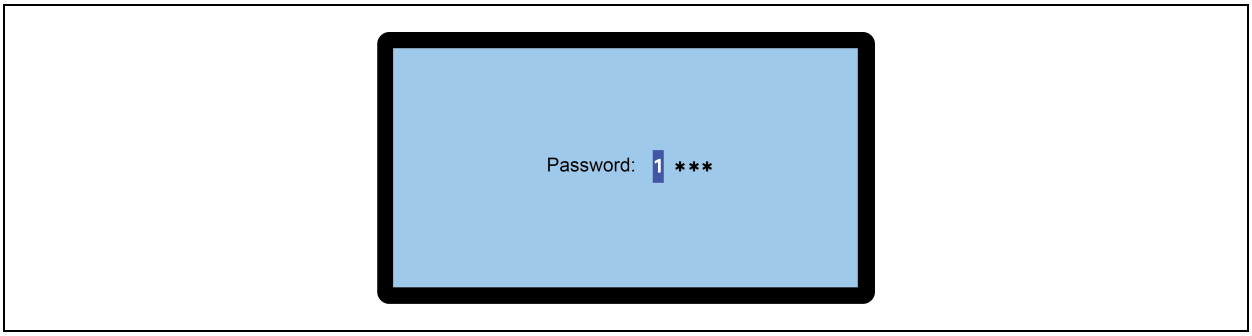
Table 6.2 Description of Icons

Icon	Description
SUP	Supply air temperature setpoint
ACT	Actual air temperature
RET	Return air temperature setpoint
	The percentage of the actual compressor capacity
	Fan rotating speed rate (40% to 95%)
	• Unit attribute/running state: S: standalone; RUN: running; OFF: shutdown • Unit property/operation state. S: single; ON: running; R-OFF: remote shutdown; L-OFF: local shutdown; M-OFF: monitoring shutdown; MANU: manual mode; BKUP: backup; Lock: alarm lock

NOTE: For VRC100 and VRC101, the temperature is in Fahrenheit. For VRC102B, the temperature is in Celsius.

Press the ENT button. The password screen is displayed. Do not enter password. Press the ENT button four times to enter the main menu screen.

Figure 6.3 Password Screen

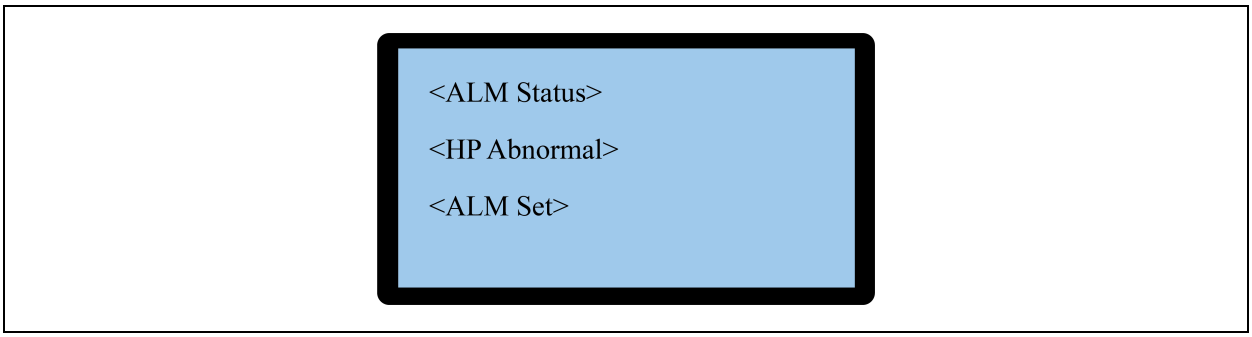


6.3 Menu

6.3.1 Alarm Menu

On the main menu screen, select Alarm Menu to enter the alarm menu screen. Press the Up or Down button to scroll up or down the menu items.

Figure 6.4 Alarm Menu Screen



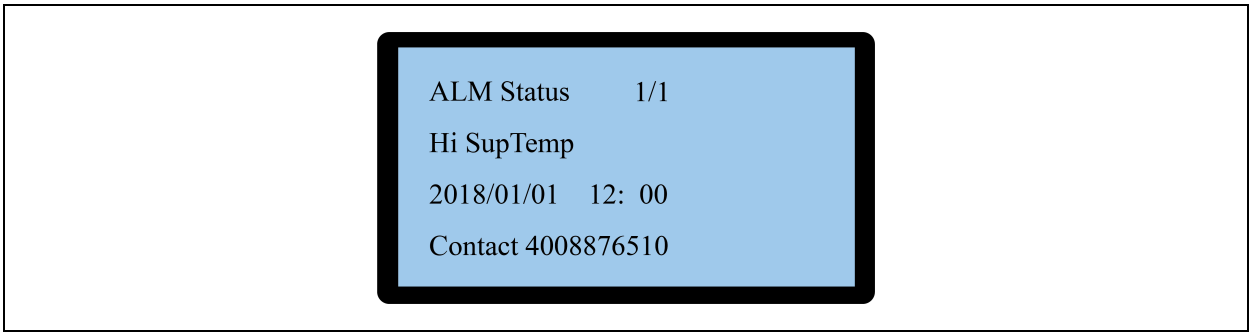
ALM Status

On the alarm status screen, the alarm sequence number (xx as of xx/yy), the total number of active alarms (yy as of xx/yy), the alarm name, and its generation time are displayed.

NOTE: The latest alarm has the largest sequence number.

NOTE: The latest alarm is displayed on the first page of the ALM Status screen. Press the Up or Down button to scroll through the alarm records if more than one alarm is generated. These alarms are automatically cleared upon system power failure.

Figure 6.5 Alarm Status



ALM Set

On the alarm setup screen, the alarm setpoint, system alarms, and alarm handle are displayed. Parameter settings can be saved permanently.

Figure 6.6 Alarm Value Setup

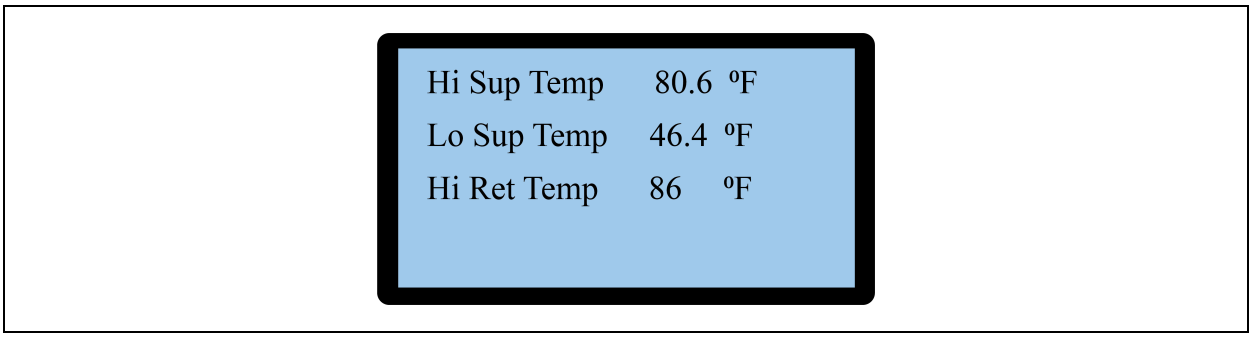


Figure 6.7 System Alarm Setup

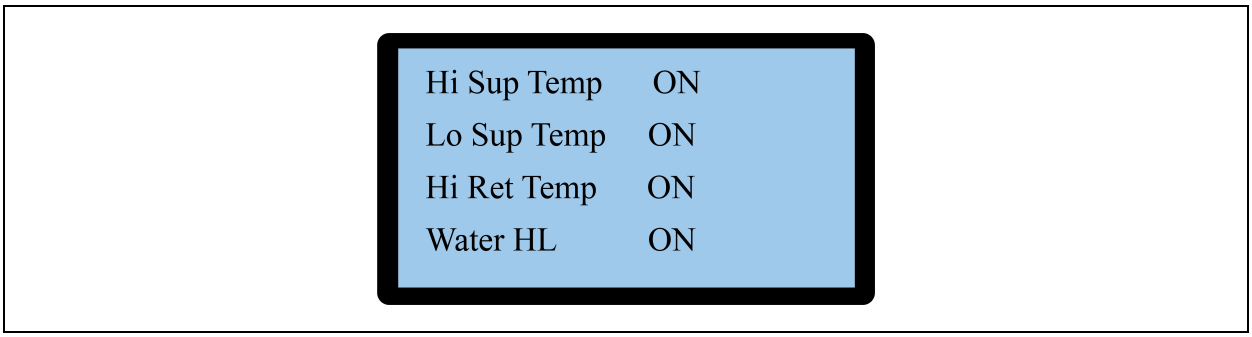
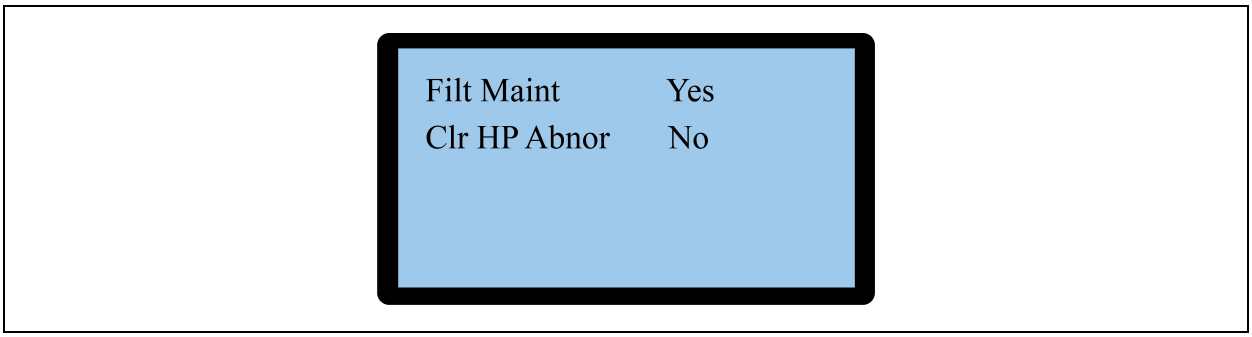


Figure 6.8 Alarm Handle Setup



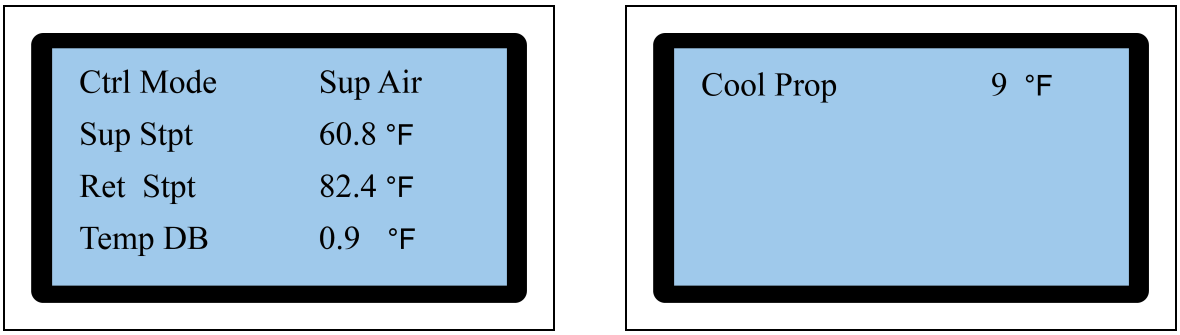
6.3.2 Temp Set

On the main menu screen, select Temp Set to enter the temperature settings screen. There are two control modes: supply air control mode and return air control mode. In the supply air control mode, you need to set the target supply air temperature. In the return air control mode, you need to set the target return air temperature.

NOTE: The default control mode is supply air control mode. If the unit is used in an open rack, you need to use the return air control mode.

NOTE: The temperature that has been set will be not be cleared upon power failure or power-off.

Figure 6.9 Temperature and Humidity Settings



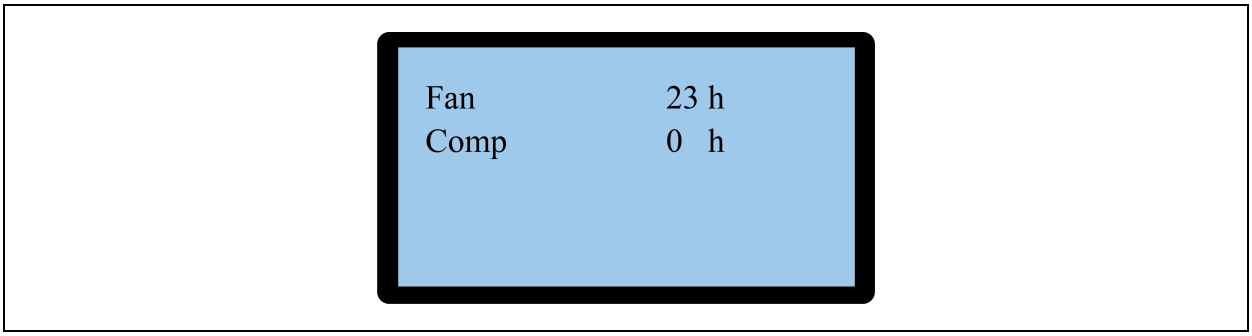
6.3.3 System State

On the main menu screen, select System State to enter the system state screen. .

Figure 6.10 System State

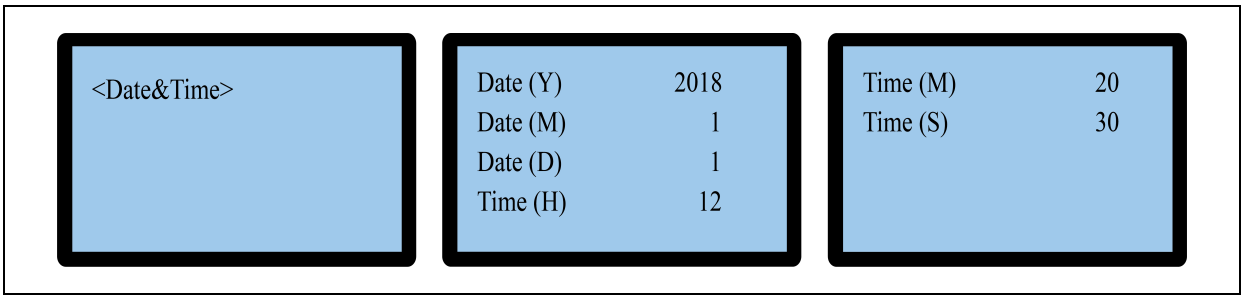
On the run time screen, you can query the operation time of the unit.

Figure 6.11 Run Time



On the date and time screen, you can set date and time for the unit.

Figure 6.12 Date and Time



7 Start-up

7.1 Inspection Before Start-up

Mechanical Aspects

- Connect the condensate water drainage pipe. Check that there is no leakage in the connections.
- Check that the unit has at least 30% of the designated head load. If not, use heating devices to provide enough heat load for the start-up.

Electrical Aspects

- Check that the input voltage of the main power supply is within ± 10% of the rated voltage.
- Check that the power cables and the communications cables are correctly connected and they are separate from each other.
- Check that the power cord of the unit has been connected to the power supply of the site.

7.2 Starting up the Unit

Press and hold the ON/OFF button on the display for three seconds to start up the unit. Check that no alarms are displayed.

NOTE: The unit may vibrate for a short time. After the unit runs for more than half an hour, check that the compressor, evaporator fan, and condenser fan are operating smoothly and that there is no vibration or noise.

NOTE: Check that the parameters such as return air temperature and supply air temperature are within the normal range.

Table 7.1 Parameter Normal Range

Item	Range
Suction pressure (gauge)	700 kPa to 1500 kPa (116.0 psig to 217.6 psig)
Discharge pressure (gauge)	2000 kPa to 3600 kPa (290.1 psig to 522.1 psig)
Discharge temperature	40 °C to 115 °C (104 °F to 239 °F)
Supply air temperature	13 °C to 28 °C (55 °F to 82 °F)

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8 Maintenance

8.1 Safety Instructions

WARNING! During the operation of the precision air conditioner, very high voltage may be present in the equipment. Adhere to all of the notes and warnings marked on the equipment or contained in this manual, which may otherwise lead to an injury or fatality.

WARNING! Only qualified maintenance personnel can operate and handle the equipment. All maintenance and operation must follow the local laws, especially the regulations about the electric power, refrigeration, and production.

WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly.

WARNING! Risk of hair, clothing and jewelry entanglement with high speed rotating fan blades. Can cause equipment damage, serious injury or death. Keep hair, jewelry and loose clothing secured and away from rotating fan blades during unit operation.

WARNING! Risk of contact with extremely hot and/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 within 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.

WARNING! Risk of improper wiring, piping, moving, lifting and handling. Can cause equipment damage, serious injury or death. 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.

CAUTION: Comply with the manufacturer's instructions before and during maintenance. Failure to observe this will result in the warranty becoming void. Adherence to the safety instructions is mandatory to ensure personnel safety and prevent any environmental impact apart from equipment damage. Unsuitable components will impede equipment performance and may cause equipment shutdown. Therefore, Vertiv recommends the use of Vertiv OEM or Vertiv-approved components.

CAUTION: Switch off the VRC self-contained rack cooler and then switch off the power input during equipment maintenance. Switch off the equipment power unless the testing devices need power.

8.2 Electrical Inspection

Inspect the control board and temperature sensor every six months for loose electrical connections and circuit corrosion. Firmly tighten all the electrical contacts. Find out the non-insulated contacts and rectify them with proper insulation covering. Clean the electrical and control components with a brush or by using compressed dry air.

8.3 Main Components Inspection

8.3.1 Fan

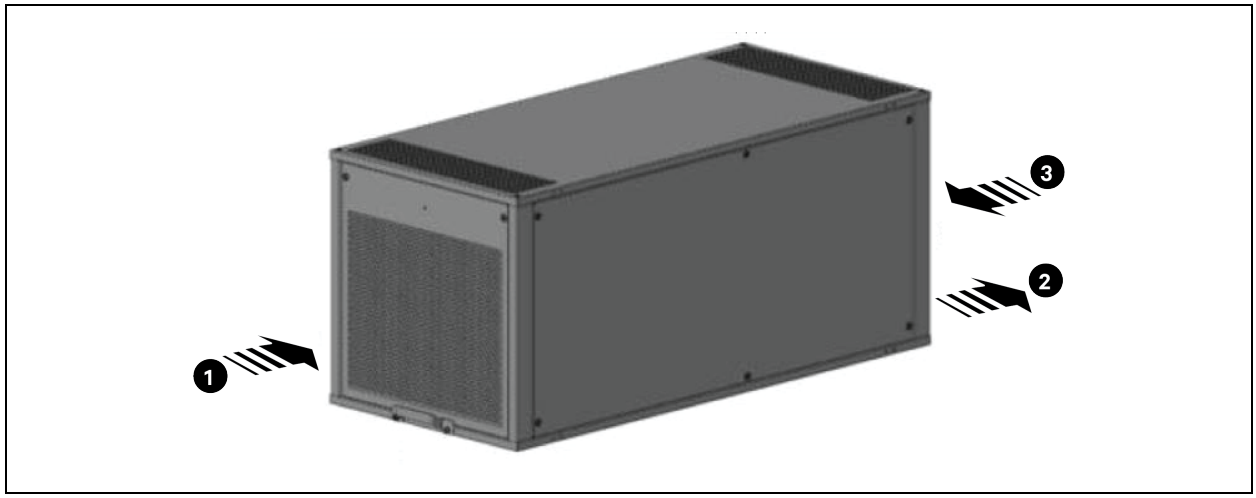
Since the fan operates 24/7 throughout the year, any unusual airflow obstruction must be cleared in time to avoid damage to the cooling system and other system components caused by reduced air volume.

- Periodic inspection covers the state of the fan impellers, fastening of fan components, abnormal fan noise, and fan cable connection.
- Pay close attention to assess whether the fan kit and impeller are properly fixed, and the rotation of the fan blade does not physically interfere with other components. Ensure that the air discharge path is free from any obstacles to the airflow.
- If the EC fan cannot rotate, check the analog signal cable, rotating speed feedback cable, power module power cable, and the power module.
- Do not operate the fan during maintenance to avoid injury to the operator or damage to the fan blades.
- During the unit operation, do not touch the fan cover as the fan rotation may cause mechanical damage.

8.3.2 Condenser

If the airflow through heat rejection is restricted, use compressed air to clean the dust and debris that inhibits airflow. The compressed air should be blown in the reversed airflow direction.

Figure 8.1 Condenser Airflow Direction



Item	Description	Item	Description
1	Condenser air in	3	Reversed air flow direction
2	Condenser air out		

8.3.3 Compressor

CAUTION: Avoid touching or having skin contact with the residual gas and oils in the compressor. Wear long rubber gloves to handle contaminated parts. The air conditioning system contains refrigerant. The release of refrigerant is harmful to the environment.

The compressor faults can be categorized into two types:

- Motor faults (such as winding burnout, insulation failure, short circuit between coils, etc.)
- Mechanical faults (such as compressor failure, relief valve faults, etc.)

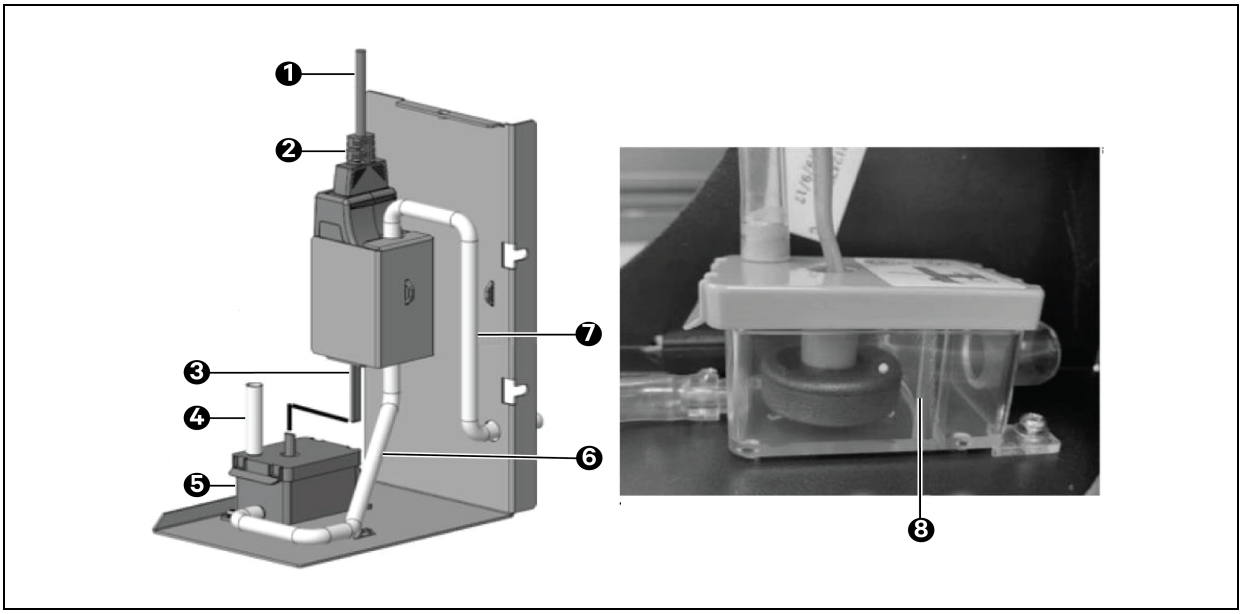
If the operating pressure is not established, the compressor has failed. Confirm that the suction pressure and discharge pressure are balanced and verify that the motor does not rotate in reverse. The controller is streamlined with capabilities like powerful alarm and protection functions to ensure safe operation of the compressor. Periodic checks of high pressure and low pressure along with alarm protection for such pressure-related issues should be carried out by maintenance personnel on a regular basis to rule out discrepancies.

8.3.4 Condensate Pump Kit

Inspect the condensate pump kit every six months.

Table 8.1 Inspecting Condensate Pump Kit

Component	Inspection Items	Remarks
Pump filter	Check if filter is clogged or damaged	
	Clean the filter	
Pump pipes	Check if the pipes are loose	
Drainage pump	Check if there are impurities and debris in the water tray	
	Check the drain pump connection line for clogging	
	Check if the cable of the drain pump is loose	

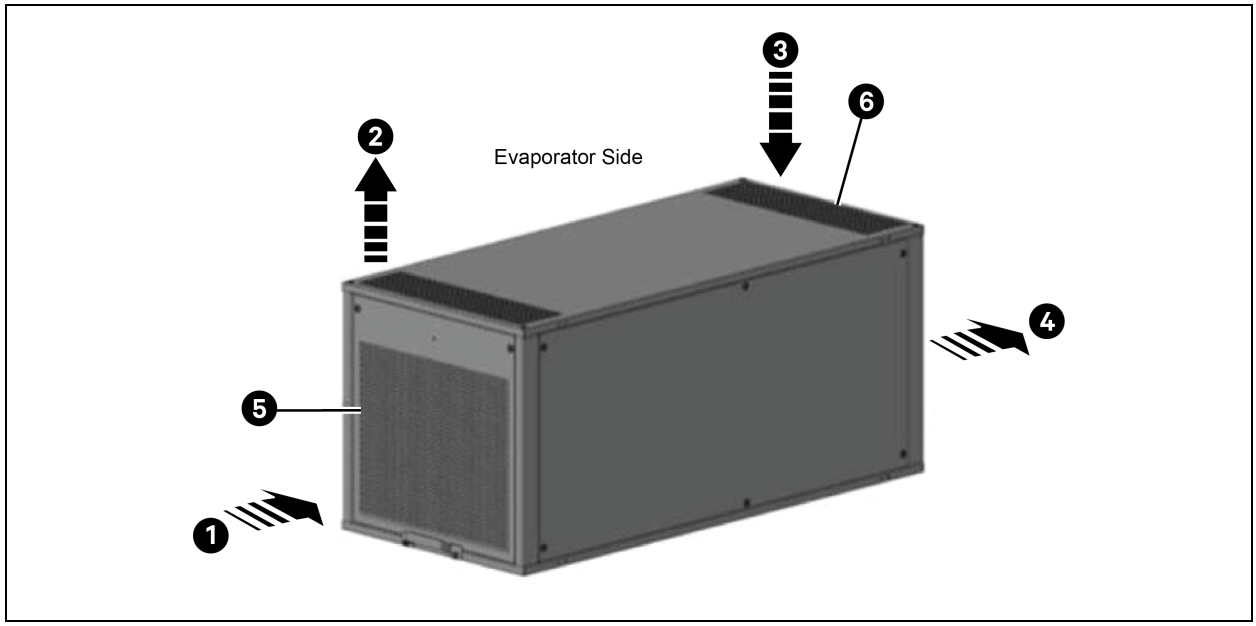


Item	Description	Item	Description
1	Pump power cable	5	Reservoir
2	Pump	6	Pipe 2 ID = 6 mm (1/4 in.), L=300 mm (11.8 in.)
3	Communications cable for pump	7	Pipe 3 ID = 6 mm (1/4 in.)
4	Pipe 1 ID =6 mm (1/4 in.), L = 60 mm (2.4 in.)	8	Pump filter

8.3.5 Air Filters

There are two air filters on the unit: one is mounted on the condenser air inlet side (PN: 02560118), and the other is mounted on the evaporator return air side (PN: 02560155). Check the filter once a week if the environment is dusty or once a month. The default fan running time is 2000 hours (which can be adjusted according to site environment). When the time exceeds, the filter service alarm is triggered. Replace the filter based on its clogging condition.

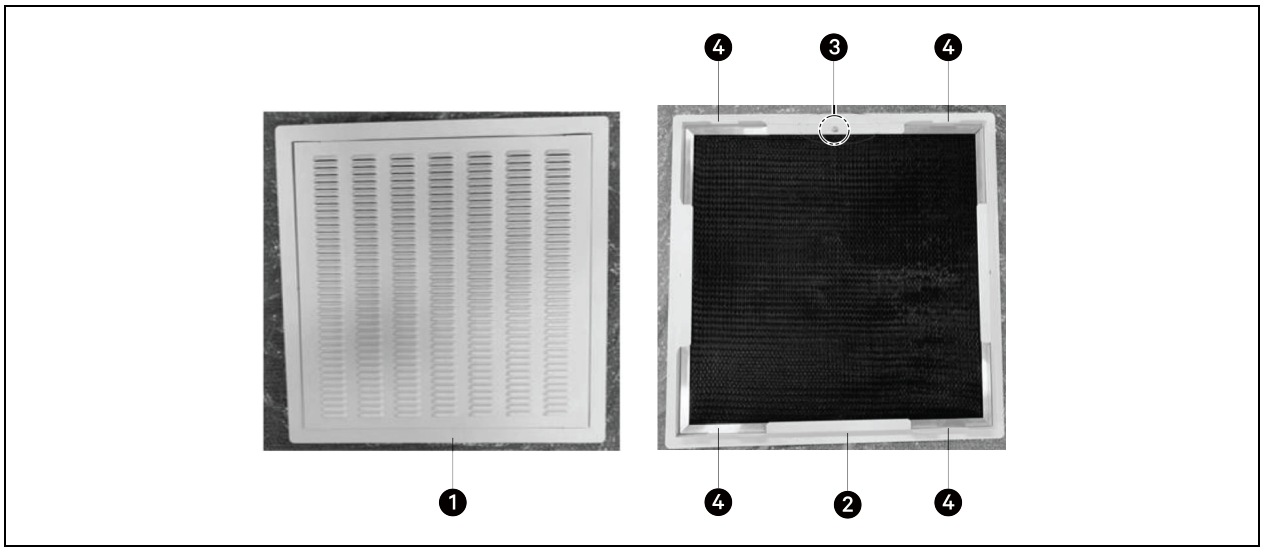
Figure 8.2 Air Filters



Item	Description	Item	Description
1	Condenser air inlet	4	Condenser air outlet
2	Evaporator supply air	5	Filter 1
3	Evaporator return air	6	Filter 2

8.3.6 Ceiling Filter

Check the ceiling filter once a month. To uninstall the filter, remove the ceiling filter from the ceiling. On its rear side, loosen the M5 screw and slide the filter from the limit columns of the ceiling tile.



Item	Description	Item	Description
1	Front side of the ceiling filter	3	M5 screw
2	Rear side of the ceiling filter	4	Limit column on ceiling tile

8.4 System Diagnosis Testing

Use the manual mode of the microprocessor controller to enable and disable unit components, so as to detect the state of the components.

8.5 Controller Connections Inspection

Check the appearance of the controller and follow the steps below.

- Check the appearance of the power module and measure the output voltage.
- Check if the surface of the control interface board, control board, temperature NTC, and electronic expansion valve control board show any signs of aging or wear and tear.
- Clean up dust and dirt from the electrical control components and control board with a brush using an electronic dust cleaning agent.
- Check and fasten the input and output connectors of the control interface boards, including the control board, interface board, temperature NTC, and electronic expansion valve control board.
- Check if the contact and connection of the fan power cable, signal cable, and rotating speed feedback signal cable are firmly fixed.
- Check if the interconnection terminals between the control interface board and the temperature or pressure sensor are firmly connected. If they are loose, faulty or have a bad connection immediately replace the interconnection terminal.
- Replace the faulty electrical components such as the control fuse (or air breaker) and control board.
- Use a high-precision temperature measurement meter to measure and calibrate the reading of the temperature sensor.
- Adjust the set points. Check the motion of each functional component according to the control logic.

8.6 Cooling System Inspection

The cooling system components must be inspected monthly for abnormalities in the operation which can cause abrasions due to continuous operation. As the failure or damage of components is usually accompanied by corresponding faults, check regularly to prevent system faults.

The surface of the evaporator coil should be kept clean and have no rupture.

The major reasons for electronic expansion valve failure are related to electrical failure and/or mechanical failure. The electrical failure may be attributed to the failure of the power supply of the electronic expansion valve control panel and coil, loosely connected control board wiring, and pressure and temperature sensor failure. The mechanical failure may be caused by blockage in the refrigerant flow in an electronic expansion valve. Therefore, when the electronic expansion valve is faulty, pay close attention to the control panel power supply, control board wiring, pressure and temperature sensor wiring or the valve itself.

NOTE: It is not recommended to adjust the electronic expansion valve.

8.7 General Maintenance Checklist

Table 8.2 General Maintenance Checklist

Component	Inspection Items	Remarks
Filters (two VRC filters, one pump filter, one ceiling tile filter)	Check if filter is clogged or damaged	
	Check if the unit prompts for filter maintenance	
	Clean the filter	
Fans	Check if fan blades are distorted	
	Check if the fan generates any noise during operation	
	Check if the fan stopped rotating	
	Check and fasten the circuit connector	
Electronic Expansion Valve	Check if the wiring and coil of the electronic expansion valve control board are loose	
Cooling Circulation System	Check the cleanliness of the evaporator surface	
	Check if the refrigeration pipe has leakage and proper support	
	Check if refrigerant is filled into the system	
Electrical Control Part	Check and fasten the circuit connector	
	Check if the cables and meter reading of each sensor are within prescribed range	

8.8 Monthly Maintenance Checklist

Table 8.3 Monthly Maintenance Checklist

Component	Inspection Items	Remarks
Filters (two VRC filters, one pump filter, one ceiling tile filter)	Check if filter is clogged and damaged	
	Clean the filter	
Fans	Check if the fan generates any noise during operation	
	Check if the fan has stopped rotating	
Drainage	Check that the drain pipe is unblocked, no pipe buckling is present, and the pump works normally	

8.9 Semi-annually Maintenance Checklist

Table 8.4 Semi-annually Maintenance Checklist

Components	Item	Remark
Pump filter	Check for clogging or damage	
	Clean the filter	
Fans	The fan blades are not distorted	
	Check if the fan generates any noise during operation	
	Check and fasten the circuit connections	
Compressor	Check for leakage	
	Check if the compressor vibrates or makes noise during operation	
	Check and fasten the circuit connections	
Condenser	Check the cleanliness of the fins	
	The fan base should be firm	
	The fan vibration absorber is not deteriorated or damaged	
	The temperature switch is set at the required position	
	The refrigerant pipes are properly supported	
	Check and fasten the circuit connections	
Refrigeration system	Check the suction pressure	
	Check the discharge pressure	
	Check the superheat	
	Check the refrigerant pipes	
Electric control part	Check the fuse and the miniature circuit breaker	
	Check and fasten the circuit connections	
	Check the control program	

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9 Troubleshooting

WARNING! Certain circuits carry lethal voltages. Only professional technicians are allowed to maintain the unit. Extra precautions should be taken when troubleshooting a live unit. Be particularly careful troubleshooting with the unit's power switched on.

WARNING! If jumpers are used for troubleshooting, make sure to remove the jumpers after troubleshooting. If the connected jumpers are not removed, they may bypass certain control functions causing damage to the equipment.

9.1 Troubleshooting for the Unit

Table 9.1 Troubleshooting for the Unit

Fault Occurrence	Possible Cause	Check or Remedy
High temperature alarm	Unreasonably high temperature alarm setpoint	Check and reset high temperature alarm setpoint
	Overload condition	Check if the actual heating load is over the rated value
	Condenser fan does not run normally or is faulty	Check if the fan power cable is disconnected
	Compressor does not run normally	Check if the compressor power cable is disconnected
Low temperature alarm	Unreasonably low temperature alarm setpoint	Check and reset low temperature alarm setpoint
	Evaporator fan does not run normally or is faulty	Check if the fan power cable is disconnected
	Compressor does not run normally	Check if the compressor power cable is disconnected
High pressure alarm	Condenser fan does not run normally or is faulty	Check if the fan power cable is disconnected
	High pressure sensor is abnormal	Check if the high-pressure sensor is normal
	Insufficient condensing airflow	Remove debris from the coil and air inlet
		Check if the fan speed controller operates normally
Low pressure alarm	Refrigerant leakage	Check for leaking points and re-charge refrigerant according to the nameplate
	Condenser fan runs at full speed when ambient temperature is too low	Check if wire connection of condenser fan is reversed
	EEV adjusts abnormally or is closed	Check if the EEV coil or EEV cable is loose
	Evaporator fan does not run normally or is faulty	Check if the cable of fan is disconnected
	Insufficient airflow across evaporator coil	Remove debris from the coil and air inlet
	The air humidity is too high	Use other dehumidifier to control the air humidity
Severe condensation or water leakage	EEV adjusts abnormally	Check if the EEV coil or EEV cable is loose
	Compressor runs at high speed	Check if the compressor is out of control
	The drainage pan or pipe is loose or blocked.	Check if drainage pipe is loose or clean the debris in the drainage pan or pipe

Table 9.1 Troubleshooting for the Unit (continued)

Fault Occurrence	Possible Cause	Check or Remedy
Compressor vibration or abnormal noise	The mounting position is not even	Check mounting position state
	The fixing parts are loose	Check the fixing nuts of compressor and fasten again
	Compressor is faulty	Contact Vertiv™

9.2 Troubleshooting for the Fan

Table 9.2 Troubleshooting for the Fan

Symptom	Probable Causes	Check Items and Handling Methods
EC fan cannot be started	Fan power module failure	Check the Fan power module alarm indicator to see if the control board fails
	The cable is faulty	Check if the cable from the main control board, fan fault detection board, or power module to the control terminal bar is firmly connected Check if the cable from the control terminal bar to the plug wire terminal of the fan is firmly connected

9.3 Troubleshooting for the Electronic Expansion Valve

Table 9.3 Troubleshooting for the Electronic Expansion Valve

Symptom	Probable Causes	Check Items and Handling Methods
The adjustment of the electronic expansion valve is faulty	The temperature sensor or pressure sensor is faulty	Check if the sensor cable is firmly connected Check if the sensor cable position on the control board is correct
	The control board is powered off	Check if the output fuse of the transformer has tripped/broken Check if the input power of the control board of the electronic expansion valve is a 24 V power supply
	The cable connection of the control board is faulty	Check if the communication cable between the electronic expansion valve control board and the main control board is properly connected Check if the valve cable connection on the control board of the electronic expansion valve is faulty

9.4 Troubleshooting for the Cooling System

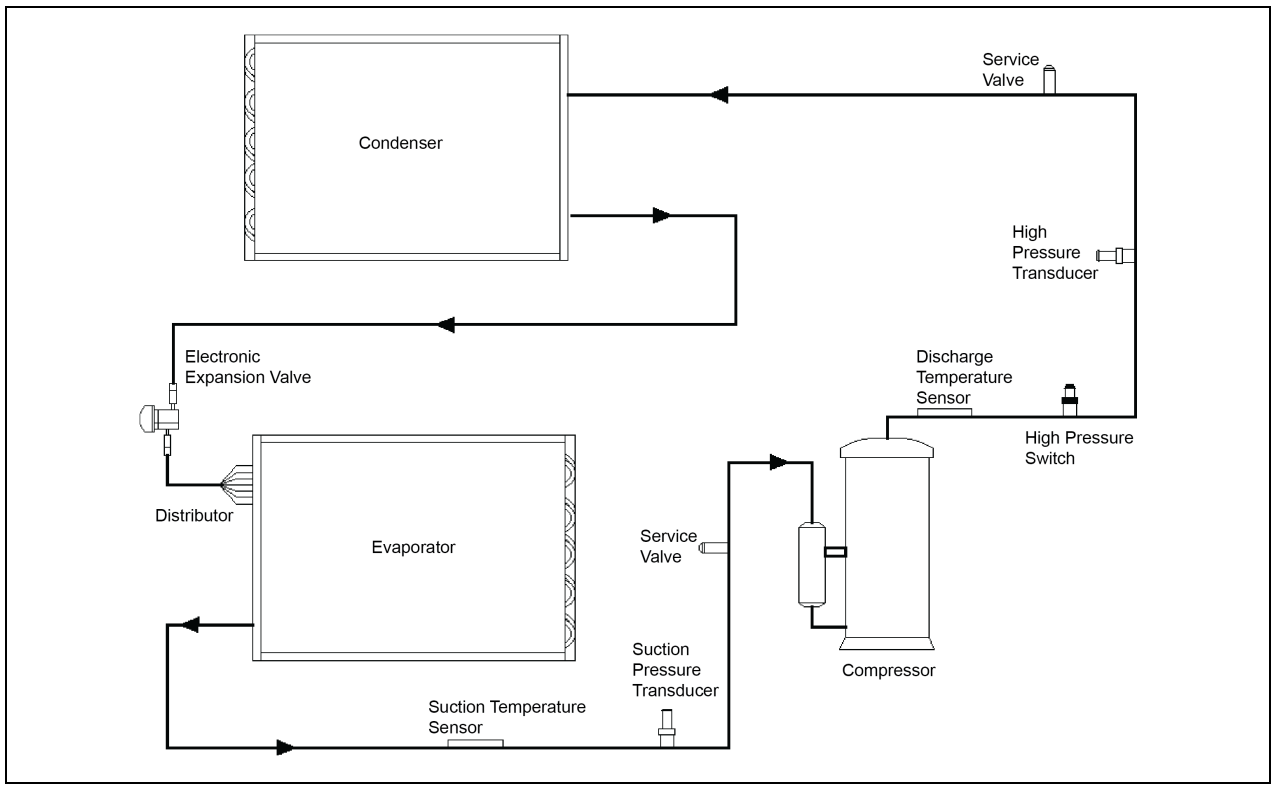
Table 9.4 Troubleshooting for the Cooling System

Symptom	Probable Causes	Check Items and Handling Methods
The surface of the evaporator has serious condensation	Check if the surface of the evaporator is blocked with debris	Check the surface of the evaporator. Blockage may result in uneven discharge of the condensate water
Air volume decrease	The air filter is blocked	Periodically check the filter and replace it in a timely manner to avoid reduction in air volume due to blockage
	The fan is faulty	Check if the fan is faulty. describes the diagnosis and handling methods
	Blockage of the evaporator	Check the surface of the micro-channel evaporator and periodically handle the blockage problem

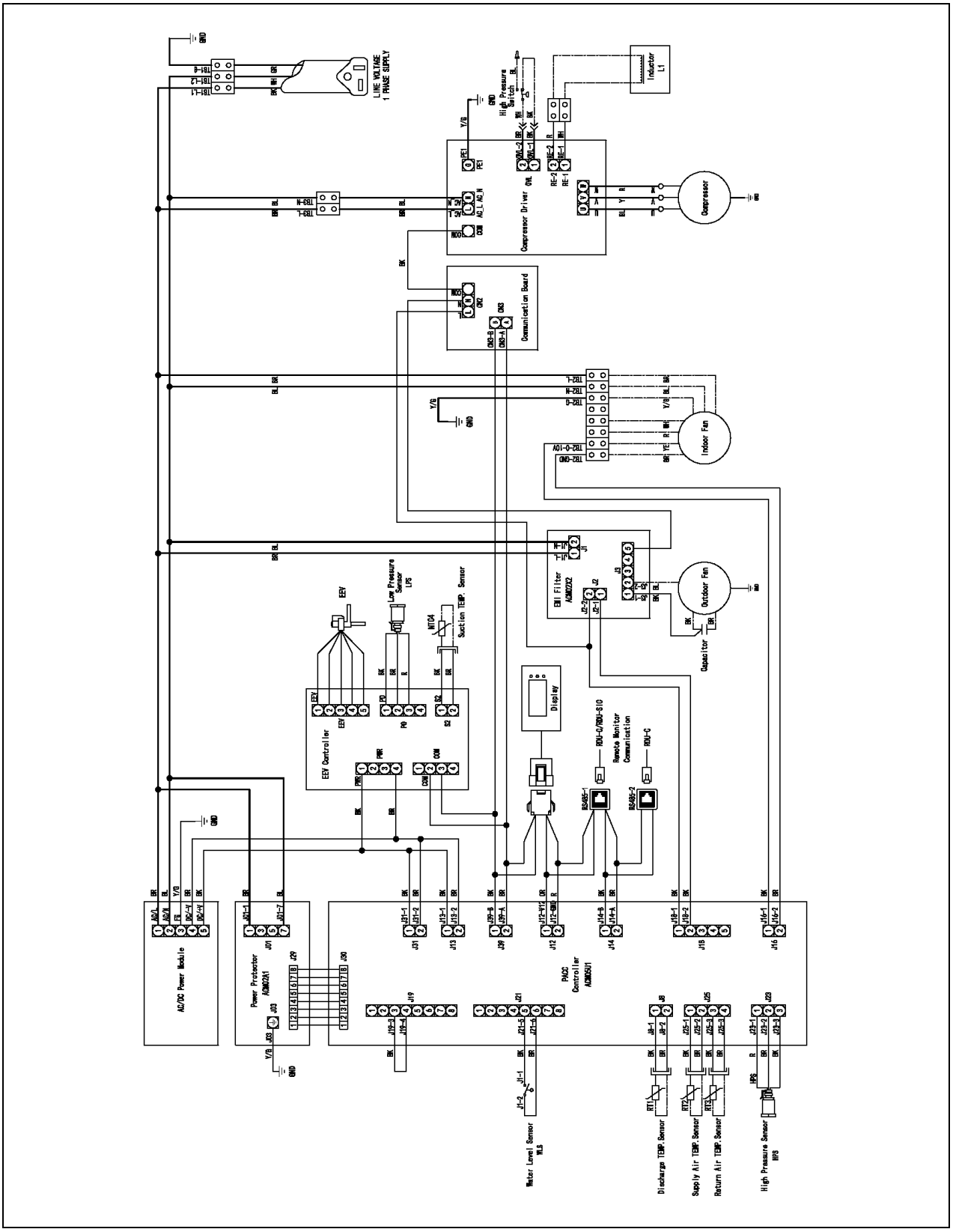
10 Appendices

Appendix A: Diagrams

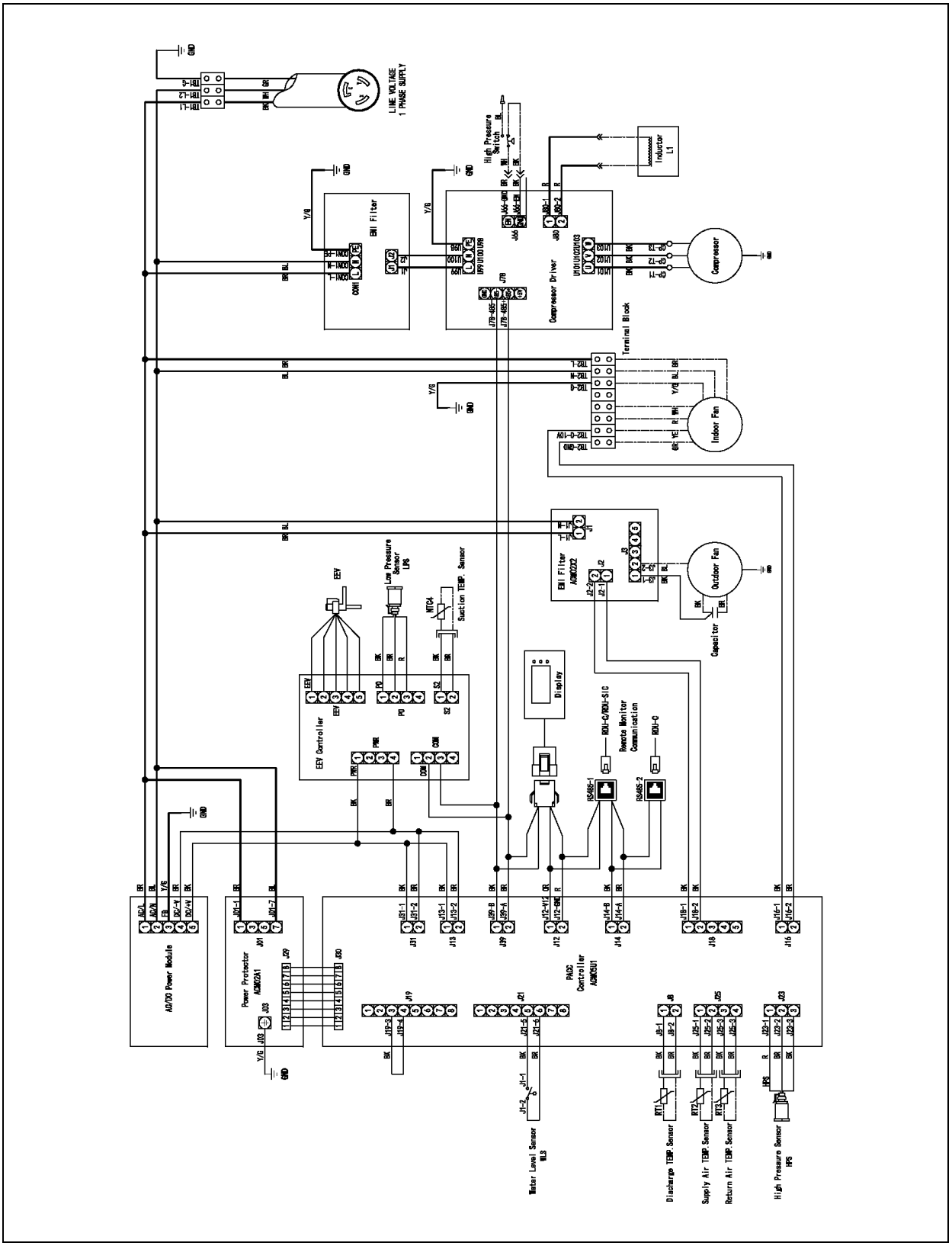
A.1 System Diagram



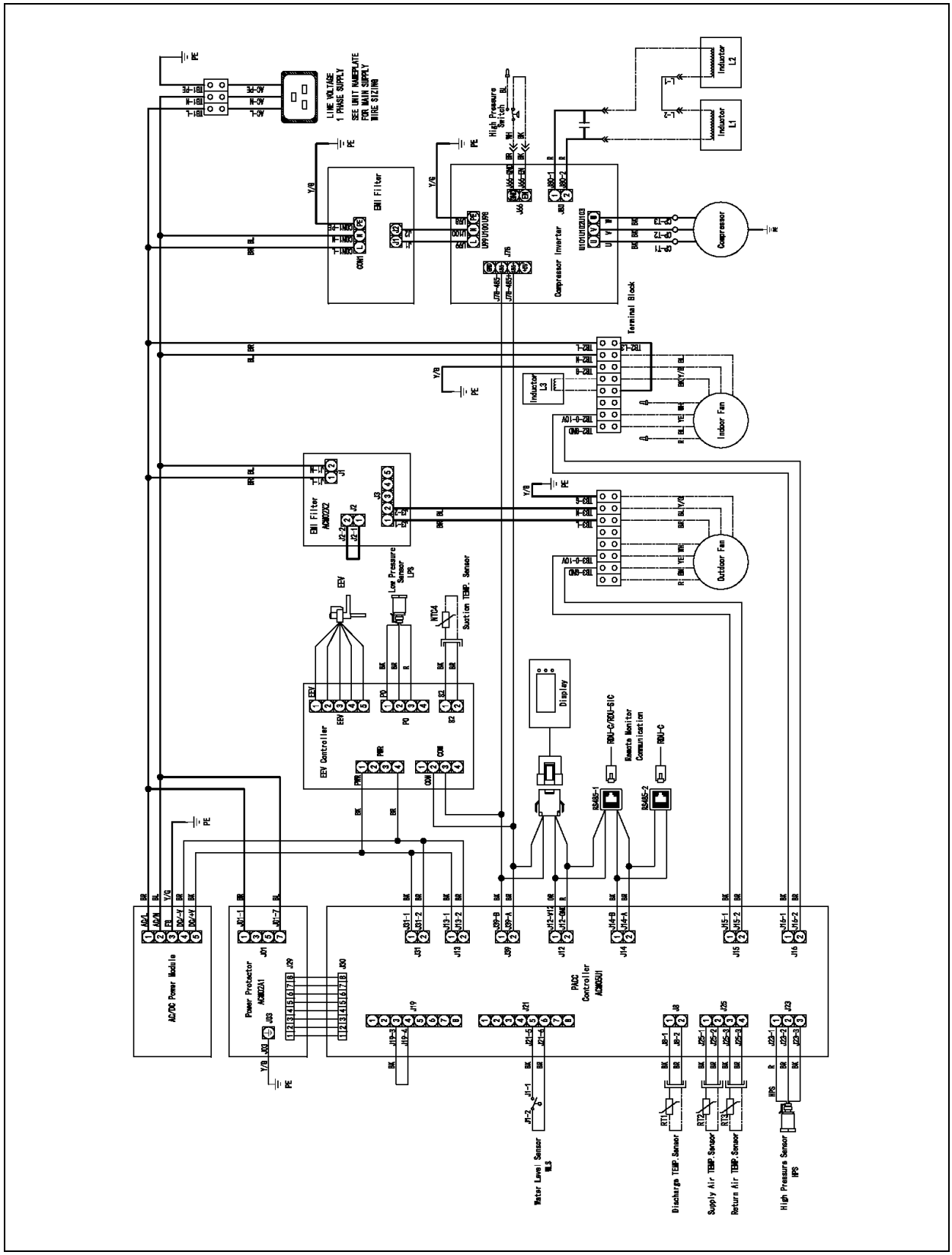
A.2 Wiring Diagram (VRC100 Unit)



A.3 Wiring Diagram (VRC101 Unit)



A.4 Wiring Diagram (VRC102B Unit)



Appendix B: Suppliers Declaration of Conformity

Unique Identifier: VRC100, VRC101

Party Issuing Supplier's Declaration of Conformity

Vertiv Group Corp. 1050 Dearborn Driver Columbus, OH, US

Customer service hotline: 1-800-LIEBERT (1-800-543-2378)

FCC Compliance Statement (for products subject to Part 15)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Appendix C: Technical Support Contact

United States: +1 800 543 2378; +1 800 543 2778; +1 800 222 5877

Europe, the Middle East and Africa: For technical support, please contact your local Vertiv or Partner office. You can also contact us using the contact details on our website: https://www.vertiv.com/en-emea/contacts2

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