Liebert® CRV CRD25 and CRD35

User Manual (Original Instructions)

25 kW and 35 kW, 50/60 Hz, Row-Based Cooling System

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

Refer to local regulations and building codes relating to the application, installation, and operation of this product. The consulting engineer, installer, and/or end user is responsible for compliance with all applicable laws and regulations relation to the application, installation, and operation of this product.

The products covered by this instruction manual are manufactured and/or sold by Vertiv. This document is the property of Vertiv and contains confidential and proprietary information owned by Vertiv. Any copying, use, or disclosure of it without the written permission of Vertiv is strictly prohibited.

Names of companies and products are trademarks or registered trademarks of the respective companies. Any questions regarding usage of trademark names should be directed to the original manufacturer.

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.

TABLE OF CONTENTS

This page intentionally left blank

1 Important Safety Instructions

NOTE: Prior to moving, installing or servicing this unit, read the Safety Instructions sheet provided as a separate document shipped with the unit.

1.1 Conformity to EU Directives

Fabbricante-Manufacturer-Hersteller-Fabricant-Fabricante

Fabricante- Tillverkare – Fabrikant – Valmistaja – Produsent
Fabrikant – Κατασκεναστηξ – Producent

Il Fabbricante dichiara che questo prodotto è conforme alle direttive Europea:
The Manufacturer here by declares that this product conforms to the European Union directives:
Der Hersteller erklärt hiermit, dass dieses Produkt den Anforderungen der europäischen Richtlinien gerecht wird:
Le Fabrican déclare que ce produit est conforme aux directives Européennes:
El Fabricante declara que este producto es conforme a las directivas Europeas:
O Fabricante declara que este produto está em conformidade com as directivas Europeias:
Tillverkare försäkrar härmed att denna produkt överensstämmer med Europeiska Uniones direktiv:
De Fabrikant verklaart dat dit product conform de Europese richtlijnen is:
Vaimistaja vakuuttaa täten, että tämä tuote täyättää seuraavien EU-direktiivien vaatimukset:
Produsent erklærer herved at dette produktet er i samsvar med EU-direktiver:
Fabrikant erklærer herved, at dette product opfylder kravene i EU direktiverne:

kατασÀευαστρj δηλνξιüτιτο παÃüν πÃοϊüν εβναι ÀατασàευαmŸνο αỳm ωνα mε τιj οδηγβεj τηj E.E.:

2006/42/EC

2014/30/EU

2014/35/EU

2011/65/EU with its amendment (EU) 2015/863

1.2 Regulation (EU)

Stationary air conditioners within the European market and operating with fluorinated greenhouse gases (F-gas, such as R407C, R134a, R410A), have to comply starting from 1st Jan, 2015 with the F-gas Regulation (EU) No. 517/2014 which replaces the previous Re. (EU) no. 342/2006, valid from 4th since July, 2007.

Note that, the refrigerants like R22 are not F-gas and their relevant regulation is Reg. (EU) no. 2037/2000.

The following notes have to be considered when operating with the above mentioned systems:

- Fluorinated greenhouse gases are covered by the Kyoto Protocol.
- The fluorinated greenhouse gases in this equipment must not be released into the atmosphere.
- The values indicated in Annex I and Annex IV of Regulation (EU) No 517/2014 concerning the global warming potential (GWP) of some major F-gases or mixtures are given below:
    - R-134a GWP 1430
    - R-407C GWP 1774
    - R-410A GWP 2088

- Operators of the above mentioned applications, which contain fluorinated greenhouse gases, shall, using all measures which are technically feasible and do not entail disproportionate costs:
    a. Prevent leakage of these gases and as soon as possible repair any detected leakage.
    b. Ensure that they are checked for leakage by certified personnel.
    c. Ensure proper recovery of flourinated greenhouse gases by certified personnel.
    d. In case of applications containing 5 tons CO2 equivalent, i.e. 2.4 kg of R410A (10 tons in case of hermetically sealed system) or more of F- gases: certified personnel and Companies (according to Reg. 303/2008) provides regular leak testing (according to Reg. 1516/2007 and Reg. 1497/2007) and maintain records of maintenance activities in a dedicated log book.
    e. Recovery for the purpose of recycling, reclamation or destruction of the fluorinated greenhouse gases, pursuant to Art. 8 of the Regulation shall take place before the final disposal of that equipment and, when appropriate, during its servicing and maintenance.
- Operator, according to Regulation Article 2, point 8, means the natural or legal person exercising actual power over the technical functioning of products and equipment covered by this Regulation. The State may, in defined, specific situations, designate the owner as being responsible for the operator's obligations. Where large installations are involved, service companies are contracted to carry out maintenance or servicing. In these cases, the determination of the operator depends on the contractual and practical arrangements between the parties.
- Direct methods of leakage checking approved by the manufacturer (Reg. 1516/2007 and Reg. 1497/2007).
    a. Gas detection device adapted to the refrigerant in the system; the sensitive of portable gas detection devices (as a direct test method) shall be at least five grams per year.
    b. Proprietary bubble solutions / soapsuds.
- Additional information located into a dedicated label of unit (Reg. 1494/2007)
    a. Where fluorinated greenhouse gas is foreseen to be added to the equipment outside of the manufacturing site at the point of installation, a dedicated label accommodates notation of both the quantity (kg) pre-charged in the manufacturing plant and of the quantity charged at the installation site as well as the resulting total quantity of f-gas as a combination of the above mentioned quantities, in a manner which conforms to the legibility and indelibility.

        Our split units are usually not pre-charged on factory, in this case the total quantity of refrigerant charged in the unit has to be written in the relevant label, during the commissioning operation at the installation site.

    b. Our packaged units (not split) operating with f-gas are usually full charged on factory and the total amount of refrigerant charge is already reported on the label. In this case, the label has no need of further written information.
    c. In generally, the above mentioned information has been located in the main nameplate of relevant unit.
    d. For equipment with double refrigeration circuits, in regards to differentiates requirements on the basis of the quantity of f-gas contained, the required information about refrigerant charge quantities has to be listed separately for each individual circuit.
    e. For equipment with separate indoor and outdoor sections connected by refrigerant piping, the label information will be on that part of the equipment which is initially charged with the refrigerant. In case of a split system (separate indoor and outdoor sections) without a factory pre-charge of refrigerant, the mandatory label information will be on that part of the product or equipment which contains the most suitable service points for charging or recovering the fluorinated greenhouse gas(es).
- Safety data sheets of f-gases used in the products are available on demand.

2 Product Overview

The Vertiv™ Liebert® CRV CRD25 and CRD35 row-based cooling units are specifically created and designed for small to medium data centers, computer rooms, equipment rooms, and similar high heat density environments.

The CRD25 and CRD35 indoor units are used together with the CCD25 and CCD35 condensers. CRD25 and CRD35 provide power to CCD25 and CCD35 and control their operation.

2.1 Model Nomenclature

Table 2.1 below and Table 2.2 below describe the model number for the Vertiv™ Liebert® CRV CRD25 and CRD35 cooling units.

Table 2.1 CRD25 Model Number Example

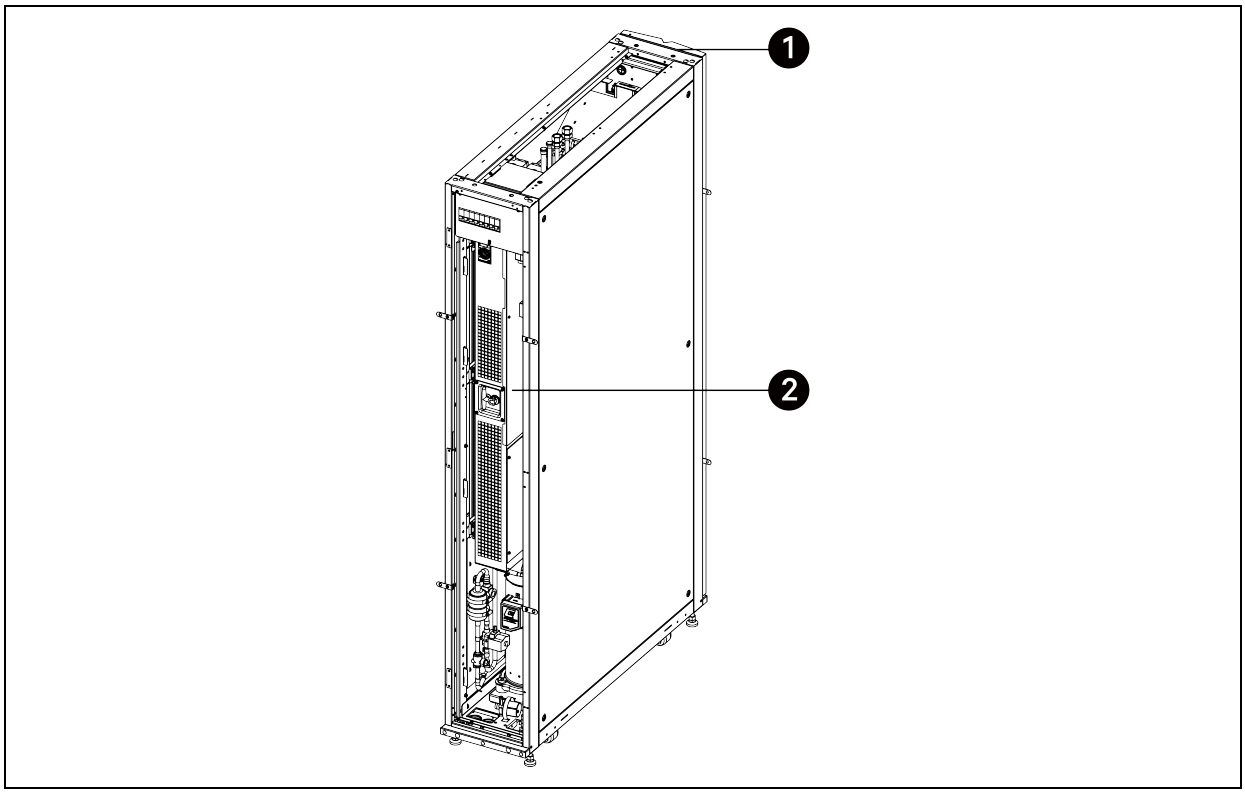
Model Number											
1	2	3	4	5	6	7	8	9	10	11	12
C	R	D	2	5	5	-	P	D	0	0	A

Table 2.2 CRD25 and CRD35 Model Number Digit Definitions

Digit	Variable	Description
1	C	Vertiv™ Liebert® CRV
2	R	
3	D	Air-cooled
4	25, 35	Model number
5		
6	5	400 V, 3-phase, 50/60 Hz, CE
7	-	Separator
8	P	Reheat and humidifier
9	D	Dual power supply
10	0	R410A refrigerant
11	0	Free digit
12	A- Z	Revision

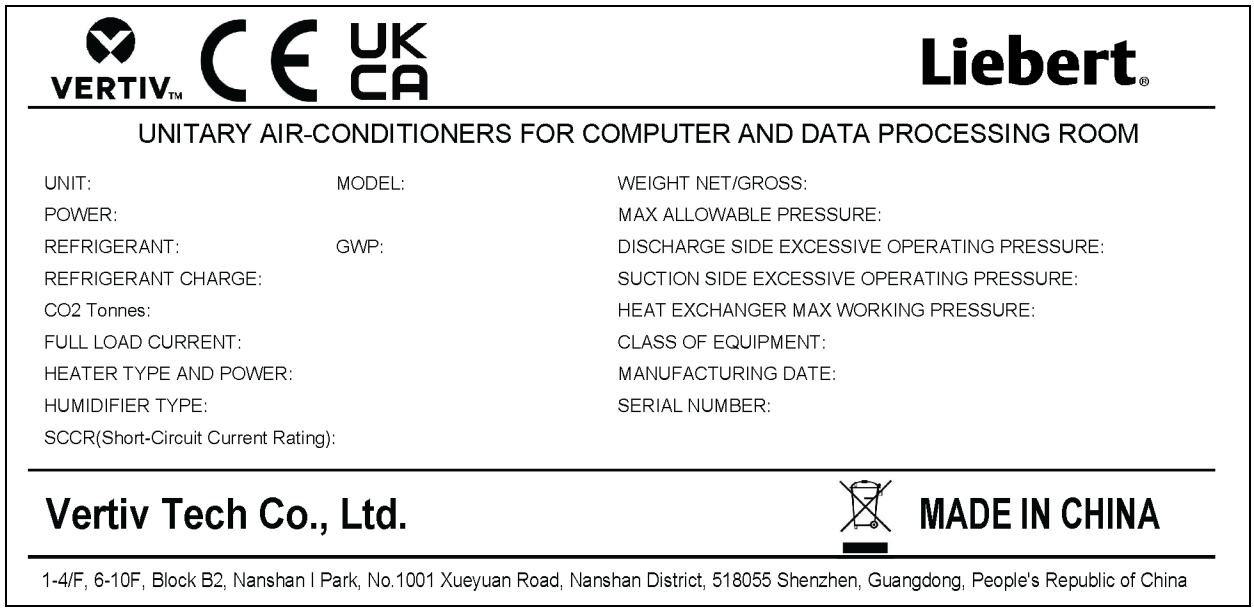
2.2 Name Plate and Components

Figure 2.1 Name Plate Location



Item	Description
1	Front door
2	Name plate on the side cover of the slider electrical box (electrical box 2)

Figure 2.2 Vertiv™ Liebert® CRV CRD25 and CRD35 Name Plate Information

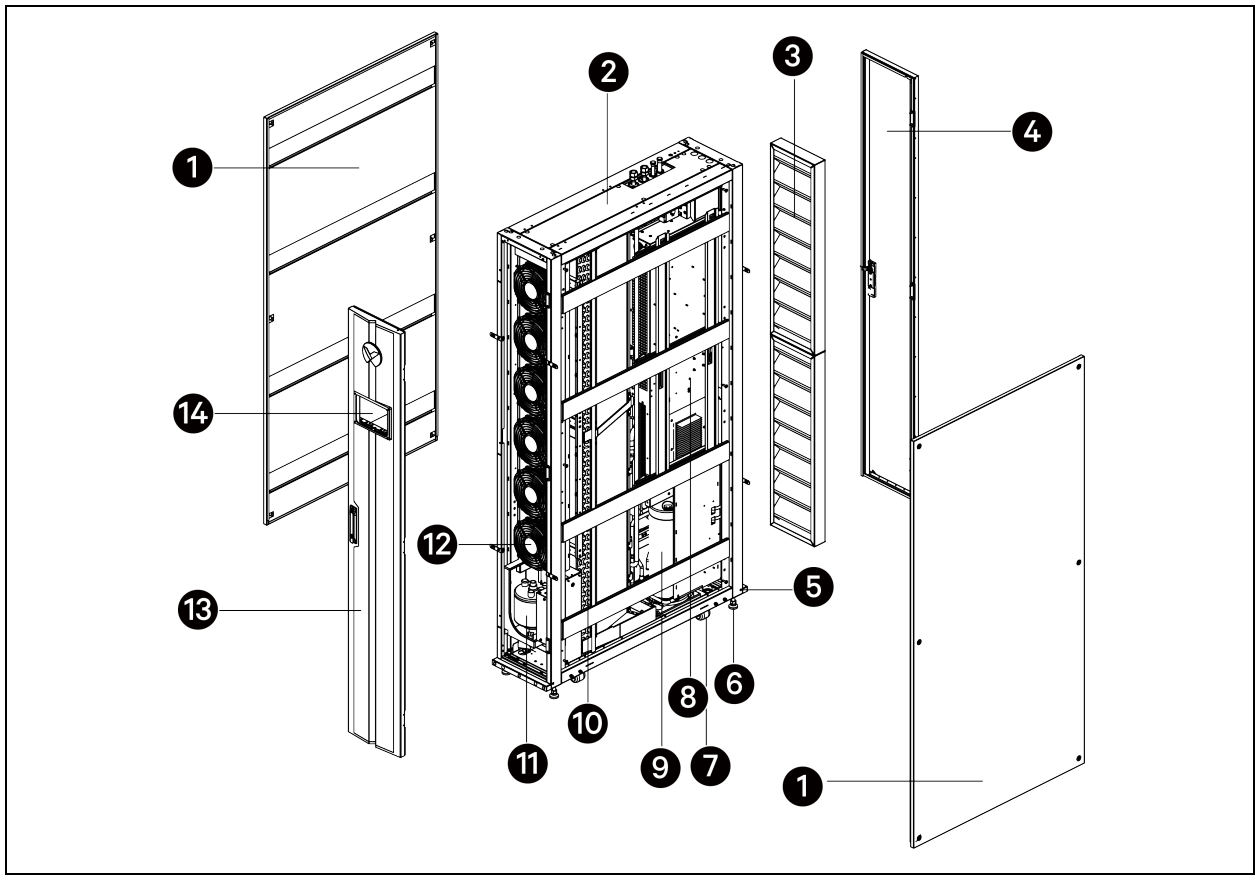


Name Plate Information	Description
UNIT	Unit defined by 6 digits
MODEL	Model defined by 12 digits
REFRIGERANT	Type of the refrigerant
WEIGHT NET/GROSS	Net weight and gross weight of the unit
REFRIGERANT CHARGE	Amount of refrigerant charged on site
GWP	Global warming potential

NOTE: Refer **Table 2.1** on page 3 and **Table 2.2** on page 3 for unit and model information.

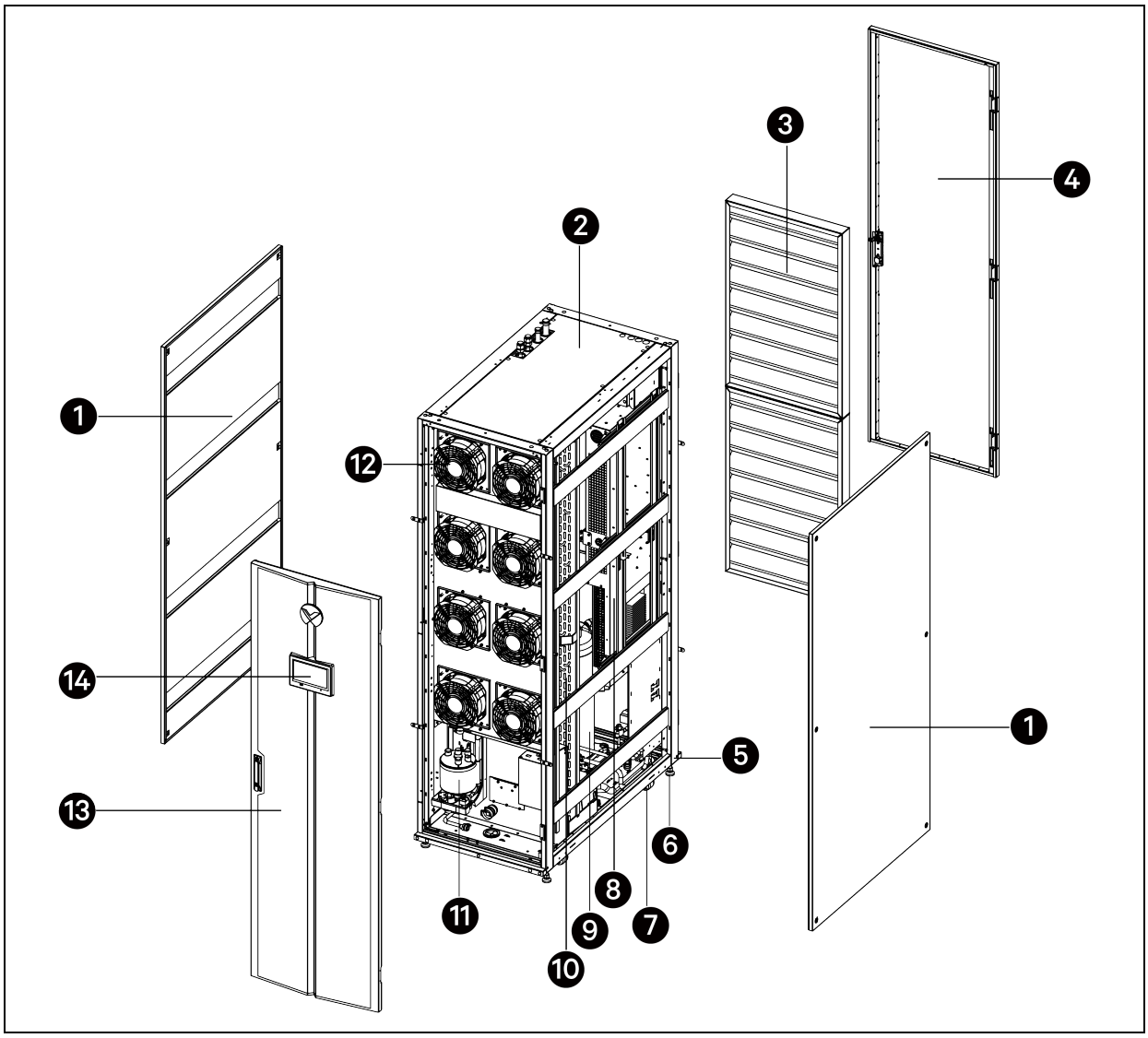
2.3 Component Location

Figure 2.3 Vertiv™ Liebert® CRV CRD25 Component Location



Item	Description	Item	Description
1	Side panel	8	Slider electrical box (electrical box 2)
2	Top panel	9	Compressor
3	Filter	10	Heat exchanger
4	Rear door	11	Humidifier
5	Bottom panel	12	EC fan
6	Leveling foot	13	Front door
7	Caster	14	Human machine interface (HMI) display

Figure 2.4 Vertiv™ Liebert® CRV CRD35 Component Location



Item	Description	Item	Description
1	Side panel	8	Slider electrical box (electrical box 2)
2	Top panel	9	Compressor
3	Filter	10	Heat exchanger
4	Rear door	11	Humidifier
5	Bottom panel	12	EC fan
6	Leveling foot	13	Front door
7	Caster	14	Human machine interface (HMI) display

2.4 Accessories

The accessories provided with the unit are listed in Table 2.3 below .

Table 2.3 Accessories

Component	Quantity		Remark
	CRD25	CRD35	
Remote temperature sensor (IRMS01T)	1	1	
CAN bus cable	10 m x 2	10 m x 2	1 x CAN bus cable for remote temperature sensor. 1 x CAN bus cable for unit-to-unit (teamwork) communication
Water underfloor sensor (board) (CM20AR)	1	1	
Bracket for water underfloor sensor	1	1	
Cable for water underfloor sensor	4 m	4 m	For connecting the water underfloor sensor (board).
Bottom drainpipe assembly	0.8 m x 1	0.8 m x 1	With Rc1/2 in. brass drainage connector
Rc1/2 in. brass humidifier pipe connector	1	1	
Tie wrap	10	10	
Plastic cap	4	4	For covering the unused holes on the plate.
M12 x 30 hexagon bolt	8	8	For fixing the cabinet.
M5 x 12 cross grooved countersunk head screw	5	5	
L-shaped baying bracket	8	8	
Cabinet guide rail (Ramp)	2	2	For removing the cabinet from the pallet.
User manual	1	1	
Unit circuit diagram	1	1	
EU declaration of conformity	1	1	
UKCA declaration of conformity	1	1	
Safety statement	1	1	

2.5 System Data

Table 2.4 Technical Specifications

Parameter	CRD25	CRD35
Width mm (in.)	300 (11.8)	600 (23.6)
Input power	AC 400V 3Ph+N+PE 50/60 Hz	AC 400V 3Ph+N+PE 50/60 Hz
Total airflow rated/maximum m^3/h (CFM)	5200/5500 (3061/3237)	8000/8500 (4709/5003)
Total fan power consumption maximum (kW)	1.215	1.234
Number of fans	6	8
Cooling capacity (kW)	24	35
Heating capacity (kW)	3	6
Minimum cooling capacity(kW)	0	0
Humidification capacity kg/h (lb/h)	2 (4.4)	2 (4.4)
Condensate pump capacity L/min at 5 m	3.5	3.5
Air filtration efficiency	G4	G4

Table 2.5 Operating Limits

Parameter		Design Condition (Min.)	Design Condition (Max.)
Unit entering air	Temperature °C (°F)	24 (75.2)	45 (113)
	Relative humidity	17%	60%
Storage conditions	Temperature °C (°F)	-40 (-40)	70 (158)
Outdoor air	Without low ambient kit, temperature °C (°F)	-20 (-4)	48 (118.4) *Note: Unit remains operational up to 52 °C (125.6 °F) with reduced capacity*
	With low ambient kit, temperature °C (°F)	-40 (-40)	48 (118.4)
Power supply tolerances		Voltage ± 10%	
		Frequency ± 3 Hz	
Equivalent length of pipe between evaporator and condenser m (ft)		-	120 (393.7)
Height between evaporator and condenser m (ft)	Condenser placed higher than evaporator	-	30 (98.4)
	Condenser placed lower than evaporator	-	8 (26.2)

NOTE: The operating limits refer to new units and those that have been correctly installed and serviced.

NOTE: If the altitude is higher than 2000 m (6562 ft), contact Vertiv Support.

NOTE: Low pressure transducer failure or low discharge superheat alarms may occur during startup at outdoor temperatures below -35°C (-31°F), but they will clear up automatically and the unit will operate normally.

Table 2.6 Performance Data

Parameter	CRD25	CRD35
Return air condition: 35 °C (95°F) DB, 24% RH; outdoor condition: 35 °C (95°F)		
Net total capacity kW (kBtu/h)	24 (81.9)	35 (119.4)
Net sensible capacity kW (kBtu/h)	24 (81.9)	35 (119.4)
Indoor unit power input kW (kBtu/h)	6.42 (21.9)	9.07 (30.9)
System power input (indoor unit + outdoor unit) kW (kBtu/h)	7.08 (24.2)	9.50 (32.4)

Table 2.7 Sound Level (50 Hz to 250 Hz)

Model	Fan Speed	Average Sound Pressure Level dB (A)	Location	1/3 Octave Band Center Freq	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz
				Sound Pressure Level dB (A)	dB	dB	dB	dB	dB	dB	dB	dB
CRD 25	100%	74.3	Front	77.2	17.6	26.2	29	35	39.5	39.4	44.7	52.3
			Left	71.4	15.5	22.5	32.4	35.7	41.8	44.2	44.2	48.8
			Right	71.4	16	22.1	31.6	40.1	40	45.6	45	50.4
CRD 35	100%	73.8	Front	77.1	18.2	30.1	33.2	34.4	36.8	39	44.4	51.5
			Left	69.4	15.4	29.5	35.2	39.2	38.4	39.4	42.1	46
			Right	70.7	19.2	29.6	35.1	35.9	42.1	40.2	42.1	46.4

Table 2.8 Sound Level (315 Hz to 1.6 kHz)

Model	Fan Speed	Average Sound Pressure Level dB (A)	Location	1/3 Octave Band Center Freq	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz
				Sound Pressure Level dB (A)	dB	dB	dB	dB	dB	dB	dB	dB
CRD 25	100%	74.3	Front	77.2	67	69.1	62.1	63.8	66.4	66	66.7	66.3
			Left	71.4	62.5	64.4	58.7	61.2	62.4	59	59.6	59
			Right	71.4	60.9	62.3	57.7	61.7	62.7	59.7	60.2	60.6
CRD 35	100%	73.8	Front	77.1	62.7	65	57.7	60.1	62.6	66.7	67.5	67
			Left	69.4	57.4	60.8	52.6	55.8	58.1	59.2	59.9	59.2
			Right	70.7	56	59.2	55.3	58.9	60.5	60.6	61	61.2

Table 2.9 Sound Level (2 kHz to 10 kHz)

Model	Fan Speed	Average Sound Pressure Level dB (A)	Location	1/3 Octave Band Center Freq	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
				Sound Pressure Level dB (A)	dB	dB	dB	dB	dB	dB	dB	dB
CRD 25	100%	74.3	Front	77.2	65.6	68.7	63.8	61.7	58.6	55.9	51.8	47.3
			Left	71.4	58.6	59.3	55.4	51	47.2	43	38.7	33.1
			Right	71.4	59.9	60.8	56.9	52.5	48.8	45.2	41.4	36.3
CRD 35	100%	73.8	Front	77.1	68.2	70.3	65.9	64.2	61	58.8	55.4	52.6
			Left	69.4	59.4	60.5	57	53.3	49.2	45.1	40.3	34.8
			Right	70.7	61.6	61.9	58.3	54.5	50.3	46.5	41.7	37

NOTE: Measurement Standard: EN 13487

NOTE: The sound level is measured in free field at three locations, each of which is 1 m (3.3 ft) high and 2 m (6.6 ft) away from the air conditioner, with fans in operation.

This page intentionally left blank

3 Pre-installation Preparation

WARNING! Risk of top-heavy unit falling over when improperly lifted or moved. Improper handling can cause equipment damage, injury or death. 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.

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

NOTICE

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

NOTICE

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

NOTICE

Risk of improper storage. Can cause unit damage. Keep the unit in its original package, upright, indoors and protected from dampness, freezing temperatures and contact damage.

3.1 Tools Required

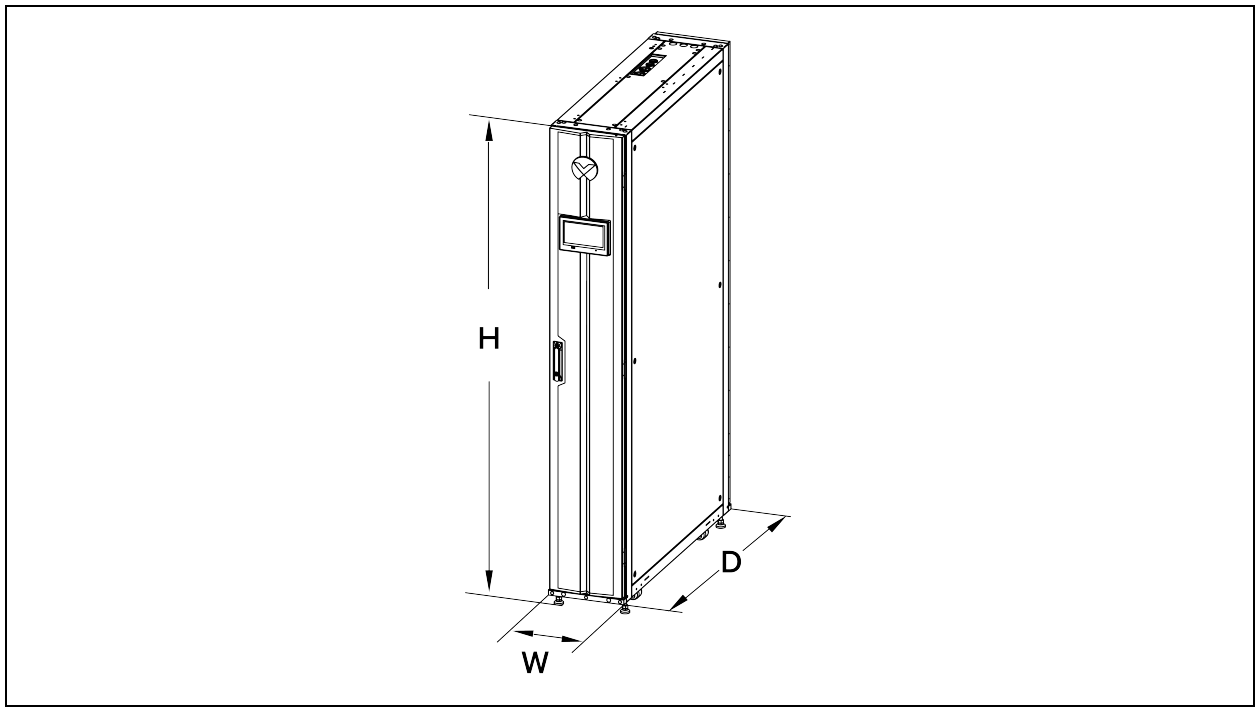
The tools required are listed in Table 3.1 below . These tools are not provided with the unit.

Table 3.1 Tools Required

Name of Tools	Name of Tools
Electric hand drill	Adjustable wrench
Slotted screwdriver	Cross head screwdriver
Stepladder	Forklift
Level	Wire cutting pliers
Claw hammer	Diagonal cutting pliers
Insulating shoes	Antistatic gloves
Electrician knife	Cable ties
Insulating tape	Insulating gloves
Crimping pliers	Heat shrinkable tube
Insulated torque wrench	Torque screwdriver
Multimeter	Clip-on ammeter

3.2 Dimensions and Weights

Figure 3.1 Unit Dimension



Model	Unit Dimensions (Width x Depth x Height) mm (in.)	Shipping Dimensions (Width x Depth x Height) mm (in.)	Net Weight kg (lb)	Shipping Weight kg (lb)
CRD25	300 × 1132 × 2000 (11.8 x 44.6 x 78.7)	776 x 1276 x 2228 (30.6 x 50.2 x 87.7)	265 (584.2)	348 (767.2)
CRD35	600 × 1146 × 2000 (23.6 x 45.1 x 78.7)	776 x 1276 x 2228 (30.6 x 50.2 x 87.7)	335 (738.5)	426 (939.2)

3.3 Clearance Requirements

Figure 3.2 Vertiv™ Liebert® CRV CRD25 Clearance Requirements (Top View, mm (in.))

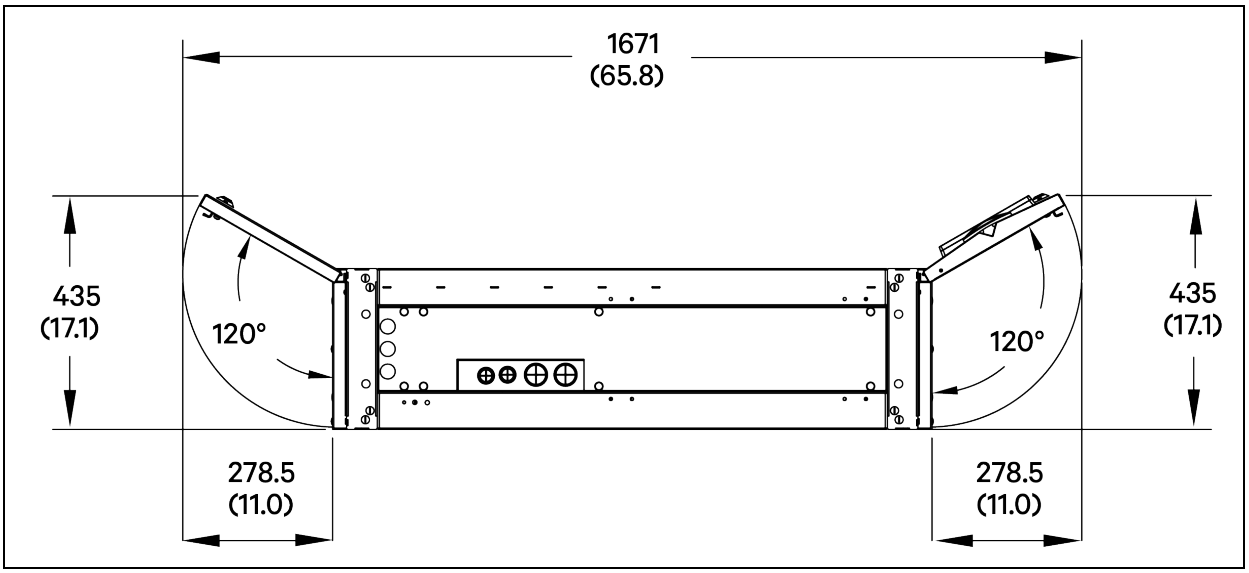
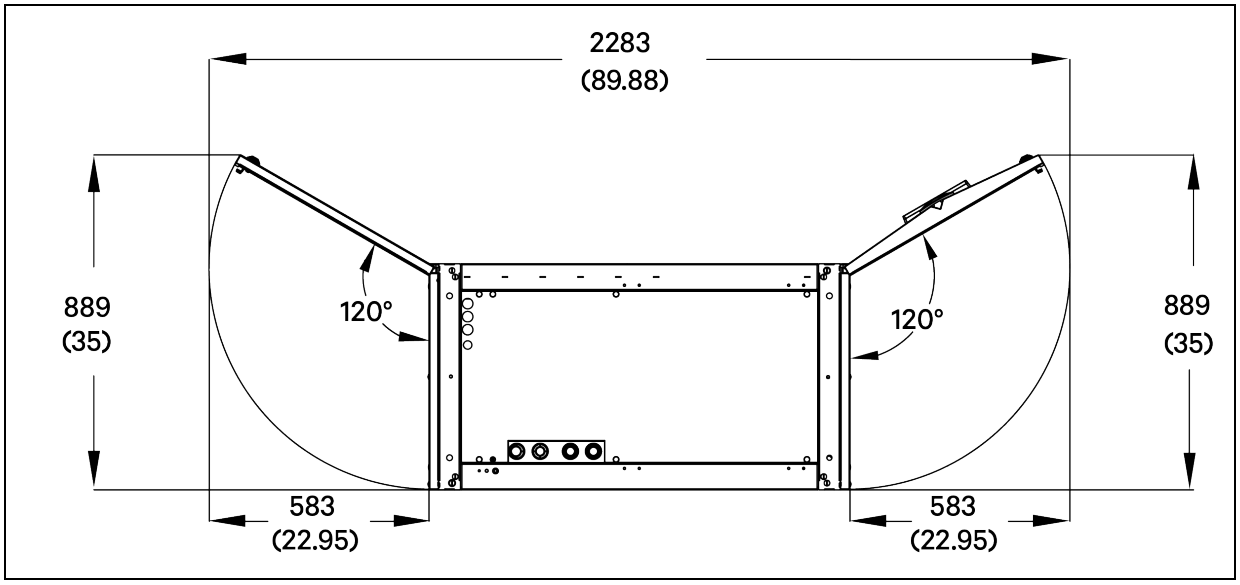


Figure 3.3 Vertiv™ Liebert® CRV CRD35 Clearance Requirements (Top View, mm (in.))



NOTE: Keep space at least 915 mm (36 in.) from the front door and rear door to the wall or to other obstacles for service clearance.

3.4 Inspecting the Unit

Upon arrival of the unit and before unpacking:

- Verify that the labeled equipment matches the bill of lading.
- Inspect that there are no visible or concealed damages on the package.
- Check that the tilt monitor indicator on the package is not red. If it becomes red, tipping has occurred.
- Additional inspection of the unit is warranted to ensure no exterior or internal damage.

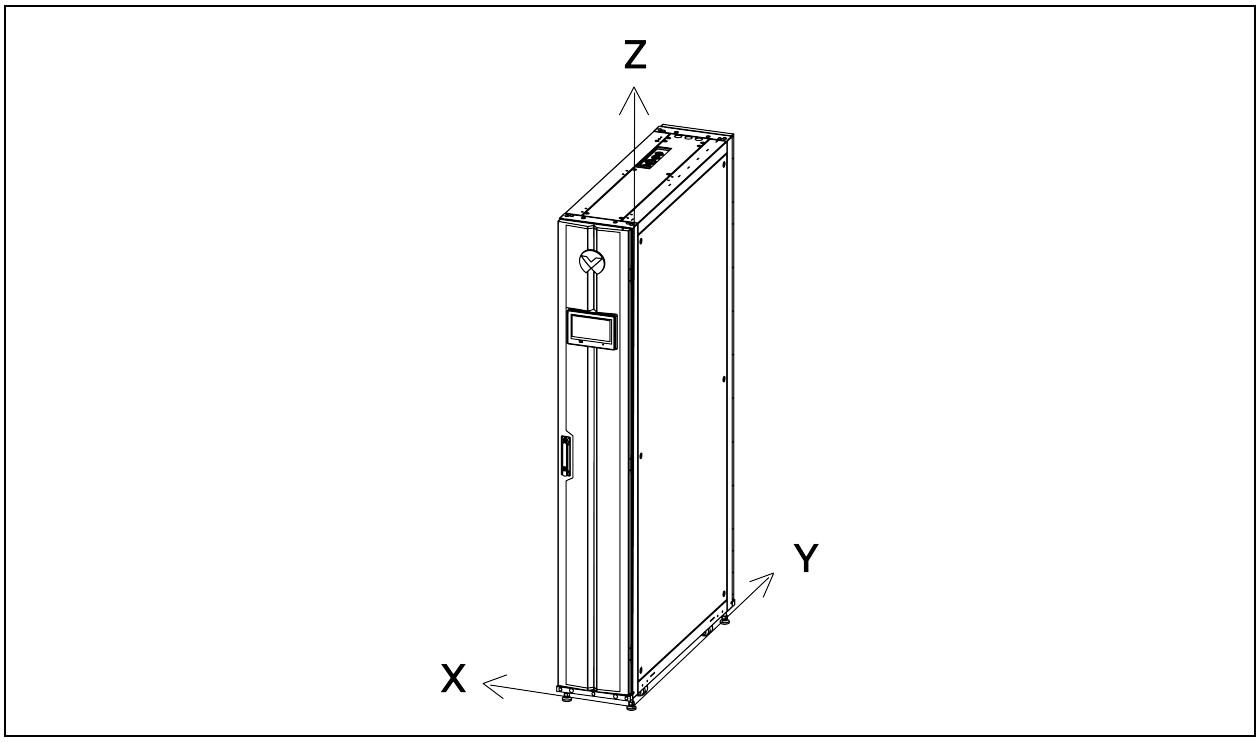
Report damage immediately to the carrier and file a damage claim with a copy sent to Vertiv or to your sales representative.

3.5 Moving the Packaged Unit

Transport the unit with a forklift. When using the forklift:

- Make sure the fork length is suitable for the width of the pallet.
- Do not tilt the unit more than 20 degrees in any direction to prevent the unit from falling over.
- When moving the packaged unit, do not lift it any higher than 102 mm (4 in.) off the ground. Exercise great care if the unit must be lifted higher than 102 mm (4 in.).
- Refer to the Figure 3.4 below for the location of the center of gravity.

Figure 3.4 Center of Gravity



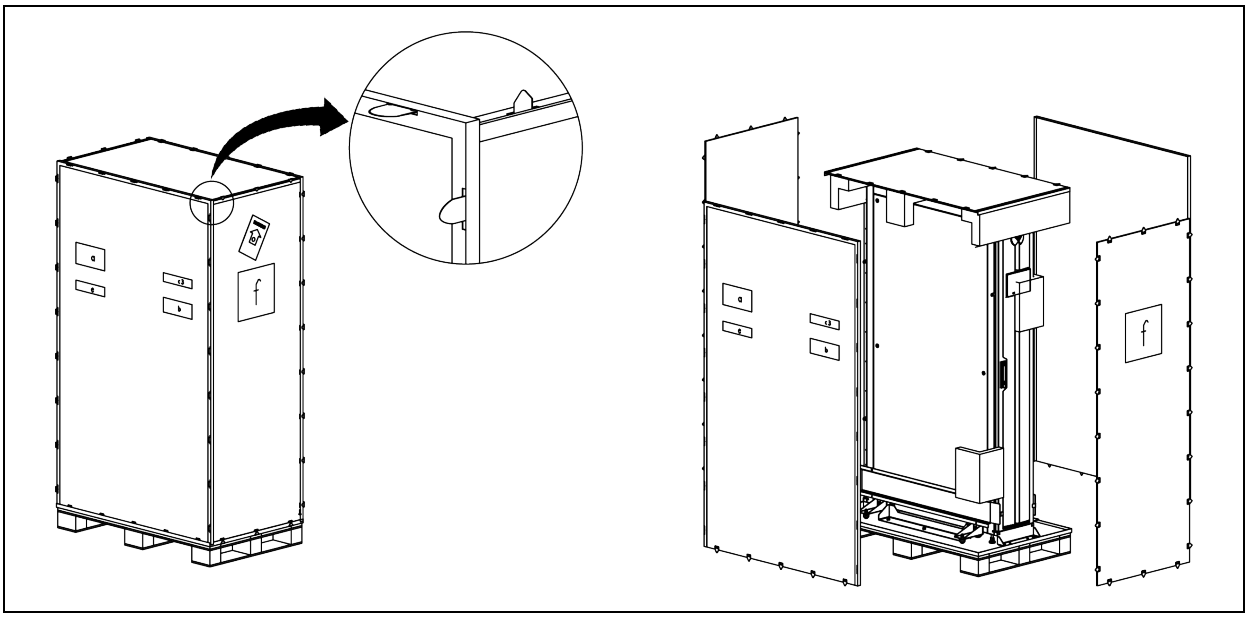
Center of Gravity	X Axis mm (in.)	Y Axis mm (in.)	Z Axis mm (in.)
Distances from Corner	X ± 50 (2)	Y ± 50 (2)	Z ± 100 (3.9)
CRD25	148 (5.8)	573 (22.6)	927 (36.5)
CRD35	272 (10.7)	583 (23)	923 (36.3)

3.6 Unpacking the Unit

To unpack the unit:

1. Pull straight the latches on the wooden box using a claw hammer.
2. Remove the side wooden panels. And then remove the top wooden panel and the cushioning from the top of the unit.
3. Remove the stretch wrap that attach the ramp to the unit. Remove the ramp and set it aside until needed for moving the unit. Remove the bag around the unit.

Figure 3.5 Unpacking the Unit



3.7 Removing the Unit from the Pallet

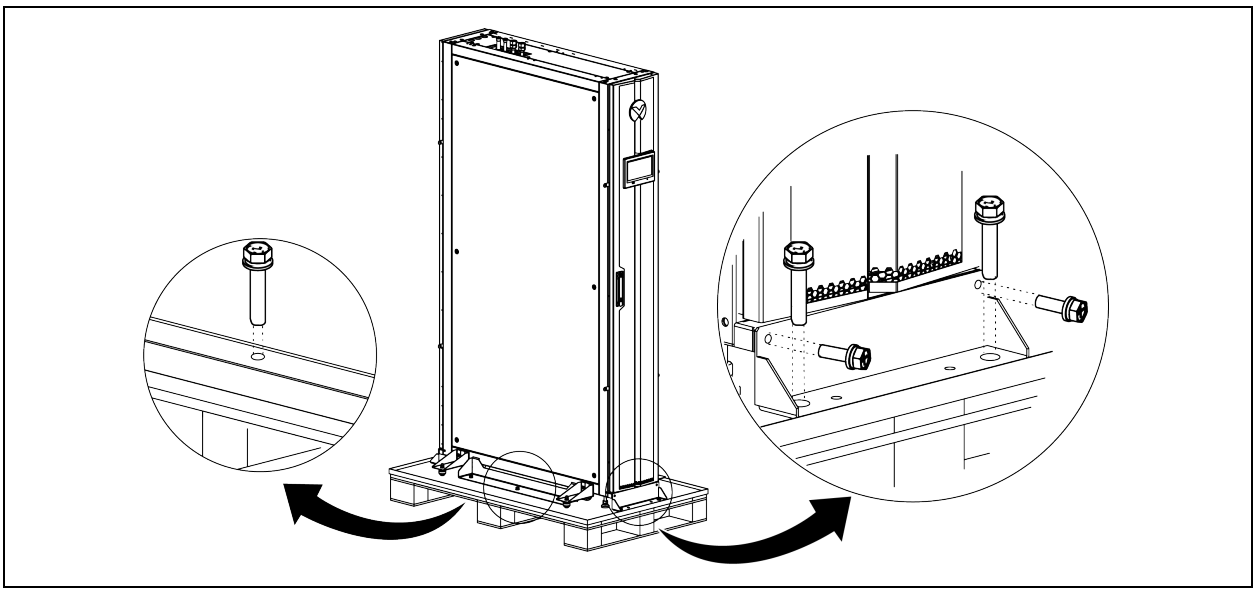
WARNING! Risk of unsecured unit rolling off pallet. Can cause serious injury or death. Ensure that the unit and pallet are located on a flat surface before loosening the hardware securing the unit to its shipping pallet.

WARNING! Two or more properly trained and qualified personnel are required to move the unit to its installation location.

To remove the unit from the pallet:

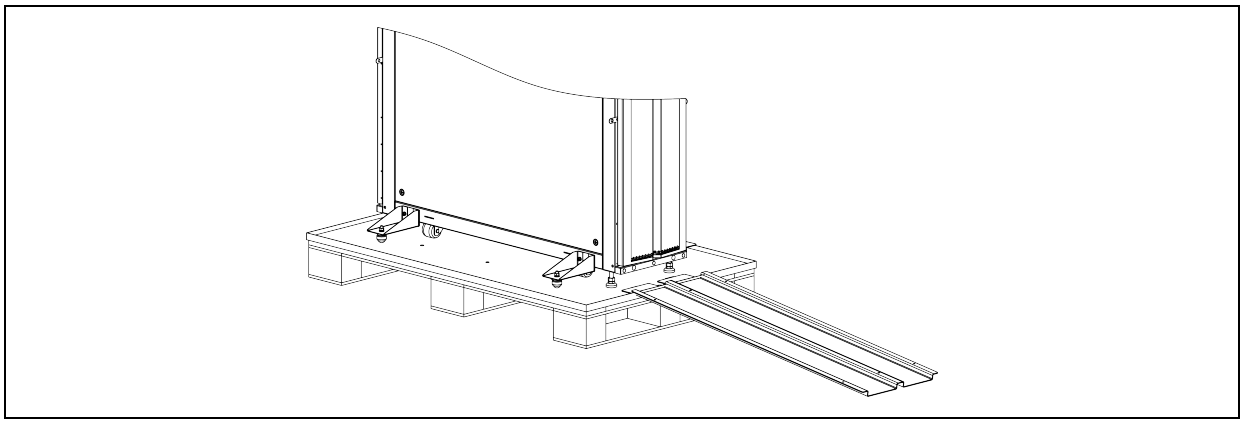
1. Remove the left and right shipping brackets from pallet by removing three M8 hex screws from each bracket.
2. Remove the front and rear shipping brackets from the pallet by removing two M6 hex screws and two M8 hex screws for each bracket.

Figure 3.6 Removing Shipping Brackets from Pallet



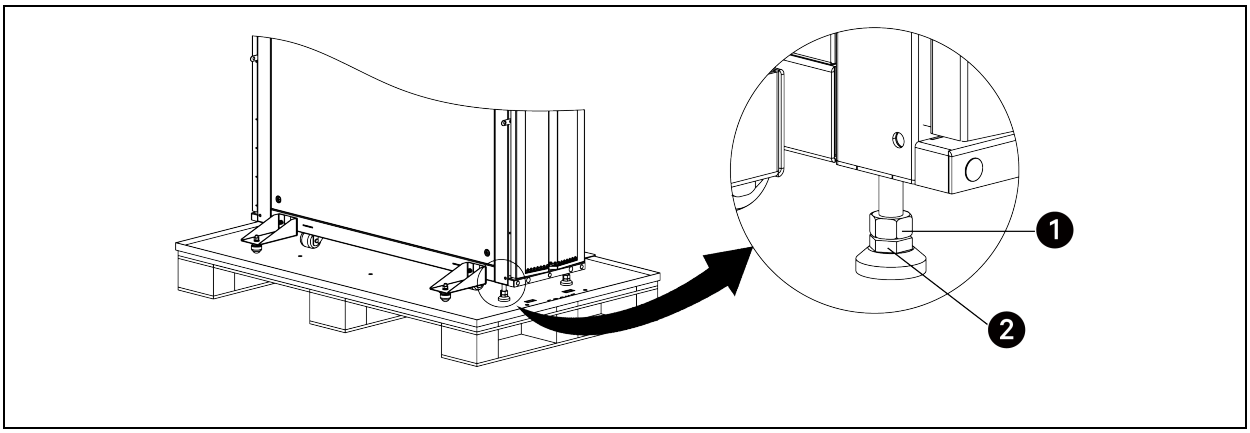
3. Place two ramps on the pallet by fitting the tabs into the holes on the pallet.

Figure 3.7 Installing Ramps



4. Lift the four leveling feet under the unit. Lift the unit one corner at a time.
    a. Use an adjustable wrench to loosen the fixing nut on each foot in counterclockwise direction.
    b. Use an adjustable wrench to turn the hex bolt clockwise to adjust feet up.
    c. Tighten the fixing nut.

Figure 3.8 Lifting Leveling Feet



Item	Description
1	Fixing nut
2	Hex bolt

5. Move the unit to its installation location using the built-in casters.

This page intentionally left blank

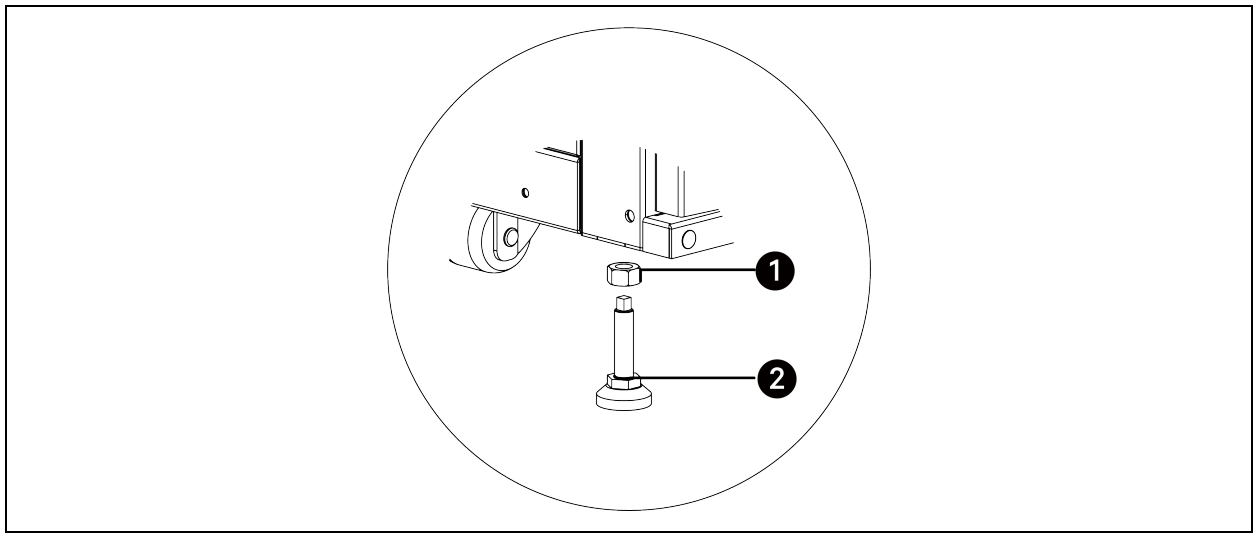
4 Installing in Enclosure Row

4.1 Leveling the Unit

To level the unit:

1. Use an adjustable wrench to loosen the fixing nut on each foot in counterclockwise direction.
2. Rotate the hex bolt on the base of each foot in clockwise or counterclockwise direction until the foot rises or falls to a suitable position. Use a level to ensure that the cabinet is level.
3. Tighten the fixing nut on each foot.

Figure 4.1 Leveling the Unit



Item	Description
1	Fixing nut
2	Hex bolt

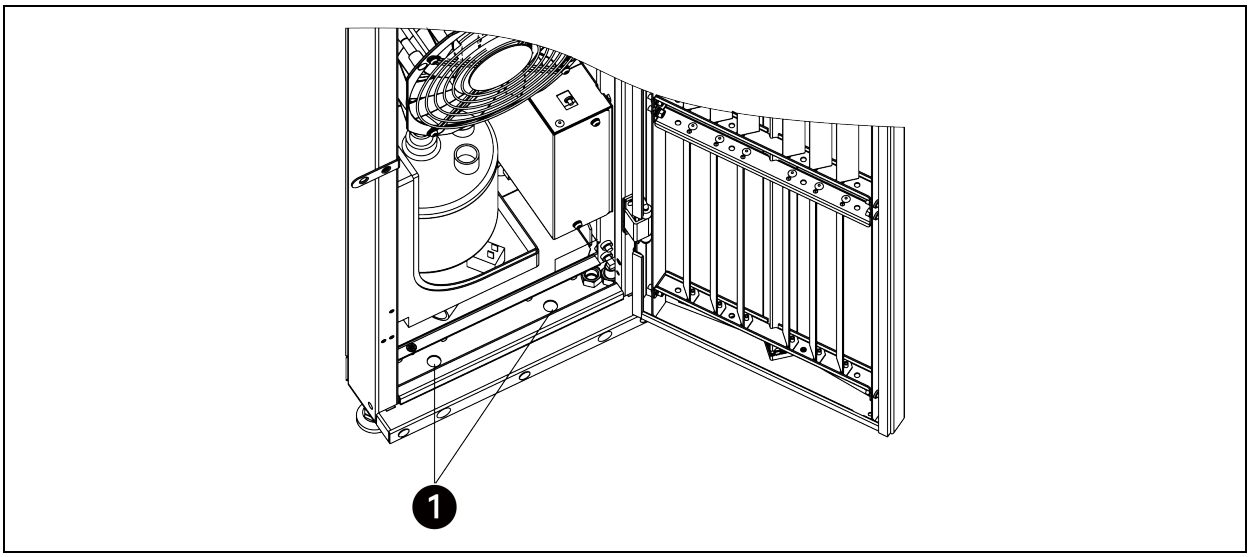
4.2 Removing the Feet and Fixing the Unit (Optional)

NOTE: If the machine room has a mounting bracket, and its width does not exceed 30 mm (1.2 in.), you can remove the feet and fix the unit onto the mounting bracket.

To remove the feet and fix the unit:

1. Use an adjustable wrench to loosen the fixing nut on each foot in counterclockwise direction. Rotate the hex bolt counterclockwise until each foot drops from the unit.
2. The unit provides four holes (diameter: 13.5 mm (0.5 in.)) on the bottom frames of the unit. Install M12 x 25 screws in the holes to fix the unit onto the floor bracket of the equipment room.

Figure 4.2 Fixing the Unit to the Floor Bracket



Item	Description
1	Holes for installing M12 x 25 screws

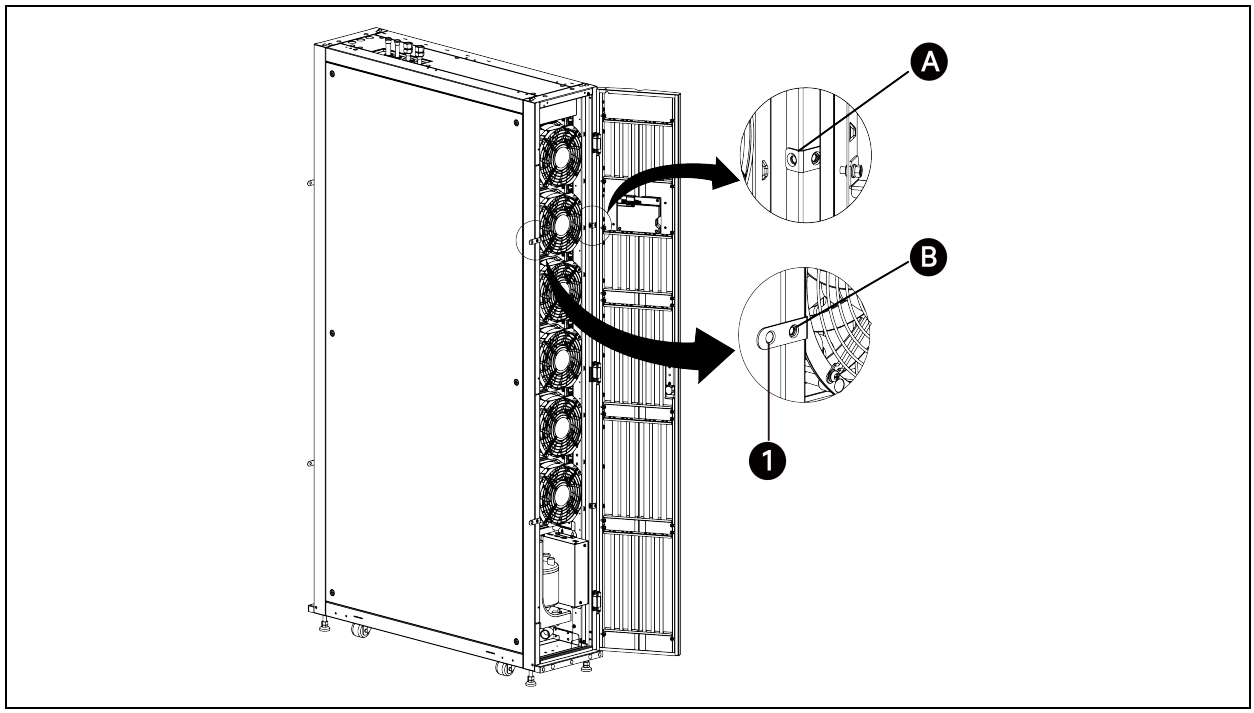
4.3 Combining the Unit with Adjacent Cabinets

Eight baying brackets are provided with the unit. Use four for the front side and four for the rear side.

To combine the unit with adjacent cabinets:

1. Open the front door. Install two baying brackets with M6 x 10 countersunk screws on the left frame. Fix each screw on position A. Install two baying brackets with M6 x 10 countersunk screws on the right frame. Fix each screw on position B.
2. Open the rear door and install two baying brackets the same way as for the front door.

Figure 4.3 Installing the Baying Brackets

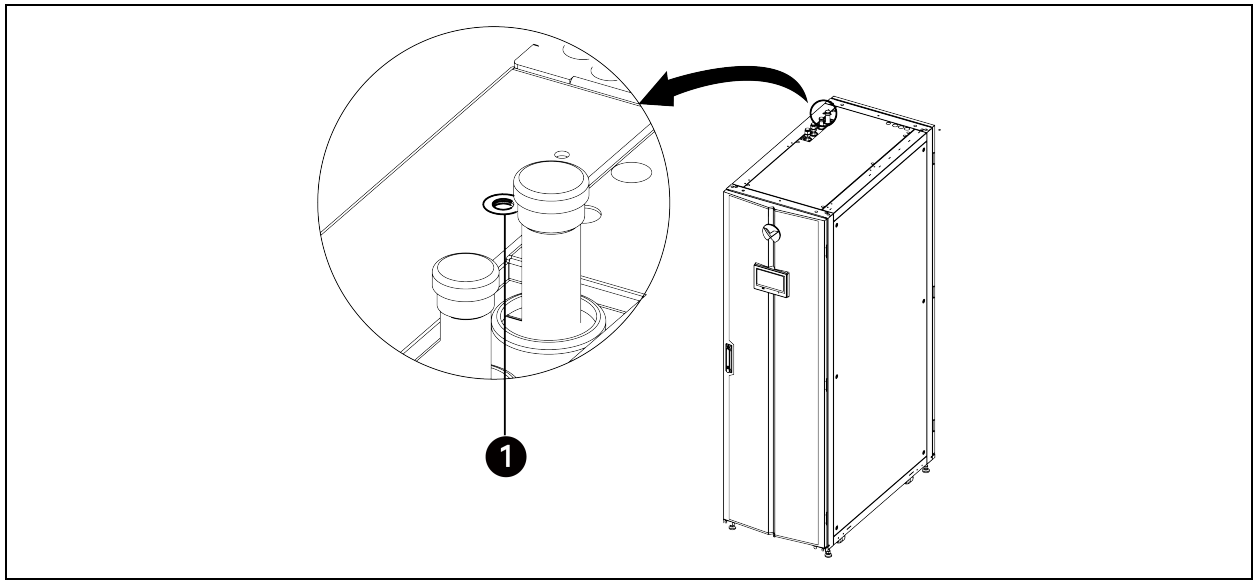


Item	Description	Item	Description
1	Baying bracket (eight pieces)	B	Position to install the screw on the left frame
A	Position to install the screw on the right frame		

4.4 Location of the Main Grounding Point

The main grounding point is located on the top panel, as shown in Figure 4.4 below .

Figure 4.4 Location of the Main Grounding Point



Item	Description
1	Main grounding point

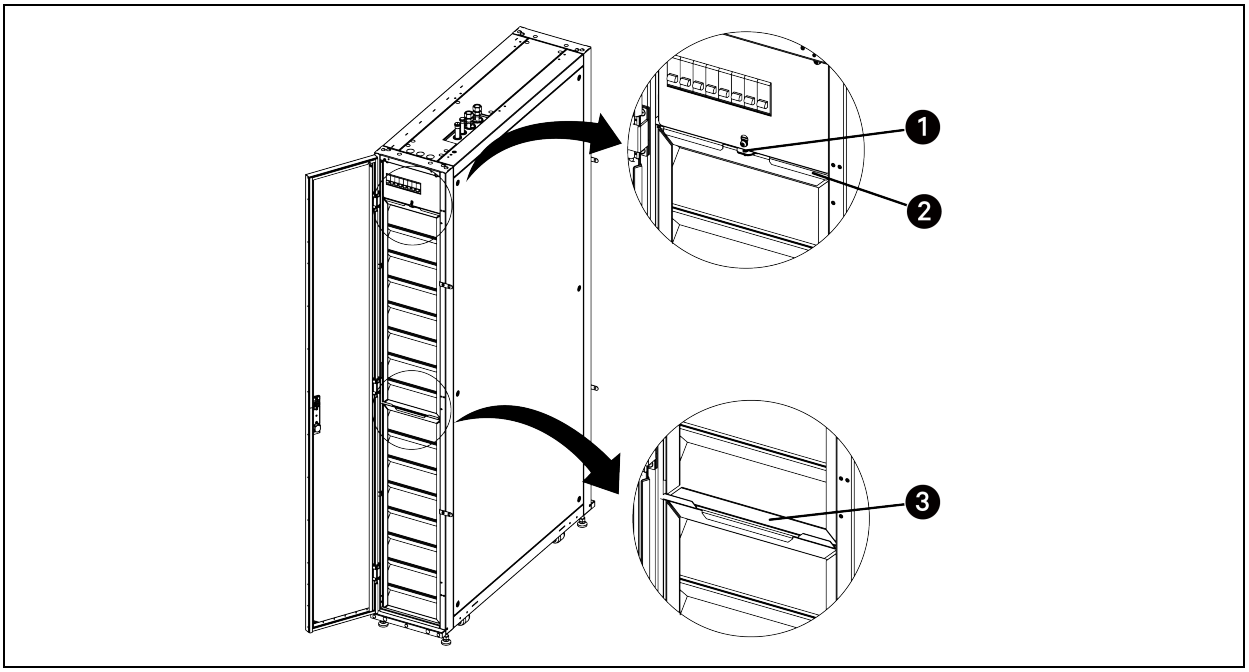
4.5 Removing Compressor Fixing Plates

The fixing plates are used to prevent the compressor from vibrating during transportation. Once the unit has been installed on site, you need to remove these fixing plates.

To remove fixing plates:

1. Open the rear door.
2. Remove filters.
    a. Pull the handle in the middle of the fastening plate above the upper filter to remove the plate. Then remove the upper filter.
    b. Tilt the fastening plate above the lower filter and remove the plate. Then remove the lower filter.

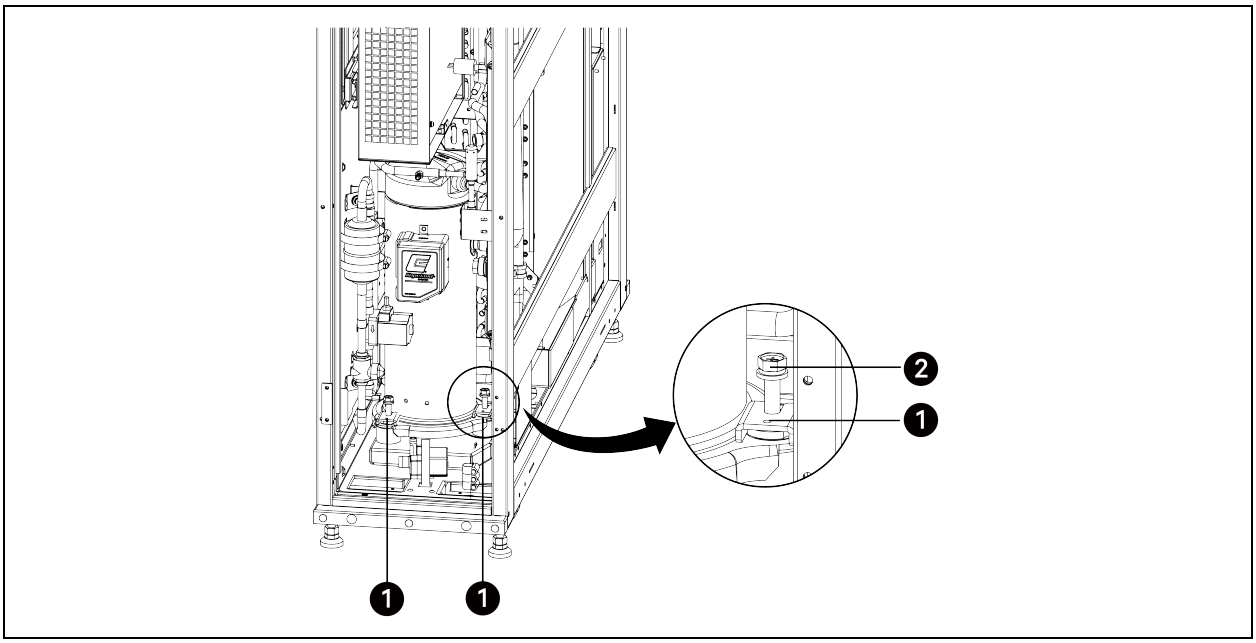
Figure 4.5 Removing the Upper and Lower Filters



Item	Description	Item	Description
1	The handle in the middle of the fastening plate	3	The fastening plate above the lower filter
2	The fastening plate above the upper filter		

3. For Vertiv™ Liebert® CRV CRD25 cooling unit, remove two fixing plates from the compressor. To remove each fixing plate, loosen the M8 x 60 screw on it so as to remove the plate. Then torque the screw at 12±1 Nm (8.85±0.74 ft/lb).

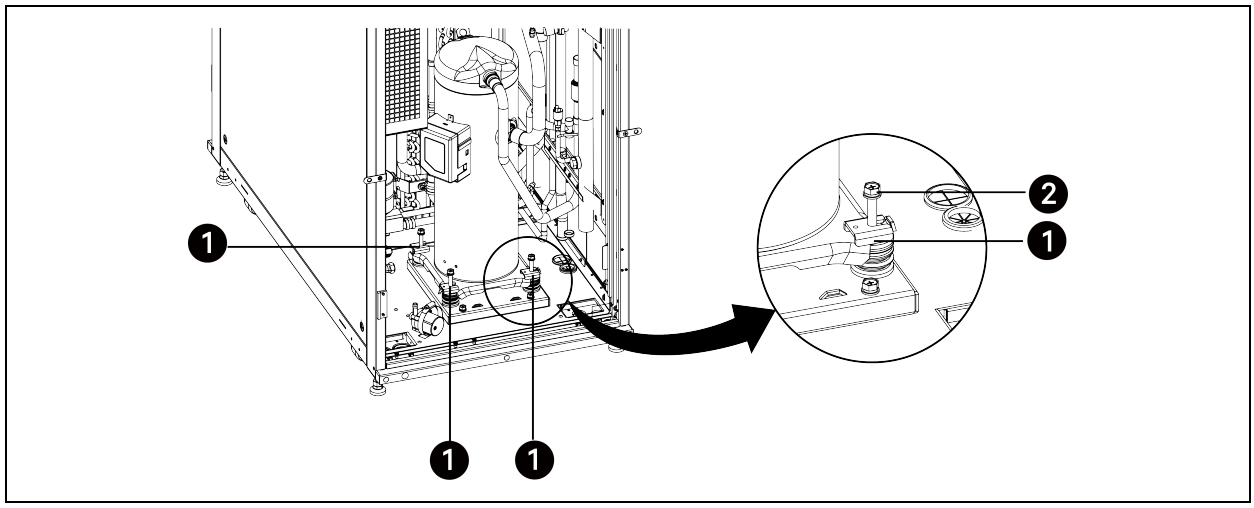
Figure 4.6 Removing Compressor Fixing Plates for CRD25



Item	Description
1	Fixing plate
2	M8 x 60 screw

4. For Vertiv™ Liebert® CRV CRD35 cooling unit, remove three fixing plates from the compressor. To remove each fixing plate, loosen the M8 x 60 screw on it so as to remove the plate. Then torque the screw at 12±1 Nm (8.85±0.74 ft/lb).

Figure 4.7 Removing Compressor Fixing Plates for CRD35



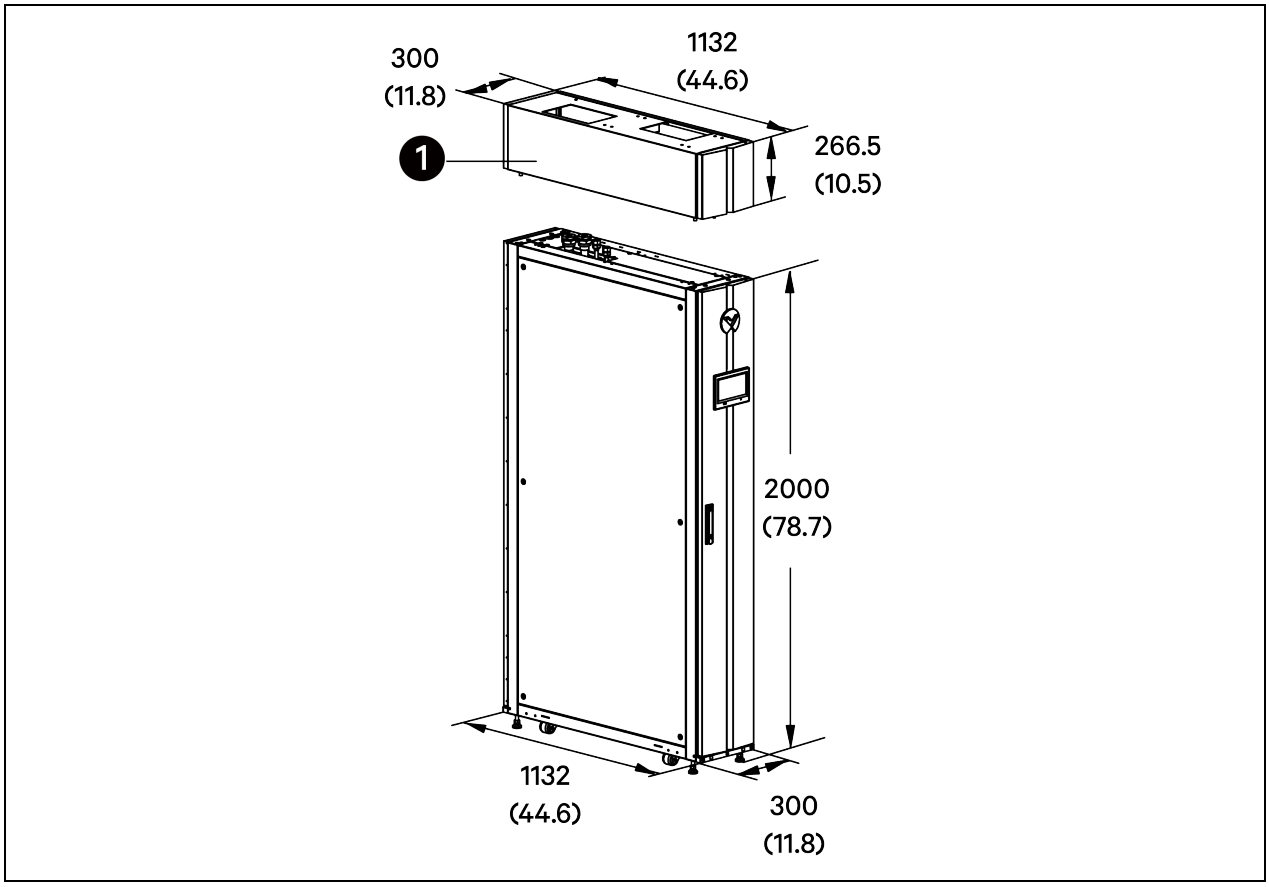
Item	Description
1	Fixing plate
2	M8 x 60 screw

4.6 Installing Top Frame and Front Frame (Optional)

The unit can be installed with only the top frame, or it can be installed with both the top frame and front frame.

4.6.1 Installing the Top Frame without the Front Frame

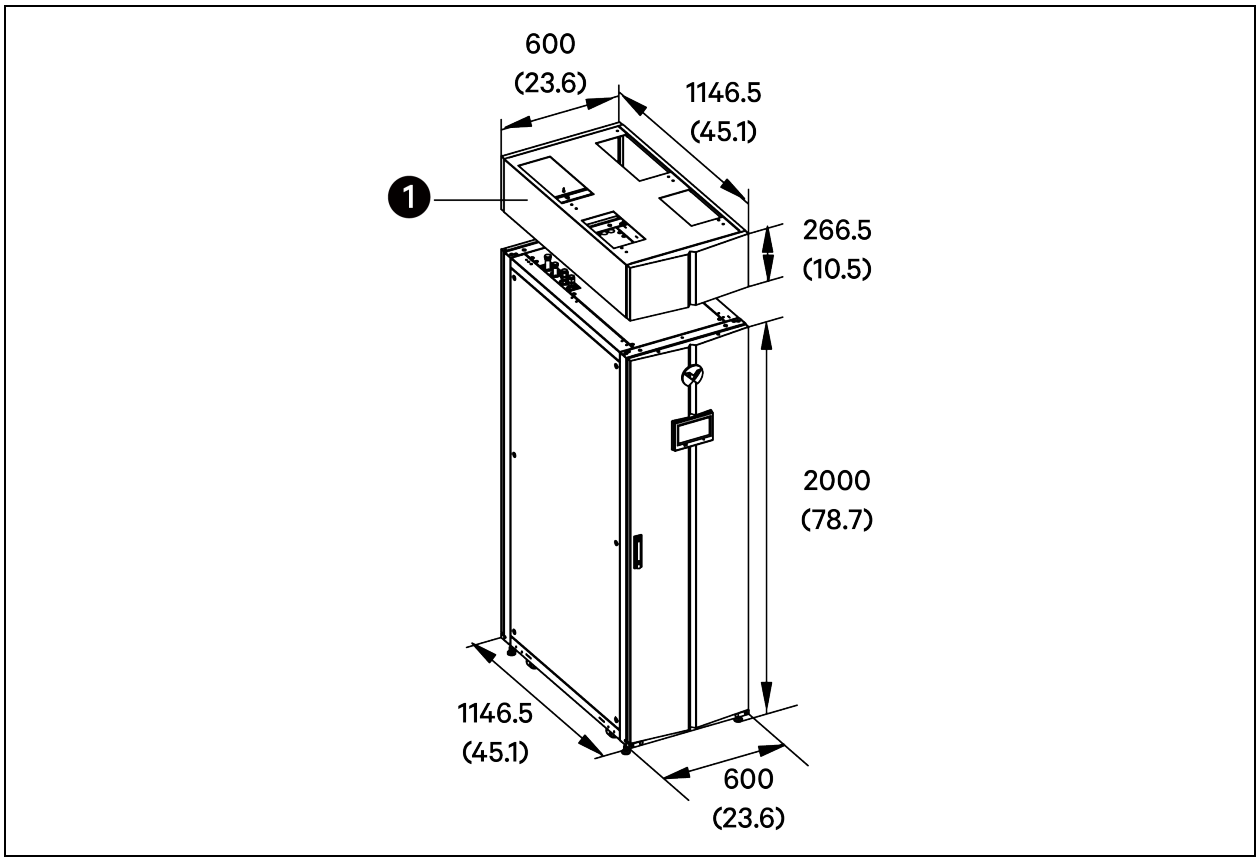
Figure 4.8 CRD25 - Dimensions of the Top Frame



Item	Description
1	Top frame

NOTE: All dimensions are in mm (in.).

Figure 4.9 CRD35 - Dimensions of the Top Frame



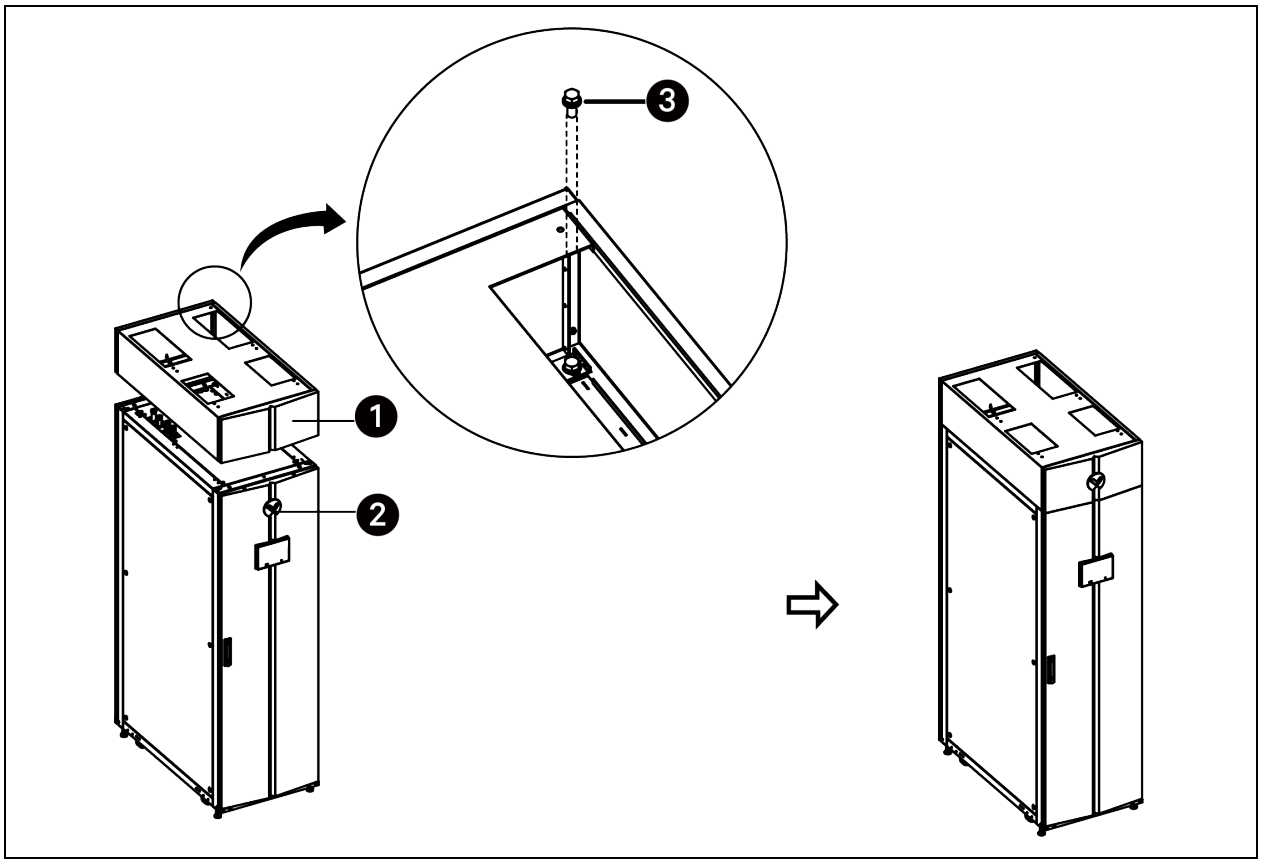
Item	Description
1	Top frame

NOTE: All dimensions are in mm (in.).

To install the top frame:

1. Install the top frame and fixed it with four M12 × 30 screws.
2. Move the V logo to the top frame.

Figure 4.10 Installing the Top Frame without the Front Frame (CRD35 as an Example)

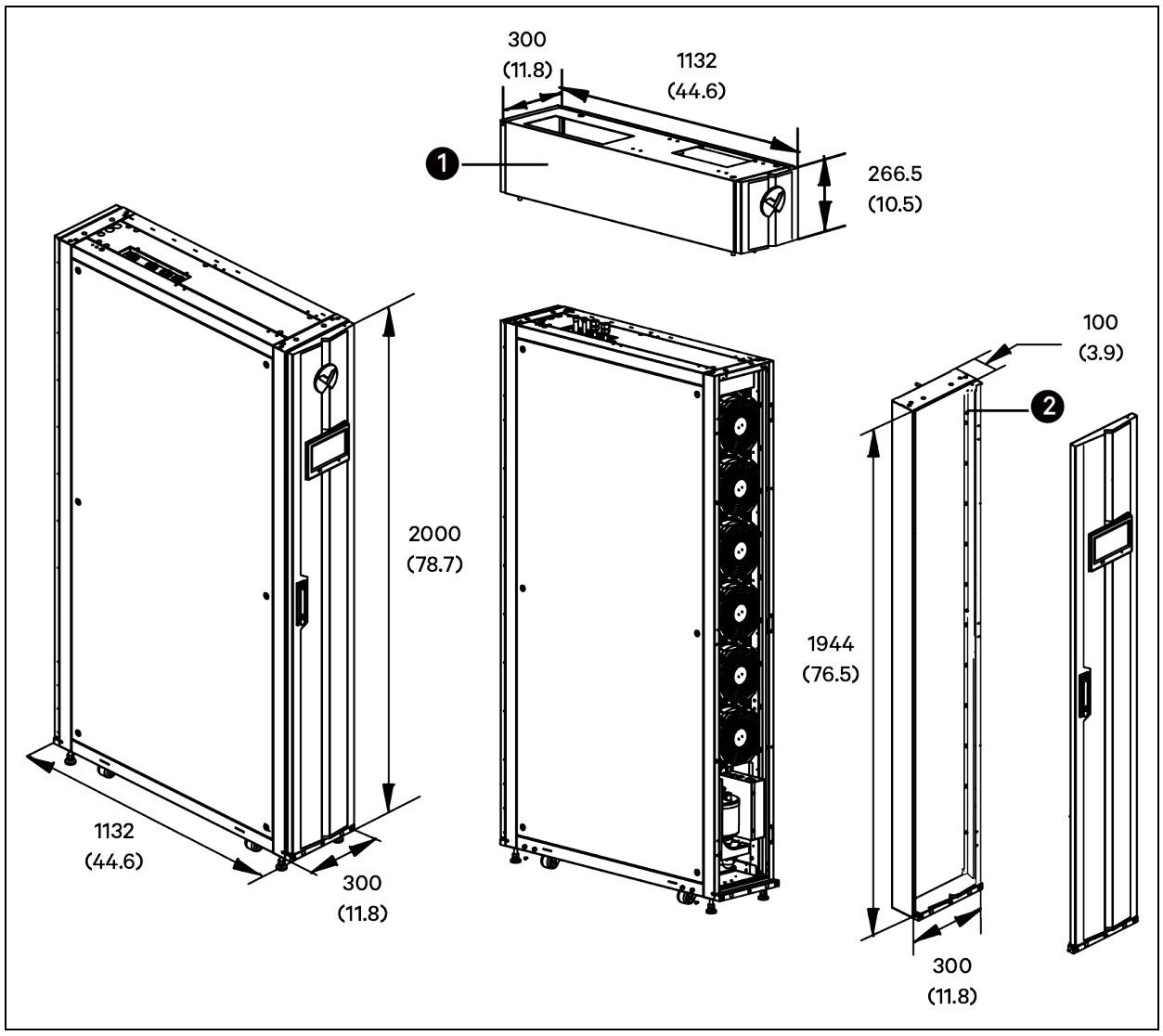


Item	Description	Item	Description
1	Top frame	3	M12 × 30 screw
2	V logo		

NOTE: After the top frame is installed, use plastic caps to cover the unused holes on the top plate.

4.6.2 Installing the Top Frame and the Front Frame

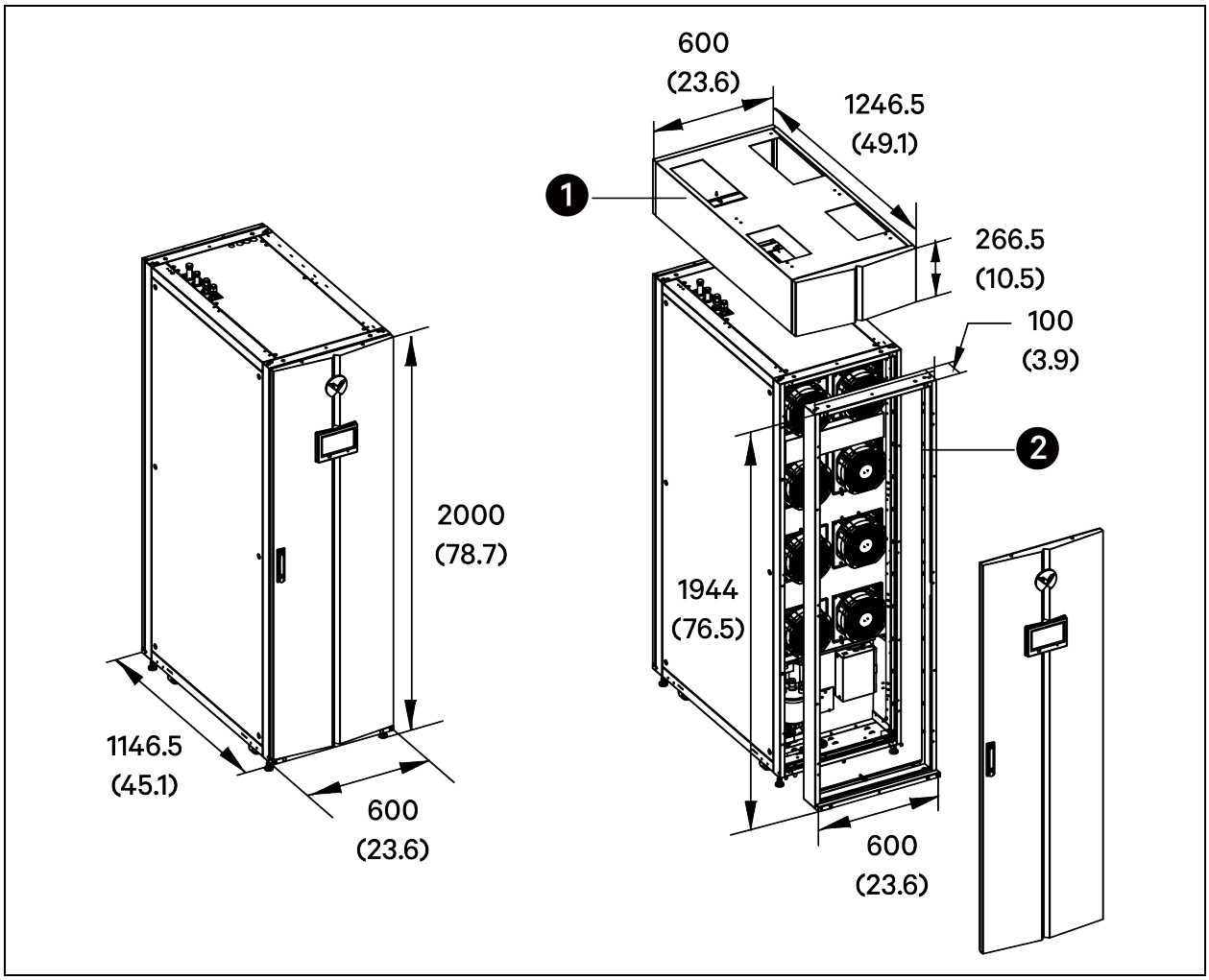
Figure 4.11 CRD25 - Dimensions of the Top Frame and the Front Frame



Item	Description
1	Top frame
2	Front frame

NOTE: All dimensions are in mm (in.).

Figure 4.12 CRD35 Dimensions of the Top Frame and the Front Frame



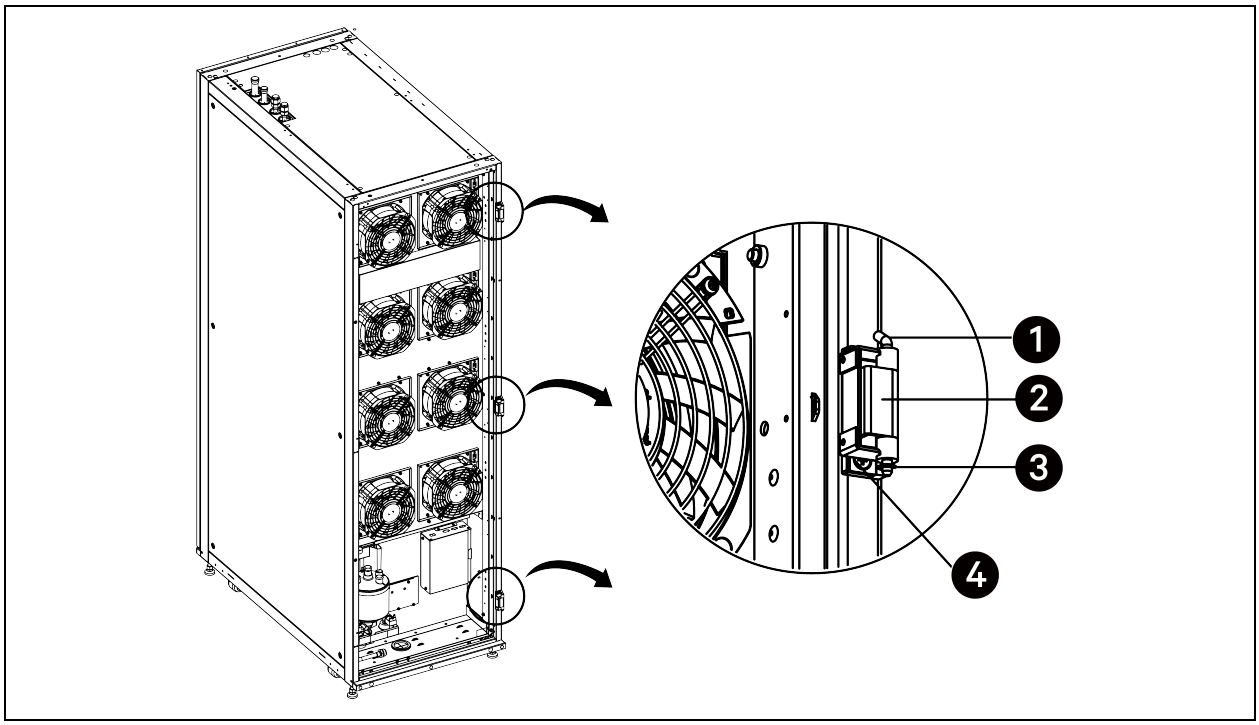
Item	Description
1	Top frame
2	Front frame

NOTE: All dimensions are in mm (in.).

To install the top frame and the front frame:

1. Open the front door, disconnect the grounding cable from the front door by removing the M4 screw. Disconnect the power cable and the communications cable from the HMI by unplugging the two connectors from the PWR port and the CAN1 port.
2. Remove the front door by removing three hinges that connect the door to the vertical post.
    a. Remove the circlip from the bottom of each hinge using a needle nose pliers.
    b. Take out the pin from each hinge.
    c. Remove two M6 Philips head screws from each hinge.

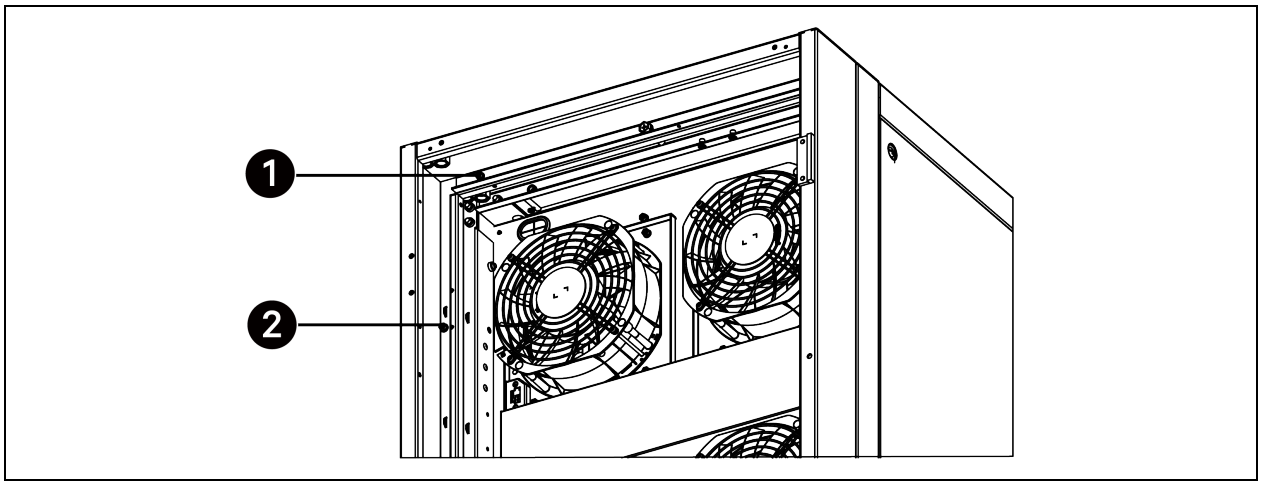
Figure 4.13 Removing the Front Door (CRD35 as an Example)



Item	Description	Item	Description
1	Pin	3	Circlip
2	Door hinge	4	M6 Philips head screw

3. Install the front frame to the unit with ten M5 × 12 screws (six on the left and right frames and four on the top and bottom frames).

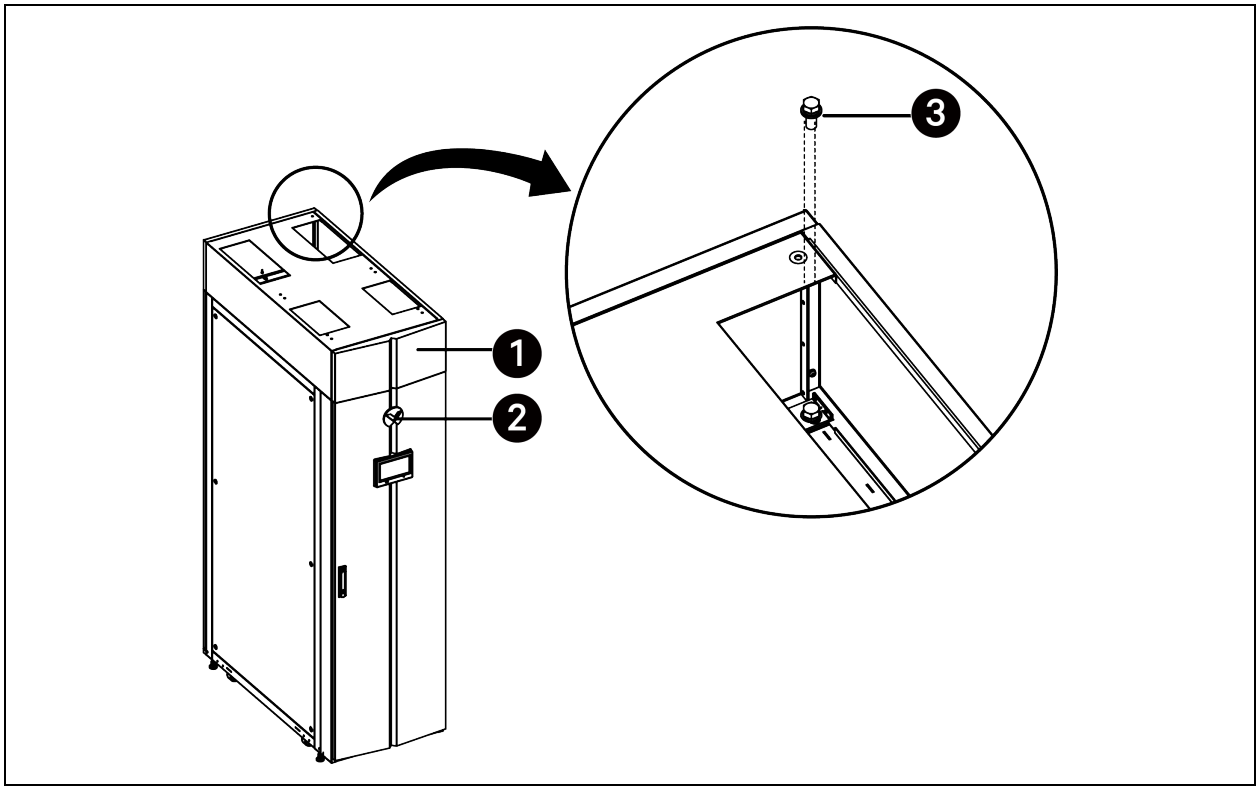
Figure 4.14 Installing the Front Frame (CRD35 as an Example)



Item	Description
1	M5 × 12 screw on top frame
2	M5 × 12 screw on side frame

4. Install the top frame on the top panel of the unit with four M12 × 30 screws.

Figure 4.15 Installing the Top Frame (CRD35 as an Example)



Item	Description	Item	Description
1	Top frame	3	M12 × 30 screw
2	V logo		

5. Install back the front door. Connect the power cable and communications cable to the HMI.
6. Move the V logo to the top frame.

NOTE: After the top frame is installed, use plastic caps to cover the unused holes on the top plate.

This page intentionally left blank

5 Piping and Refrigeration Connections

WARNING! Risk of over-pressurization of the refrigeration system. Can cause serious injury or death. Can cause explosive discharge of high-pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate.

CAUTION: Risk of excessive refrigerant line pressure. Can cause equipment damage or injury resulting from tubing and component rupture. Please observe local regulations and do not close off the refrigerant-line isolation valve for repairs if the room ambient temperature is higher than 52°C. An increase in ambient temperature can cause the pressure of the isolated refrigerant to rise and exceed the system-design pressure rating (marked on the unit nameplate).

NOTICE

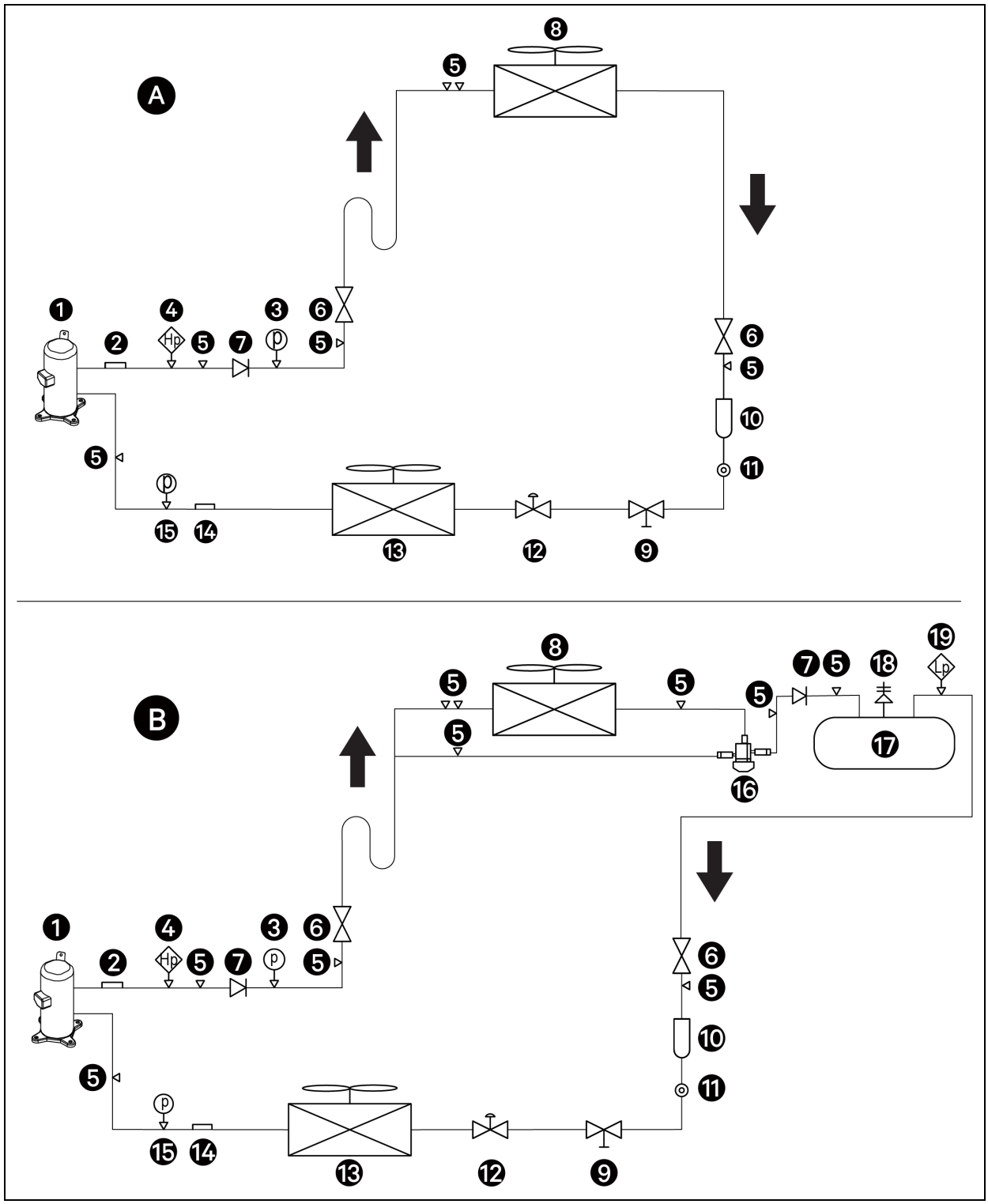
Risk of oil contamination with water. Can cause equipment damage. Vertiv™ Liebert® CRV systems require the use of POE (polyolester) oil. POE oil absorbs water at a much faster rate when exposed to air than previously used oils. Because water is the enemy of a reliable refrigeration system, extreme care must be used when opening systems during installation or service. If water is absorbed into the POE oil, it will not be easily removed and will not be removed through the normal evacuation process. If the oil is too wet, it may require an oil change. POE oils also have a property that makes them act as a solvent in a refrigeration system. Maintaining system cleanliness is extremely important because the oil will tend to bring any foreign matter back to the compressor.

NOTICE

Risk of improper refrigerant charging. Can cause equipment damage. Refrigerant charge must be weighed into air-cooled compressorized systems before they are started. Starting scroll and digital scroll compressors without proper refrigerant charging can cause the compressors to operate at less than –15 °C (5 °F) evaporator temperature and at less than 138 kPa (20 psig). Operation for extended periods at less than 138 kPa (20 psig) can cause premature compressor failure.

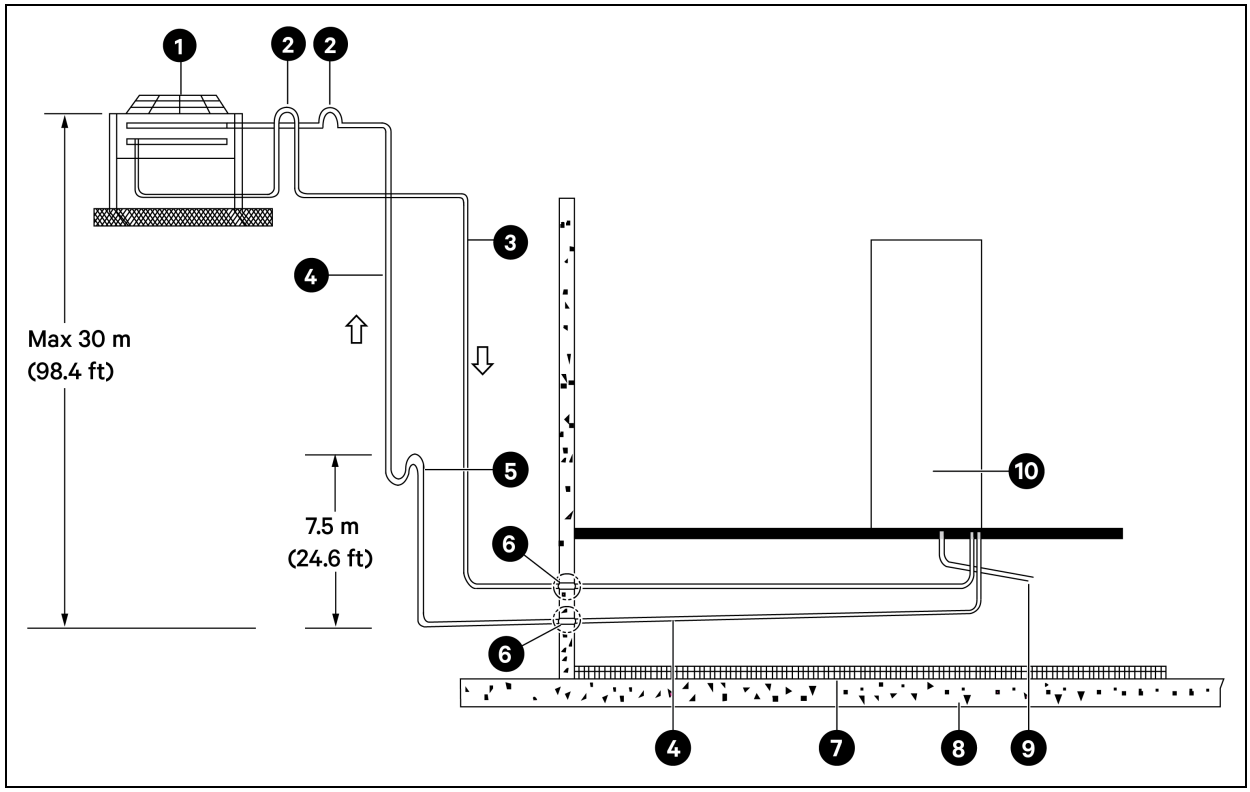
5.1 General Arrangement

Figure 5.1 General Arrangement Diagram



Item	Description	Item	Description
A	The diagram without low ambient kit	10	Filter drier
B	The diagram with low ambient kit	11	Sight glass
1	Compressor	12	Electronic expansion valve
2	Discharge temperature sensor	13	Evaporator coil
3	High pressure sensor	14	Suction temperature sensor
4	High pressure switch	15	Low pressure sensor
5	Schrader valve	16	Head pressure valve
6	Ball valve	17	Receiver
7	Check valve	18	Safety valve
8	Condenser coil	19	Pressure switch
9	Solenoid valve		

Figure 5.2 Condenser Placed Higher than the Evaporator



Item	Description	Item	Description
1	Condenser (outdoor)	6	The gap between the pipe and the wall needs to be sealed
2	Inverted trap	7	Heat insulation floor
3	Liquid pipe	8	Floor

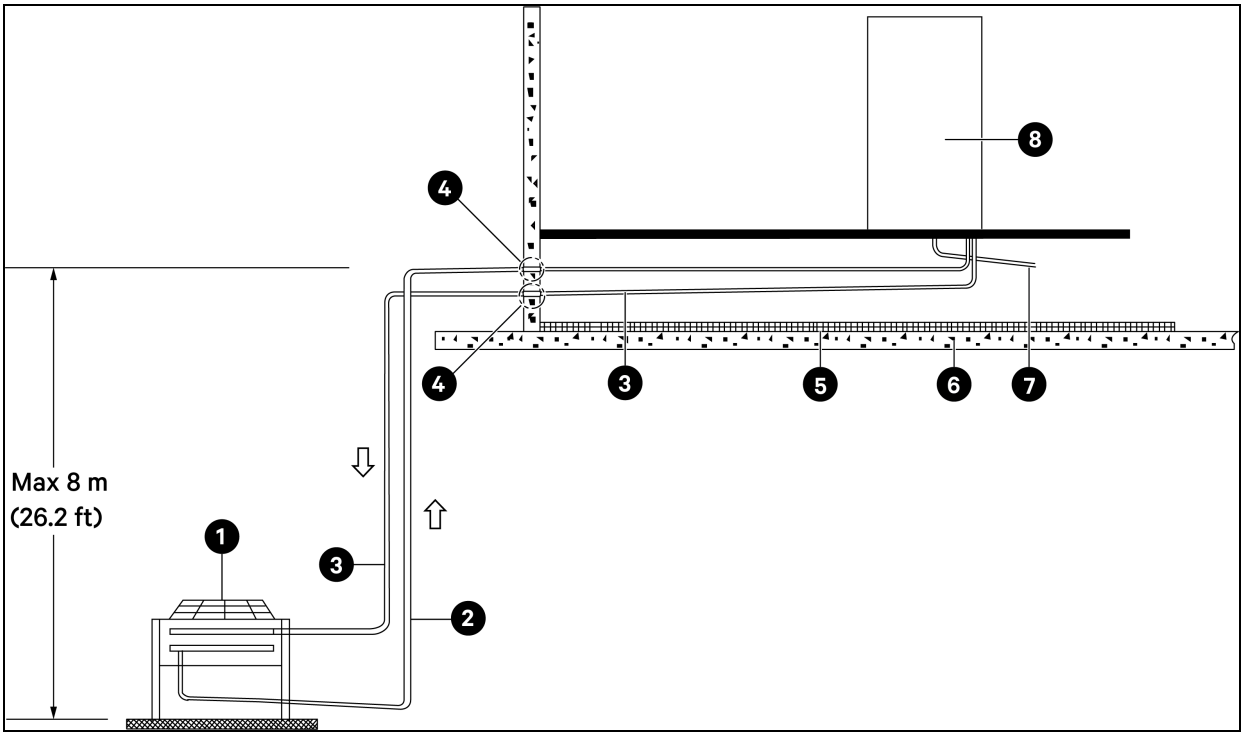
Item	Description	Item	Description
4	Gas pipe	9	Condensate pipe
5	Oil trap	10	Evaporator (indoor)

NOTE: The unit can be top piped as well.

NOTE: It is recommended to still set two inverted traps even with low ambient kit installed.

NOTE: If the condenser is installed higher than the compressor, install an inverted trap in the gas pipe and the liquid pipe of the condenser, to prevent liquid refrigerant from flowing back once the condenser stops. The top end of the inverted trap must be at least 150 mm (5.9 in) higher than the pipe of the condenser. Install an oil trap every 7.5 m (24.6 ft) of the vertical gas pipe.

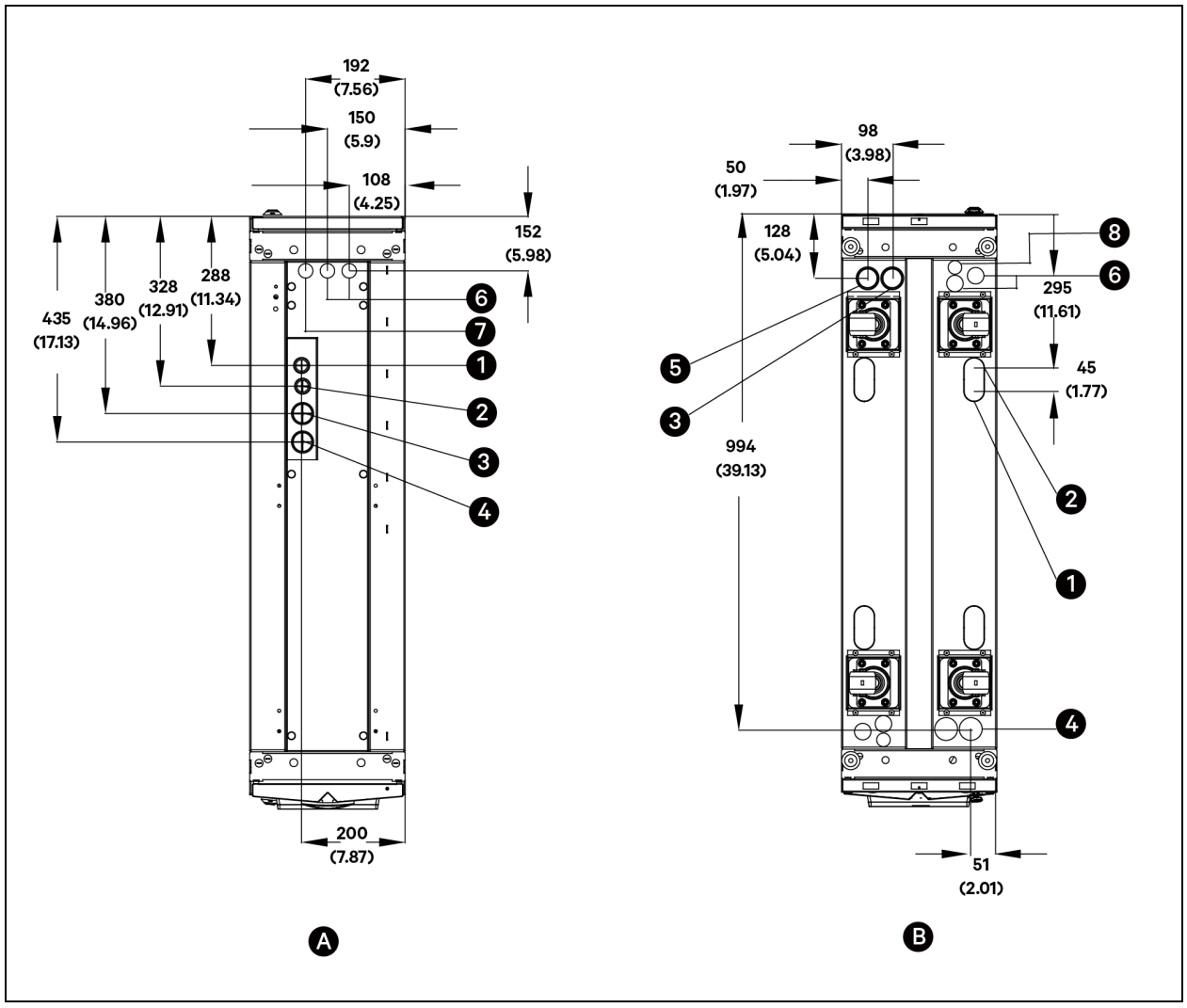
Figure 5.3 Condenser Placed Lower than the Evaporator



Item	Description	Item	Description
1	Condenser (outdoor)	5	Heat insulation floor
2	Liquid pipe	6	Floor
3	Gas pipe	7	Condensate pipe
4	The gap between the pipe and the wall needs to be sealed	8	Evaporator (indoor)

NOTE: The unit can be top piped as well.

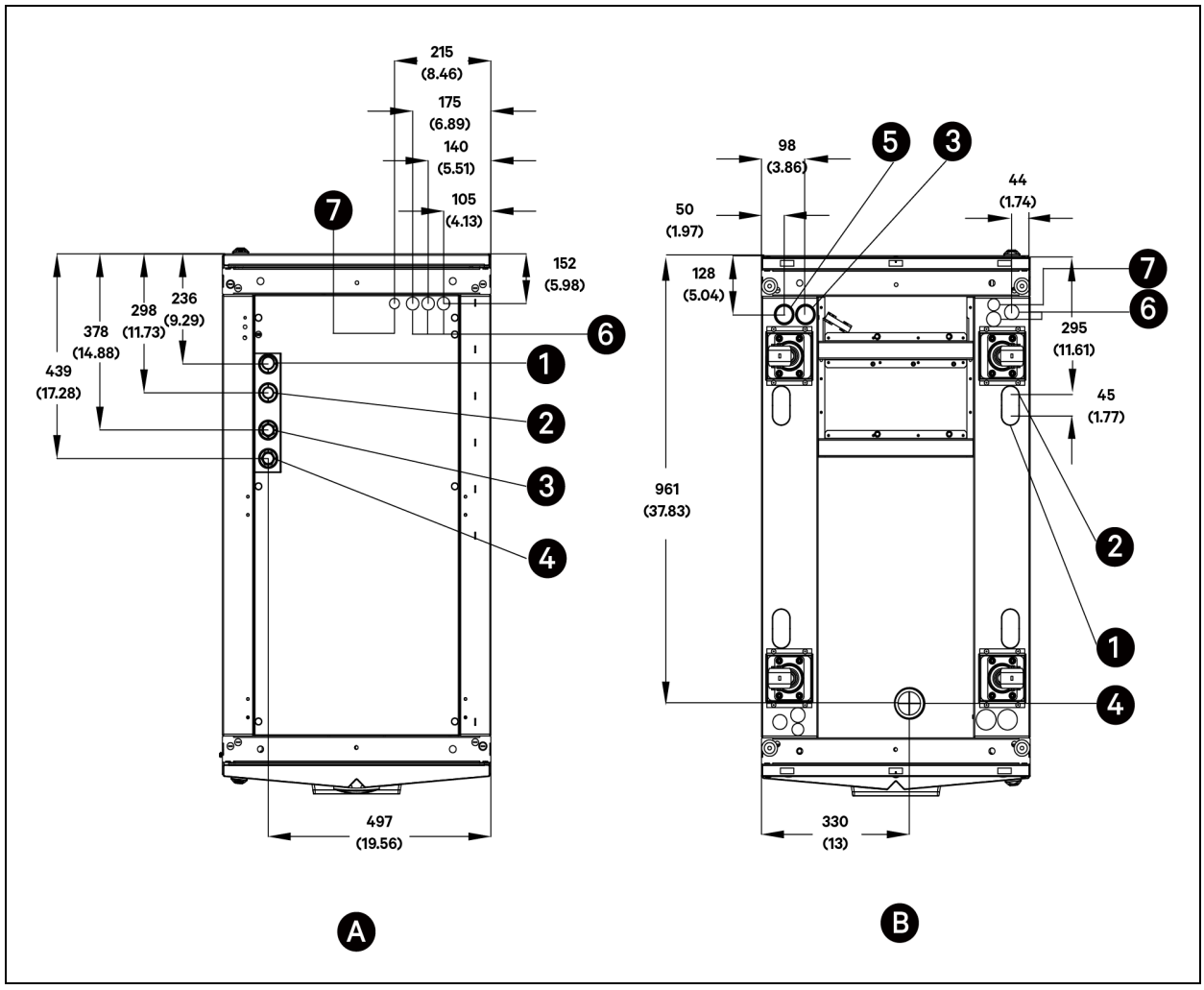
Figure 5.4 CRD25 - Location and Dimension of Pipe and Cable Outlets on Top Plate and Base Plate



Item	Description		
A	Top plate		
B	Bottom plate		
1	RGT	Refrigerant gas line outlet	5/8 in. O.D. copper sweat
2	RLT	Refrigerant liquid line inlet	1/2 in. O.D. copper sweat
3	CPT	Condensate pump outlet	Rc 1/2 in. female copper, threaded joint
4	HF	Humidifier feed	G 3/4 x Rc 1/2 in.
5	CGT	Condensate gravity outlet	Rc 1/2 in. female copper threaded joint
6	HVT	High voltage cable access	Combination knockout: 28 mm (1-1/8 in.)
7	LVT1	Low voltage cable access1	Combination knockout: 28 mm (1-1/8 in.)
8	LVT2	Low voltage cable access2	Combination knockout: 22 mm (7/8 in.)

NOTE: All dimensions are in mm (in.).

Figure 5.5 CRD35 - Location and Dimension of Pipe and Cable Outlets on Top Plate and Base Plate



Item	Description		
A	Top plate		
B	Bottom plate		
1	RGT	Refrigerant gas line outlet	7/8 in. O.D. copper sweat
2	RLT	Refrigerant liquid line inlet	3/4 in. O.D. copper sweat
3	CPT	Condensate pump outlet	Rc 1/2 in. female copper, threaded joint
4	HF	Humidifier feed	G 3/4 x Rc 1/2 in.
5	CGT	Condensate gravity outlet	Rc 1/2 in. female copper threaded joint
6	HVT	High voltage cable access	Combination knockout: 28 mm (1-1/8 in.)
7	LVT	Low voltage cable access	Combination knockout: 22 mm (7/8 in.)

NOTE: All dimensions are in mm (in.).

Table 5.1 Vertical Distance between Condenser and Evaporator

Position of the Condenser		Distance m (ft)
Height between evaporator and condenser	Condenser placed higher than evaporator	Maximum: 30 (98.4)
	Condenser placed lower than evaporator	Maximum: -8 (-26.2)

NOTE: When the condenser is equipped with the Low Ambient Kit, the height requirement between evaporator and condenser remains the same.

5.2 Connecting Drainage Pipes

The water from the humidifier and the condensate water from the coil accumulate in the drain pan. The water in the drain pan is drained through the top or bottom of the unit.

5.2.1 Top Connection

A pipe has been pre-installed between the pump and the drainage copper pipe. The top end of the drainage copper pipe has been routed through the Condensate Pump outlet on the top plate. Connect the top end to your drainage system using a soft pipe.

5.2.2 Bottom Connection

To connect condensate drainage pipes from the bottom:

1. Open the rear door and remove filters. For details on removing filters, see Figure 4.5 on page 25 .
2. Unscrew the connector between the soft pipe and the drainage copper pipe. Route the soft pipe through the Condensate Pump outlet on the base plate to your drainage system.
3. A pipe has been pre-installed from the drain pan. Route the pipe through the Gravity Drain outlet on the base plate. Wrap a drain trap under the drain pan.

NOTE: All water drainage pipes should resist heat higher than 90 °C (194 °F).

NOTE: Ensure at least a 2% gradient towards the drain.

NOTE: There must be a drain trap placed at least 200 mm (7.9 in.) below the drain tray. Fill the drain trap with water.

5.3 Connecting Water Supply for Humidifier

NOTE: The connections must be sealed to prevent water leakage.

NOTE: The pressure of your water supply system should be within 100 kPa to 700 kPa (14.5 psig to 101.5 psig).

NOTE: The cylinder in the humidifier can be used for water with conductivity 300-1250 μS/cm. The water should not contain insoluble impurities that can be observed by eyes.

5.3.1 Water supply requirements for Humidifier

Only use drinking water with the following specifications:

- pressure between 0.1 and 0.7 MPa (1 and 7 bar)

- temperature between 1 and 40°C

- instant flow rate no higher than the “MAX water supply” given in the table Electrode humidifier technical data

- hardness no greater than 400 ppm of CaCO3 (40°fH)

- conductivity range: 300-1250 μS/cm

Table 5.2 Supply water chemical specifications

Inorganic compounds	Unit of measure	Normal water		Water with low salt content	
		MIN	MAX	MIN	MAX
Hydrogen ions	(pH)	7	8,5	7	8,5
Specific conductivity at 20°C (σR, 20°C)	(σR, 20°C) S/cm	350	1250	75	350
Total dissolved solids (TDS)	mg/l	(1)	(1)	(1)	(1)
Dry residue at 180°C (TH)	mg/l	(1)	(1)	(1)	(1)
Total hardness	mg/l CaCO3	100 (2)	400	50 (2)	160
Temporary hardness	mg/l CaCO3	60 (3)	300	30 (3)	100
Iron + Manganese	mg/l Fe+Mn	=	0.2	=	0.2
Chlorides	ppm Cl-	=	30	=	20
Silica	mg/l SiO2	=	20	=	20
Residual chlorine	mg/l Cl2	=	0.2	=	0.2
Solvents, thinners, detergents, lubricants	mg/l	0	0	0	0

(1) = values depend on the specific conductivity; in general: TDS≈0,93*σR, 20 °C; R180≈0,65*σR, 20 °C

(2) = not less than 200% of the chloride content in mg/l CL-

(3) = not less than 300% of the chloride content in mg/l CLNOTE

NOTE: There is not reliable relationship between hardness and conductivity of the water.

NOTE: Do not treat the water with softeners. This could cause corrosion of the electrodes of the formation of foam, leading to potential operating problems or failures.

CAUTION: Do not add disinfectants or anticorrosive compounds to the water, as these are potential irritants. The use of well water, industrial water or water from cooling circuits and, in general, any potentially chemically or bacteriologically contaminated water is not recommended.

5.3.2 Top Connection

A soft pipe has been pre-installed between the humidifier and the humidifier supply copper pipe. The top end of the humidifier supply copper pipe is located on the top plate. If water is supplied from the top of the unit, connect the top end of the humidifier supply copper pipe (Humidifier Supply on top plate) to your water supply system.

5.3.3 Bottom Connection

If water is supplied to the humidifier from the bottom of the unit, open the front door, unscrew the connector between the soft pipe and the humidifier supply copper pipe, and route the soft pipe through the Humidifier Supply on the base plate to your water supply system.

NOTE: The end of the humidifier supply pipe is G3/4 connector. You can use the convertor provided in the accessories bag to convert the connector to Rc1/2.

5.4 Connecting Gas Pipe and Liquid Pipe

WARNING! The operation of opening the valves and cutting the pipes at the bottom of the unit must be carried out as final operations.

Note the following while connecting gas pipe and liquid pipe:

- Connect the condenser and evaporator using copper pipes.
- Use as short refrigeration pipelines as possible to minimize the total charge of refrigerant and the pressure drops.
- Reduce the number of bends to a minimum. The bend must be of large radius, at least equal to pipe diameter. If not using preformed curves, bend the pipes as follows:
  a. Soft copper: by hand or bending device.
  b. Hard copper: use preformed curves. Do not overheat the pipes when brazing so as to minimize oxidation.
- Lay the horizontal gas pipes with 1% downward gradient in the direction of the refrigerant flow.
- Maintain a minimum distance of 20 mm (0.8 in.) between the gas and liquid pipelines. If this is not possible, insulate both the lines.
- Insulate the piping to avoid damage to cable, if the pipes are put next to electrical cables.
- Support both horizontal and vertical pipes with vibration damping clamps (including rubber gaskets). It is recommended to place clamps every 1.5 m to 2 m (4.9 ft to 6.6 ft).
- When the condenser is installed higher than the compressor: install an inverted trap to the discharge line of the evaporator and the liquid line of the condenser. The inverted trap prevents the liquid refrigerant from flowing back when the condenser stops working. The top end of the inverted trap must be higher than the height of the copper pipes of the condenser. The minimum height difference is 150 mm (5.9 in.).
- Install an oil trap every 7.5 m (24.6 ft) of the vertical discharge line.

NOTE: Equivalent pipe length = Length of straight pipe + Equivalent length of bend

Table 5.3 External Diameter and Thickness of Pipelines

Pipe Length m (ft)	CRD 25 Gas pipe	CRD 25 Liquid Pipe	CRD 35 Gas Pipe	CRD 35 Liquid Pipe
	External diameter mm (in.) x Pipe Thickness mm (in.)			
0 to 20 (0 to 65.6)	18 (3/4) x 1.2 (0.05)	16 (5/8) x 1 (0.04)	22 (7/8) x 1.5 (0.06)	16 (5/8) x 1 (0.04)
20 to 50 (65.6 to 164)	22 (7/8) x 1.5 (0. 06)	18 (3/4) x 1 (0.04)	25 (1) x 1.5 (0.06)	18 (3/4) x 1.2 (0.05)
50 to 120 (164 to 393.7)	25 (1) x 1.5 (0.06)	22 (7/8) x 1.2 (0.05)	25 (1) x 1.5 (0.06)	22 (7/8) x 1.5 (0.06)

NOTE: 28 mm (1-1/8 in.) pipe can be used to instead of 25 mm (1 in.) if the 25 mm (1 in.) is difficult to find. In this case the Comp Oil Return Cap parameter needs to be increased by 10-15% through the display. The setting path of Comp Oil Return Cap: Menu > Maintenance > Compressor Control > Comp Oil Return Cap.

Table 5.4 Equivalent Length of Components

Liquid Pipe, External Diameter x Pipe Thickness mm (in.)	Equivalent Length m (ft.)	
	90° Bend	45° Bend
16 (5/8) x 1 (0.04)	0.27 (0.886)	0.15 (0.492)
18 (3/4) x 1 (0.04)	0.3 (0.984)	0.18 (0.591)
22.2 (7/8) x 1.2 (0.05)	0.44 (1.443)	0.24 (0.787)
28 (1-1/8) x 1.5 (0.06)	0.56 (1.837)	0.3 (0.984)

Installing Pipelines

To install pipelines:

1. Release the pre-charged nitrogen. The evaporator and condenser have been pre-charged with 2 bar (29 psig) nitrogen. Open all the Schrader valves in the system to release nitrogen.
2. Cut the liquid pipe and gas pipe connectors on the evaporator and condenser.
3. Lay the pipes between the evaporator and condenser.
4. Connect a nitrogen cylinder to the Schrader valve. Purge the pipe with nitrogen to flow through the pipe while welding the pipe.

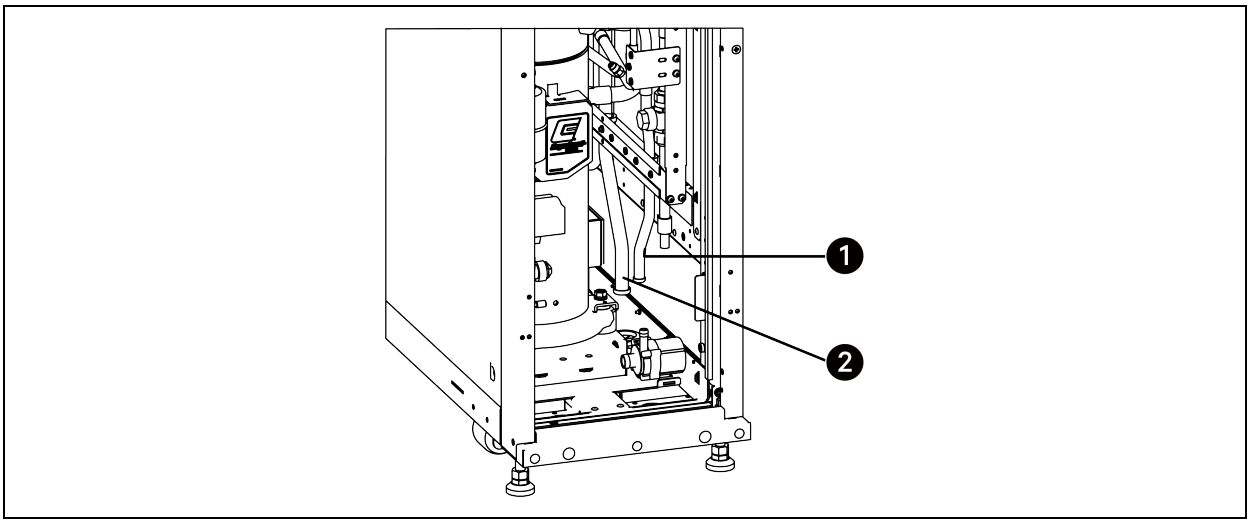
NOTE: A pure dry nitrogen flow of 0.5 - 1.5 l/s (1 - 3 ft^3/min) inside the pipe during brazing is sufficient to displace the air. Control the flow using a suitable measuring device.

NOTE: Nitrogen prevents the formation of copper oxide scale inside the piping. When copper is heated in the presence of air, copper oxide forms. Lubricating oil will dissolve these oxides from inside the copper pipes and deposit them throughout the system, clogging filter driers and affecting other system components.

NOTE: Before brazing connections, use wet rags to quench the heat and prevent damage to piping bushings or heat sensitive refrigerant components.

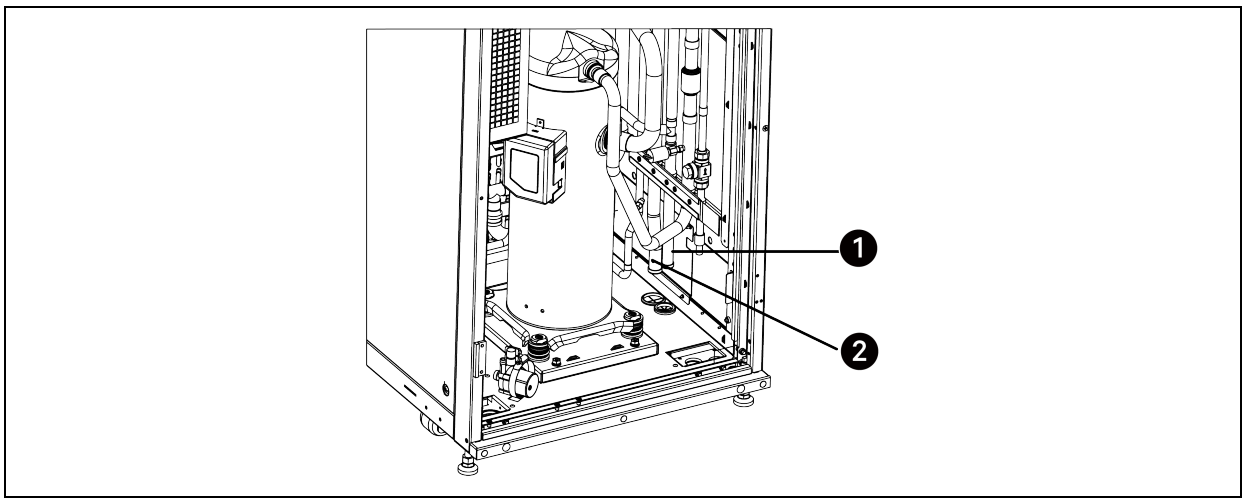
NOTE: When brazing connections from the bottom, do not weld the liquid pipe and the gas pipe at the same time. Weld one pipe and then another. The location of the liquid pipe and the gas pipe in the bottom is shown in the figure below.

Figure 5.6 Location of Liquid Pipe and Gas Pipe for Bottom Routing (CRD25)



Item	Description
1	Liquid pipe
2	Gas pipe

Figure 5.7 Location of Liquid Pipe and Gas Pipe for Bottom Routing (CRD35)



Item	Description
1	Liquid pipe
2	Gas pipe

This page intentionally left blank

6 Electrical Connections

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.

NOTE: The equipment shall be installed in accordance with national wiring regulation.

NOTE: A means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III conditions must be incorporated in the fixed wiring.

Before proceeding with the electrical connections, ensure that:

- The unit has been fixed to the floor or the adjacent cabinets.
- All electrical components are in good condition.
- All terminal screws are tight.
- The supply voltage and frequency are as indicated on the unit.

6.1 Connecting Power Supply Cable

The power supply is 400V/3Ph/50/60Hz for the unit. The size of power cable must support the full load current. Do not fit the supply cable in the raceways inside the electrical panel. Use multipolar cables with sheath (CEI20-22) only.

Table 6.1 Rated Full Load Current (Unit Ampere)

Item	Model	CRD25			CRD35		
	Power Phase	L1	L2	L3	L1	L2	L3
Indoor Unit	Compressor	14.1	14.1	14.1	18.6	18.6	18.6
	Fans Power Module	-	-	9.1	-	-	9.1
	Heaters	7.5	7.5	-	15	15	-
	Humidifier	-	11.2	-	-	11.2	-
	Conmpressor+Fans	14.1	14.1	23.2	18.6	18.6	27.7
	Fans+Heaters	7.5	7.5	9.1	15	15	9.1
	Fans+Humidifier	-	11.2	9.1	-	11.2	9.1
	Compressor+Fans+Heaters	21.6	21.6	23.2	**33.6**	33.6	27.7
	Compressor+Fans+Humidifier	14.1	**25.3**	23.2	18.6	29.8	27.7
Condenser	Without low ambient kit	1.4	1.4	1.4	2.8	2.8	2.8
	Low ambient kit heater	1.3	-	-	1.3	-	-
	With low ambient kit	**2.7**	1.4	1.4	**4.1**	2.8	2.8
Indoor unit+Condenser	Full load current per phase	24.3	**26.7**	24.6	**37.7**	36.4	30.5
	Rated full load current	**26.7**			**37.7**		

NOTE: The bolded font means the maximum full load current of indoor unit or outdoor unit or the overall unit. The rated full load current depends on the maximum full load current per phase.

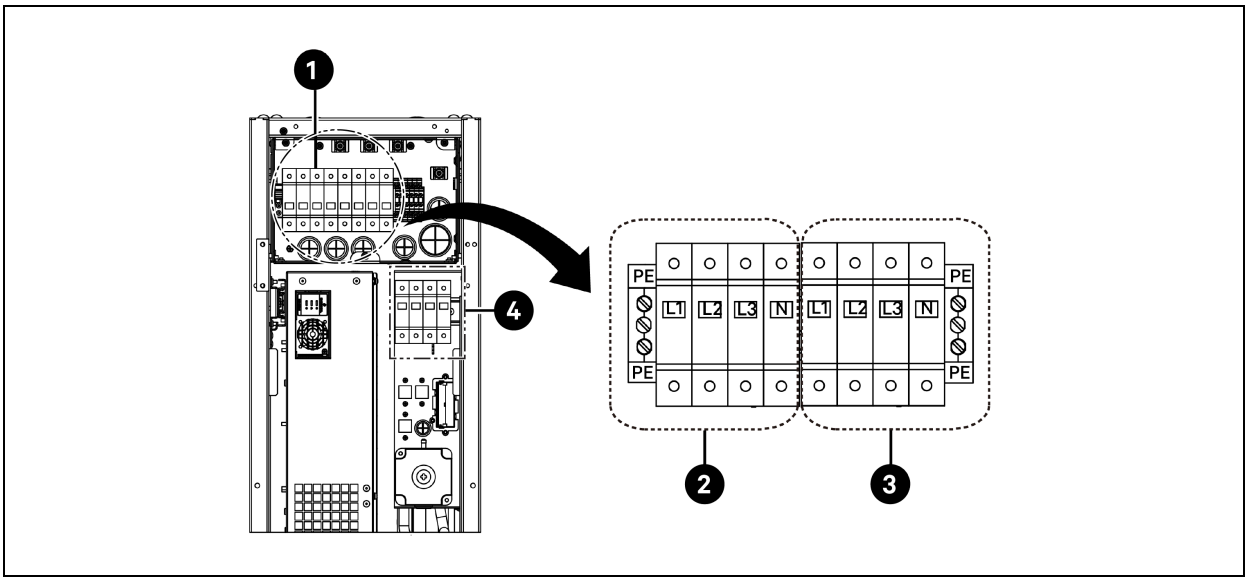
NOTE: The heater and humidifier will not work at the same time.

To connect the power supply cables:

1. Open the rear door. The electrical box 1 is located under the top panel. Remove the cover plate from the electrical box 1 by removing three M4 x 10 pan head screws for CRD25 and four M4 x 10 pan head screws for CRD35.
2. Route the power supply cables into the unit from the top or bottom panel and connect the cables to the L1, L2, L3, N, and PE terminals of power supply 1 and power supply 2 on the main circuit breaker.

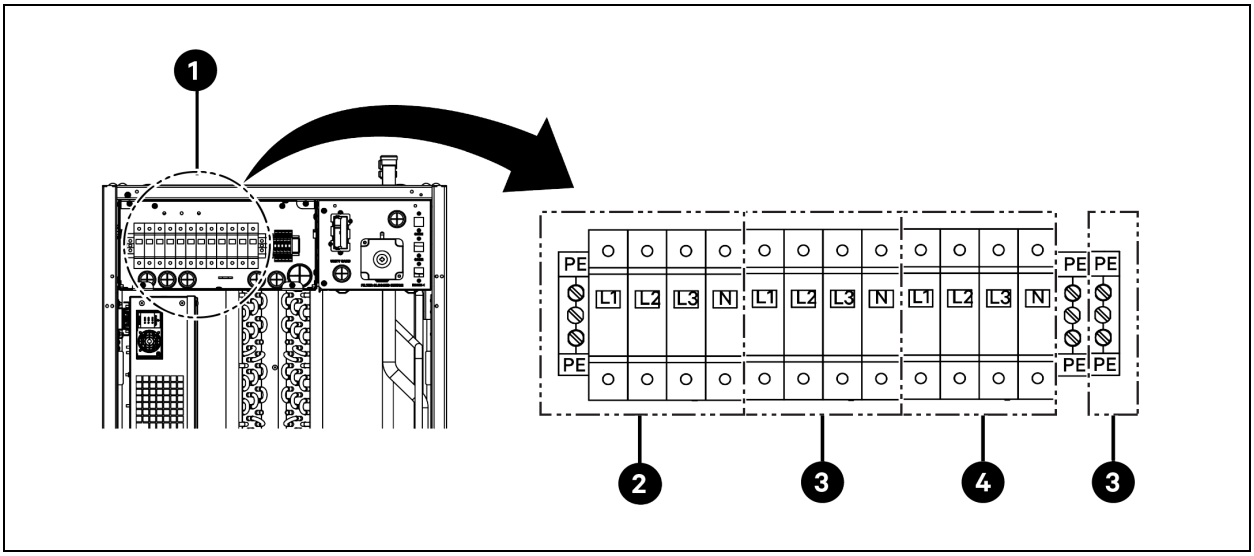
NOTE: Dual power supplies are provided to the unit, with power supply 1 as the primary power feed and power supply 2 as secondary. When power supply 1 fails, power supply 2 automatically takes over. When power supply 1 restores, it automatically resume its function as the primary power feed.

Figure 6.1 Connecting Power Supply Cables for CRD25



Item	Description	Item	Description
1	Main circuit breaker	3	Connecting to power supply 2
2	Connecting to power supply 1	4	Connecting to condenser

Figure 6.2 Connecting Power Supply Cables for CRD35



Item	Description	Item	Description
1	Main circuit breaker	3	Connecting to power supply 2
2	Connecting to power supply 1	4	Connecting to condenser

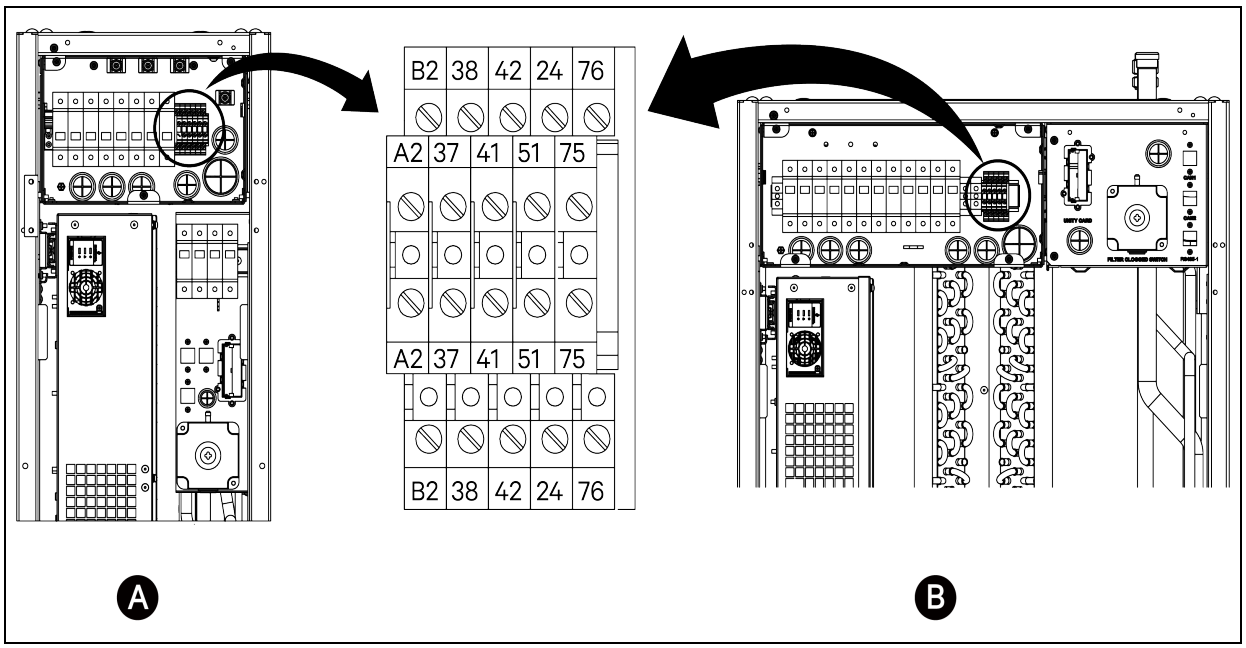
6.2 Connecting Communications Cables

6.2.1 General Arrangement

NOTE: Take anti-static measures when connecting communications cables.

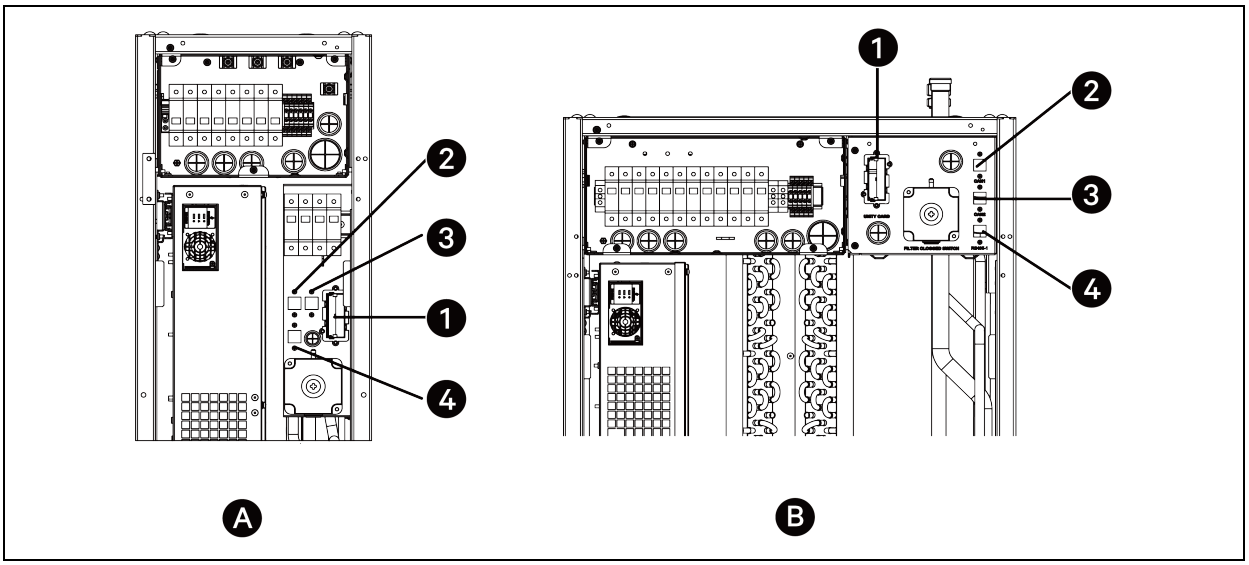
NOTE: The RJ45 port on the back of HMI is not available for any usage.

Figure 6.3 Terminal Block



Item	Description	Item	Description
A	CRD25 evaporator	41/42	Static pressure sensor
B	CRD35 evaporator	24/51	Water leakage sensor
A2/B2	RS485	75/76	Common alarm
37/38	Remote on/off device		

Figure 6.4 Communications Ports



Item	Description	Item	Description
A	CRD25 evaporator	2	CAN 1 port
B	CRD35 evaporator	3	CAN 2 port
1	Unity card	4	RS485-1

6.2.2 Connecting Communications Cable between Evaporator and Condenser

The communications cable is not provided with the unit. To connect the communications cable, connect one end of the cable to the A2 and B2 terminals of the evaporator, and connect the other end to the A2 and B2 terminals of the condenser. The iCOM Edge board controls the operation of condenser fans through the communications cable.

NOTE: Use shielded cables as communication cables. The size of the cable should be larger than 0.75 mm^2, and the length should be shorter than 150 m (492.1 ft).

NOTE: Do not run the communication cable in the same conduit, raceway or chase used for power cable.

6.2.3 Connecting the Water Leakage Sensor (Optional)

The water leakage sensor is provided in the accessories bag. To connect the water leakage sensor, connect it to the 51 and 24 terminals.

6.2.4 Connecting the Static Pressure Sensor (Optional)

The static pressure sensor is not provided with the unit. To connect the static pressure sensor, connect it to the 41 and 42 terminals on the terminal block.

NOTE: For the detailed installation and setting of the static pressure sensor, please refer to the Installer/User Guide included with the static pressure sensor.

6.2.5 Connecting the Monitor Device to Unity Card (Optional)

The monitor device is not provided with the unit. To connect the monitor device, connect it to the Ethernet port on the unity card.

6.2.6 Connecting Alarm Device (Optional)

The alarm device is not provided with the unit. To connect the alarm device, connect it to the 75 and 76 terminals on the terminal block, so that the iCOM Edge can send alarms to the alarm device.

6.2.7 Connecting Remote Temperature Sensors (Optional)

One remote temperature sensor is provided in the accessories bag. The unit can be connected with a maximum of 10 temperature sensors. It is recommended to place the sensors in front of the heat loads, 1.5 m (4.9 ft) higher than the unit base.

To connect remote temperature sensors:

1. Insert the connector of the sensor to the RS485-1 port. Route the cable through the top or bottom of the unit. Connect the second sensor to the first sensor.
2. Fix the sensor on rack surface using the magnets provided in the kit. Do not fix it on an empty rack. Set the address on the dialing switch on the sensor, according to the following table.

Table 6.2 Address Settings for Remote Temperature Sensors

Sensor	1	2	3	4	5	6	ID
Remote temperature sensor 1	OFF	OFF	OFF	ON	OFF	OFF	10
Remote temperature sensor 2	OFF	OFF	OFF	ON	OFF	ON	11
Remote temperature sensor 3	OFF	OFF	OFF	ON	ON	OFF	12
Remote temperature sensor 4	OFF	OFF	OFF	ON	ON	ON	13
Remote temperature sensor 5	OFF	OFF	ON	OFF	OFF	OFF	20
Remote temperature sensor 6	OFF	OFF	ON	OFF	OFF	ON	21
Remote temperature sensor 7	OFF	OFF	ON	OFF	ON	OFF	22
Remote temperature sensor 8	OFF	OFF	ON	OFF	ON	ON	23
Remote temperature sensor 9	OFF	OFF	ON	ON	OFF	OFF	30
Remote temperature sensor 10	OFF	OFF	ON	ON	OFF	ON	31

6.2.8 Connecting the Remote On/Off Device (Optional)

The remote on/off device is not provided with the unit. To connect the remote on/off device, connect it to the 37 and 38 terminals on the terminal block. These two terminals have been connected with a jumper in factory, and you need to remove this jumper before connecting to the remote on/off device.

NOTE: If the jumper between the 37 and 38 terminals is removed but no remote on/off device is connected to the terminals, the unit cannot be powered on.

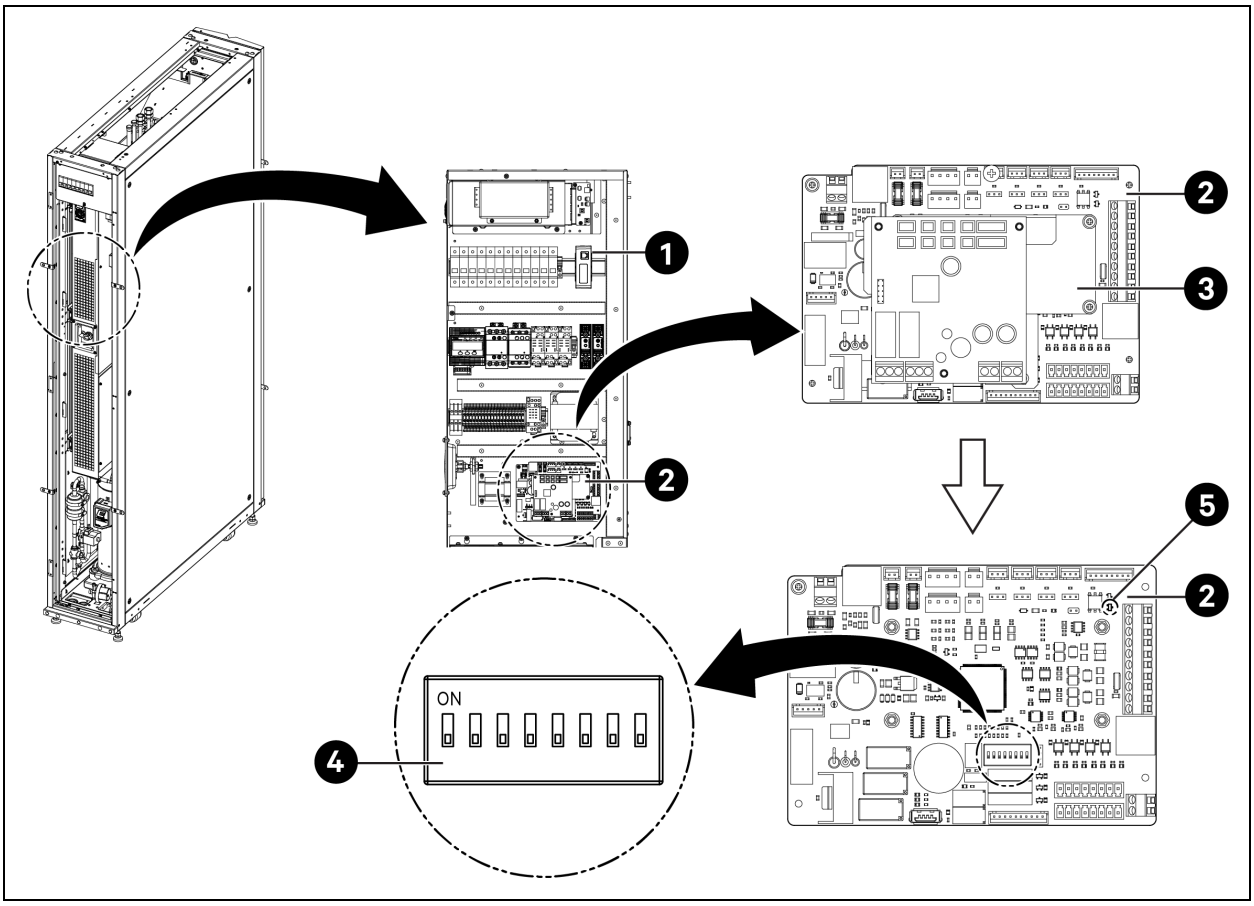
6.2.9 Connecting for Teamwork

Connect the CAN port of one unit to the CAN port of another unit using a CAN network cable. Set the CAN ID of each unit on the DIP SW3 and set the connection of the Jumper J27. The DIP SW3 and Jumper J27 are located on the iCOM Edge board, under the EEV Drive board.

To access the DIP SW3:

1. Open the rear door and remove filters. For details on removing filters, see Figure 4.5 on page 25 .
2. Hold the handle and pull the electrical box 2. Remove the side cover from the box by removing three M4 x 10 pan head screws.
3. Remove the EEV Driver board from the iCOM Edge board.

Figure 6.5 Location of DIP SW3 and Jumper J27



Item	Description	Item	Description
1	Slider electrical box (electrical box 2)	4	DIP SW3
2	iCOM Edge board	5	Jumper J27
3	EEV Driver board		

To set the connection of Jumper J27:

1. It is necessary to short Jumper J27 of the iCOM Edge board of the master teamwork unit and the last teamwork unit and remove the connection cap of J27 of the iCOM Edge board of the units between the master and last units.
2. For the iCOM Edge board, the Jumper J27 is in shorted connection by factory default.

Table 6.3 Address Settings of CAN ID

CAN ID	SW3-1	SW3-2	SW3-3	SW3-4	SW3-5	SW3-6	SW3-7	SW3-8	Note
0	ON	ON	ON	ON	ON	ON	ON	ON	Master Unit
1	OFF	ON	ON	ON	ON	ON	ON	ON	Subordinate Unit 1
2	ON	OFF	ON	ON	ON	ON	ON	ON	Subordinate Unit 2
3	OFF	OFF	ON	ON	ON	ON	ON	ON	Subordinate Unit 3
4	ON	ON	OFF	ON	ON	ON	ON	ON	Subordinate Unit 4
5	OFF	ON	OFF	ON	ON	ON	ON	ON	Subordinate Unit 5
6	ON	OFF	OFF	ON	ON	ON	ON	ON	Subordinate Unit 6
7	OFF	OFF	OFF	ON	ON	ON	ON	ON	Subordinate Unit 7
8	ON	ON	ON	OFF	ON	ON	ON	ON	Subordinate Unit 8
9	OFF	ON	ON	OFF	ON	ON	ON	ON	Subordinate Unit 9
10	ON	OFF	ON	OFF	ON	ON	ON	ON	Subordinate Unit 10
11	OFF	OFF	ON	OFF	ON	ON	ON	ON	Subordinate Unit 11
12	ON	ON	OFF	OFF	ON	ON	ON	ON	Subordinate Unit 12
13	OFF	ON	OFF	OFF	ON	ON	ON	ON	Subordinate Unit 13
14	ON	OFF	OFF	OFF	ON	ON	ON	ON	Subordinate Unit 14
15	OFF	OFF	OFF	OFF	ON	ON	ON	ON	Subordinate Unit 15

NOTE: The iCOM Edge can connect up to 16 units. Unit CAN ID address must be set in sequence from 0 to 15.

NOTE: CAN ID 0 is master unit. Teamwork parameters only can be set in master unit and then shared to secondary units. Secondary units upload operation status and alarms to the master unit.

NOTE: The recommended maximum length of CAN network cable is 40m (131ft.), but please minimize the length of this CAN network cable to ensure efficient communication.

This page intentionally left blank

7 Start-up

7.1 Charging Refrigerant and Lubricating Oil

7.1.1 Amount of Refrigerant and Lubricating Oil

NOTE: The unit is not charged with refrigerant from factory. You need to charge refrigerant on site. The refrigerant for the unit is R410A.

NOTE: The unit has been charged with certain amount of lubricating oil in the factory. If the liquid pipe between the evaporator and condenser is shorter than 30 m (98.4 ft) and the unit is not equipped with a low ambient kit, you do not need to add extra lubricating oil. If the unit is equipped with a low ambient kit or if the liquid pipe between the evaporator and condenser is longer than 30 m (98.4 ft), you need to add extra lubricating oil. The lubricating oil for the unit is POE (32-3MAF).

NOTE: Do not use refrigerant and lubricating oil of poor quality or wrong type, as they can damage the system.

Table 7.1 CRD 25 Total Refrigerant Charge and Extra Lubricating Oil Charge

Liquid Pipe Length		Total Refrigerant Charge without Low Ambient Kit		Total Refrigerant Charge with Low Ambient Kit		Extra Lubricating Oil Charge without Low Ambient Kit		Extra Lubricating Oil Charge with Low Ambient Kit	
m	ft	kg	lb	kg	lb	ml	oz	ml	oz
10	32.8	10	22.05	25	55.1	-	-	3650	123.42
15	49.2	10.9	23.97	25.9	57	-	-	3650	123.42
20	65.6	11.7	25.89	26.7	59	-	-	3650	123.42
25	82	13.7	30.15	28.7	63.2	-	-	3650	123.42
30	98.4	14.9	32.85	29.9	65.9	-	-	3650	123.42
35	114.8	16.1	35.56	31.1	68.6	147	4.97	3797	128.39
40	131.2	17.4	38.26	32.4	71.3	294	9.94	3944	133.36
45	147.6	18.6	40.96	33.6	74	441	14.91	4091	138.33
50	164	19.8	43.66	34.8	76.7	588	19.87	4238	143.3
55	180.4	24.4	53.9	39.4	87	963	32.55	4613	155.98
60	196.8	26.1	57.44	41.1	90.5	1156	39.06	4806	162.5
65	213.2	27.7	60.98	42.7	94.1	1348	45.57	4998	169.01
70	229.6	29.3	64.52	44.3	97.6	1541	52.08	5191	175.52
75	246	30.9	68.06	45.9	101.1	1733	58.59	5383	182.03
80	262.4	32.5	71.6	47.5	104.7	1926	65.1	5576	188.55
85	278.8	34.1	75.14	49.1	108.2	2119	71.61	5769	195.06
90	295.2	35.7	78.67	50.7	111.7	2311	78.12	5961	201.57
95	311.6	37.3	82.21	52.3	115.3	2504	84.63	6154	208.08
100	328	38.9	85.75	53.9	118.8	2696	91.14	6346	214.6

Table 7.1 CRD 25 Total Refrigerant Charge and Extra Lubricating Oil Charge (continued)

Liquid Pipe Length		Total Refrigerant Charge without Low Ambient Kit		Total Refrigerant Charge with Low Ambient Kit		Extra Lubricating Oil Charge without Low Ambient Kit		Extra Lubricating Oil Charge with Low Ambient Kit	
m	ft	kg	lb	kg	lb	ml	oz	ml	oz
105	344.4	40.5	89.29	55.5	122.4	2889	97.65	6539	221.11
110	360.8	42.1	92.83	57.1	125.9	3082	104.16	6732	227.62
115	377.2	43.7	96.37	58.7	129.4	3274	110.67	6924	234.13
120	393.6	45.3	99.91	60.3	133	3467	117.18	7117	240.65

Table 7.2 CRD 35 Total Refrigerant Charge and Extra Lubricating Oil Charge

Liquid Pipe Length		Total Refrigerant Charge without Low Ambient Kit		Total Refrigerant Charge with Low Ambient Kit		Extra Lubricating Oil Charge without Low Ambient Kit		Extra Lubricating Oil Charge with Low Ambient Kit	
m	ft	kg	lb	kg	lb	ml	oz	ml	oz
10	32.8	13.5	29.8	28.5	62.8	-	-	3650	123.42
15	49.2	14.4	31.7	29.4	64.8	-	-	3650	123.42
20	65.6	15.2	33.6	30.2	66.7	-	-	3650	123.42
25	82	17.2	37.9	32.2	70.9	-	-	3650	123.42
30	98.4	18.4	40.6	33.4	73.6	-	-	3650	123.42
35	114.8	19.6	43.3	34.6	76.3	147	4.97	3797	128.39
40	131.2	20.9	46	35.9	79	294	9.94	3944	133.36
45	147.6	22.1	48.7	37.1	81.8	441	14.91	4091	138.33
50	164	23.3	51.4	38.3	84.5	588	19.87	4238	143.3
55	180.4	27.9	61.7	42.9	94.7	963	32.55	4613	155.98
60	196.8	29.6	65.2	44.6	98.2	1156	39.06	4806	162.5
65	213.2	31.2	68.8	46.2	101.8	1348	45.57	4998	169.01
70	229.6	32.8	72.3	47.8	105.3	1541	52.08	5191	175.52
75	246	34.4	75.9	49.4	108.8	1733	58.59	5383	182.03
80	262.4	36	79.4	51	112.4	1926	65.1	5576	188.55
85	278.8	37.6	82.9	52.6	115.9	2119	71.61	5769	195.06
90	295.2	39.2	86.5	54.2	119.5	2311	78.12	5961	201.57
95	311.6	40.8	90	55.8	123	2504	84.63	6154	208.08
100	328	42.4	93.6	57.4	126.5	2696	91.14	6346	214.6
105	344.4	44	97.1	59	130.1	2889	97.65	6539	221.11
110	360.8	45.6	100.6	60.6	133.6	3082	104.16	6732	227.62
115	377.2	47.2	104.2	62.2	137.2	3274	110.67	6924	234.13
120	393.6	48.8	107.7	63.8	140.7	3467	117.18	7117	240.65

The total refrigerant charge is calculated using the following equations:

Total refrigerant charge (kg) = Base refrigerant charge (kg) + Refrigerant charge per meter of each size of liquid pipe (kg/m) × ((Total length of liquid pipe (m) - 10 (m))

Total refrigerant charge (lb) = Base refrigerant charge (lb) + Refrigerant charge per meter of each size of liquid pipe (lb/ft) × ((Total length of liquid pipe (ft) - 32.8 (ft))

Table 7.3 Base Refrigerant Charge

Model	Base Refrigerant Charge without Low Ambient Kit kg (lb)	Base Refrigerant Charge with Low Ambient Kit kg (lb)
CRD25	10 (20.9)	25 (55.1)
CRD35	13.5 (29.8)	28.5 (62.8)

Table 7.4 Refrigerant Charge Per Meter of Each Size of Liquid Pipe

Liquid Pipe Diameter mm (in.)	Refrigerant Charge Per Meter of Liquid Pipe kg/m (lb/ft)
16 (5/8)	0.174 (0.117)
18 (3/4)	0.245 (0.165)
22 (7/8)	0.321 (0.216)

The extra lubricating oil charge is calculated using the following equations:

Extra lubricating oil charge (ml) = Base lubricating oil charge (ml) + Refrigerant charge per meter of each size of liquid pipe (kg/m) × [(Total length of liquid pipe (m) - 30 (m)] × 1000 x 12%

Extra lubricating oil charge (oz) = Base lubricating oil charge (oz) + Refrigerant charge per meter of each size of liquid pipe (lb/ft) × [(Total length of liquid pipe (ft) – 98.4 (ft)] × 1.84

Table 7.5 Base Lubricating Oil Charge

Model	Base Lubricating Oil Charge without Low Ambient Kit ml (oz)	Base Lubricating Oil Charge with Low Ambient Kit ml (oz)
CRD25	0	3650 (123.4)
CRD35	0	3650 (123.4)

7.1.2 Evacuating the Unit

NOTE: Before evacuating the unit, switch off the circuit breakers of the compressor, indoor fans, outdoor fans, electric heater, and humidifier.

To evacuate the unit:

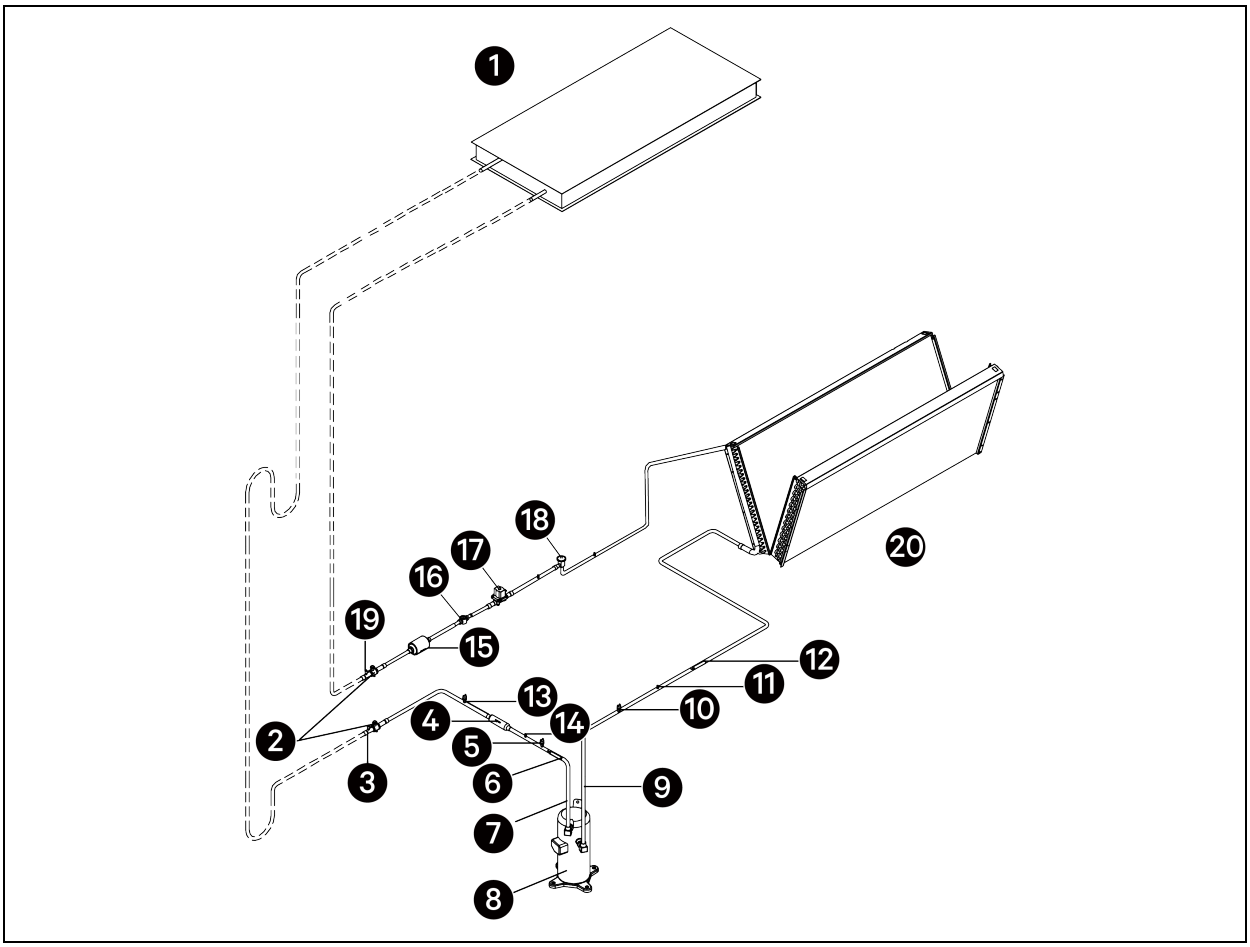
1. Switch on the circuit breaker of the transformer.
2. On the HMI display, choose Maintenance > Manual Mode, and select On for Vacuumize Pipeline. EEV and solenoid valve will be opened.
3. Manually open all the ball valves.
4. Connect a manifold gauge to the vacuum pump. Connect the manifold gauge to the Schrader valves 3, 11 and 14, as shown in Figure 7.1 on the facing page .
    a. Pull an initial deep vacuum of 65 Pa(a) or 500 microns on the system with a suitable pump.

b. After four hours, check the pressure readings and, if they have not changed, break vacuum with dry nitrogen. Pull a second and third vacuum to 65 Pa(a) or 500 microns or less. Re-check the pressure after two hours.

NOTE: The Fan/Power Failure alarm can be generated. This does not affect normal operation.

NOTE: Never use the compressor to evacuate the system. This invalidates its guarantee.

Figure 7.1 Schrader Valves in the System



Item	Description	Item	Description
1	Condenser coil	11	Schrader valve
2	Ball valve	12	Suction temperature sensor
3	Schrader valve	13	High pressure sensor
4	Check valve	14	Schrader valve
5	High pressure switch	15	Dry filter
6	Temperature sensor	16	Sight glass
7	Discharge pipe	17	Solenoid valve

Item	Description	Item	Description
8	Compressor	18	Electronic expansion valve
9	Suction pipe	19	Schrader valve
10	Low pressure sensor	20	Evaporator coil

7.1.3 Adding Lubricating Oil

NOTE: The unit has been charged with certain amount of lubricating oil in the factory. If the liquid pipe between the evaporator and condenser is shorter than 30 m (98.4 ft) and the unit is not equipped with a low ambient kit, you do not need to add extra lubricating oil. If the unit is equipped with a low ambient kit or if the liquid pipe between the evaporator and condenser is longer than 30 m (98.4 ft), you need to add extra lubricating oil. The lubricating oil for the unit is POE (32-3MAF).

NOTE: Do not use refrigerant and lubricating oil of poor quality or wrong type, as they can damage the system.

After evacuating the unit, connect the lubricating oil tank to the Schrader valve 3, as shown in Figure 7.1 on the previous page . The oil is drawn into the unit.

7.1.4 Charging the Refrigerant

NOTE: The unit is not charged with refrigerant from factory. You need to charge refrigerant on site. The refrigerant for the unit is R410A.

Charging refrigerant statically

Connect a manifold gauge to the refrigerant cylinder. Purge the air out of hoses. Connect the manifold gauge to the Schrader valves 3 and 11, as shown in Figure 7.1 on the previous page . Charge the refrigerant and keep the refrigerant cylinder inverted to ensure liquid refrigerant is being drawn into the unit.

NOTE: Do not over charge the unit. Charge the unit dynamically only if the unit is not charged with enough refrigerant.

NOTE: After charging the refrigerants statically, do not turn on the compressor to charge the refrigerant dynamically until the compressor has been pre-heated for more than 12 hours.

NOTE: Before charging the refrigerant dynamically, switch on the circuit breaker of the indoor fans and the compressor.

Charging refrigerant dynamically

On the HMI display, press and hold the ON/OFF button for three seconds to start the unit. Choose Maintenance > Manual Mode, and select Yes for Enable Manual Mode. Set the output value to 75% for the fan, start the compressor after 5 minutes, and adjust the compressor output to 72%. Connect the refrigerant cylinder to the Schrader valve 11, as shown in Figure 7.1 on the previous page and keep the refrigerant cylinder inverted. After the compressor starts to operate, the refrigerant will be drawn into the unit.

NOTE: Do not charge the unit too fast. Otherwise the compressor can be damaged.

NOTE: After charging the refrigerant dynamically, if the unit needs to be powered off, press and hold the ON/OFF button on the HMI display to power it off. Do not power off the unit by turning off the circuit breakers, as this may damage the compressor.

7.2 Start-up Procedure

7.2.1 First Start-up (or After Long Standstill)

To prevent the compressor from damaged, preheat the compressor for at least 12 hours before starting the unit (the compressor is preheated by its crankcase heater).

Start the unit as follows:

1. Open all valves in the system according to the instruction labels attached to the valves.
2. Using a leak detector, verify that there are no refrigerant leaks. If there are any, then repair the leak and recharge the refrigerant.
3. At least 4 hours before start-up, close the main switch and the circuit breaker for transformer protection on the electrical panel. The HMI will turn on immediately to indicate the presence of electrical power. If the screen does not light up, check the main power supply.
4. Check that there are no water leaks.
5. Disconnect all circuit breakers.
6. Check if the supply voltage is normal. If so, switch on all the circuit breakers.
7. Ensure that the compressor has been preheated for at least 4 hours before starting the unit.
8. Start the unit by pressing and holding the ON/OFF button on the HMI display for three seconds.
9. Ensure that all control system settings are correct and that there are no alarms.
10. Once the system is operating under load, carry out the following checks:
    - Verify that the fans are operating properly.
    - Ensure that the temperature and relative humidity are reached, and that the humidifier and heaters operate when required.
    - Ensure that the compressor operates when required.
    - Ensure that the fan speed controller on the external condenser is calibrated correctly, and that it controls the fan operation.
    - Ensure that all the sensors have been calibrated.

7.2.2 Automatic Restart

The unit will automatically restart on the return of power after a power interruption.

This page intentionally left blank

8 HMI Display

8.1 Appearance

The HMI display is a 7-inch touch-screen color display.

Figure 8.1 HMI Display

The indicator (1) is located under the screen. Its colors and indication are described in Table 8.1 below .

Table 8.1 Indicator Description

Indicator Color	Description
Blue	Display is starting
Yellow	Unit is shut down, or the display fails to communicate with iCOM Edge
Green	Unit is running normally
Red	An alarm has been generated and the buzzer keeps generating sound (you can tap the display to stop the buzzer)

8.2 Main Functions

8.2.1 Home Page

After the HMI display is powered on for one minute, press **Locked**, input password **1490**, and press **Enter**. The home page will be displayed. You can power on or off the unit by pressing and holding the ON/OFF button for three seconds.

NOTE: If no password is entered, you can only view the menu settings.

Figure 8.2 Entering Password

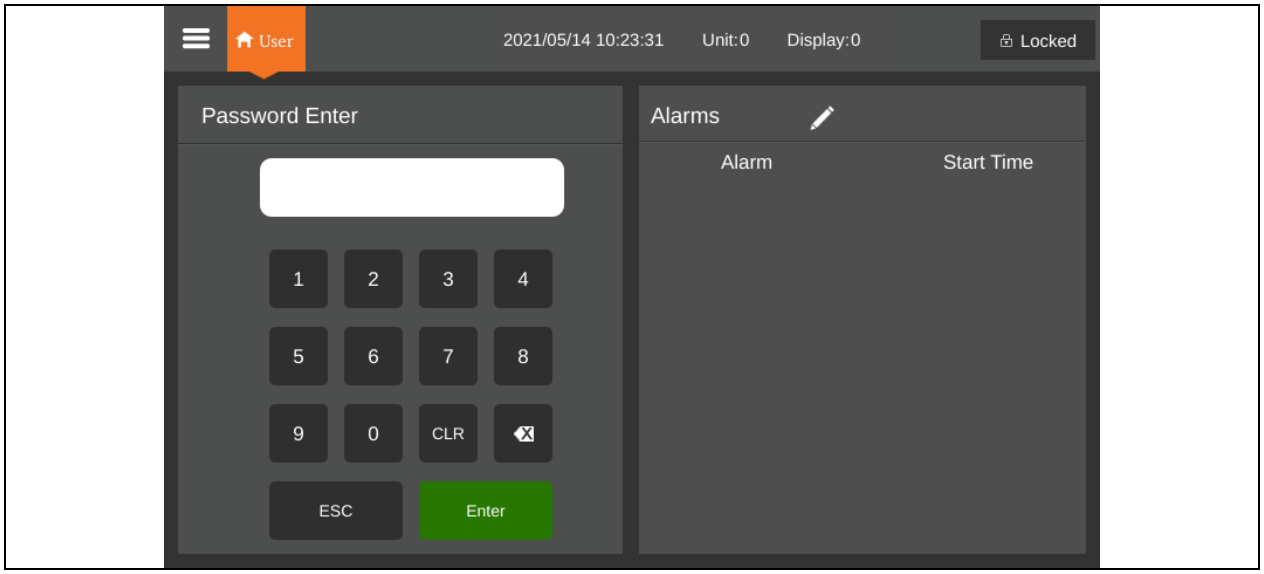


Figure 8.3 Functional Keys

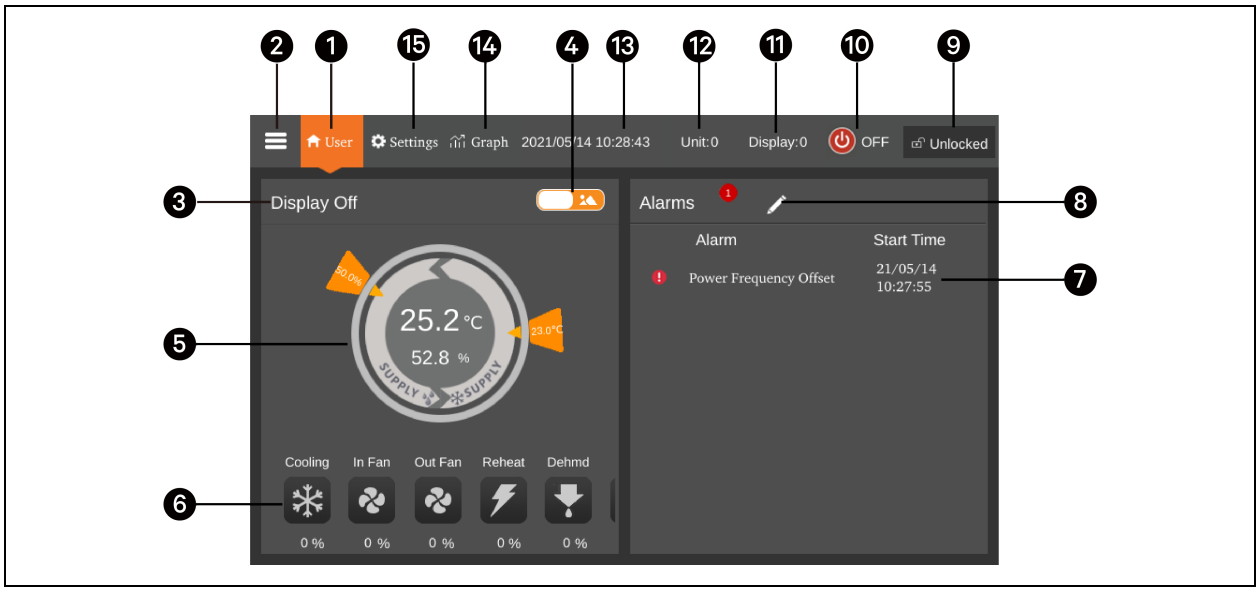


Table 8.2 Function Description

Items	Touch Keys	Functional Description
1	Home button	Return to the home page
2	Menu button	Check or configure operation status, alarm information, temperature and humidity settings, parameter settings, temperature and humidity graph, and check version information and service information
3	Operating status	Display the current state of the unit: unit run, remote off, display off, monitor off, standby
4	Toggle button 1	Switch between graphical display mode and list display mode
5	Control mode	Show unit settings and temperature and humidity data
6	Status display	Show the data of cooling, fan, electric heater, humidifier, dehumidifier, fan speed, heating status, and humidifier status
7	Alarm list	Show current alarms and the time when they are generated
8	Toggle button 2	Switch between the sensor data page and the alarm page
9	Unlock button	Unlock the HMI display
10	ON/OFF button	Press the button for three seconds to start or stop the unit
11	Display address	Show HMI address and set HMI address
12	Unit address	Show unit address
13	Time display	Show current time and date
14	Graph button	Show the graphs of average return air temperature, average return air humidity, average supply air temperature, and average remote temperature
15	Setting button	Set temperature and humidity

8.2.2 Control Mode

The compressor and fan are controlled according to temperature (supply air temperature, return air temperature, and remote temperature) and humidity (supply air humidity, return air humidity, and remote humidity).

Figure 8.4 Control Mode Diagram

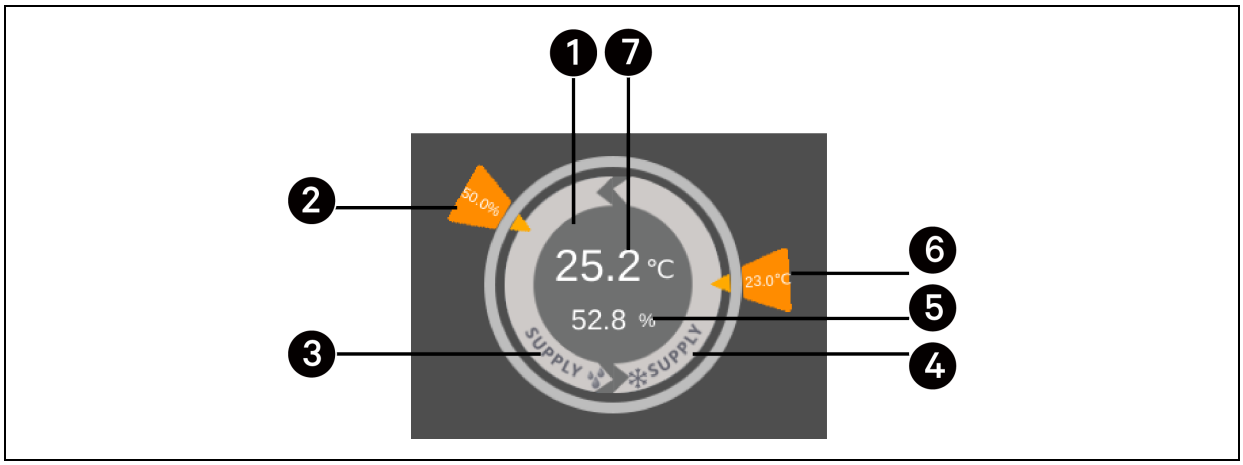


Table 8.3 Description of Control Mode Diagram

Item	Description
1	Each color of this area indicates different status: • Green: The unit is On and the temperature within normal range • Red: The unit is On and the temperature is not within normal range • Grey: The unit is Off
2	Desired humidity set by user
3	Control mode: compressor is controlled according to supply air humidity
4	Control mode: compressor is controlled according to supply air temperature, return air temperature, or remote temperature
5	Theoretical supply air humidity calculated according to current data
6	Desired supply air temperature, return air temperature, or remote temperature set by user
7	Supply air temperature, return air temperature, or remote temperature, depending on the control mode

8.3 Menu Structure and Parameters

For menu structure and parameters, see Menu Structure on page 86 .

8.4 Alarm Information

Press the menu button and choose **Alarm Information** to check active alarms and historical alarms. **Active Alarms** show the active alarms and the time they are generated. **Historical Alarms** show active alarms and historical alarms, and the time they are generated and closed (if the alarm has been resolved). Alarm Table on page 91 lists all the alarms.

NOTE: Alarms are displayed in time sequence, starting with the latest one.

NOTE: Up to 500 historical alarms can be stored. They will not be cleared when unit is powered off.

8.5 Teamwork Control

Press the menu button and choose **Parameter Settings** > **Teamwork Settings** to set teamwork control. **Teamwork Mode** includes Teamwork 0, Teamwork 1, Teamwork 2, and Teamwork 3. Teamwork 0 indicates standby and rotation control. Teamwork 1 indicates standby, rotation, and cooling/heating cascade control. Teamwork 2 indicates standby, rotation, and avoid fighting control. Teamwork 3 indicates standby, rotation, and fan cascade control.

Standby function

One or several units can be defined as standby unit. The standby unit fan runs at a default speed of 20%. If a critical alarm or normal alarm is generated on the master unit, a standby unit will start to run.

- Critical fault alarms: high pressure lock, low pressure lock, high discharge temperature lock, low discharge superheat lock, low pressure sensor fail lock, compressor drive fail lock, fan fail alarm (when its alarm handling is set to shut down), water underfloor alarm (when its alarm handling is set to shut down), power fail alarm.
- Normal alarms: high discharge temperature alarm, air flow temperature sensor failure, air flow loss alarm, discharge temperature sensor failure, suction temperature sensor failure, low pressure sensor failure, EEV drive communication failure, compressor drive communication failure, compressor temperature control sensors failure, fan temperature control sensors failure, high supply temperature alarm, high return temperature alarm, and high remote temperature alarm.

Rotation function

This function ensures that all the units have equal runtime.

Avoid fighting function

This function prevents the units from performing conflicting operations, such as cooling and heating, humidifying and dehumidifying. The master unit will calculate the number of cooling units and heating units (or humidifying units and dehumidifying units). If cooling units (or humidifying units) are more than heating units (or dehumidifying units), the heating units (or humidifying units) will stop working.

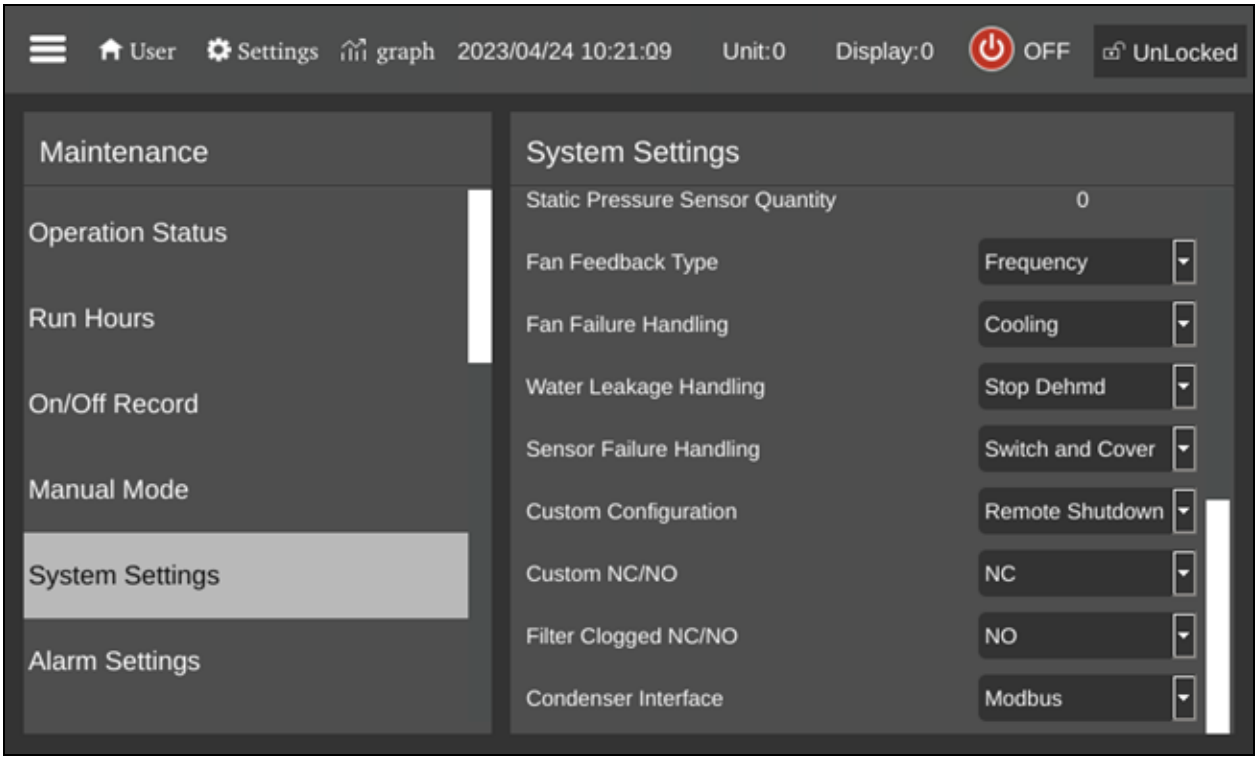
Cascade function

If an alarm is generated on the master unit, a standby unit will start to run.

8.6 Third-Party Condenser Setting

The CRD cooling units are equipped with Vertiv CCD condenser by default, if a third-party condenser is selected, the condenser interface should be set up on the HMI. Press the menu button and choose **Maintenance > System Settings** to set the condenser interface. The condenser interface for Vertiv CCD condenser defaults to “Modbus” and for a third-party condenser should be set to “None”.

Figure 8.5 Condenser Interface Setting Schematic



NOTE: A third-party condenser which must be provided with its own condenser fan speed controller. It will not be possible to apply the Vertiv Low Ambient Kit (LAK) to a third-party condenser. Thus, the third-party condenser can be used only if there is no risk that the ambient temperature drops below -20°C (-4°F).

NOTE: This parameter must be set with the unit turned OFF only and it must be set up by Vertiv professional technical support team. For more information and precautions, please confirm with Vertiv technical support team before selecting and installing a third-party condenser in advance.

This page intentionally left blank

9 Maintenance

WARNING! All maintenance operations must be carried out strictly observing the European and National accident prevention regulations, especially the accident prevention regulations concerning electrical systems, refrigerators and manufacturing resources. Maintenance may be done to air conditioning equipment only by authorized and qualified technicians. To keep all warranties valid, the maintenance must adhere to the manufacturer's instructions.

WARNING! The work should be done on the system only when it is at switched-off. Stop the system by switching off the air conditioner at the controller and the main switch. Check that the electrical components of device are off and not receiving a power supply.

NOTICE

Only original spare parts made by Vertiv may be used. Using third-party material can invalidate the warranty. When the spare parts must be brazed, be careful not to damage the internal parts (gaskets, seals, o-rings, etc.).

NOTICE

Risk of release of hazardous substances into the environment. Can cause environmental pollution and violation of environmental regulations.

9.1 Maintenance Schedule

Conduct monthly, quarterly, biannual and annual checks according to the following guidelines.

Component	Check Items	Maintenance Period			
		Monthly by user	3 months	6 months	1 year
General	Check unit/remote display for clogged-filter warning	X			
	Check for irregular noise from unit fans	X			
	Check for irregular noise from compressor	X			
	Check for irregular noise from remote condenser fans (if applicable)	X			
Filters	Check the state of filters		X		
	Clean or replace air filters if necessary		X		

Component	Check Items	Maintenance Period			
		Monthly by user	3 months	6 months	1 year
Fan	Verify that impellers move freely		X		
	Check bearings			X	
	Check that motor supports are fixed securely			X	
Electronics	Check the condition of contactors			X	
	Check electrical connections				X
	Check the operation of controller			X	
	Check unit operation sequence			X	
Humidifier	Check steam hoses conditions			X	
	Check cylinder conditions				X
Refrigerant circuit	Check compressor noise or vibrations		X		
	Check sight glass for problems		X		
	Check main refrigerant circuit pressure		X		
	Check compressor suction superheat		X		
	Check discharge temperature		X		
Condenser	Check fan bearings			X	
	Check that the fan motors are firmly secured			X	
	Check coil condition			X	
	Check fan speed controller operation				X

9.2 Air Filters

Check the air filters monthly to maintain efficient air distribution through the evaporator coil.

To replace filters:

1. Open the rear door and disconnect the main circuit breaker.
2. If the filters appear dirty, remove them. For details on removing filters, see Figure 4.5 on page 25 .

NOTE: After cleaning or replacing the filter and before reassembling the unit, check that the air differential pressure switch tubes are correctly installed.

9.3 Condensate Drain and Condensate Pump

Condensate drain

To maintain the condensate drain:

- Check and clear any obstructions in pipelines during routine maintenance.
- Check the filter routinely.

Condensate pump

To maintain or replace the pump:

1. Open the rear door. Disconnect the main circuit breaker.
2. Remove filters. For details on removing filters, see Figure 4.5 on page 25 .
3. Unplug the two power cables (labeled "Pump") from the terminals near the pump. Loosen the hose clamp on the connection between the water inlet tube and the soft pipe. Loosen the hose clamp on the connection between the drainage tube and the soft pipe. Pull out the soft pipes.
    a. To maintain the pump, check and clear any obstructions in the main line for the condensate pump. Re-install the pump and check the operation.
    b. To replace the pump, reverse the steps to install the replacement pump.

9.4 Condenser

To maintain the condenser:

- Clear coil surface of all debris that inhibit airflow.
- Check that there are no bent or damaged coil fins.
- Do not permit snow to accumulate around the outdoor unit.
- Periodically clean coil surface with dedicated degreasing products.
- Inspect fans, motors and controls for proper operation.
- Check all piping and capillaries for proper support.
- Inspect for leaks.

9.5 Fan

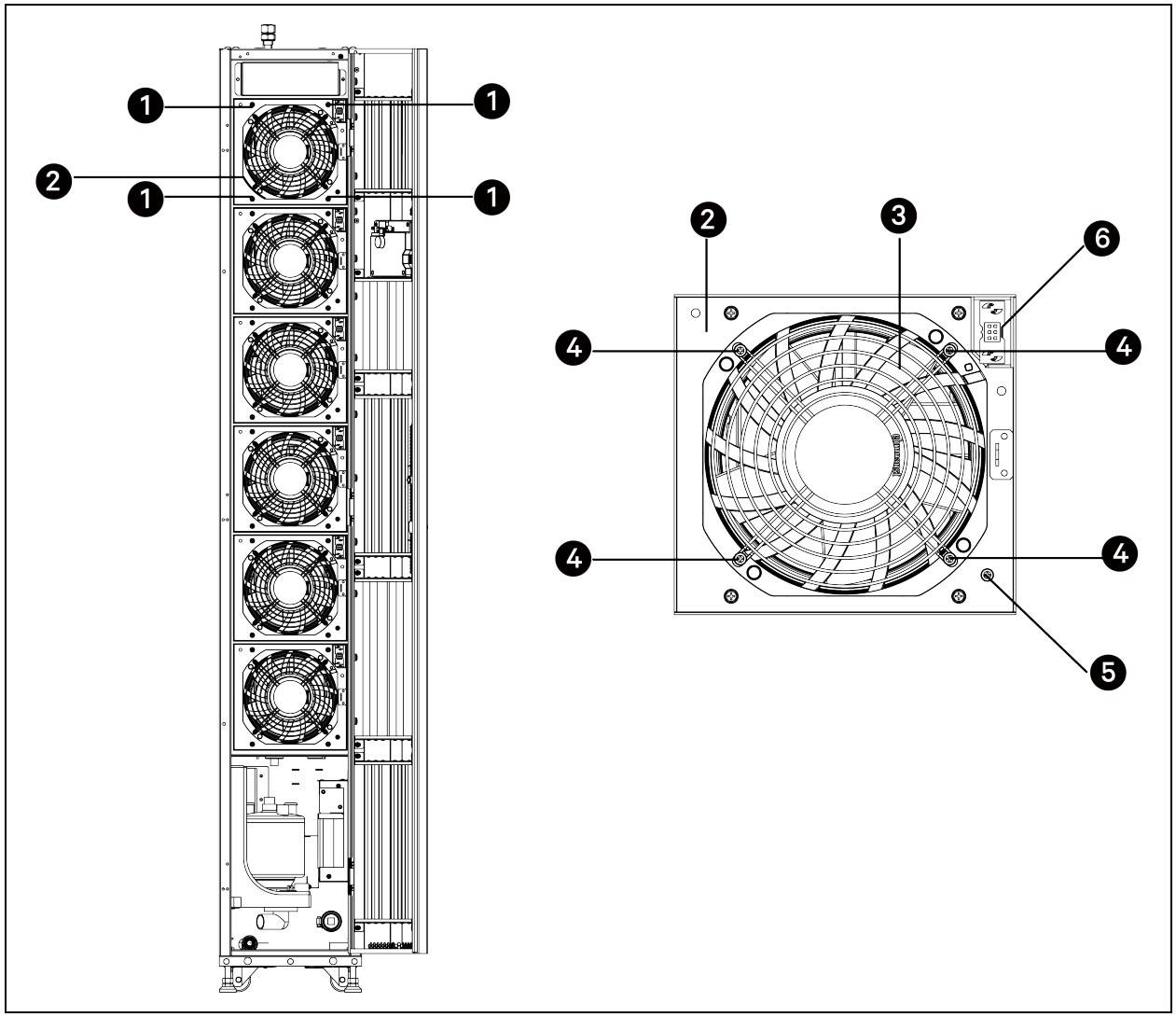
WARNING! Risk of electric shock and contact with high speed rotating fans. Can cause injury or death. Switch off all local and remote electrical supplies, verify that power is off with a voltmeter and verify that all fans have stopped rotating before working inside the unit cabinet or disconnecting the fan power wires.

To replace the fan:

1. Open the rear door and disconnect the main circuit breaker.
2. Open the front door.
3. Remove the fan frame assembly by removing the four M5 x 12 hex screws in the corners.
4. Set the fan assembly in a work area.

5. Remove the fan by removing the four M4 x 80 pan head screws, remove one grounding screw that attach the fan to the fan frame, and unplug the power supply terminal from the power socket on the fan frame assembly.
6. Reverse the steps to install the replacement fan.

Figure 9.1 Removing fan



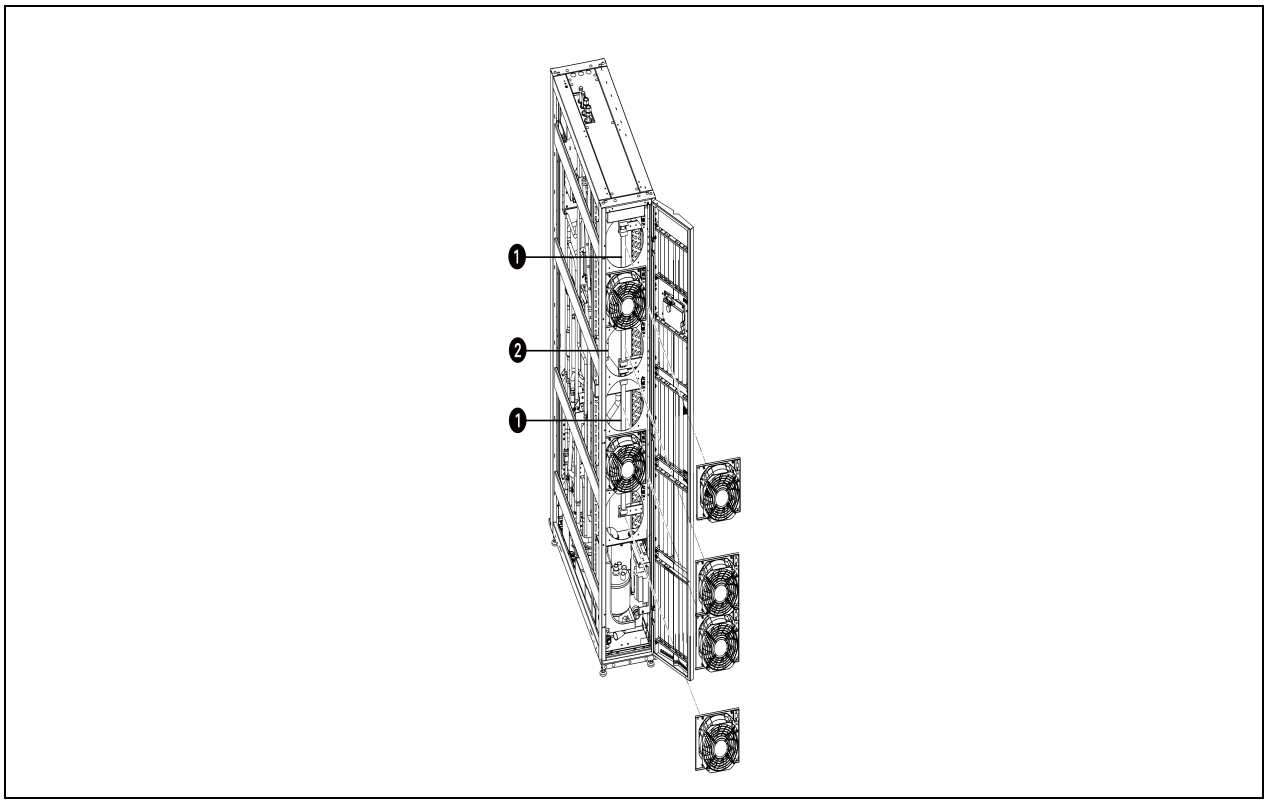
Item	Description	Item	Description
1	M5 x 12 hex screw	4	M4 x 80 Pan head screw
2	Fan frame assembly	5	Grounding screw
3	Fan	6	Power socket

9.6 Electric Heater

To maintain the electric heater:

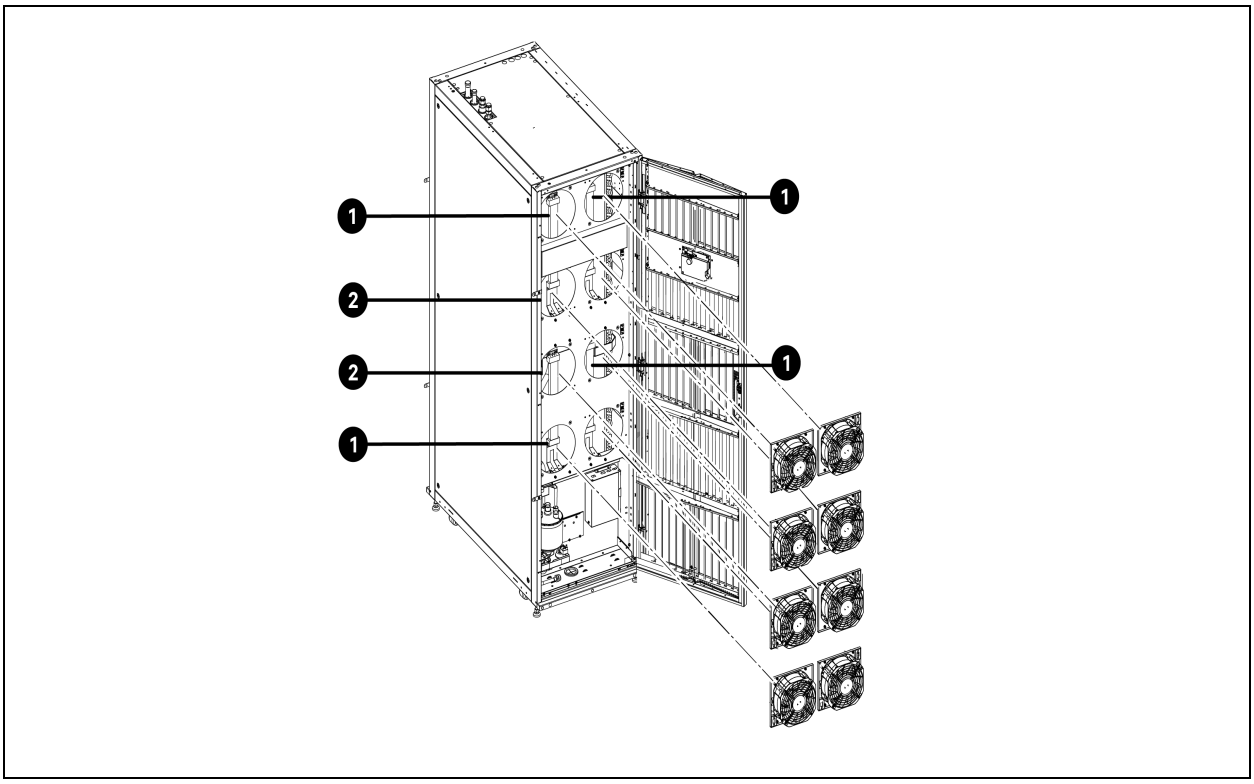
1. Open the rear door and disconnect the main circuit breaker.
2. Open the front door.
3. Remove the fan frame assemblies. For CRD25, remove four assemblies. For CRD35, remove all the eight assemblies.
4. Remove the power supply cables from the terminal block of the electric heater.
5. Remove the M4 x 12 pan head screws from the electric heater. Each electric heater is fixed by four screws (two on top the two on bottom). Take out the heater.
6. Inspect and clean heating elements.
7. Inspect and tighten support hardware.

Figure 9.2 Removing Electric Heater for CRD25



Item	Description
1	Electric heater (two pieces)
2	Terminal block

Figure 9.3 Removing Electric Heater for CRD35



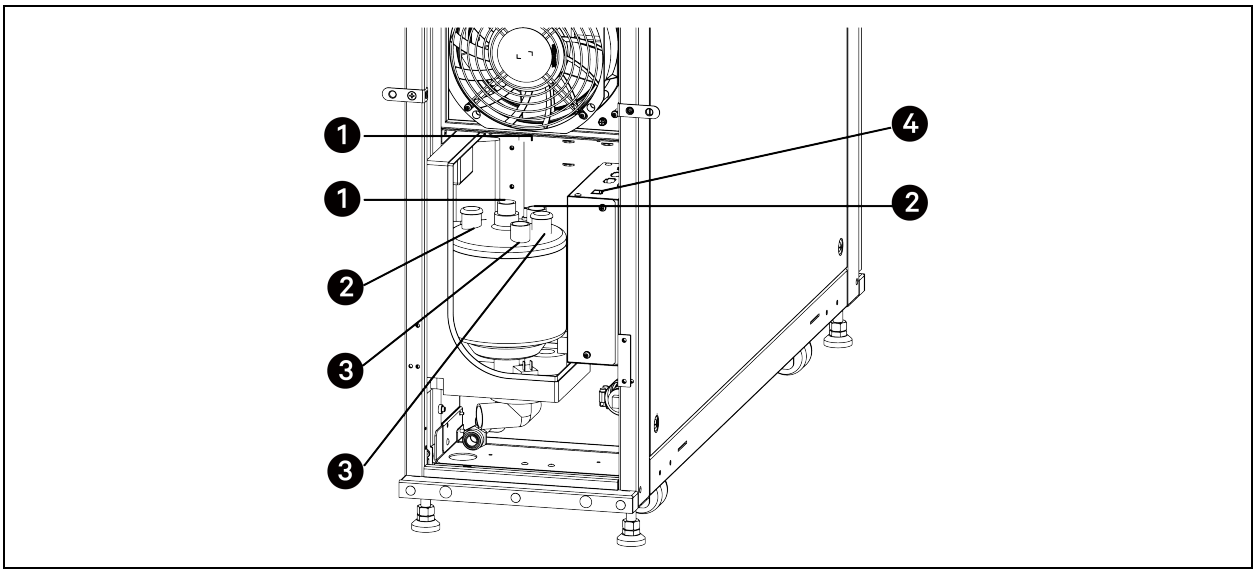
Item	Description
1	Electric heater (four pieces)
2	Terminal block

9.7 Humidifier

To remove the humidifier:

1. Open the rear door and disconnect the main circuit breaker.
2. Drain all the water from the cylinder by turning the power switch to 1 on the electrical control box near the humidifier.
3. Disconnect the steam hose (made of non-conductive rubber).
4. Disconnect the power electrode wires and level sensor wires.
5. Release the cylinder from the brackets.
6. Pull the cylinder out of its gland.

Figure 9.4 Removing Humidifier



Item	Description	Item	Description
1	Steam hose connection	3	Power electrode wire connection
2	Level sensor wire connection	4	Power switch

NOTE: After replacing the filter, clear the operating time of the humidifier. Press the menu button on the HMI display, choose Maintenance > Parameter Reset, and select Yes for Confirm Humidifier Maintenance.

9.8 Refrigeration Circuit

Note the following when maintaining the refrigerant circuit:

- When repairing the refrigeration circuit, collect all refrigerant in a container and do not allow the refrigerant to escape.
- When either removing (for repairs) or charging refrigerant, this must be performed on both the high and low pressure sides of the compressor simultaneously.
- The compressor copper plated steel connections should be brazed with a Silfos material containing a minimum of 5% silver.

9.9 Dismantling the Unit

CAUTION: The unit contains substances and components hazardous for the environment (electronic components, refrigerating gases and oils). At the end of the useful life, when the unit is dismantled, the operation must be carried out by specialized refrigerating technicians. Any component that is removed must be taken to collection and disposal centers specialized in the collection and disposal of equipment containing hazardous substances. The refrigerating fluid and the lubricating oil inside the circuit must be recovered according to the laws in force in the relevant country.

NOTICE

Please be environmentally responsible and recycle this product through your recycling facility at its end of life. Do not dispose of this product as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of Waste Electrical and Electronic Equipment (WEEE).

The machine has been designed and built to ensure continuous operation. The working life of some of the main components, such as the fan and the compressor, depends on the operating condition and maintenance that they receive.

9.10 Troubleshooting

The Table 9.1 below lists possible issues and their cause and corrective steps.

Table 9.1 Troubleshooting

Problem	Possible Cause	Corrective Action
Rack temperature is too high	Dirty filters	Replace filters
	Filter clog sensor	Call Vertiv Technical Support
	Incorrect position of remote temperature sensors	Verify that remote temperature sensors are correctly positioned
	Remote temperature sensor issue	Call Vertiv Technical Support
	Condensation pressure too high	Verify remote condenser fans are running
	Refrigerating circuit charge issue	Call Vertiv Technical Support
	Cold air short-cycling issues	Verify unit positioning/room configuration
		Verify unit air-baffles set-up
		Verify cold aisle containment seals (if applicable)
	Insufficient room cooling capacity	Reduce rack heat load or add cooling units
	Unit safety device intervention	Contact your local Vertiv representative
Unit fan fail to start	The fan is faulty	Call Vertiv Technical Support
Water drops carried by airflow	Room humidity is over acceptable limit	Check room condition
	Condensate pan drain is clogged	Call Vertiv Technical Support
	Problem to humidifier control	
Water on the floor around the unit	Unit is not properly levelled	Adjust the levelling feet
	Unit condensate drain pipe is clogged	Remove pipe obstruction
	Piping insulation broken/damaged	Restore insulation integrity
	Leak in the draining circuit	Call Vertiv Technical Support
	Condensate pump is faulty	
	Leak in the humidifier filling hose	
Cooling Unit noise level is too high than expected	Incorrect positioning of remote temperature sensors	Verify that remote temperature sensors are correctly positioned
	Unbalanced heat load distribution	Enhance racks heat load distribution
	Remote temperature sensor/s issue	Call Vertiv Technical Support
Unsteady air delivery temperature	Faulty temperature sensor	Call Vertiv Technical Support
	Unit controller issue	
Local display not operational but unit operates	Local display cable disconnected	Connect the cable
	Local display cable damaged	Replace the cable
	Local display configuration lost	Call Vertiv Technical Support

Table 9.1 Troubleshooting (continued)

Problem	Possible Cause	Corrective Action
HMI display does not operate and the unit does not operate	Unit electrical supply is off	Restore electrical supply
	Unit main switch is off	Switch on the unit
	Control board supply issue	Call Vertiv Technical Support
	Control board issue	

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

1-800-543-2778

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Technical Support/Service in Europe, the Middle East and Africa

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

A.3 Locations

United States

Vertiv Headquarters

1050 Dearborn Drive

Columbus, OH, 43085, USA

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

Appendix B: Menu Structure

Level 1 Menu	Level 2 Menu	Parameter
Operation Status	Temp/Hmd Information	Return Temp 1
		Return Hmd 1
		Return Temp 2
		Return Temp 3
		Avg Return Temp
		Avg Return Hmd
		Supply Temp 1
		Supply Temp 2
		Supply Temp 3
		Avg Supply Temp
		Avg Supply Hmd
		Remote Temp 1
		Remote Temp 2
		Remote Temp 3
		Remote Temp 4
		Remote Temp 5
		Remote Temp 6
		Remote Temp 7
		Remote Temp 8
		Remote Temp 9
		Remote Temp 10
		Avg Remote Temp
	Switch Status	Differential Pressure
		Condensate Water High
		Condensate Water Low
		High Pressure
		Floor Water Leak
		Humidifier Failure
		Heater Failure
		Custom 1

Level 1 Menu	Level 2 Menu	Parameter
	Power Information	L1 Voltage
		L2 Voltage
		L3 Voltage
		Active Power
		AC Frequency
	Teamwork Information	Unit 00 Status
		Unit 01 Status
		Unit 02 Status
		Unit 03 Status
		Unit 04 Status
		Unit 05 Status
		Unit 06 Status
		Unit 07 Status
		Unit 08 Status
		Unit 09 Status
		Unit 10 Status
		Unit 11 Status
		Unit 12 Status
		Unit 13 Status
		Unit 14 Status
		Unit 15 Status
Alarm Information	Active Alarms	-
	Historical Alarms	-
Temp/Hmd Settings	Temp Settings	Supply Temp
		Return Temp
		Remote Temp
	Hmd Settings	Supply Hmd

Level 1 Menu	Level 2 Menu	Parameter
Parameter Settings	Teamwork Settings	Teamwork Mode
		Unit Address
		Unit Quantity
		Standby Quantity
		Rotation Quantity
		Rotation Cycle
		Rotate Every
		Rotate At
		Manual Rotation
		Active/Standby Switch Delay
		Cascade Mode
		Cascade Start Point

Level 1 Menu	Level 2 Menu	Parameter
		Cascade Stop Point
		Cascade Max Point
		Cascade Start Delay
		Cascade Stop Delay
		Cascade Min Time
	Alarm Settings	High Supply Temp Alarm
		Low Supply Temp Alarm
		High Return Temp Alarm
		Low Return Temp Alarm
		High Return Hmd Alarm
		Low Return Hmd Alarm
		High Remote Temp Alarm
		Low Remote Temp Alarm
	Alarm Attribute	High Return Temp
		Low Return Temp
		High Return Hmd
		Low Return Hmd
		High Supply Temp
		Supply Low Temp
		High Remote Temp
		Low Remote Temp
	Communication Settings	Monitor Protocol
		Monitor Baudrate
		Monitor Address
	Time Settings	Date Settings
		Time Settings
	Display Settings	Language
		Display Address
	Password Settings	Level 1 Password
		Level 2 Password
Temp/Hmd Graph	Avg Return Temp	-
	Avg Return Hmd	-
	Avg Supply Temp	-
	Avg Remote Temp	-

Level 1 Menu	Level 2 Menu	Parameter
About	Version Information	Control Software Model
		Control Software Version
		Display Software Model
		Display Software Version
	Service Information	-
Service	Maintenance/ System Settings	Condenser Interface

Appendix C: Alarm Table

Alarm	Description
High Pressure Alarm	The pressure of the discharge gas is higher than the set value.
High Pressure Lock	The High Pressure Alarm is generated three times in an hour or the High Pressure Alarm is active for ten minutes. In this case, the compressor stops working.
Low Pressure Alarm	The pressure of the suction gas is lower than the set value.
Low Pressure Lock	The Low Pressure Alarm is generated three times in an hour or the Low Pressure Alarm is active for ten minutes. In this case, the compressor stops working.
High Discharge Temp	The temperature of the discharge gas is higher than the set value.
High Discharge Temp Lock	The High Discharge Temp alarm is generated three times in 24 hours. In this case, the compressor stops working.
Low Discharge Superheat	The superheat of the discharge gas is lower than the set value.
Low Discharge Superheat Lock	The Low Discharge Superheat alarm is generated for three times in an hour.
High Supply Temp	The temperature of the supply air is higher than the set value.
Low Supply Temp	The temperature of the supply air is lower than the set value.
High Return Temp	The temperature of the return air is higher than the set value.
Low Return Temp	The temperature of the return air is lower than the set value.
High Return Humidity	The humidity of the return air is higher than the set value.
Low Return Humidity	The humidity of the return air is lower than the set value.
Power Loss	Power supply is off and is then restored.
Power Overvoltage	The voltage of the power is higher than the set value.
Power Undervoltage	The voltage of the power is lower than the set value.
Power Frequency Offset	The offset of power frequency exceeds the set range.
Heater Failure	The heater cannot work normally.
Condensate Water High	The condensate water in the drain pan reaches the highest level.
Water Underfloor	The condensate water is leaking from the drain pan onto the room floor.
Filter Clogged	The filter is clogged.
Filter Maintenance	The filter has not been maintained in the specified time period.
Airflow Loss	All fans cannot work normally.
Remote Shutdown	The unit has been shut down remotely.
Master Unit Loss	The master unit cannot communicate with subordinate units.
Subordinate Unit Loss	The subordinate unit cannot communicate with the master unit.
Unit Address Duplicated	The address of one unit is the same with the address of another unit.
EEV Driver Communication Failure	The EEV driver cannot communicate with the iCOM Edge board.
10DI Communication Failure	The 10DI board cannot communicate with the iCOM Edge board.
Compressor Driver Communication	The compressor driver cannot communicate with the iCOM Edge board.

Alarm	Description
Failure	
Compressor Driver Protect 00 to Compressor Driver Protect 15	The compressor driver detects abnormal operation. In this case, the compressor stops working.
Fan 1 Failure, Fan 2 Failure, Fan 3 Failure, Fan 4 Failure, Fan 6 Failure, Fan 8 Failure	The fan cannot work normally.
Supply Temp Sensor 1 Failure, Supply Temp Sensor 2 Failure, Supply Temp Sensor 3 Failure	The temperature of the supply air is out of the detection range of the supply temperature sensor.
Remote Temp Sensor 1 Failure to Remote Temp Sensor 10 Failure	The ambient temperature is out of the detection range of the remote temperature sensor.
Discharge Temp Sensor Failure	The temperature of the discharge gas is out of the detection range of the discharge temperature sensor.
Suction Temp Sensor Failure	The temperature of the suction gas is out of the detection range of the suction temperature sensor.
Low Pressure Sensor Failure	The pressure of suction gas is out of the detection range of the low pressure sensor.
High Pressure Sensor Failure	The pressure of discharge gas is out of the detection range of the high pressure sensor.
Return Humidity Sensor 1 Failure	The humidity of the return air is out of the detection range of the return humidity sensor.
Smoke Sensor Alarm	Smoke is detected.
Fire Sensor Alarm	Fire is detected.
Custom 1	This alarm can be set as Smoke Sensor Alarm, Fire Sensor Alarm, or Remote Shutdown. Or it can be customized.
Outdoor Fan 1 Communication Failure, Outdoor Fan 2 Communication Failure	The outdoor fan cannot communicate with the iCOM Edge board.
Outdoor Fan 1 Driver Failure, Outdoor Fan 2 Driver Failure	The driver of the outdoor fan cannot work normally.
ESP Sensor 1 Failure, ESP Sensor 2 Failure	The external static pressure (ESP) of the supply air or return air is out of the detection range of the ESP sensor.
Energy Meter Communication Failure	The energy meter cannot communicate with the iCOM Edge board.
High Remote Temp	The ambient temperature detected by the remote temperature sensor is higher than the set value.
Low Remote Temp	The ambient temperature detected by the remote temperature sensor is lower than the set value.
Humidifier Failure	The humidifier cannot work normally.
Return Temp Sensor 1 Failure, Return Temp Sensor 2 Failure, Return Temp Sensor 3 Failure	The temperature of the return air is out of the detection range of the return temperature sensor.
Compressor Driver Lock	One of the Compressor Driver Protect 00 to Compressor Driver Protect 15 alarms is generated three times within two hours or the alarm is active for ten minutes. Or three Compressor Driver Protect alarms are generated in two hours.
EEV Driver Abnormal	The compressor is operating but it is not in the EEV balance stage, EEV is operating normally, and the EEV opening is less than the degree allowed by the unit.

This page intentionally left blank

Connect with Vertiv on Social Media


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


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


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


https://www.twitter.com/Vertiv/

Vertiv.com | Vertiv Headquarters, 1050 Dearborn Drive, Columbus, OH, 43085, USA

SL-70747_REVE_10-23