VERTIV.

Liebert® CRV CRD10

User Manual (Original Instructions)

10 kW, 50/60 Hz, Row-Based Cooling System

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit https://www.vertiv.com/en-us/support/ for additional assistance.

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1 Important Safety Instructions

SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Vertiv™ Liebert® CRV CRD10 row-based cooling unit (referred as "the unit" or the "indoor unit" in the following chapters). Read this manual thoroughly before attempting to install or operate this unit.

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

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

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

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

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 unit's 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 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.

WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure.

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.

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

WARNING! Risk of contact with extremely hot and/or cold surfaces. Can cause injury. Verify that all components have reached a temperature that is safe for human contact or wear appropriate, OSHA-approved PPE before working within the electric connection enclosures or unit cabinet. Perform maintenance only when the system is de-energized and component temperatures have become safe for human contact.

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

WARNING! Risk of improper wire sizing/rating and loose electrical connections. Can cause overheated wire and electrical connection terminals resulting in smoke, fire, equipment and building damage, injury or death. Use correctly sized copper wire only and verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.

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

CAUTION: Risk of exposure to harmful noise levels. Can cause hearing injury or loss. Depending on the installation and operating conditions, a sound pressure level greater than 70 dB(A) may arise. Take appropriate technical safety measures. Operating personnel must wear appropriate, OSHA-approved PPE and observe all appropriate hearing-protection safety requirements.

CAUTION: Risk of excessive refrigerant line pressure. Can cause equipment damage or injury resulting from tubing and component rupture. Do not close off the refrigerant-line isolation valve for repairs unless a pressure-relief valve is field- installed in the line between the isolation valve and the check valve. The pressure-relief valve must be rated 5% to 10% higher than the system-design pressure. 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 improper power-supply connection. Can cause equipment damage and loss of warranty coverage. Prior to connecting any equipment to a main or alternate power source (for example back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within ±10% of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

NOTICE

The 96 VA transformer default wiring is orange cable (230 V to 24 V). If the unit rated voltage is 208 V, a properly trained and qualified electrician must change the transformer wiring from orange to red cable (208 V to 24 V). See section Connecting Communication Cables on page 46

NOTICE

Risk of oil contamination with water. Can cause equipment damage. The unit require the use of PVE (FV50S) oil. PVE 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 PVE 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. PVE 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 compressors without proper refrigerant charging can cause the compressors to operate at less than 5 °F (–15 °C) evaporator temperature and at less than 20 psig (138 kPa). Operation for extended periods at less than 20 psig (138 kPa) can cause premature compressor failure.

NOTICE

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

NOTICE

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

NOTICE

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

NOTICE

Risk of improper maintenance. It can cause damage to the equipment. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE. Ignoring safety instructions is dangerous. Soiled parts cause a loss of performance and, for switch or control devices, can lead to the breakdown of the unit performance and operation.

NOTICE

Risk of release of hazardous substances into the environment. Can cause environmental pollution and violation of environmental regulations. The unit contains substances and components hazardous for the environment (electronic components, refrigerating gases and oils). At the end of its useful life, the unit must be dismantled by specialized refrigerating technicians. The unit must be delivered to suitable centers specializing in the collection and disposal of equipment containing hazardous substances.

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 δηλνξιϋτιτο παÃϋν πÃοϊϋν 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) no. 517/2014 (F-gas)

1.2.1 Introduction

Stationary air conditioners placed into the European Community market and operating with fluorinated greenhouse gases (F-gas, such as R407C, R134a, R410A), have to comply with the F-gas Regulation (EU) No. 517/2014.

This Regulation is in force since Jan 1, 2015 an it replaces the Re. (EU) no. 342/2006.

This document summarizes the obligations for the operators that are responsible for the equipment during all its operative life until its disposal.

1.2.2 Normative References

F-gas	517/2014	Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006.
Certified personnel and Companies	2015/2067	Commission Implementing Regulation (EU) 2015/2067 of 17 November 2015 establishing, pursuant to Regulation (EU) No 517/2014 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of natural persons as regards stationary refrigeration, air conditioning and heat pump equipment, and refrigeration units of refrigerated trucks and trailers, containing fluorinated greenhouse gases and for the certification of companies as regards stationary refrigeration, air conditioning and heat pump equipment, containing fluorinated greenhouse gases.
Leak check air conditioning	1516/2007	Commission Regulation No 1516/2007 of 19 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases.
Leak check fire protection systems	1497/2007	Commission Regulation No 1497/2007 of 18 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary fire protection systems containing certain fluorinated greenhouse gases. From 01/01/2017 to be replaced by: Commission Implementing Regulation (EU) 2015/2068 of 17 November 2015 establishing, pursuant to Regulation (EU) No 517/2014 of the European Parliament and of the Council, the format of labels for products and equipment containing fluorinated greenhouse gases.

1.2.3 Fluorinated Greenhouse Gases

Following notes have to be considered when operating with the above mentioned equipments:

Fluorinated greenhouse gases are covered by the Kyoto Protocol.

The fluorinated greenhouse gases in this equipment should not be vented to the atmosphere.

Referring to the value noted in Annex I and Annex IV of Regulation (EU) No 517/2014 here below the global warming potential (GWP) of some major F-gases or mixtures:

- R-134a GWP 1430
- R-407C GWP 1774
- R-410A GWP 2088

NOTE: The refrigerants as R22 are not F-gas and their relevant regulation is Reg. (EU) no. 1005/2009.

1.2.4 Operators

Definitions

- Operator, according to Regulation 517/2014 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.

Obligations

Operators of stationary air conditioners, which contain fluorinated greenhouse gases, shall, using all measures which are technically feasible and do not entail disproportionate cost:

1. Prevent leakage of these gases and as soon as possible repair any detected leakage.
2. Ensure that they are checked for leakage by certified personnel.
3. Ensure for putting in place arrangements for the proper recovery by certified personnel.
4. According to Regulation 517/2014 the operators shall ensure that the equipment is checked for leaks as following:
    a. Case 1: Non-sealed equipment contains less than 5 tonnes of CO 2 equivalent of fluorinated greenhouse gases.
        - Leakage test not required
    b. Case 2: Hermetically sealed equipment contains less than 10 tonnes of CO 2 equivalent of fluorinated greenhouse gases.
        - Leakage test not required
    c. Case 3:
        - Leakage test required:

Check the equipment for leaks with the minimum frequency given in the following table:

X = Tonnes of CO2 Equivalent	Y = Equivalent Amount of Refrigerant (kg)			Minimum Frequency for Leak Check	
	R134a	R410A	R407C	With Leakage Detection	Without Leakage Detection
5 ≤ X < 50	3,5 ≤ Y < 35	2,4 ≤ Y < 24	2,8 ≤ Y < 28	12 Months	24 Months
50 ≤ X < 500	35 ≤ Y < 350	24 ≤ Y < 240	28 ≤ Y < 282	6 Months	12 Months
X ≥ 500	Y ≥ 350	Y ≥ 240	Y ≥ 282	3 Months	12 Months

Recovery for the purpose of recycling, reclamation or destruction of the fluorinated greenhouse gases, pursuant to Art. 8 of the Regulation 517/2014 shall take place before the final disposal of that equipment and, when appropriate, during its servicing and maintenance.

1.2.5 Leakage Detection

The manufacturer approves the following leakage check methods according to Reg. 1516/2007 and Reg. 1497/2007.

Method	Specifications
Check of circuits and components representing a risk of leakage with gas detection devices adapted to the refrigerant in the system.	Gas detection devices shall be checked every 12 months to ensure their proper functioning. The sensitivity of portable gas detection devices shall be at least five grams per year.
Application of ultraviolet (UV) detection fluid or suitable dye in the circuit.	The method shall only be undertaken by personnel certified to undertake activities which entail breaking into the refrigeration circuit containing fluorinated greenhouse gases.
Proprietary bubble solutions/soapsuds.	---

1.2.6 Labelling

The label applied on the unit (see Onboard Label) is designed to fill-in the relevant amounts of refrigerant according to Regulation 1494/2007 (2015/2068):

1. 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.

   All of the quantities of must be given both as mass of refrigerant [kg] and as Tonnes of CO2 Equivalent. Use the following rule for computation:

$$\text{Tonnes of } CO_2 = \frac{\text{kg of refrigerant x GWP of refrigerant}}{1000}$$

   Where:

Refrigerant	GWP
R-134a	1430
R-407C	1774
R-410A	2088

2. 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.
3. In general, the above mentioned information has been located in the main nameplate of relevant unit.
4. 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

5. 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).

NOTE: Safety data sheets of F-gases used in the products are available on demand.

1.2.7 Record Keeping

Operators of equipment which is required to be checked for leaks (see Leakage Detection on the previous page), shall establish and maintain records for each piece of such equipment specifying the following information:

1. The quantity and type of fluorinated greenhouse gases installed.
2. The quantities of fluorinated greenhouse gases added during installation, maintenance or servicing or due to leakage.
3. Whether the quantities of installed fluorinated greenhouse gases have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number.
4. The quantity of fluorinated greenhouse gases recovered.
5. The identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate.
6. The dates and results of the leak checks carried out (see Leakage Detection on the previous page).
7. If the equipment was decommissioned, the measures taken to recover and dispose of the fluorinated greenhouse gases Unless the records are stored in a database set up by the competent authorities of the Member States the following rules apply:
    a. The operators shall keep the records for at least five years.
    b. Undertakings carrying out activities for operators shall keep copies of the records for at least five years.

2 Product Overview

The Vertiv™ Liebert® CRV CRD10 row-based cooling unit is specifically created and designed for small to medium data centers, computer rooms, equipment rooms, and similar high heat density environments.

The CRD10 indoor unit is used together with the CCD10 condenser. CRD10 provides power to the CCD10 and controls its operation.

2.1 Model Nomenclature

Table 2.1 below and Table 2.2 below describe the model number for the CRD10 indoor unit.

Table 2.1 CRD10 Model Number Example

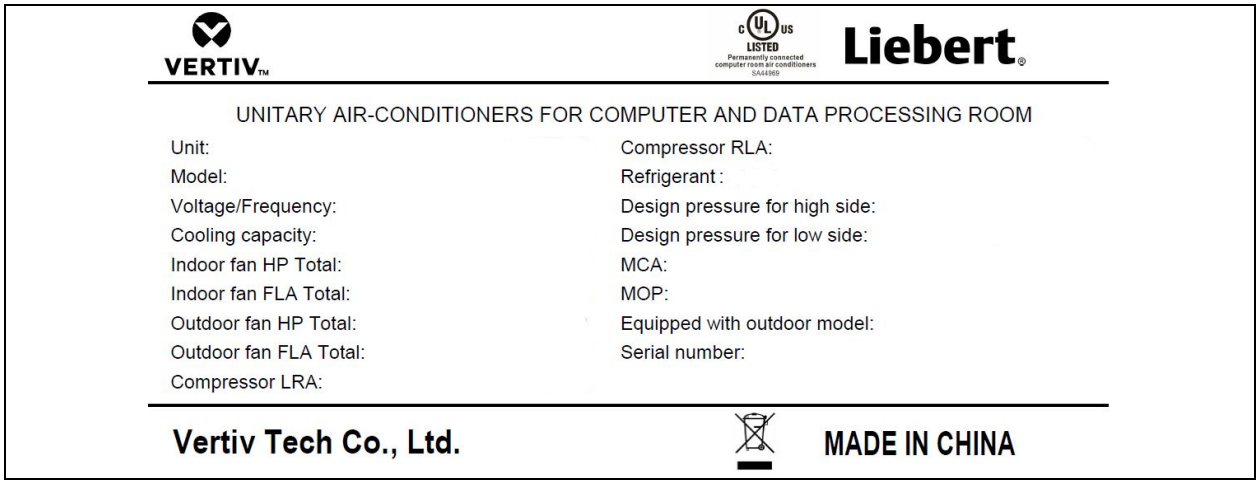
Model Number											
1	2	3	4	5	6	7	8	9	10	11	12
C	R	D	1	0	0	-	0	D	0	0	A

Table 2.2 CRD10 Model Number Digit Definitions

Digit	Variable	Description
1	C	CRD10 row-based cooling unit
2	R	
3	D	Air cooled
4	1	Model number
5	0	
6	0, 1, 2	0: 208 V / 230 V, 1 Ph, 60 Hz, UL 1: 208 V / 230 V, 3 Ph, 60 Hz, UL 2: 230 V, 1 Ph, 50 Hz / 60 Hz, CE
7	-	Separator
8	0, 1	0: Cooling only 1: Reheat only
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 and Description (CE)



Notes to figure:

- Unit: Unit defined by 6 digits.
- Model: Model defined by 12 digits.
- Indoor fan HP Total: Indoor fan power in total.
- Indoor fan FLA Total: Indoor fan full load current in total.
- Outdoor fan HP Total: Outdoor fan power in total.
- Outdoor fan FLA Total: Outdoor fan full load current in total.
- Compressor LRA: Locked rotor current of compressor.
- Compressor RLA: Rated load current of compressor.
- Refrigerant: Refrigerant category and the amount of refrigerant charged on site.
- Design pressure for high side: discharge side excessive operating pressure.
- Design pressure for low side: suction side excessive operating pressure.
- MCA: Minimum circuit amps.
- MOP: Maximum overcurrent protection.

Figure 2.2 Name Plate and Description (CE/UKCA)

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UNITARY AIR-CONDITIONERS FOR COMPUTER AND DATA PROCESSING ROOM

UNIT:	MODEL:	WEIGHT NET/GROSS:
POWER:		MAX ALLOWABLE PRESSURE:
REFRIGERANT:	GWP:	DISCHARGE SIDE EXCESSIVE OPERATING PRESSURE:
REFRIGERANT CHARGE:		SUCTION SIDE EXCESSIVE OPERATING PRESSURE:
CO2 Tonnes:		HEAT EXCHANGER MAX WORKING PRESSURE:
FULL LOAD CURRENT:		CLASS OF EQUIPMENT:
HEATER TYPE AND POWER:		MANUFACTURING DATE:
SCCR(Short-Circuit Current Rating):		SERIAL NUMBER:

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Notes to figure:

- UNIT: Unit defined by 6 digits.
- MODEL: Model defined by 12 digits.
- REFRIGERANT: Refrigerant category.
- REFRIGERANT CHARGE: Amount of refrigerant charged on site.
- GWP: Global warming potential.

Figure 2.3 Rear View of Components and Locations

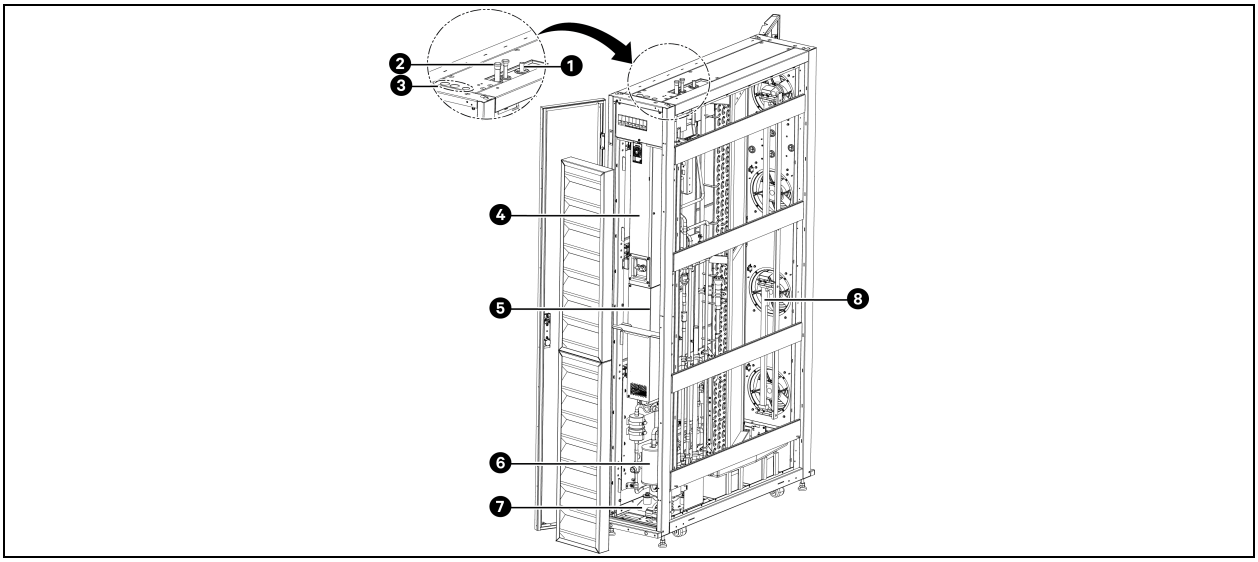
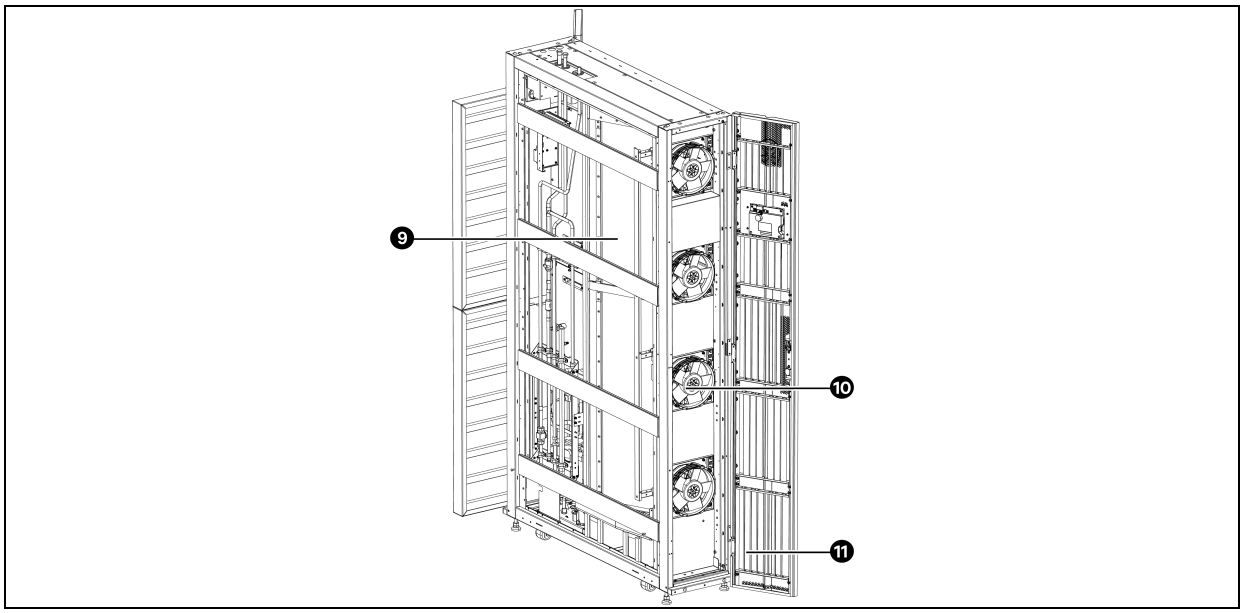


Figure 2.4 Front View of Components and Locations



Item	Description	Item	Description
1	Pump drainage pipe	7	Condensate pump
2	Discharge and suction pipe	8	Electric heaters (for CE/UKCA model)
3	Electrical access locations on top plate	9	Evaporate coil
4	Electric box	10	EC fans
5	Compressor driver	11	Baffles
6	Compressor		

2.3 Technical Specifications

Table 2.3 Technical Specifications

Parameters	Specifications		
Unit	CRD100	CRD101	CRD102
Model	CRD100-0D00A	CRD101-0D00A	CRD102-1D00B
Certification	UL		CE/UKCA
Cooling type	Air cooled		
Cold source type	DX		
Refrigerant	R410A		
Compressor type	Twin rotary DC inverter compressor		
Flow control	Electronic expansion valve		
Fan type	EC fan		

Table 2.3 Technical Specifications (continued)

Parameters	Specifications	
Air filter	MERV8	G4
Air discharge baffles	Standard	
Drain pump	Standard	
Filter clogged switch	Standard	
Unity card	Standard	
Remote temperature sensors	Standard	
Reheat	None	Standard
Outdoor model	CCD100S-00A	CCD101S-00B

2.4 Performance Data

Table 2.4 Performance Data

Certification	UL		CE/UKCA
Unit	CRD100	CRD101	CRD102
Model	CRD100-0D00A	CRD101-0D00A	CRD102-1D00B
Voltage/Frequency	208 V / 230 V, 1 Ph, 60 Hz	208 V / 230 V, 3 Ph, 60 Hz	230 V, 1 Ph, 50 Hz / 60 Hz
Rated cooling capacity (kW)	10.0	10.0	10.0
Heating capacity (kW)	-	-	2.0
Minimum cooling capacity(kW)	2.0	2.0	2.0
Power input (kW)	3.2	3.2	3.2 (without electric heater)
Full load current (A)	-	-	38 (with electric heater) 28 (without electric heater)
MCA (A)	29	21	-
MOP (A)	40	30	-
Test condition: • Return air: 29.4 °C (85 °F), 32% RH • Outdoor temperature: 35 °C (95 °F)			

NOTE: The allowed thermal load should not be lower than the minimum cooling capacity. Lower thermal load will cause imprecise temperature and humidity control and frequent compressor(s) switch on/off.

Table 2.5 Performance Data of AHRI

Model Number	CRD100-0D00A		CRD101-0D00A	
Voltage (Volts/Phase/Hz)	208/1/60	230/1/60	208/3/60	230/3/60
Net total cooling capacity kW (kBtu/h)	10.0 (34.1)	9.98 (34.0)	10.32 (35.2)	10.41 (35.5)
Net sensible cooling capacity kW (kBtu/h)	9.92 (33.8)	9.96 (33.9)	10.08 (34.4)	10.12 (34.5)
Net sensible coefficient of performance (NSenCOP) kW/kW	3.57	3.62	3.69	3.71
Unit airflow (ACFM)	1960	1961	1897	1898
Unit airflow (SCFM)	1896	1887	1835	1836
External static pressure (Pa)	0.0		0.0	
Humidification	None		None	
Refrigerant	R-410A		R-410A	
Return air condition: 95 °F DB, 52 °F DP (35 °C DB, 11.1 °C DP) 32% RH				
Outdoor ambient temperature: 95 °F (35 °C)				
Certified in accordance with the AHRI Datacom Cooling Certification Program at AHRI Standard 1360 Standard Rating Conditions. Certified units may be found in the AHRI Directory at www.ahridirectory.org.				

2.5 Sound Data

Table 2.6 Sound Data (50 dB to 630 dB)

1/3 Octave Band Center Freq (Hz)	Air (m^3/h)	volume (SCFM)	50 dB	63 dB	80 dB	100 dB	125 dB	160 dB	200 dB	250 dB	315 dB	400 dB	500 dB	630 dB
IDFAN 75%	3250	1913	28.6	25.4	33.8	33.7	32.3	40.2	42.7	46.4	52.9	68.3	67.3	58.0
IDFAN 70%	3000	1766	29.1	24.5	34.7	31.2	30.9	38.2	40.5	45.2	53.6	64.4	58.9	56.2
IDFAN 60%	2500	1471	24.8	26.8	28.9	28.9	30.9	33.9	39.3	45	59.3	59.5	53.2	59.4

Table 2.7 Sound Data (800 dB to 10000 dB)

1/3 Octave Band Center Freq (Hz)	Air (m^3h)	volume (SCFM)	800 dB	1000 dB	1250 dB	1600 dB	2000 dB	2500 dB	3150 dB	4000 dB	5000 dB	6300 dB	8000 dB	10000 dB	dB (A)
IDFAN 75%	3250	1913	63	63.1	67.8	65.7	65.4	66.4	63.7	61.8	59.8	57.4	55.2	49.4	73.3
IDFAN 70%	3000	1766	62.1	58.7	64.4	64.4	63.6	64.1	61.5	60.1	57.8	55.2	52.6	47.2	70.1
IDFAN 60%	2500	1471	60	59.2	59.7	60.4	59	59.7	57.4	55.4	53.1	50.1	47.1	42.3	67.1

NOTE: The sound is tested in free-field condition, 2 m (6.6 ft) away from the unit and 1 m (3.3 ft) away from the ground.

2.6 Dimensions and Weights

Table 2.8 Dimensions and Weights

Model	Unit Dimension (W x D x H) mm (in.)	Shipping Dimensions (W x D x H) mm (in.)	Unit Weight kg (lb)	Shipping Weight kg (lb)
CRD100-0D00A	300 x 1132 x 2000 (11.8 x 44.6 x 78.7)	776 x 1276 x 2228 (30.6 x 50.2 x 87.7)	231 (509)	313 (690)
CRD101-0D00A				
CRD102-1D00B				

2.7 Accessories

Component	Quantity			Remark
	CRD100	CRD101	CRD102	
Remote temperature sensor (IRMS01T)	1	1	1	
CAN bus cable	10 m x 2	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	1	
Bracket for water underfloor sensor	1	1	1	
Cable for water underfloor sensor	4 m	4 m	4 m	For connecting the water underfloor sensor (board)
Bottom drainpipe assembly	0.8 m x 1	0.8 m x 1	0.8 m x 1	With brass drainage connector
Tie wrap	10	10	10	
Plastic cap	4	4	4	For covering the unused holes on the plate
M12 x 30 hexagon bolt	8	8	8	For fixing the cabinet

Component	Quantity			Remark
	CRD100	CRD101	CRD102	
M5 x 12 cross grooved countersunk head screw	5	5	5	
L-shaped baying bracket	8	8	8	
Cabinet guide rail (Ramp)	2	2	2	For removing the cabinet from the pallet
Solenoid valve	1	1	1	Liquid Line Solenoid Valve (LLSV)
Solenoid valve coil	1	1	1	
User manual	1	1	1	
Unit circuit diagram	-	-	1	
EU declaration of conformity	-	-	1	
UKCA declaration of conformity	-	-	1	
Safety statement	-	-	1	

3 Pre-installation Preparation

NOTE: Before installing unit, determine whether any building alterations are required to run piping, wiring and duct work. Follow all unit dimensional drawings and refer to the submittal engineering dimensional drawings of individual units for proper clearances.

3.1 Site Preparation

3.1.1 Equipment Room Requirements

The equipment room must meet the following requirements to reach desired ventilation and heating:

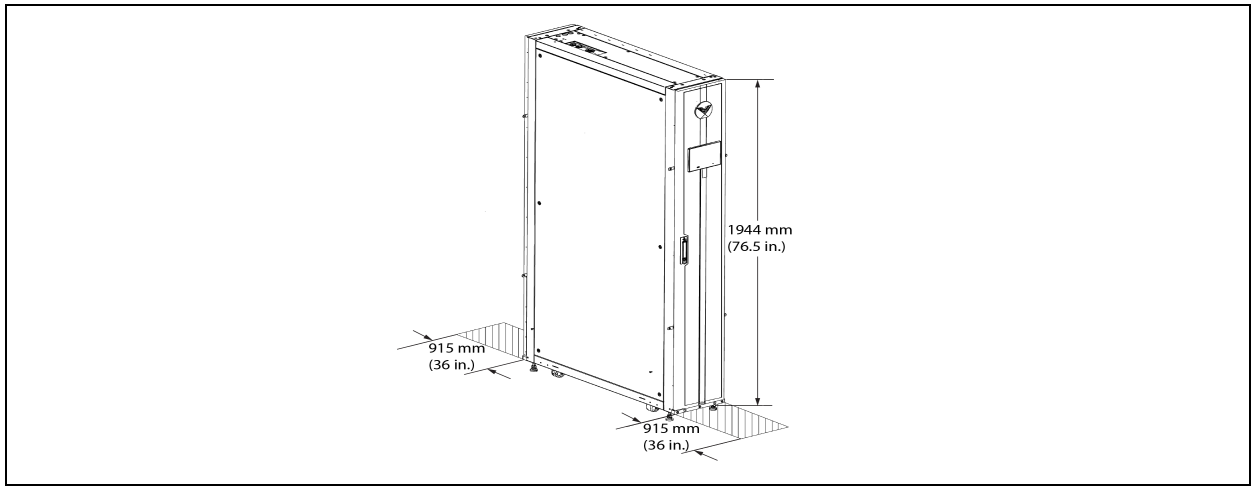
- The room is insulated and has a damp proof layer.
- The inhalation of outside air is kept below 5% of the total indoor airflow.

NOTE: The indoor unit cannot be used in an outdoor environment.

3.1.2 Installation Space Requirements

The unit should be installed in a row of cabinets with high heat density and in a hot aisle and cold aisle arrangement. A minimum space of 915 mm (36 in.) must be reserved at the front and rear of the unit for maintenance accessibility.

Figure 3.1 Maintenance Space



3.1.3 Operating and Storage Conditions

Table 3.1 Operating Conditions

Item	Requirement		
Ambient temperature	Indoor environment: • Temperature: 18 °C (64.4 °F) to 40 °C (104 °F) • Relative humidity 17% to 60% Outdoor environment: • Temperature: -15 °C (5 °F) to 45 °C (113 °F) without low ambient kit • Temperature: -34 °C (-29.2 °F) to 45 °C (113 °F) with low ambient kit		
Protection level	• Indoor unit: IP20 • Outdoor unit: IPX4		
Altitude	< 2000 m (6561.6 ft). If the altitude is above this value, please contact Vertiv.		
Operation voltage range	CRD100-0D00A	CRD101-0D00A	CRD102-1D00B
	208 V / 230 V, 1 Ph, 60 Hz	208 V / 230 V, 3 Ph, 60 Hz	230 V, 1 Ph, 50 Hz / 60 Hz

Table 3.2 Storage Conditions

Item	Requirement
Storage environment	Indoor, clean (without dust)
Ambient humidity	< 95% RH at 30 °C (86 °F)
Ambient temperature	-40 °C (-40 °F) to 70 °C (158 °F)
Storage time	Total transportation and storage time should not exceed six months. Otherwise, the performance needs to be re-calibrated.

3.2 Installation Tools

Table 3.3 below shows the standard tool sets used in the installation and maintenance process. These tools are for reference and may vary with on-site scenario.

Table 3.3 Standard Tool Sets

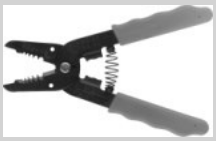
Name	Drawing	Name	Drawing
Electric hand drill		Adjustable wrench	
Slotted screwdriver		Cross head screwdriver	
Stepladder		Forklift	
Drill		Wire cutting pliers	
Claw hammer		Diagonal cutting pliers	
Insulating shoes		Antistatic gloves	
Electrician knife		Cable ties	
Insulating tape		Insulating gloves	

Table 3.3 Standard Tool Sets (continued)

Name	Drawing	Name	Drawing
Crimping pliers		Heat shrinkable tube	
Insulated torque wrench		Torque screwdriver	
Multimeter		Clip-on ammeter	

Table 3.4 Fasteners

Fasteners	Usage
Floating nut	Used together with the M6 screw, to install the parts in the cabinet.
M5 countersunk head screw	Used to install the cabinet connector.
M6 panel screw	Used to install the power distribution unit, monitoring system, and user equipment.
M6 pan head screw	Used to connect and fix the frame.
M6 flange nut	Used together with the M6 pan head screw, to install the L fastener.
Adhesive tape	Used to seal the gap between the connected frames.
Cable tie fixture kit	Used to fix and bind the cables.

3.3 Moving and Unpacking the Unit

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.

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.

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

NOTICE

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

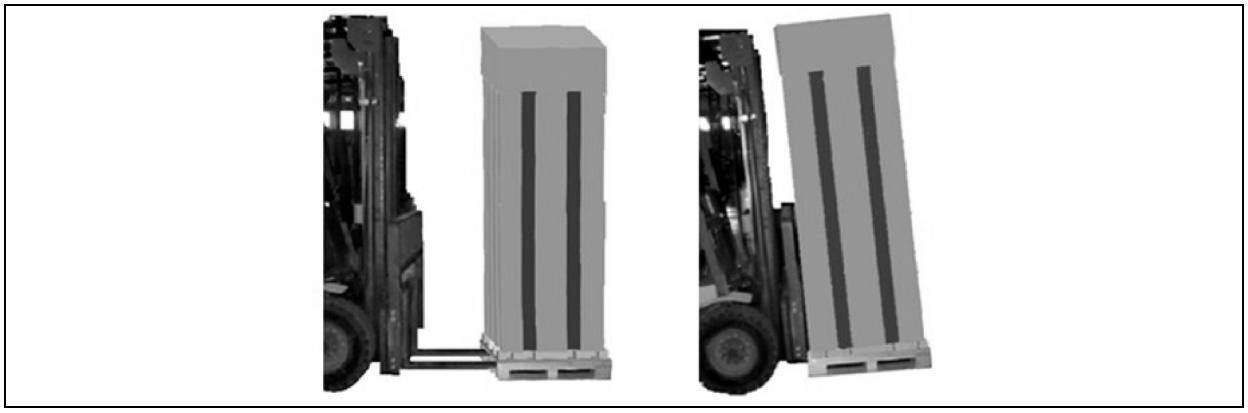
NOTICE

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

3.3.1 Moving the Unit

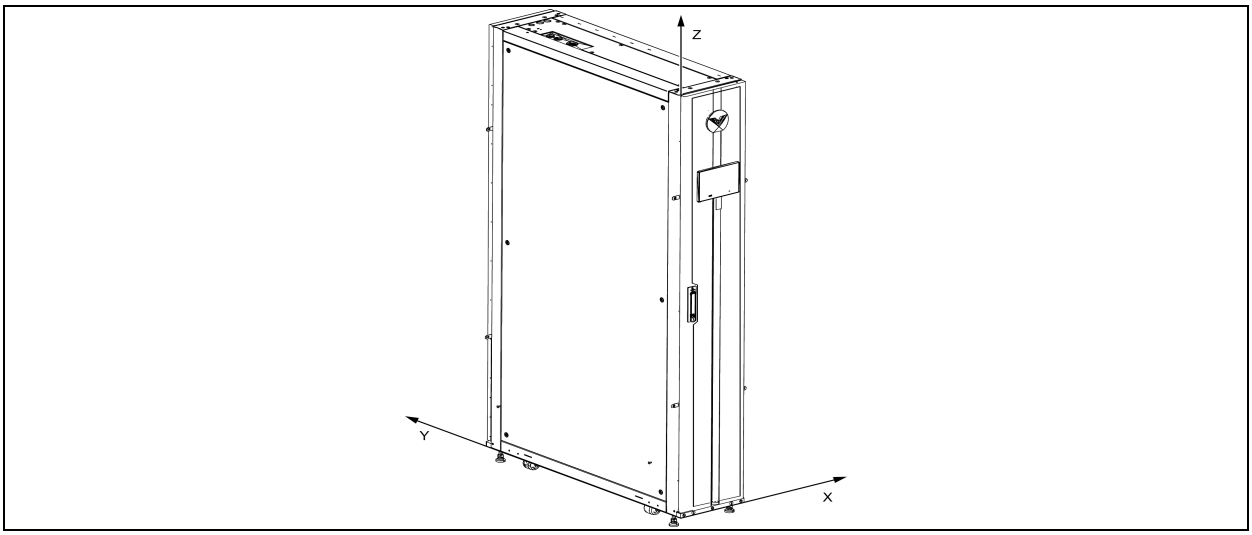
It is recommended to use mechanical equipment like forklift to move the unit to the location nearest to the installation site. Insert the tines of the forklift under the pallet, as shown in Figure 3.2 below .

Figure 3.2 Moving the Unit Using a Forklift



When moving the packaged unit, align the fork arms with the unit center of gravity and do not tilt the unit more than 20 degrees in any direction to prevent the unit from falling over.

Figure 3.3 Axis of Coordinates

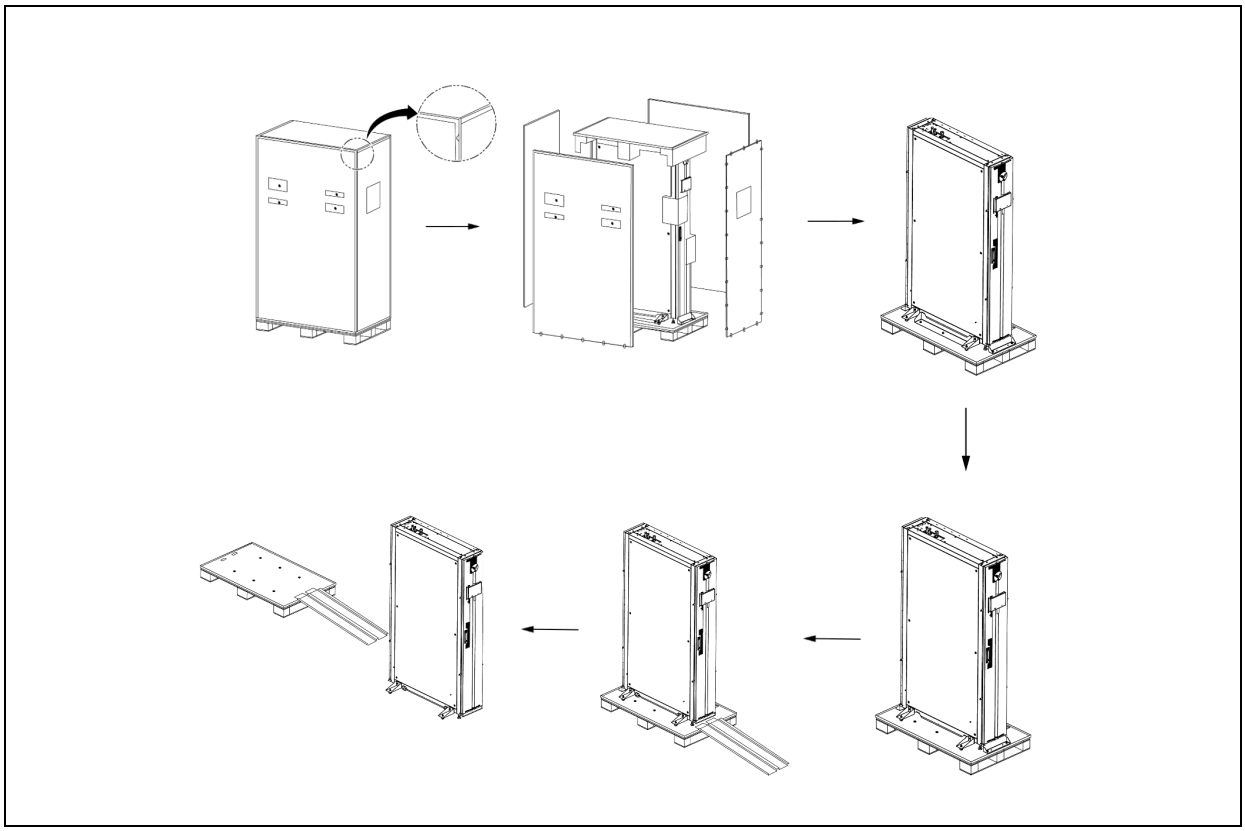


Center of Gravity ± 10 mm (0.4 in.)		
X Axis mm (in.)	Y Axis mm (in.)	Z Axis mm (in.)
150 (5.9)	550 (21.7)	970 (38.2)

3.3.2 Unpacking 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 starch 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.
4. Remove the screws that secure the shipping brackets to the pallet. Then remove the shipping brackets from the front, rear, and side of the unit.
5. Remove the screws that secure the fixing plates to the pallet. Then remove the fixing plates.
6. Fit the tab on each ramp into a hole on the pallet.
7. 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.
8. Move the unit to its installation location using the built-in roasters.

Figure 3.4 Unpacking the Unit

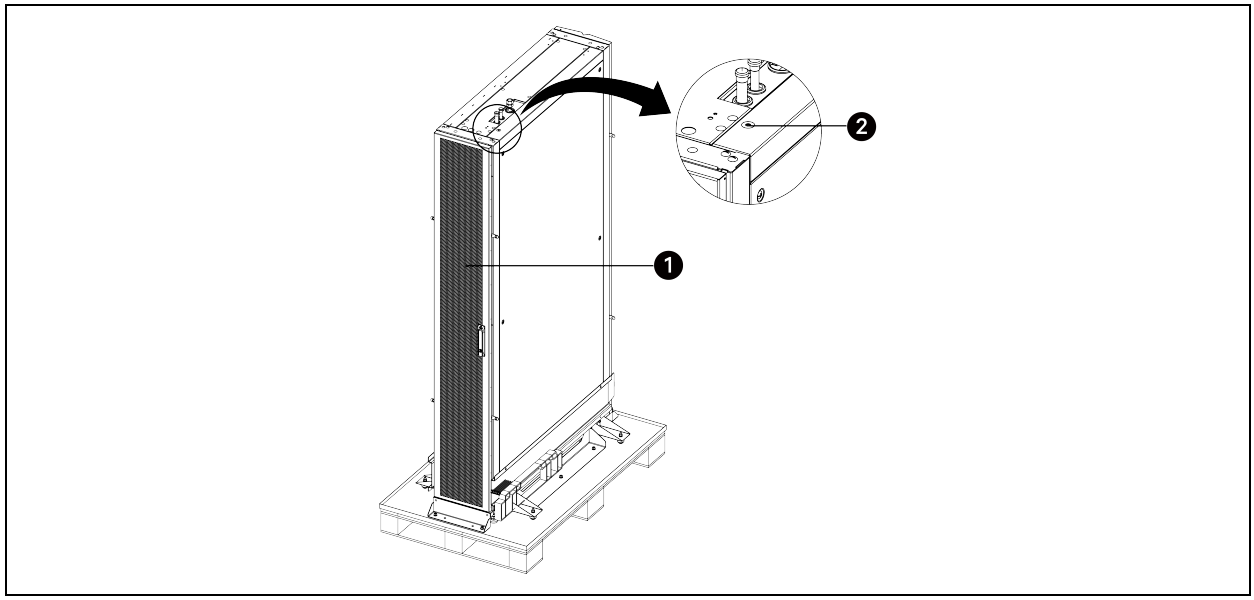


NOTE: Check the unit against the packing list. If any parts are missing or damaged, immediately report to the carrier and the local office of Vertiv.

3.4 Location of the Main Grounding Point

The main grounding point is located on the top panel, as shown in Figure 3.5 below .

Figure 3.5 Location of the Main Grounding Point



Item	Description
1	Rear door
2	Main grounding point

4 Mechanical Installation

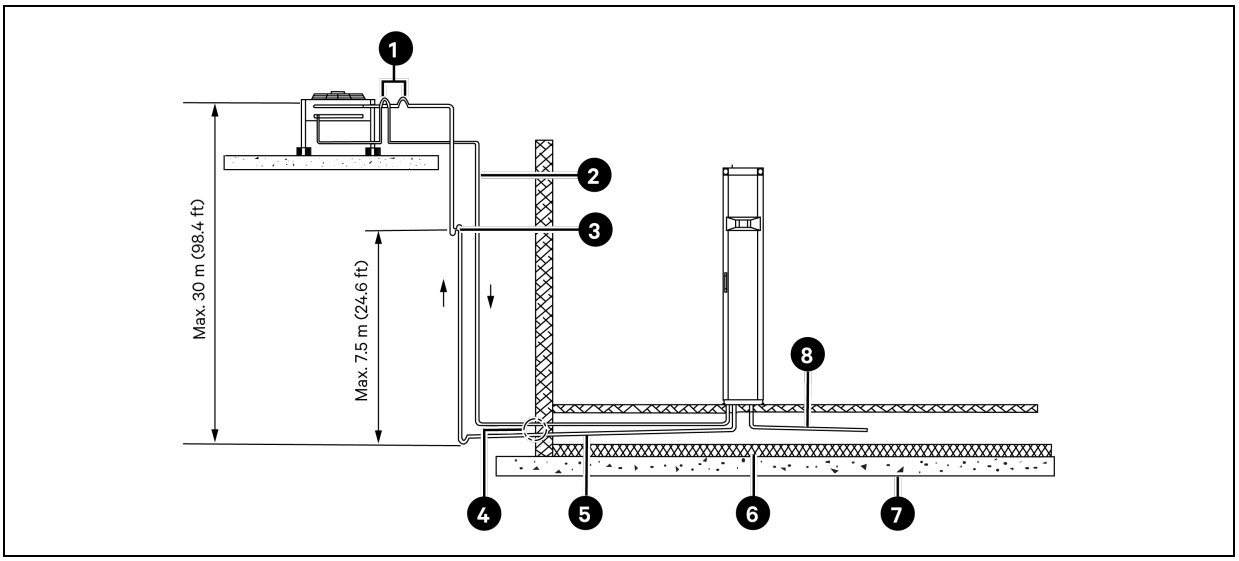
4.1 Installation Notes

- Check if any modifications are made to the plumbing, wiring, or ventilation facility before installing the unit.
- Install the unit on the floor of equipment room or computer room.
- Follow industry standards when selecting, laying out, and fixing the pipes.
- Taking into account pressure drop, compressor oil return, noise reduction, and vibration.

4.2 Installation Drawings

4.2.1 Layout of Indoor and Outdoor Units

Figure 4.1 Outdoor Unit Placed Higher than the Indoor Unit

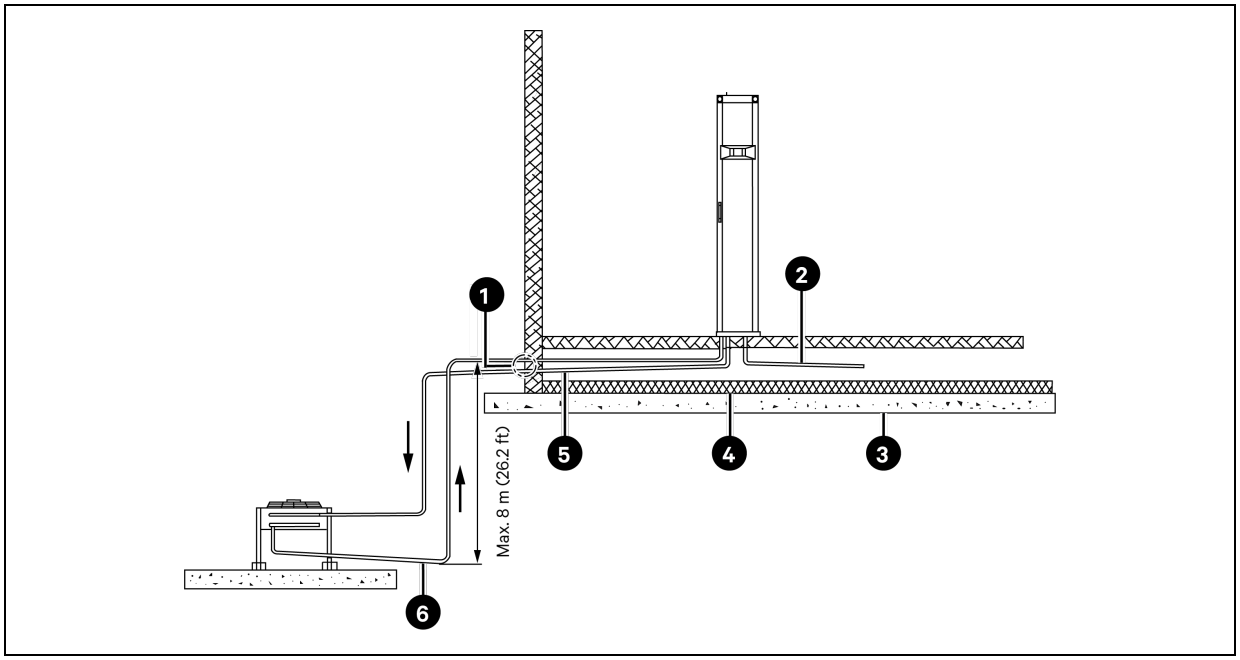


Item	Description
1	Inverted trap
2	Liquid pipe
3	Oil trap
4	The gap between the pipe and the wall needs to be sealed
5	Gas pipe with a slope
6	Heat insulation floor
7	Floor
8	Condensate water

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.

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

Figure 4.2 Outdoor Unit Placed Lower than the Indoor Unit



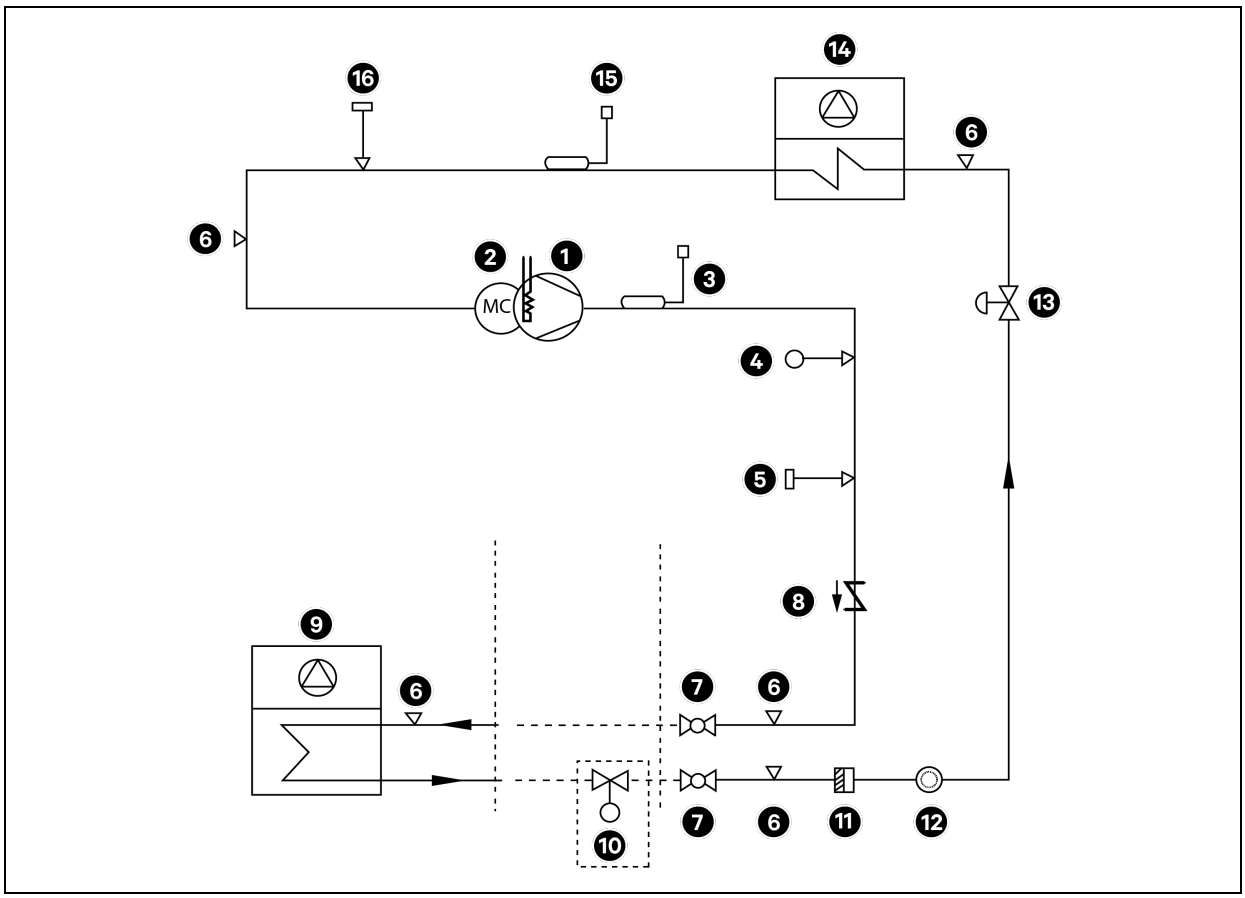
Item	Description
1	Gap between the pipe and the wall needs to be sealed
2	Condensate water
3	Floor
4	Heat insulation floor
5	Gas pipe with a slope
6	Liquid pipe with a slope

Table 4.1 Vertical Distance between the Outdoor Unit and the Indoor Unit

Positioning of the Outdoor Unit		Height						
Outdoor unit is higher than the Indoor unit.		Maximum: +30 m (98.4 ft)						
Outdoor unit is lower than the indoor unit.		Maximum: -8 m (-26.2 ft)						
Outdoor unit (with low ambient kit) is lower than the indoor unit.	Equivalent pipe length m (ft)	10 (33)	15 (49)	30 (99)	45 (147)	60 (197)	75 (246)	91 (300)
	Max. height m (ft)	-5 (-16)	-4.7 (-15)	-3.7 (-12)	-2.8 (-9)	-1.9 (-6)	-1 (-3)	0 (0)

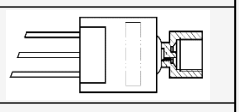
4.2.2 System Diagram

Figure 4.3 System Diagram



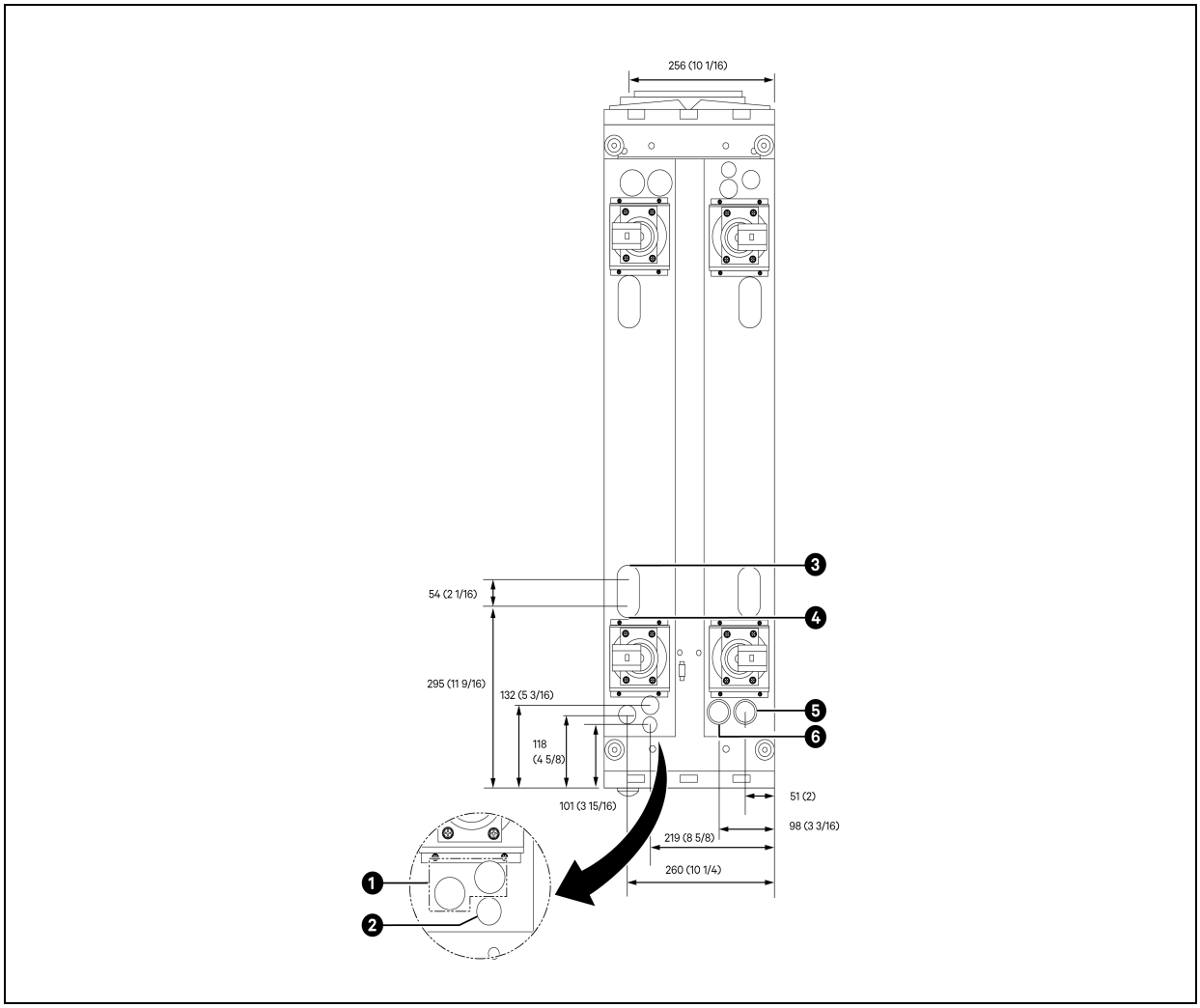
Item	Description	Item	Description
1	Compressor	9	Condenser
2	Crankcase heater	10	Solenoid valve (connected on site)
3	Discharge temperature sensor	11	Filter drier
4	High pressure switch	12	Sight glass
5	High pressure sensor	13	Electronic expansion valve
6	Schrader valve	14	Evaporating coil
7	Ball valve	15	Suction temperature sensor
8	Check valve	16	Low pressure sensor

Table 4.2 Safety Components

Refrigeration Circuit Item No.	Component	Setting	Notes	Contact
4	High pressure switch	Open: 4.1 ± 0.1 MPa Close: 3.3 ± 0.1 MPa		Normally closed
5	High pressure sensor	Range: 0 - 4.5 MPa (0.5 - 4.5 VDC)		-
16	Low pressure sensor	Range: 0 - 1.73 MPa (0.5 - 4.5 VDC)		-
-	Clogged filter differential pressure switch	Range: 50 - 400 Pa		Normally open

4.2.3 Pipe and Cable Access Locations and Dimensions

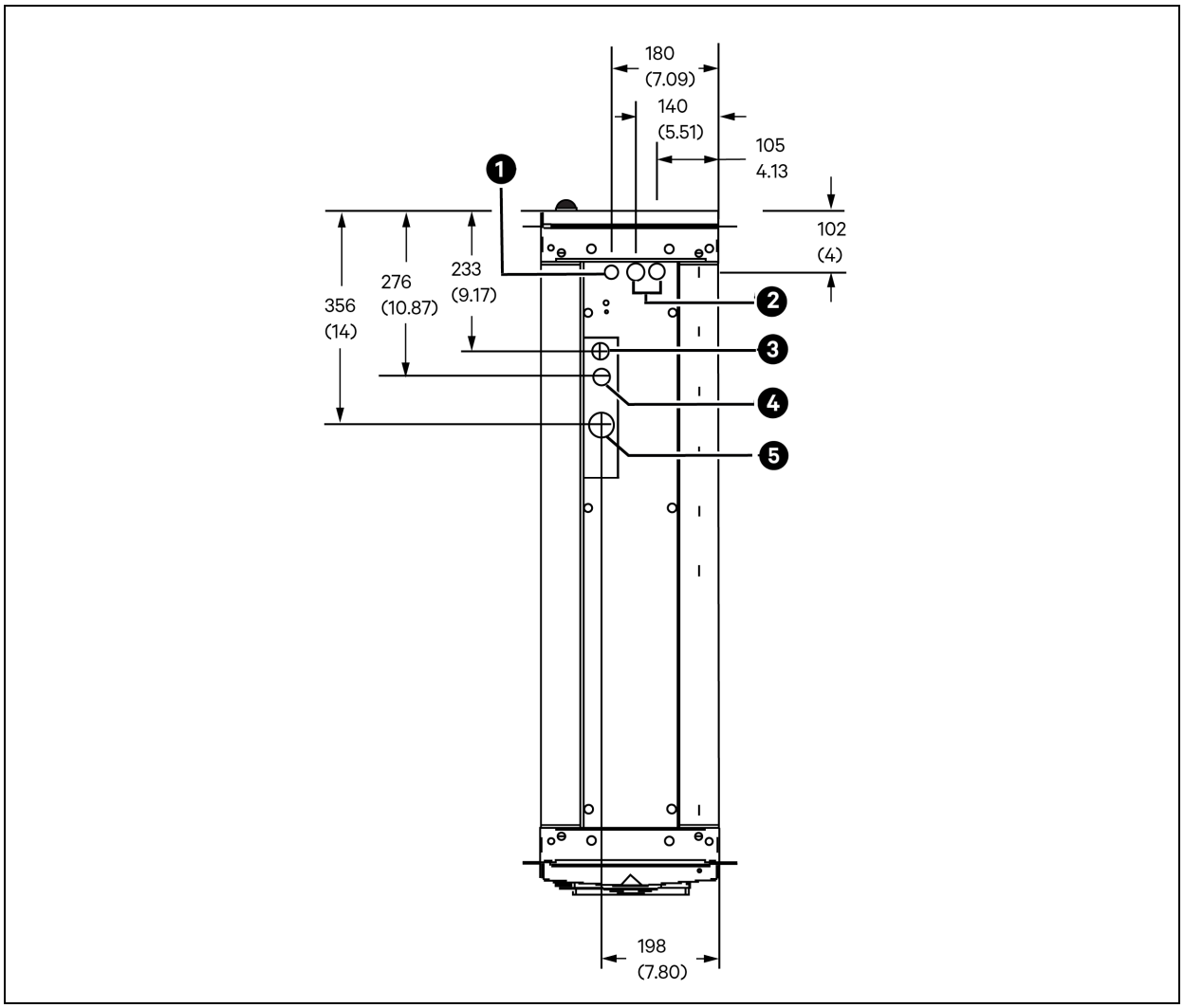
Figure 4.4 Pipe and Cable Access Locations and Dimensions on Base Plate



Item	Description		
1	HVT	High voltage cable access	Combination knockout: 29 mm (1-1/8 in.)
2	LVT	Low voltage cable access	Knockout hole diameter: 22 mm (7/8 in.)
3	RGT	Refrigerant gas line outlet	5/8 in. O.D. copper
4	RLT	Refrigerant liquid line inlet	1/2 in. O.D. Copper
5	CGT	Condensate gravity outlet	NPT 1/2 in. (Rc 1/2 in.) female copper threaded joint
6	CPT	Condensate pump outlet	NPT 1/2 in. (Rc 1/2 in.) female copper threaded joint
NOTE: All dimensions are mentioned in mm (in.).			

NOTE: NPT threaded joint is for UL model. Rc threaded joint is for CE/UKCA model.

Figure 4.5 Pipe and Cable Access Locations and Dimensions on Top Plate



Item	Description		
1	LVT	Low voltage cable access	Knockout hole diameter: 22 mm (7/8 in.)
2	HVT	High voltage cable access	Combination knockout: 29 mm (1-1/8 in.)
3	RGT	Refrigerant gas line outlet	5/8 in O.D. copper sweat
4	RLT	Refrigerant liquid line inlet	1/2 in. O.D. copper sweat
5	CPT	Condensate pump outlet	NPT 1/2 in. (Rc 1/2 in.) female copper threaded joint
NOTE: All dimensions are mentioned in mm (in.).			

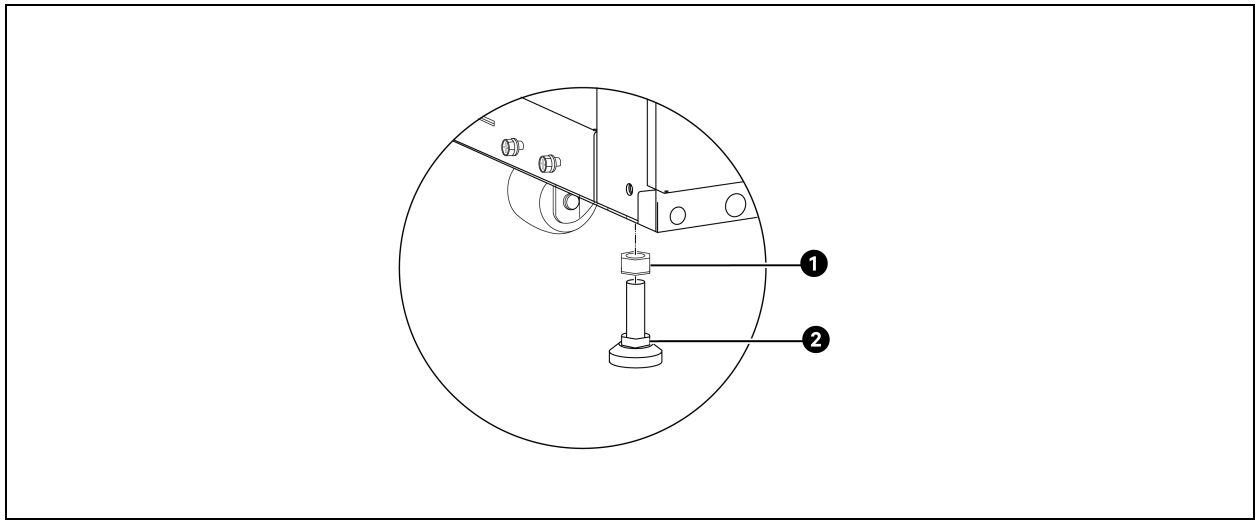
NOTE: NPT threaded joint is for UL model. Rc threaded joint is for CE/UKCA model.

4.3 Installation Procedures

4.3.1 Leveling the Cabinet

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 gradient measuring tool to ensure that the cabinet is level.
3. Tighten the fixing nut on each foot.

Figure 4.6 Leveling the Cabinet



Item	Description
1	Fixing nut
2	Hex bolt

4.3.2 Removing Leveling Feet and Fixing the Cabinet (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.

Removing Leveling Feet

Use an adjustable wrench to loosen the fixing nuts counter-clockwise. Rotate the hex bolt counter-clockwise until each foot drops from the unit.

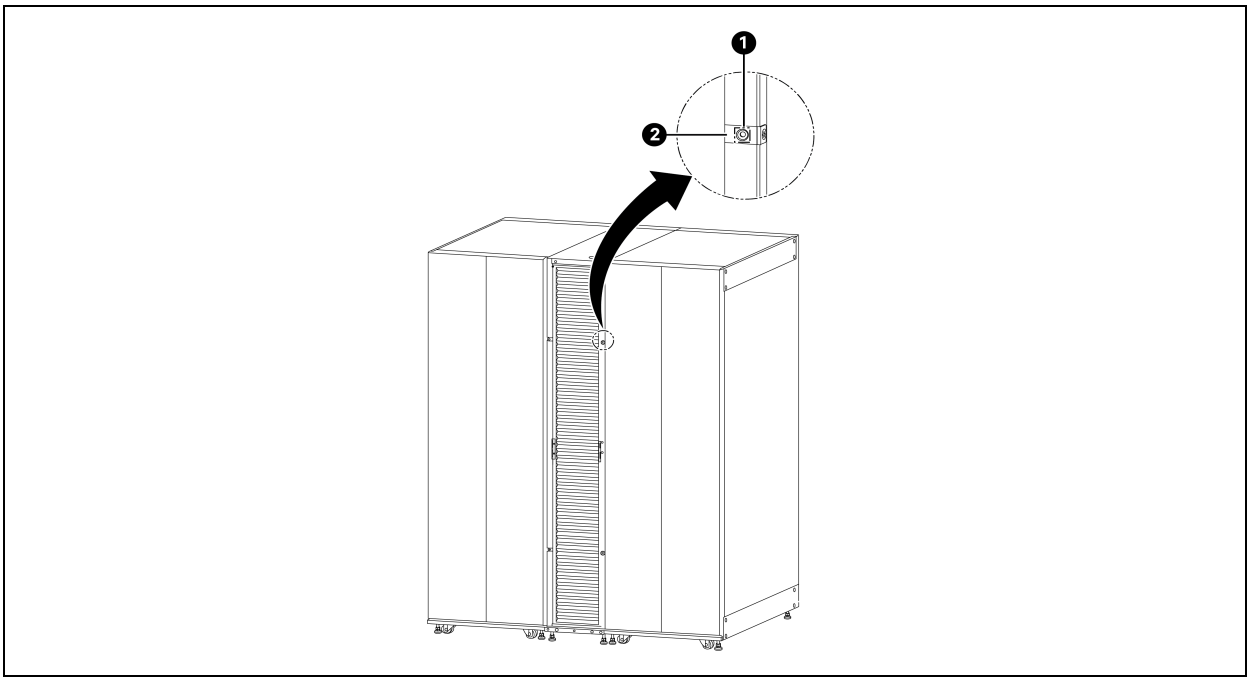
Fixing the Cabinet

The unit provides eight holes (diameter: 13.5 mm (0.5 in.)) on the top and bottom frames of the unit. Install M12 x 30 screws in the holes to fix the unit onto the roof or the floor brackets of the equipment room.

4.3.3 Baying the Cabinets

1. Unlock and open the front door.
2. Use M6 x 10 countersunk screws to secure the baying brackets into the installation holes of the cabinet frame (side of the hinge) and the rack frame adjacent to the cabinet. The baying brackets are included in the accessories.

Figure 4.7 Baying the Cabinets



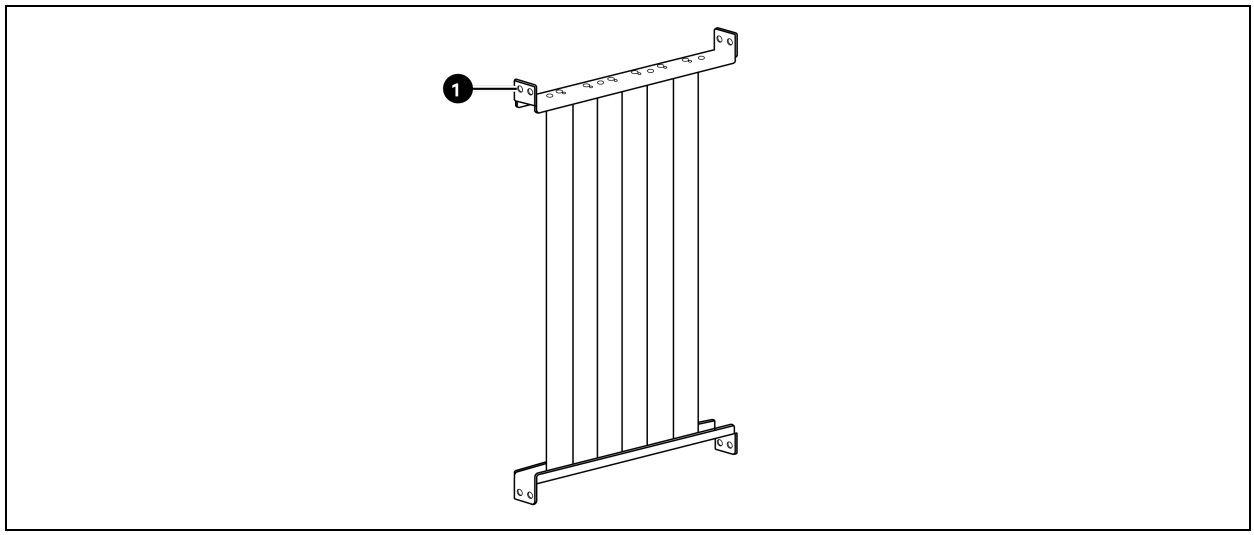
3. Repeat the above steps to Install the other three baying brackets.

Item	Description
1	M6 x 10 mounting screw
2	Baying bracket

4.3.4 Adjusting the Air Baffle

Adjust the direction of the supply air baffle to lead wind to the left or right if necessary. Remove the screws on both sides of the single piece of the supply air baffle, rotate it by 180 degrees, and install it back to change the wind direction. Figure 4.8 below shows the mounting screws of a single piece of the supply air baffle.

Figure 4.8 Fixed Air Baffle



Item	Description
1	M5 screw (8 pieces)

4.3.5 Connecting Pipelines

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.

NOTICE

On-site pipeline connection must comply with local regulations, such as ASHRAE 15, CSA B52 and local construction laws. It must be completed by qualified technician.

NOTICE

Before connecting pipelines, open the ball vales on the liquid line and gas line and release the nitrogen air from the needle valves.

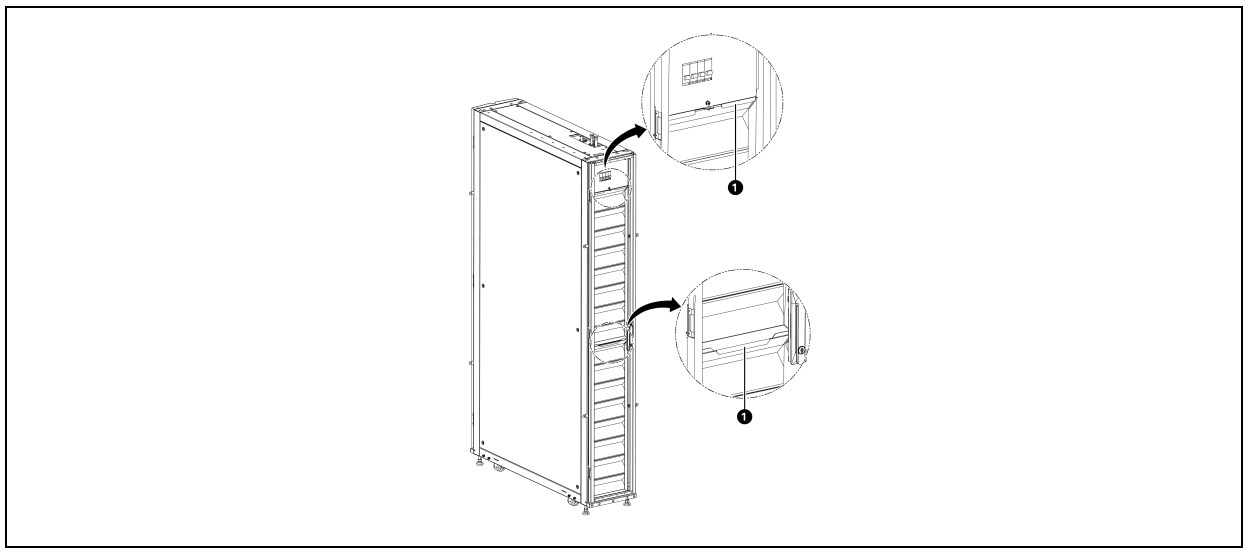
NOTICE

Pipeline welding can cause overheating of the pipeline and open flame. The installation environment must be free of combustible materials to avoid fire.

Removing Filters

1. Unlock the rear door and open the door.
2. Pull the handle of the fastening plate to remove the plate. Then remove the upper filter.
3. Remove the plate. Then remove the lower filter.

Figure 4.9 Removing the Filters



Item	Description
1	Fastening plate

Connecting the Condensate Drainage Pipe of the Indoor Unit

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

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 pipe.

Bottom Connection

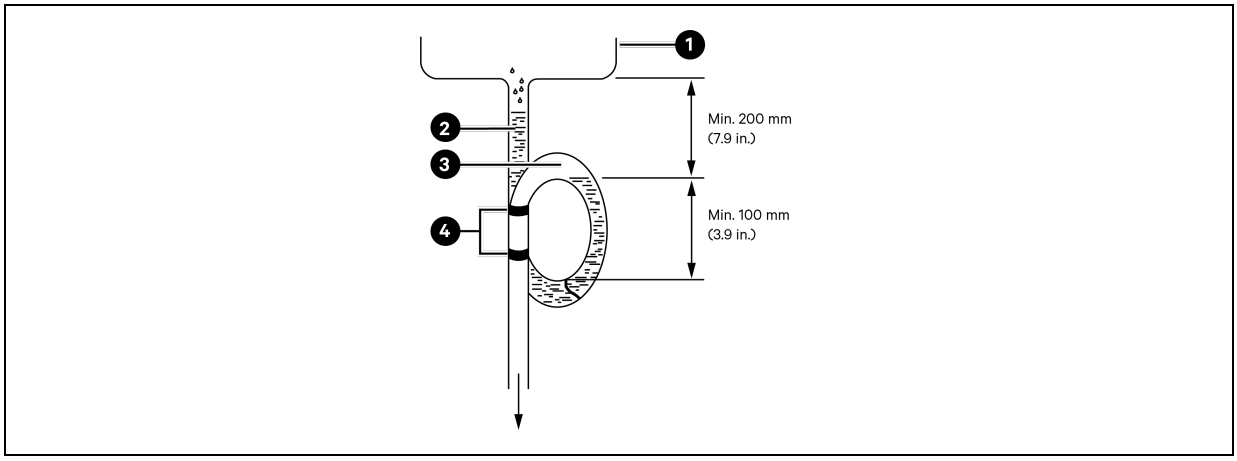
NOTE: To drain the condensate water from the bottom, it is recommended to use pump drainage as well. Otherwise you need to disable the pump drainage. To disable it, press the menu button on the HMI display, choose Maintenance > System Settings, and select No for Enable Condensate Pump.

1. A pipe has been pre-installed from the drain pan. Route the pipe through the condensate gravity outlet on the base plate. Wrap a drain trap under the drain pan.
2. Remove the soft pipe between the pump and the drainage copper pipe, use the extended soft pipe provided in the accessories and route the pipe through the condensate pump outlet on the base plate to your drainage system.

NOTE: The recommended maximum vertical rise of the pump lift is 5 m (16.4 ft). 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.

Figure 4.10 Draining the Condensate Water



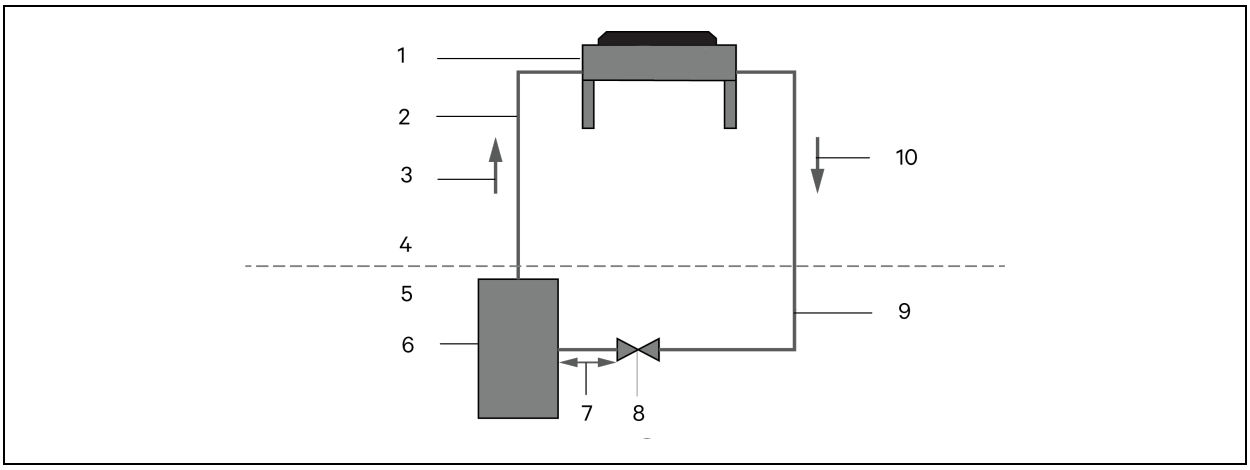
Item	Description
1	Drain pan
2	Filling water in the trap
3	Trap
4	Bracket: 2 pieces

Installing the Solenoid Valve

NOTE: It is recommended to install the solenoid valve horizontally. The valve body must be upward.

Install the solenoid valve on the liquid pipe, as close to the indoor unit as possible. The distance from the solenoid valve to the indoor unit pipe should not exceed 2 m (6.6 ft) The valve body and the coil of the solenoid valve are separated when the valve is shipped. Mount the valve body horizontally on the refrigerant pipe. Ensure that the arrow on the valve body points towards the indoor unit.

Figure 4.11 Pipe Dimensions and Installation Position of Solenoid Valve



Item	Description
1	Condenser
2	Gas pipe Diameter: • 16 mm (5/8 in.) if pipe length ≤ 40 m (131.2 ft) • 18 mm (3/4 in.) if 40 m (131.2 ft) < pipe length ≤ 91 m (300.0 ft)
3	Refrigerant flow direction
4	Outdoor
5	Indoor
6	CRD10 indoor unit
7	Max 2 m (6.6 ft)
8	Solenoid valve
9	Liquid pipe Diameter: • 12.7 mm (1/2 in.) if pipe length ≤ 40 m (131.2 ft) • 16 mm (5/8 in.) if 40 m (131.2 ft) < pipe length ≤ 91 m (300.0 ft)
10	Refrigerant flow direction

Connecting the Copper Pipes between the Indoor and Outdoor Units

The indoor and outdoor units are connected using type ACR copper pipes. Take into account the effect of pipe diameter on system pressure drop. For details, consult Vertiv technician.

Table 4.3 Recommended Refrigerant Pipe Sizes

Pipe Length L, m (ft.)	Discharge Pipe	Liquid Pipe
	External Diameter x Pipe Thickness mm (in.)	
0 < L≤ 40 (131.2)	16 (5/8) x 1 (0.04)	12.7 (1/2) x 1 (0.04)
40 (131.2) < L ≤ 91 (300.0)	18 (3/4) x 1 (0.04)	16 (5/8) x 1 (0.04)

NOTE: Pipe length = Actual length + Equivalent length of components

Table 4.4 Equivalent Length of Components

Liquid Pipe, External Diameter x Pipe Thickness mm (in.)	Equivalent Length m (ft)		
	90° Bend	45° Bend	T Type Three-Way
12.7 (1/2) x 1 (0.04)	0.5 (1.64)	0.25 (0.82)	0.76 (2.49)
16 (5/8) x 1 (0.04)	0.55 (1.8)	0.27 (0.88)	0.76 (2.49)
18 (3/4) x 1 (0.04)	0.6 (1.96)	0.3 (0.98)	0.76 (2.49)
22.2 (7/8) x 1.2 (0.05)	0.7 (2.29)	0.35 (1.14)	1.1 (3.6)

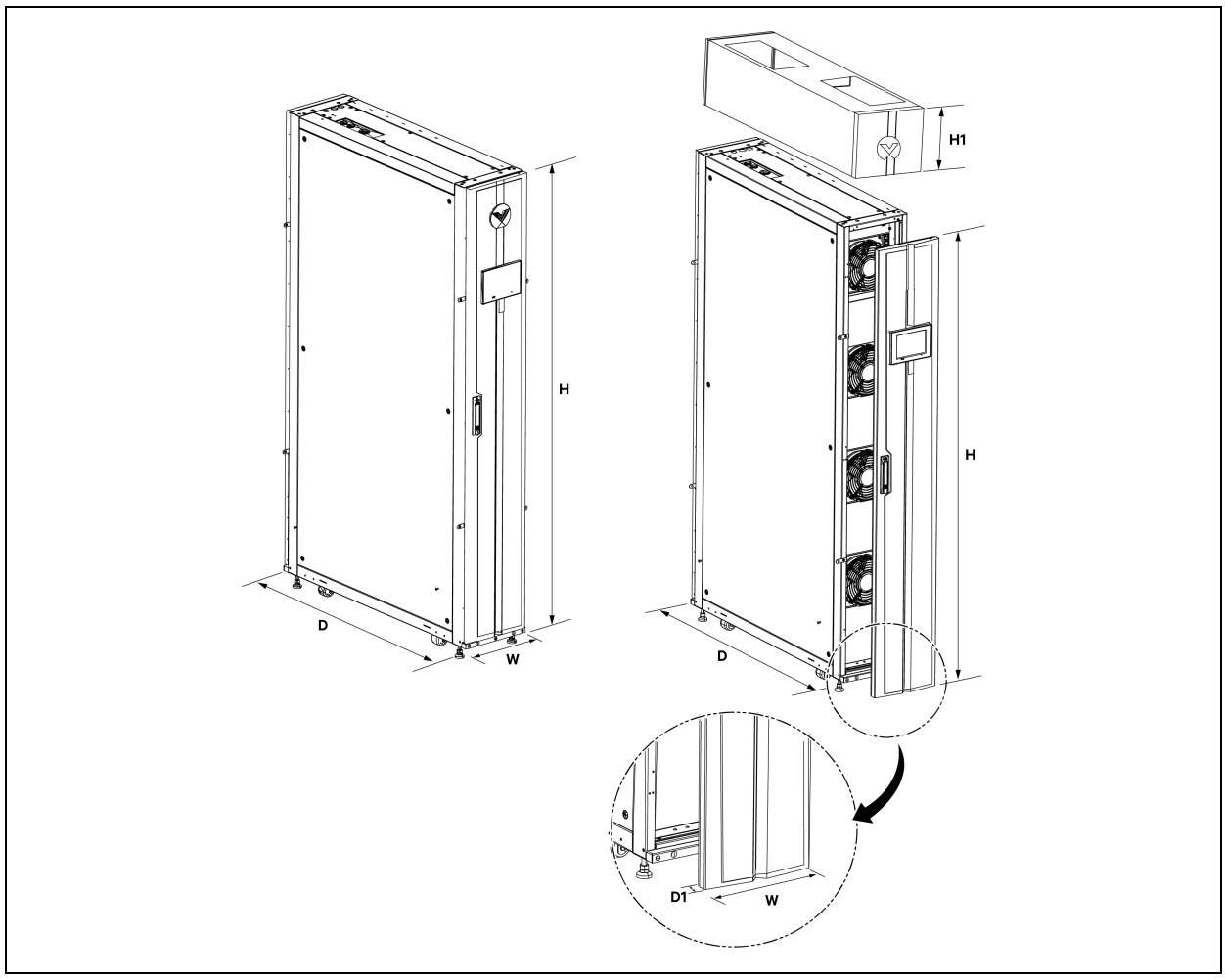
Note the following during the piping process:

- The horizontal sections of the gas pipe must be tilted downwards from the compressor with a slope of at least 1:200 (5 mm down for every 1m run). The gas pipe must be insulated from heat.
- Cut the copper pipe (a little bit of the compressor lubricating oil may leak). Do not braze-weld the copper cap on the seal directly, as this may heat the oil and cause fire.
- All the joints of the refrigerating pipes must be silver-brazed. Do not expose the pipes for more than 15 minutes. Otherwise, the PVE refrigeration oil will absorb moisture from air and contaminate the refrigerant. This may affect the life of key components and the stability of the unit.
- Use a flow of dry nitrogen through the pipeline during brazing to prevent formation of copper oxide scale inside the piping. When copper is heated in the presence of air, copper oxide forms. PVE oils will dissolve these oxides from inside the copper pipes and deposit them throughout the system, clogging filter driers and affecting other system components.
- A pure dry nitrogen flow of 1-3 ft^3/min (0.5-1.5 l/s) inside the pipe during brazing is sufficient to displace the air. Control the flow using a suitable measuring device.

NOTE: After all the pipelines are connected, use plastic caps to cover the unused holes on the top and bottom plates.

4.3.6 Installing the Top Frame and the Front Frame (Optional)

Figure 4.12 Dimensions of the Top Frame and the Front Frame



H mm (in.)	H1 mm (in.)	D mm (in.)	D1 mm (in.)	W mm (in.)
2000 (78.7)	267 (10.5)	1132 (44.6)	100 (3.9)	300 (11.8)

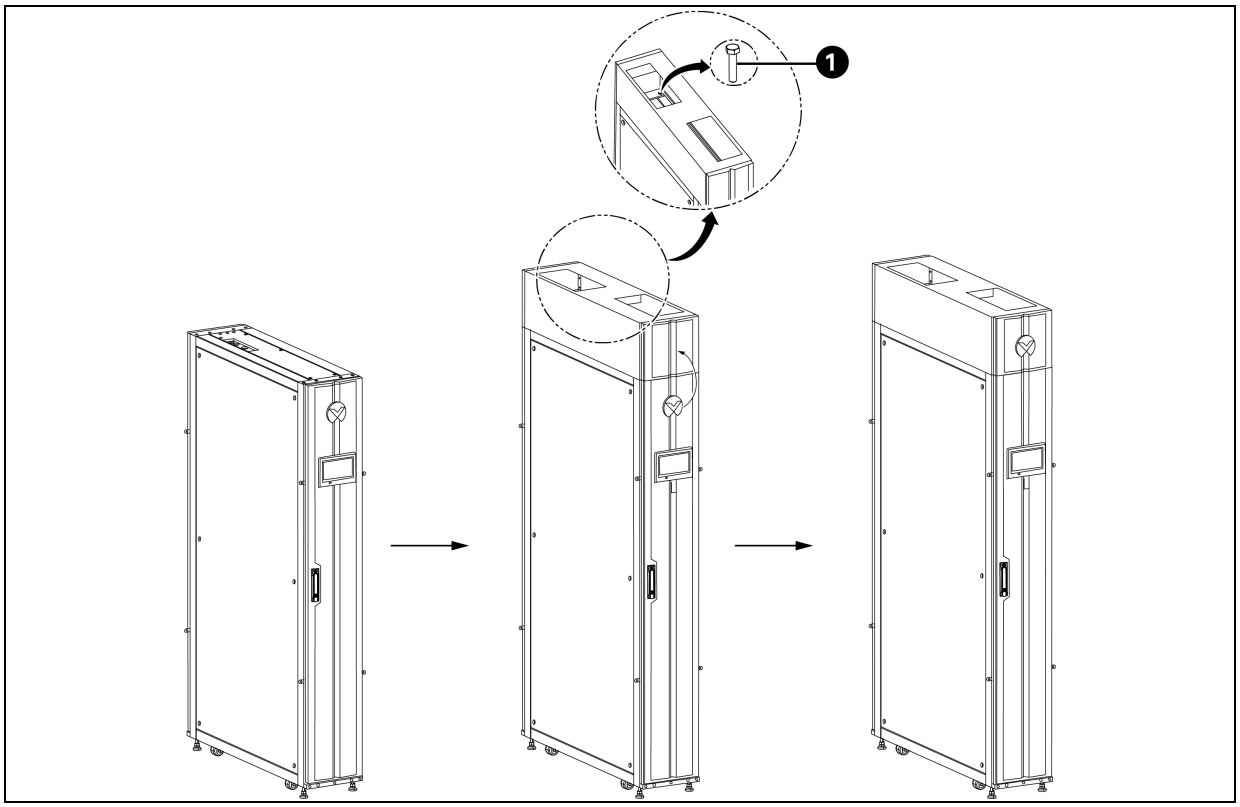
Installing the Top Frame without the Front Frame

To install a 267 mm × 1132 mm (10.5 in. × 44.6 in.) top frame, you do not need to install a front frame with it.

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

NOTE: Four M12 x 30 screws are included in the top frame accessory.

Figure 4.13 Installing the Top Frame without the Front Frame



Item	Description
1	M12 x 30 screws

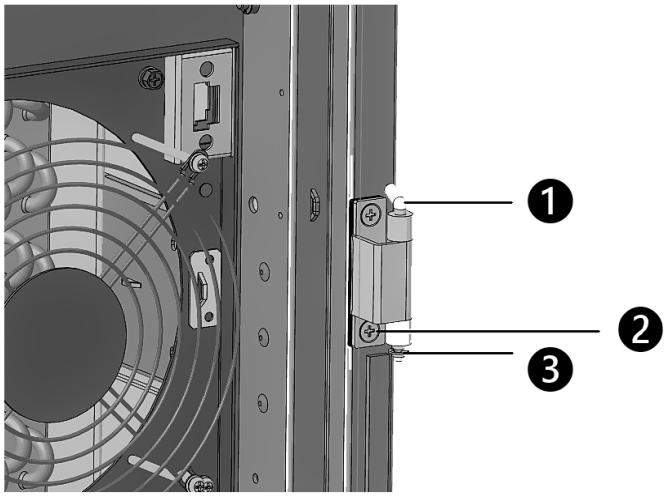
NOTE: After the top frame is installed, use plastic caps to cover the unused holes on the top plate.

Installing the Top Frame with the Front Frame

To install a 267 mm × 1232 mm (10.5 in. × 48.5 in.) top frame, you need to install a front frame with it.

1. Open the front door, 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 4.14 Removal fo Front Door

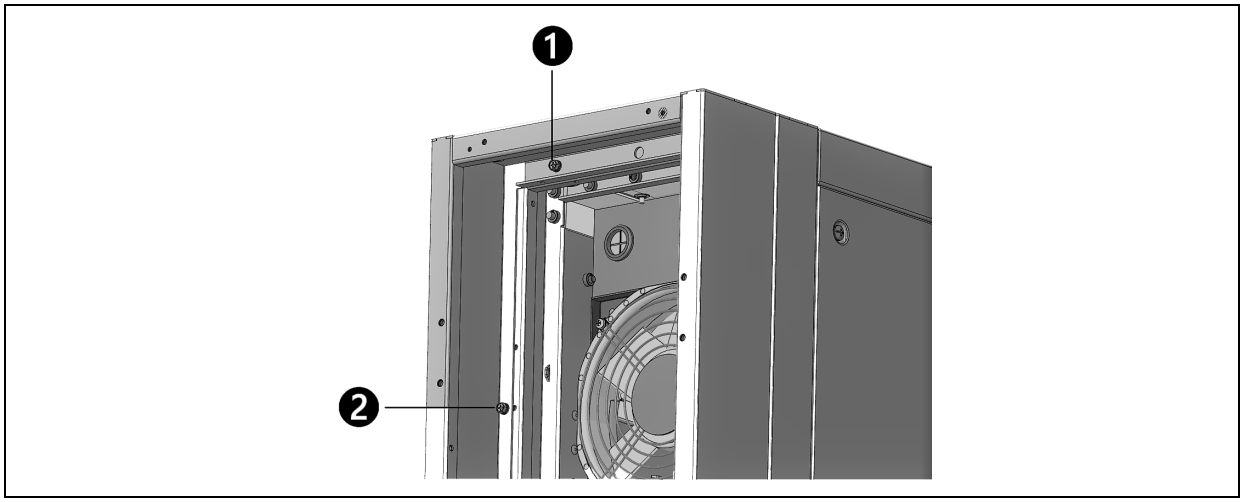


Item	Description
1	Pin
2	M6 Philips head screw
3	Circlip

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).

NOTE: Ten M5 x 12 screws are included in the front frame accessory.

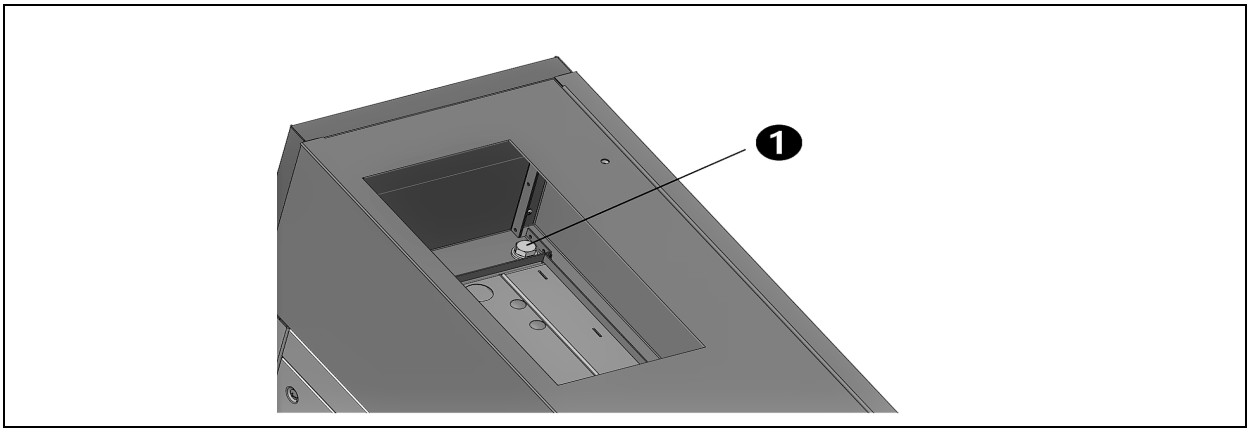
Figure 4.15 Installation of Front Frame



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 4.16 Installation of Top Frame



Item	Description
1	M12 × 30 screw

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.

4.4 Checklist for Mechanical Installation

Table 4.5 Mechanical Installation Checklist

Item	Result
Sufficient space is kept for maintenance.	
The equipment is placed vertically and mounting fasteners are fastened.	
The piping between the indoor unit and outdoor unit is completed. The ball valves of the indoor unit and outdoor unit are fully opened.	
The wind direction of the wind-leading grill has been adjusted (if required).	
Drainage pipe is connected.	
All pipe connectors are tight.	
The fasteners used for transportation have been removed.	
Foreign materials (such as shipping materials, construction materials, tools, etc.) in and around the equipment have been removed.	

5 Electrical Connection

A port of greater than a 350 short-circuit-ratio is required between the user power and the grid. Permission is required from the power supply department to ensure that the air conditioner is connected to a power greater than 350 short-circuit-ratio.

NOTE: This 350 short-circuit-ratio requirement is only for the CE/UKCA model and does not include the UL model.

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 unit's 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 improper wire sizing/rating and loose electrical connections. Can cause overheated wire and electrical connection terminals resulting in smoke, fire, equipment and building damage, injury or death. Use correctly sized copper wire only and verify that all electrical connections are tight before turning power On. Check all electrical connections periodically and tighten as necessary.

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage. Prior to connecting any equipment to a main or alternate power source (for example back-up generator systems) for start-up, commissioning, testing, or normal operation, ensure that these sources are correctly adjusted to the nameplate voltage and frequency of all equipment to be connected. In general, power-source voltages should be stabilized and regulated to within ±10% of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

5.1 Installation Notes

1. Electrical connection and maintenance must be carried out by authorized personnel or trained engineers.
2. The connection of all power cables, control cables, and ground cables and cable sizes should be in compliance with local and national electrical protocols and rules.
3. Observe the unit nameplate for the full load current.

Model	Power Supply
CRD100-0D00A	208 V / 230 V, 1 Ph, 60 Hz
CRD101-0D00A	208 V / 230 V, 3 Ph, 60 Hz
CRD102-1D00B	230 V, 1 Ph, 50 Hz / 60 Hz

4. If the power cable is damaged, it must be replaced immediately.

5. Before electrical connection, a voltmeter must be used to measure the voltage and ensure that power supply is switched off.
6. The unit power grid adheres to the TN or TT star connection power distribution system.
7. A disconnector switch should be installed. The Short-Circuit Current Rating (SCCR) of the unit is 6 kA (CE Model) and 10 kA (UL Model).

5.2 Connecting Power Supply Cables

5.2.1 Electrical Control Box

The location of dual power supply circuit breakers, outdoor breaker, and terminal blocks are shown in Figure 5.1 below .

Dual power supply enables that when one power supply fails, another power supply automatically takes over. When the failed power supply restores, it will automatically resume its function as the primary power supply.

Figure 5.1 Electrical Control Box (Single Phase Unit)

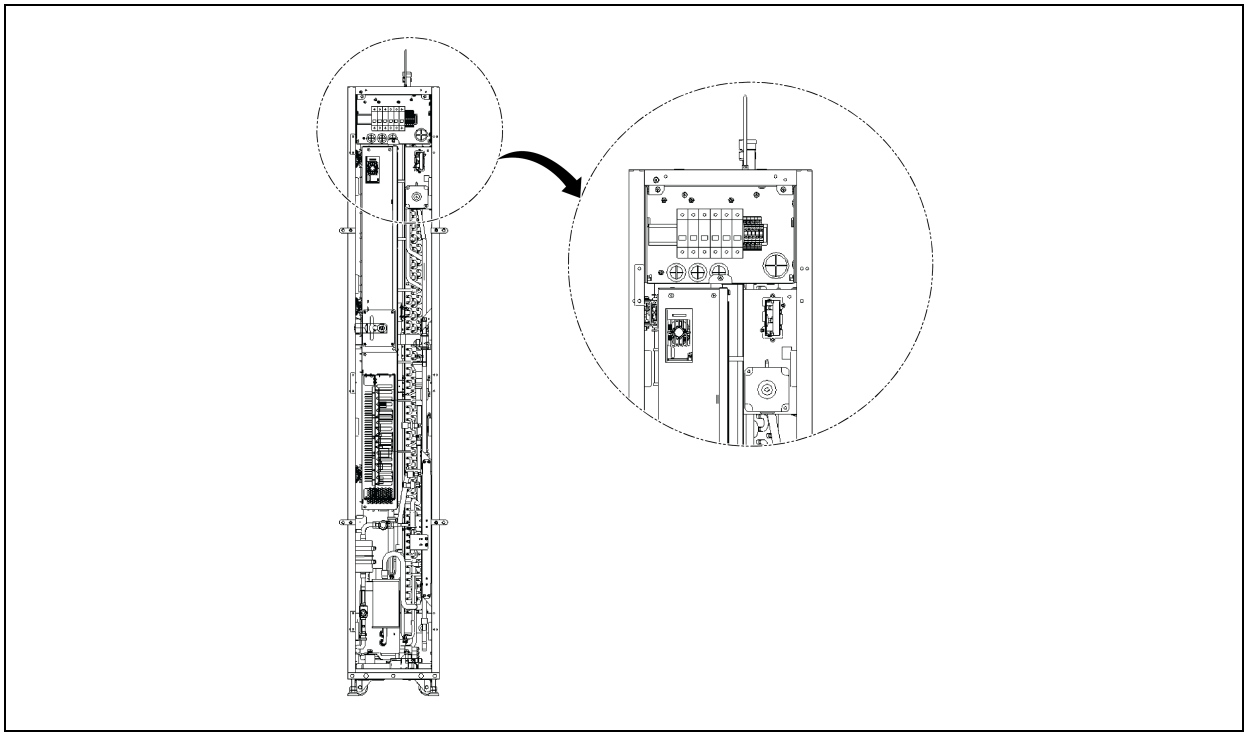


Figure 5.2 Electrical Control Box (Three Phase Unit)

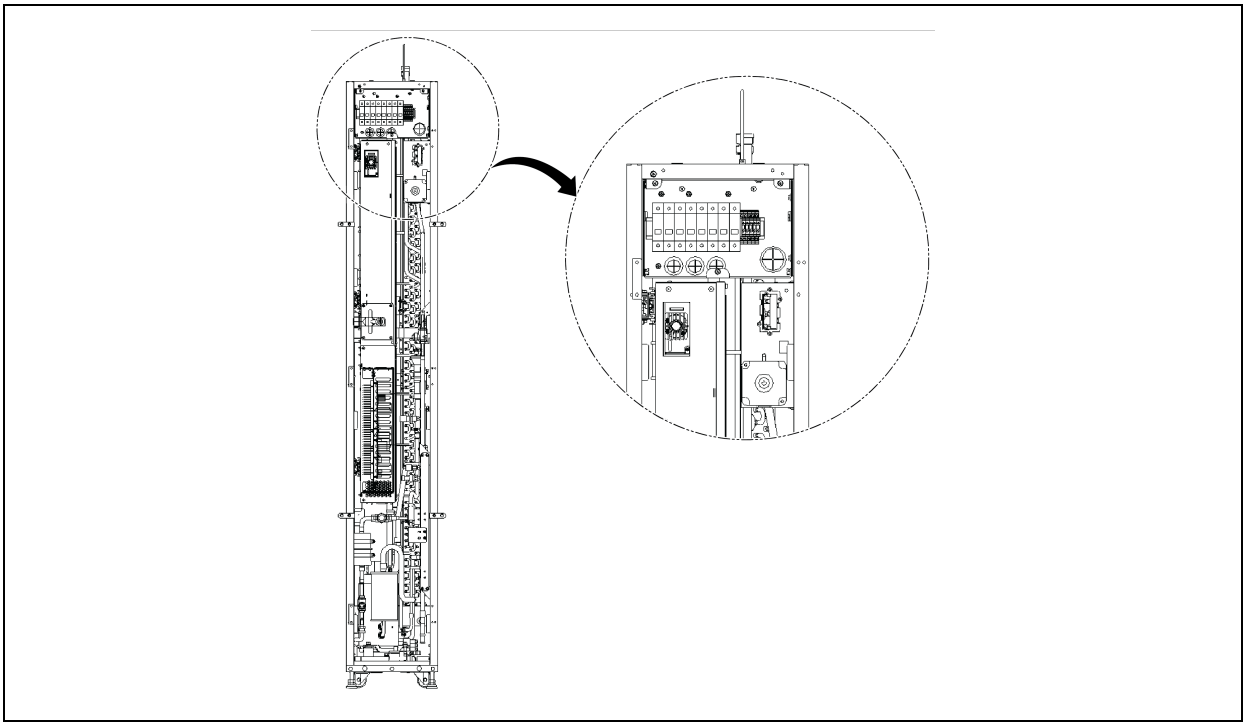


Table 5.1 MCB Current Rating

Model	MCB	Current (A)
CRD100-0D00A	NDB2-63C40/2	40
CRD101-0D00A	NDB2-63C25/3	25
CRD102-1D00B	NDB1-64C50/2	50

5.2.2 Connecting the Power Cable of the Indoor Unit

Connect the L, N, and PE (or L1, L2, and G, or L1, L2, L3, and G) terminals to the external power supply. Fix the power supply cables to the cable clamp. The cable sizes must adhere to the local wiring regulations and protocols.

Table 5.2 Full Load Current (Unit A)

Region	UL		CE/UKCA
Model	CRD100	CRD101	CRD102
Full Load Current (Indoor unit + Condenser)	26.5	19.4	38
Indoor unit only (with heater)	-	-	33.9
Indoor unit only (without heater)	23.9	16.8	23.9
Condenser (without low ambient kit)	1.9	1.9	3.4
Condenser (with low ambient kit)	2.6	2.6	4.1
MCA	29	21	-
MOP	40	30	-

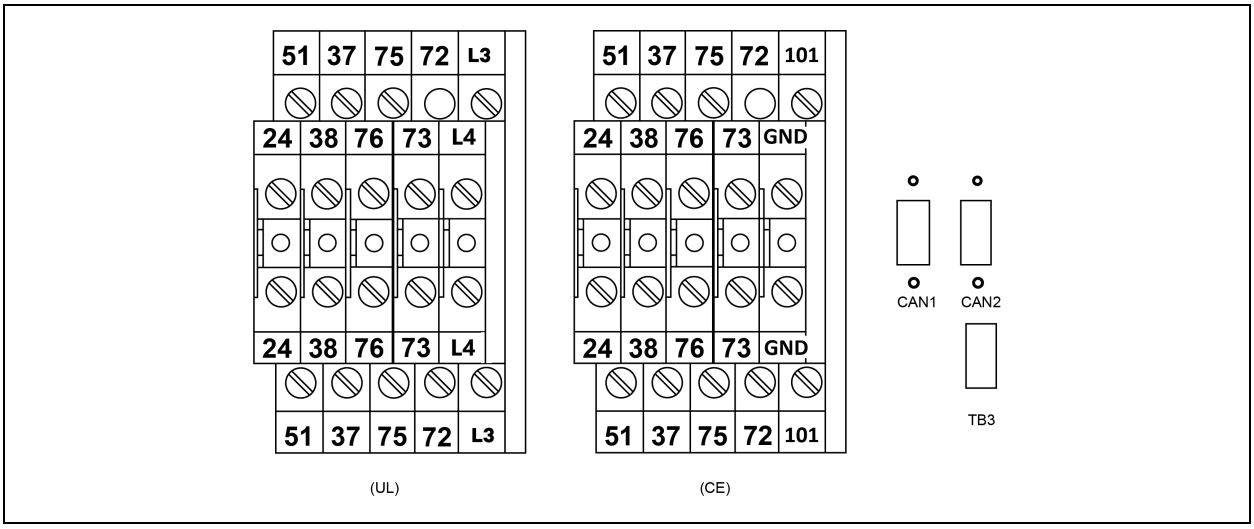
5.2.3 Connecting the Power Cable of the Outdoor Unit

The outdoor unit is controlled by the indoor unit. Connect the L, N, and PE (or L1, L2, and G) circuit breaker terminals to related terminals in the outdoor unit. For the CCD101S-00B outdoor unit, you also need to connect the 101 and GND terminals to the 10 V and GND terminals in the outdoor unit respectively.

5.3 Connecting Communication Cables

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

Figure 5.3 Terminal Block



Item	Description
51, 24	Water underfloor
37, 38	Remote shutdown
75, 76	Common alarm
72, 73	Liquid Line Solenoid Valve (LLSV)
L3, L4	Heater breaker for low ambient kit
101, GND	Condenser fan speed control
CAN-1, CAN-2	Teamwork communication
TB3	Remote temperature sensor

5.3.1 Connecting the Water Underfloor Sensor

NOTICE

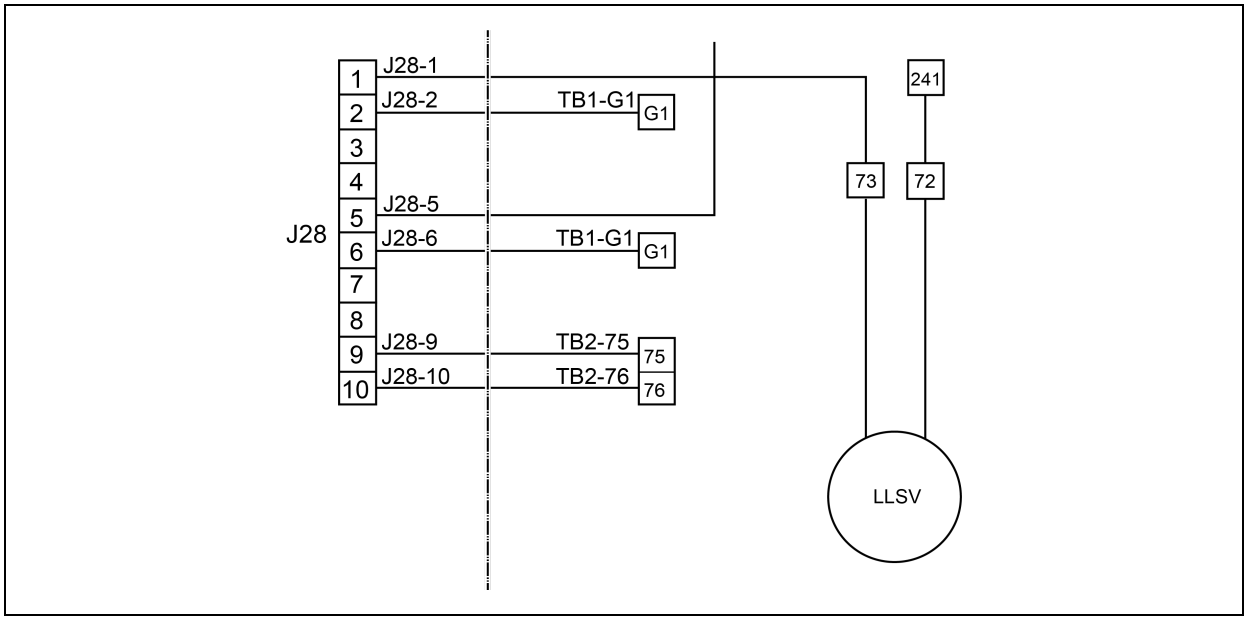
Risk of clogged or leaking drain lines and leaking water-supply lines. Can cause equipment and building damage. This unit requires a water drain connection. Drain lines must be inspected at start-up and periodically, and maintenance must be performed to ensure that drain water runs freely through the drain system and that lines are clear and free of obstructions and in good condition with no visible sign of damage or leaks. This unit may also require an external water supply to operate. Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in catastrophic and expensive building and equipment damage and loss of critical data center equipment. Do not locate unit directly above any equipment that could sustain water damage. We recommend installing a monitored fluid-detection system to immediately discover and report coolant-fluid system and condensate drain-line leaks.

The unit accessories are equipped with a water underfloor sensor. Connect one end of the sensor to terminal 51 and the other end to terminal 24.

5.3.2 Connecting the Solenoid Valve Kit

When installing the solenoid valve kit (LLSV), connect one end of the solenoid valve coil cable to terminal 72 and the other end to terminal 73. Figure 5.4 below shows the connection between the liquid line solenoid valve and the terminal block.

Figure 5.4 Connection between Liquid Line Solenoid Valve and Terminal Block

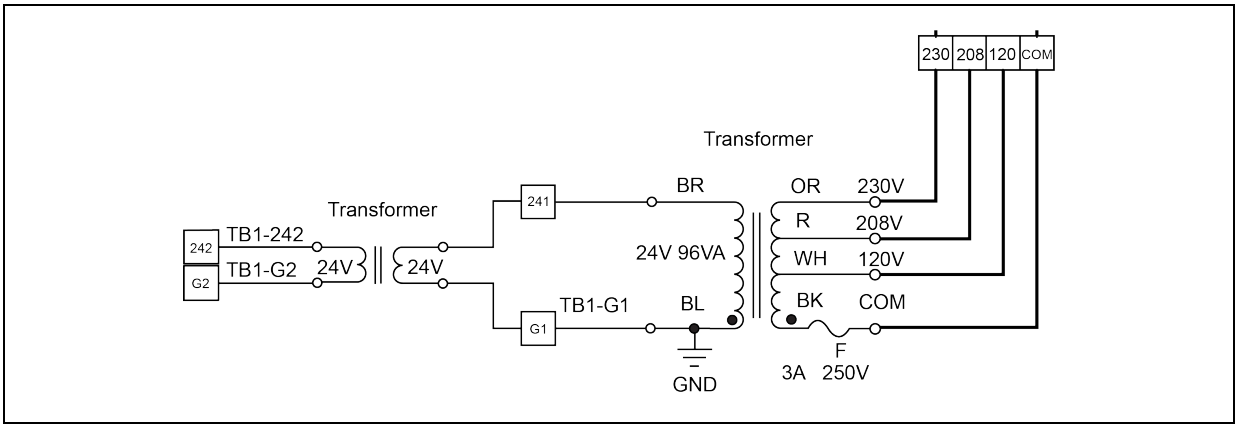


5.3.3 Connecting the Transformer

NOTICE

The 96 VA transformer default wiring is orange cable (230 V to 24 V). If the unit rated voltage is 208 V, a properly trained and qualified electrician must change the transformer wiring from orange to red cable (208 V to 24 V).

Figure 5.5 Transformer Wiring Diagram



5.3.4 Connecting the Low Ambient Kit

Power is supplied to the low ambient kit by the indoor unit. Connect the cable of low ambient kit to terminal L3 and L4 (or to outdoor breaker in condensing unit. For details, see SL-70700 Vertiv™ Liebert® CRV CCD10 Condenser User Manual).

5.3.5 Connecting the Remote Temperature Sensor

Each unit is equipped with a remote temperature sensor. 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.

1. Insert the connector of the sensor to the TB3 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. The following table shows the address settings for sensors.

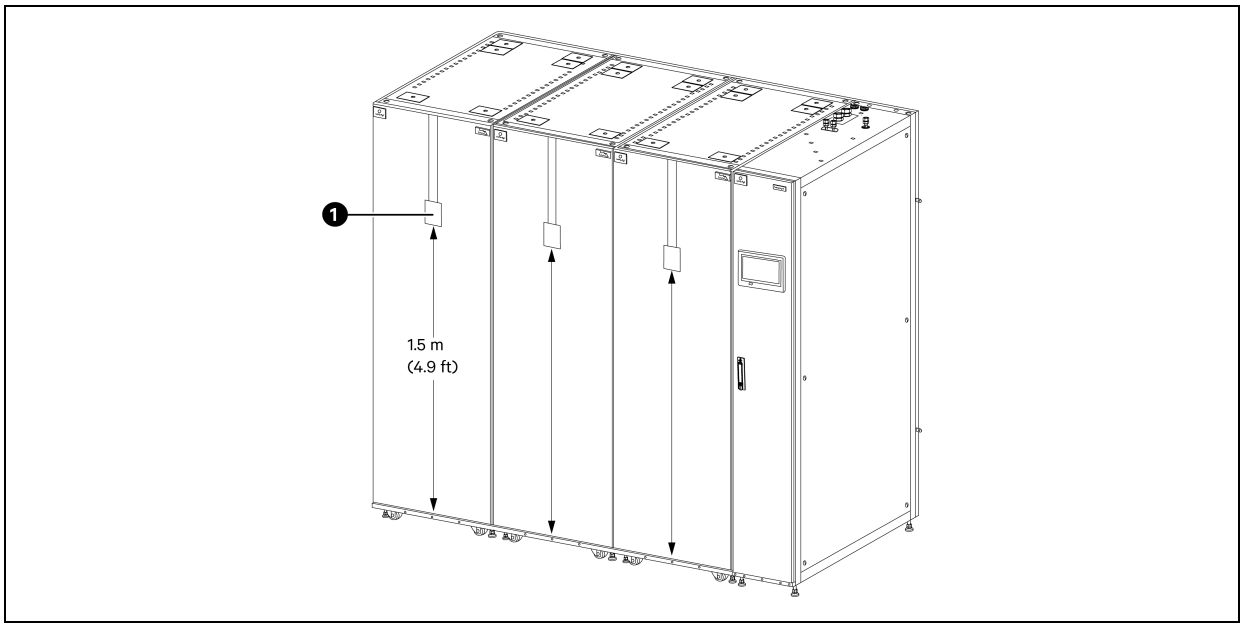
Table 5.3 Address Settings for Remote Temperature Sensors

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

Table 5.3 Address Settings for Remote Temperature Sensors (continued)

Sensor	1	2	3	4	5	6	ID
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

Figure 5.6 Layout of Remote Temperature Sensors



Item	Description
1	Remote temperature sensor

5.3.6 Connecting the Remote Power Off Device (Optional)

Connect the remote power off device to the terminal 37 and 38 on the terminal block. These two terminals have been connected with a cable in factory, and you need to remove this cable before connecting to the remote power off device.

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

5.3.7 Connecting Alarm Devices (Optional)

Connect alarm devices to terminal 75 and 76 on the terminal block. This enables the iCOM Edge to send alarms to the alarm device.

5.3.8 Connecting for Teamwork

Connect the CAN port of one unit to the CAN port of another unit using a CAN network cable. Then set the unit CAN ID on the DIP SW3 of the iCOM Edge board.

CAN ID 0 is master unit. Teamwork parameters only can be set in master unit and then shared to subordinate units. Subordinate unit uploads operation status and alarms to the master unit.

Figure 5.7 DIP SW3

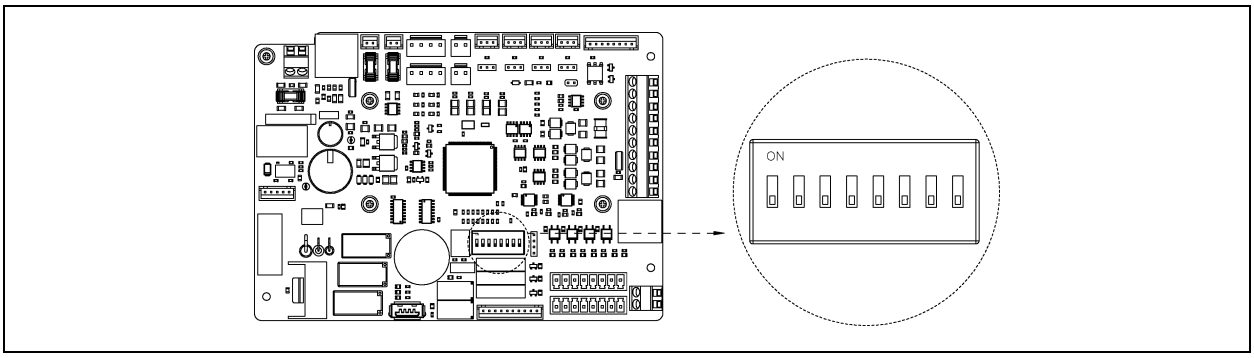


Table 5.4 Address Settings of CAN ID

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

Table 5.4 Address Settings of CAN ID (continued)

CAN ID	SW3-1	SW3-2	SW3-3	SW3-4	SW3-5	SW3-6	SW3-7	SW3-8	Note
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.

5.4 Checklist for Electrical Installation

Table 5.5 Electrical Installation Checklist

Item	Result
The power voltage is the same as the rated voltage on the unit nameplate.	
No open-circuit or short-circuit exists in the electrical connection.	
The power cables and grounding cables are correctly connected to the disconnect switch, indoor unit, and outdoor unit.	
The circuit breakers or fuses have correct ratings for the installed equipment.	
The control connections are configured and fixed properly.	
All the wiring and connector connections, including the fixing blocks, are fixed firmly and appropriately.	

NOTE: Do not power on or operate the unit before authorized professional technicians from Vertiv. Perform the check and confirm that the installation is correct.

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6 Start-up

6.1 Self Check

Table 6.1 Start-up Inspection Checklist

Item	Content	Result
Room environment	Thermal isolation and moisture proof materials are installed.	
Mounting base	The vibration absorbing material between the base and the unit is installed.	
Display panel	The surface is clean and there is no sign of damage.	
Compressor	The fixing metal plate at the bottom is removed and the compressor is fixed.	
Filter	All the filters are installed in the right positions and are in good condition.	
Outdoor unit	• The outdoor unit is installed in the right position. • Pipes are properly supported with suitable inclination. • The oil trap is installed in the right position.	
Fan	• The air inlet and outlet areas are not blocked. • The blades are not stuck or have abnormal noises when rotating.	
Electric heater (if installed)	The heating component is firmly fixed and the heating cables are well connected.	
Power supply	• The voltage, phase rotation and frequencies of the indoor and outdoor units are normal. • Power supply cables are connected correctly. • All circuit breakers and contactors are connected correctly.	
iCOM Edge	All the communication cables are in good condition.	
Pipes	• The pipes are connected correctly. • The solenoid valve kit is installed in the right position, towards the right direction. • There are no exposed copper pipes, and thermal insulation cotton is well attached.	

6.2 Charging Refrigerant and Lubricating Oil

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.

NOTICE

Risk of oil contamination with water. Can cause equipment damage. The unit requires the use of PVE (FV50S) oil. PVE 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 PVE 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. PVE 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 compressors without proper refrigerant charging can cause the compressors to operate at less than 5 °F (–15 °C) evaporator temperature and at less than 20 psig (138 kPa). Operation for extended periods at less than 20 psig (138 kPa) can cause premature compressor failure.

6.2.1 Amount of Refrigerant and Lubricating Oil

NOTE: The unit is not charged with refrigerant in factory. You need to charge refrigerant on site, according to **Table 6.2** below .

NOTE: The unit has been charged with 1270 ml FV50S lubricating oil in factory. You do not need to add extra lubricating oil, when the liquid pipe between the indoor and outdoor units is shorter than 30 m (98.4 ft) and no low ambient kit is installed. You need to add extra lubricating oil, when the liquid pipe is longer than 30 m (98.4 ft) or a low ambient kit is installed. See **Table 6.2** below for the amount of extra charge. It is recommended to charge FV50S lubricating oil. If this type of oil cannot be obtained, you can use FVC68D which can be mixed with FV50S in any ratio for CRD10 compressor.

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

Table 6.2 Charging Amount of Refrigerant and Lubricating Oil

Liquid Pipe Length m	Total Refrigerant Charging Amount		Additional Lubricating Oil Charging Amount		Liquid Pipe Length ft	Total Refrigerant Charging Amount		Additional Lubricating Oil Charging Amount	
	Without Low Ambient Kit kg	With Low Ambient Kit kg	Without Low Ambient Kit ml	With Low Ambient Kit ml		Without Low Ambient Kit lb	With Low Ambient Kit lb	Without Low Ambient Kit oz	With Low Ambient Kit oz
≤10	4.1	9.0	-	1000	≤32.8	9.0	19.8	-	33.8
15	4.6	9.5	-	1000	45	9.9	20.7	-	33.8
20	5.2	10.1	-	1000	60	11.0	21.8	-	33.8
25	5.7	10.6	-	1000	75	12.0	22.8	-	33.8
30	6.2	11.1	-	1000	98.4	13.7	24.5	-	33.8
35	6.8	11.7	134	1134	120	15.3	26.1	6.0	39.8
40	7.3	12.2	268	1268	131.2	16.1	26.9	9.1	42.9
45	9.2	14.1	544	1544	150	20.4	31.2	19.3	53.1
50	9.9	14.8	725	1725	165	21.9	32.7	24.9	58.7
55	10.6	15.5	906	1906	180	23.3	34.1	30.5	64.3
60	11.4	16.3	1088	2088	195	24.8	35.6	36.1	69.9
65	12.1	17.0	1269	2269	210	26.3	37.1	41.7	75.5
70	12.8	17.7	1450	2450	225	27.7	38.5	47.4	81.2
75	13.5	18.4	1631	2631	240	29.2	40.0	53.0	86.8
80	14.3	19.2	1813	2813	255	30.6	41.4	58.6	92.4
85	15.0	19.9	1994	2994	270	32.1	42.9	64.2	98.0
91	15.8	20.7	2211	3211	285	33.6	44.4	69.8	103.6
					300	35.0	45.8	75.4	109.2

NOTE: " indicates no need to charge additional lubricating oil.

Table 6.3 Base Refrigerant Charge

Model	Base Refrigerant Charge without Low Ambient Kit kg (lb)	Base Refrigerant Charge with Low Ambient Kit kg (lb)	Base Lubricating Oil Charge with Low Ambient Kit ml (oz)	Additional Lubricating Oil Charge ml (oz)	Total Refrigerant Charge kg (lb)
Indoor unit: CRD10 Outdoor unit: CCD100S and CCD101S	4.1 (9.0)	9.0 (19.8)	1000 (33.8)	b	c

b (ml) = Refrigerant charge per meter (kg/m) × [Total length of liquid pipe (m) - 30 (m)] × 1000 × 25%

b (oz) = Refrigerant charge per foot (lb/ft) × [Total length of liquid pipe (ft) - 98.4 (ft)] × 3.84

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

c (lb) = Base refrigerant charge (lb) + Refrigerant charge per foot (lb/ft) × [Total length of liquid pipe (ft) - 32.8 (ft)]

Table 6.4 Refrigerant Charge Per Meter of Liquid Pipe

Liquid Pipe Diameter x Thickness mm(in.)	Refrigerant Charge Per Meter of Liquid Pipe kg/m (lb/ft)
12.7 x 1 (1/2 x 0.04)	0.107 (0.0719)
16 x 1 (5/8 x 0.04)	0.145 (0.0974)

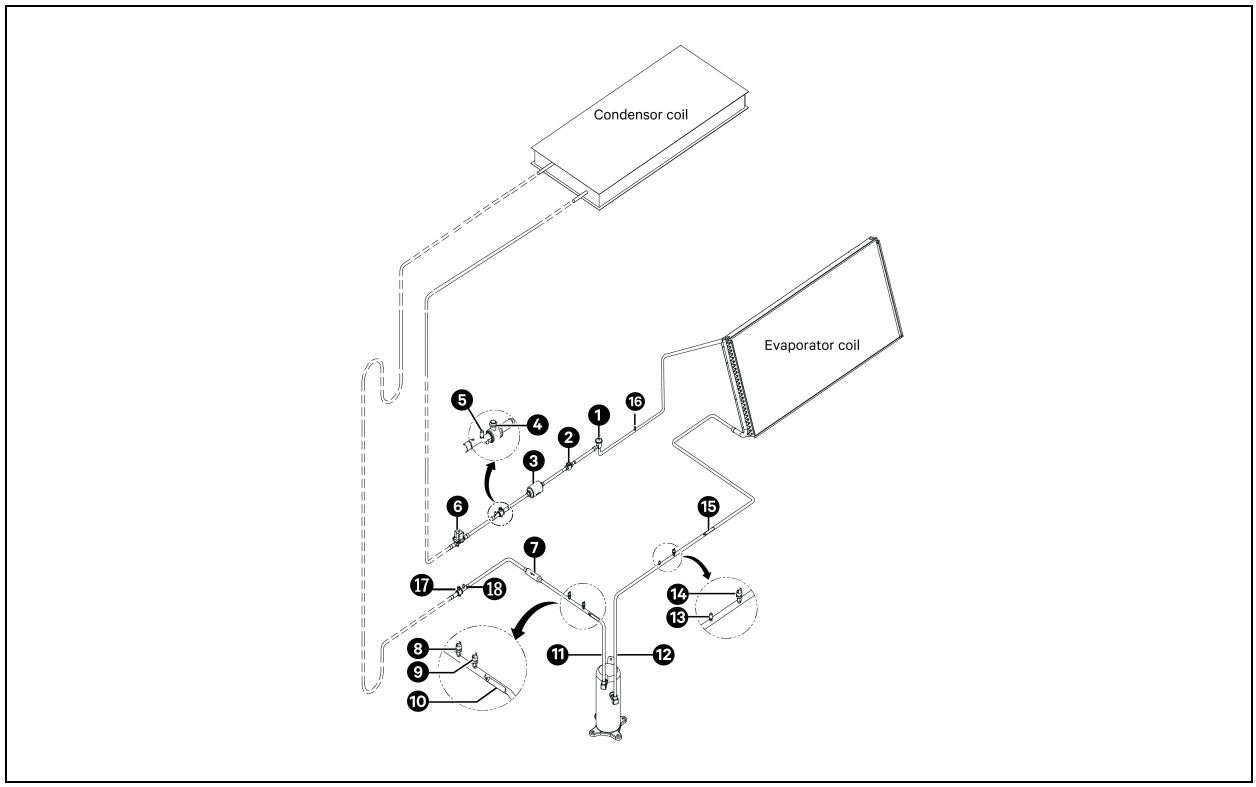
6.2.2 Vacuuming the Unit

NOTE: Before vacuuming the unit, switch off the circuit breaker of the indoor fans and the compressor.

1. Switch on the circuit breaker of the transformer.
2. On the HMI display, choose Maintenance > Manual Mode, and select On for Vacuumize Pipeline.
3. Open all the ball valves, EEV, and solenoid valve.
4. Connect a manifold gauge to the vacuum pump. Connect the manifold gauge to Schrader valve 5 and 16, as shown in Figure 6.1 on the facing page
    a. Pull an initial deep vacuum of 500 microns on the system with a suitable pump.
    b. After 4 hours, check the pressure readings and, if they have not changed, break vacuum with dry nitrogen. Pull a second and third vacuum to 500 microns or less. Re-check the pressure after 2 hours.

NOTE: The Fan/Power Failure alarm or the Low Pressure Sensor Failure alarm can be generated. This does not affect normal operation.

Figure 6.1 Schrader Valves in the System



Item	Description
1	EEV
2	Sight glass
3	Filter drier
4	Ball valve
5	Schrader valve
6	Solenoid valve
7	Check valve
8	High pressure sensor
9	High pressure switch
10	Discharge temperature sensor
11	Discharge pipe
12	Suction pipe
13	Schrader valve
14	Low pressure sensor
15	Suction temperature sensor

Item	Description
16	Schrader valve
17	Ball valve
18	Schrader valve

NOTE: You can open the EEV and solenoid valve by selecting On for Vacuumize Pipeline in the HMI display, or you can manually open them.

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

6.2.3 Adding Lubricating Oil

NOTE: The lubricating oil used in the unit is PVE (FV50S). The unit has been charged with 1270 ml base lubricating oil in factory. When the liquid pipe between the indoor unit and the outdoor unit 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. When the liquid pipe is longer than 30 m (98.4 ft), you need to add extra lubricating oil according to Table 6.2 on page 55 .

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

After vacuuming the unit, connect the lubricating oil tank to Schrader valve 13, as shown in Figure 6.1 on the previous page). The oil is drawn into the unit.

6.2.4 Charging the Refrigerant

Charging refrigerant statically

Connect a manifold gauge to the refrigerant cylinder (air in the hoses needs to be drained-out). Connect the manifold gauge to Schrader valve 5 and 16, as shown in Figure 6.1 on the previous page . Charge the refrigerant and keep the cylinder handstand during this process.

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 Schrader valve 16 , as shown in Figure 6.1 on the previous page), and keep the refrigerant cylinder handstand. 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.

6.3 Start-up Procedure

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

6.3.1 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 refrigerant circuit.
2. Switch on all the MCBs on the electrical panel.
3. In the display, press and hold the ON/OFF button for three seconds.
4. Set the target values for temperature and humidity.

Once the system is operating under load, check that the fans are operating normally and the temperature and relative humidity reach the set values.

6.3.2 Automatic Restart

The unit will automatically restart when power resumes after a power supply interruption. If the power interruption lasts several hours, stop the unit to avoid an automatic cold restart of the compressor. Preheat the compressor before restarting the unit.

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7 HMI Display

7.1 Appearance

The human machine interface (HMI display) is a 7-inch touch-screen color display, as shown in Figure 7.1 below .

Figure 7.1 HMI Display

The indicator is located under the screen. Its colors and indication are described in Table 7.1 below .

Table 7.1 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).

7.2 Main Functions

7.2.1 Home Page

After the HMI display is powered on for one minute, press Unlock and input password 1490. The home page will be displayed, as shown in Figure 7.2 below . 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 view the menu settings only.

Figure 7.2 Color Display Screen - Unlock

Table 7.2 below provides the list of touch keys and its functional description.

Table 7.2 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.

Table 7.2 Function Description (continued)

Items	Touch Keys	Functional Description
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.

7.2.2 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 7.3 Control Mode Diagram

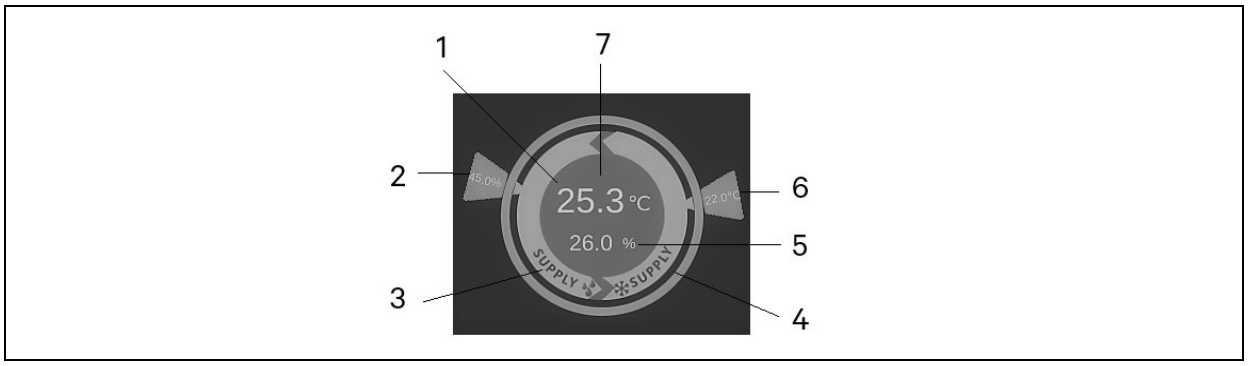


Table 7.3 Description of Control Mode Diagram

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.

7.3 Menu Structure and Parameters

For menu structure and parameters, please refer to Menu Structure on page 78

7.4 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 83 lists all the alarms.

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

NOTE: Some active alarms records will be cleared when the unit is powered off.

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

7.5 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 the speed of 0% by default. If the Back Draft Control (BDR) mode is enabled, the standby unit fan will run at 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 Maintenance and Troubleshooting

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 unit's 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 contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure.

WARNING! Risk of contact with extremely hot and/or cold surfaces. Can cause injury. Verify that all components have reached a temperature that is safe for human contact or wear appropriate, OSHA-approved PPE before working within the electric connection enclosures or unit cabinet. Perform maintenance only when the system is de-energized and component temperatures have become safe for human contact.

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

CAUTION: Risk of excessive refrigerant line pressure. Can cause equipment damage or injury resulting from tubing and component rupture. Do not close off the refrigerant-line isolation valve for repairs unless a pressure-relief valve is field- installed in the line between the isolation valve and the check valve. The pressure-relief valve must be rated 5% to 10% higher than the system-design pressure. 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 improper maintenance. It can cause damage to the equipment. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE." Ignoring safety instructions is dangerous. Soiled parts cause a loss of performance and, for switch or control devices, can lead to the breakdown of the unit performance and operation.

NOTICE

Risk of release of hazardous substances into the environment. Can cause environmental pollution and violation of environmental regulations. The unit contains substances and components hazardous for the environment (electronic components, refrigerating gases and oils). At the end of its useful life, the unit must be dismantled by specialized refrigerating technicians. The unit must be delivered to suitable centers specializing in the collection and disposal of equipment containing hazardous substances.

8.1 Maintenance Schedule

8.1.1 Monthly Maintenance

Table 8.1 Monthly Maintenance

Components	Item	Remark
Air filter	Check for clogging or damage.	
	Check the filter clogging switch.	
Fan	The fan blades are not distorted.	
	The bearings are not worn out.	
Compressor	Check for leakage.	
	Listen to the operation sound and observe the operation vibration.	
Condenser	The condenser coil is clear from dirt or debris.	
	The fan base is firm.	
	The fan vibration absorber is not deteriorated or damaged.	
	The refrigerant pipes are properly supported.	
Refrigeration system	Check the suction pressure.	
	Check the discharge pressure.	
	Check the refrigerant pipes for signs of leakage.	
	Check the moisture condition in the system through the sight glass.	
	Check the electronic expansion valve.	
Heating system	Check the operation of the electric heater.	
	Check the erosion of the components.	

Semi-annually Maintenance

Table 8.2 Semi-annually Maintenance

Components	Item	Remark
Air filter	Check for clogging or damage.	
	Check the filter clogging switch.	
Fan	The fan blades are not distorted.	
	The bearings are not worn out.	
	Check and fasten the circuit connections.	
Compressor	Check for leakage.	
	Listen to the operation sound and observe the operation vibration.	
	Check and fasten the circuit connections.	
Condenser	Check the cleanness of the fins.	
	The fan base is firm.	
	The fan vibration absorber is not deteriorated or damaged.	
	Check the voltage regulating function of the rotation speed controller.	
	The temperature switch is set at the required position.	
	The refrigerant pipes are properly supported.	
	Check and fasten the circuit connections.	
	Check the suction pressure.	
Refrigeration system	Check the discharge pressure.	
	Check the refrigerant pipes.	
	Check the moisture condition in the system through the sight glass.	
Heating system	Check the operation of the electric heater.	
	Check the erosion of the components.	
	Check and fasten the circuit connection.	
Electric control	Check the fuse and the MCB.	
	Check and fasten the circuit connections.	
	Check the control program.	
	Check the contactor action.	
Pump filter	Check if there is any foreign matter in the water tray.	
	Check pump filter.	

8.2 Maintenance of Components

8.2.1 Air Filter

WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure.

Air filter filtration class is America MERV8/Europe G4 standard.

1. On the HMI display, choose Maintenance > Alarm Settings and set Filter Maintenance Cycle SP. The default maintenance cycle is 90 days.
2. Check the filter once a month and replace it if required.

NOTE: Ensure that there is no power supply to the unit before replacing the filter.

NOTE: Clear the fan operating time after replacing the filter. To clear the time, press the menu button on the HMI display, choose Maintenance > Parameter Reset, and select Yes for Confirm Filter Maintenance.

8.2.2 Fan Kit

WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.

WARNING! Risk of contact with high-speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that power is off, and verify that all fan blades have stopped rotating before working in the unit cabinet or on the fan assembly. If control voltage is applied, the fan motor can restart without warning after a power failure.

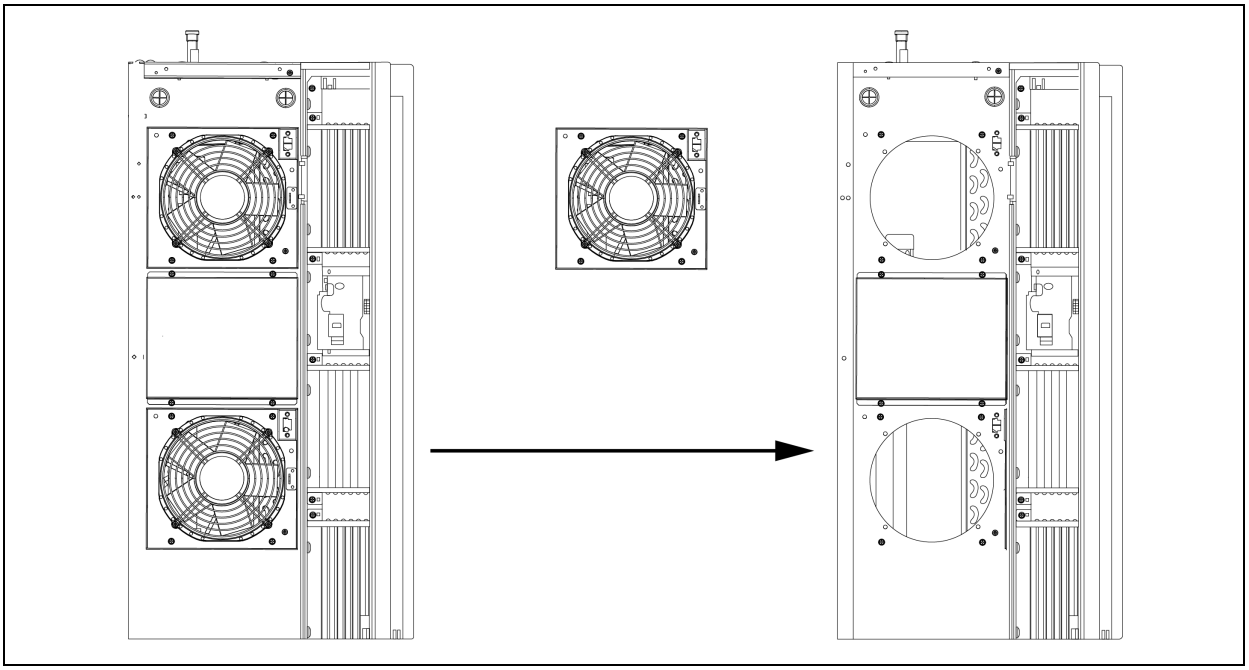
Check whether the fan or the wind-leading ring has been installed properly and firmly. Ensure that the fan blades do not hit the adjacent metal plates under any circumstances. Clear the clogging elements of the air duct.

If the fan rotating speed is abnormal, the fan failure alarm will be generated.

Fans are equipped independent from one another. If one of the fans breaks down, you can repair or replace it by taking it off from the unit. Following are the procedures to replace the fan:

1. Switch off the main MCB of the unit.
2. Open the front door.
3. Unscrew the fan and remove it from the frame.

Figure 8.1 Removing the Fan



8.2.3 Electric Heater (for CE Model)

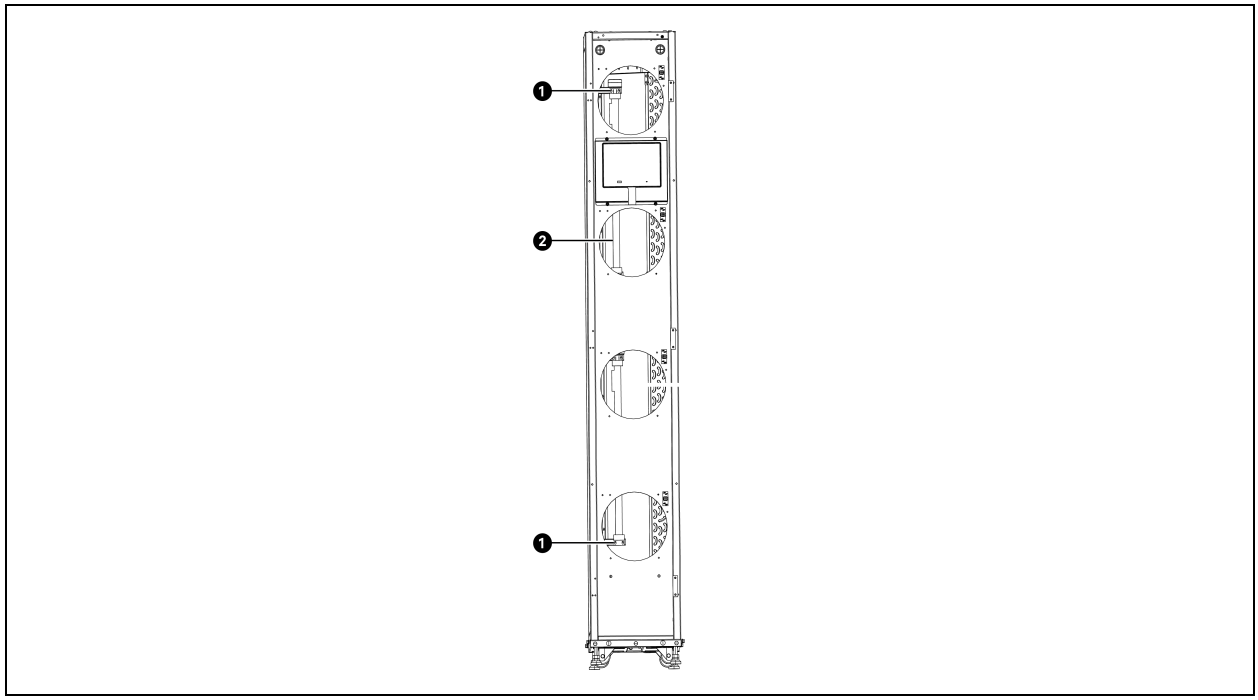
WARNING! Risk of electric shock. Can cause equipment damage, injury or death. Open all local and remote electric power supply disconnect switches and verify with a voltmeter that power is off before working within any electric connection enclosures. Service and maintenance work must be performed only 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.

Ensure that there is no dust, debris, or foreign matter on the surface of the heater. Inspect the heater every six months for its functionality.

If heating is not effective, replace the electric heater as follows:

1. Switch off the main MCB of the unit.
2. Open the front door and remove the upper or lower fan assemblies. Replace the heater which is located behind the fan assembly.
3. Remove the electric heater by unscrewing the screws.

Figure 8.2 Removing the Electric Heater



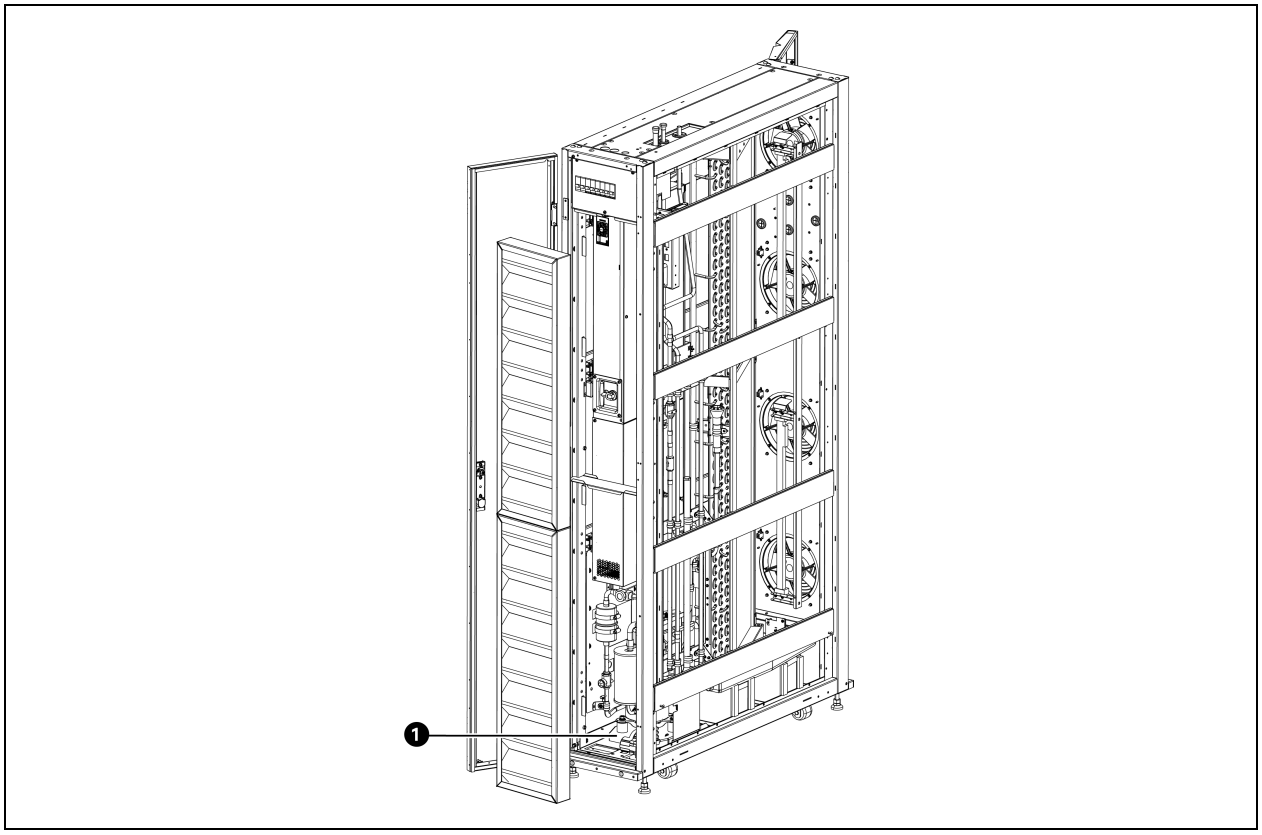
Item	Description
1	Screw (4 pieces)
2	Electric heater

8.2.4 Condensate Pump

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

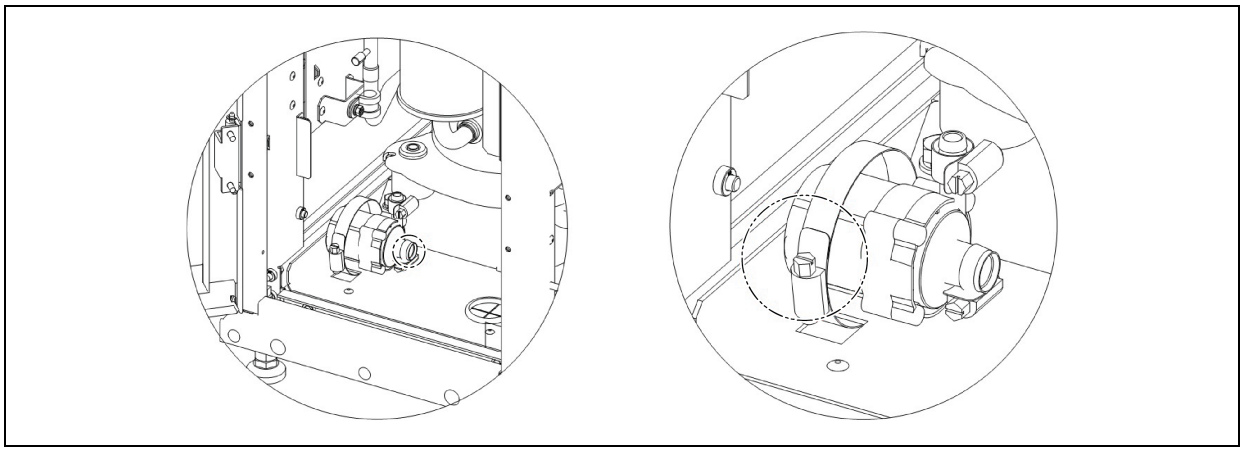
1. Switch off the main MCB of the unit.
2. Open the rear door.
3. Disconnect the cable that connects the pump to its power module.
4. Unscrew the hose clamp that fixes the pump and then remove the pump.
5. Check and clear any obstructions in the main line of the pump.
6. Clean the pump with a mild cleaning solution.
7. Check that the float is clean and free of foreign matter.
8. Re-install the pump and check its operation.

Figure 8.3 Location of the Condensate Pump



Item	Description
1	Condensate pump

Figure 8.4 Removing the Condensate Pump



8.2.5 Drainage System

Inspect the condensate water drain pan periodically to ensure normal operation of the drainage pipe. Check that there is no sediments, debris, foreign matter, or leakage in the drain pan.

8.2.6 Refrigerating System

Check the refrigerating system once a month to ensure that there is no sign of damage. Check the refrigerant pipes once every 6 months to ensure that there is no sign of damage.

8.3 Dismantling the Unit

The machine has been designed and built to ensure continuous operation. The working life of the main components, such as the fan and the compressor, depends on the operation and maintenance that they receive. The unit contains environmentally hazardous substances and components (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. The unit must be delivered to appropriate centers specialized in the collection and disposal of equipment containing hazardous substances. The refrigerating fluid and the lubricating oil inside the circuit must be recycled according to local laws and regulations.

8.4 Troubleshooting

NOTE: Troubleshooting should be performed by the trained and qualified service personnel.

NOTE: If jumpers are used for troubleshooting, remember to remove the jumpers after the troubleshooting. Otherwise the connected jumpers may bypass certain control functions and increase the risk to the equipment.

8.4.1 Troubleshooting the Fan

Table 8.3 Troubleshooting the Fan

Symptom	Possible Causes	Items to be Checked
EC fan cannot be started.	Power supply disconnected.	Check if the circuit breaker of the fan is turned ON.
	Control board faulty.	Check the J16 terminal on the iCOM Edge board.
	Fan power module faulty.	Check the alarm indicator on the fan power module.
	EC fan faulty.	Check if there is power failure, phase loss, or low voltage.
		Check that the output is within the range of 0 to 10 Vdc.
		Check if the motor is blocked.
		Check if the motor is too hot.

NOTE: EC fan may resume normal function after powered off and its motor cools down.

8.4.2 Troubleshooting the Heating System

Table 8.4 Troubleshooting the Heating System

Symptom	Possible Causes	Items to be Checked or Handling Method
Electric heater does not work.	Circuit breaker of the electric heater is switched off.	Switch on the circuit breaker of the electric heater.
	Electric heater is damaged.	Disconnect power supply and check the electric heater.

8.4.3 Troubleshooting the Compressor and the Cooling System

Table 8.5 Troubleshooting the Compressor and the Cooling System

Symptom	Possible Causes	Items to be Checked or Handling Method
Compressor cannot be started.	Compressor is not powered on.	Check the main power against under-voltage, over-voltage, and phase loss.
	MCB and contactor faulty.	Check the compressor's MCB, contactor, and connecting cables.
	Alarm lock.	View the unit alarm records, replace the damaged component and power it on again.
	Compressor coils short circuited and burnt.	Check the motor and replace it in case of any defects or malfunction.
The contactor opens and the compressor does not start.	Low discharging overheat degree alarm.	Check the state of the iCOM Edge.
	High pressure switch faulty.	Check if there is a high pressure alarm.
	Discharging temperature alarm.	Check if a low/high discharge temperature alarm exists.
	Low pressure alarm.	Check if a low-pressure alarm exists.
	Contactor faulty.	Check if the contactor is able to energize.
	Compressor driver faulty.	Check the compressor driver.
The Compressor stops after running for 3 minutes. The contactor opens.	Refrigerant leaked and low pressure is too low.	Check the suction pressure.
		Check the circuit of the low-pressure sensor.
		Calibrate to make sure the reading on the low-pressure sensor is ±0.3 bar within normal range.
High pressure protection.	Condenser clogged.	Clean the condenser.
	Condenser system does not start.	Check the condenser fan.
	Too much refrigerant has been charged.	Check if the degree of supercooling is too high.
Low discharge pressure.	Refrigerant leaked.	Locate the leakage point, repair it and add refrigerant.
	The fan speed controller of the outdoor unit is faulty, while the output voltage remains 100%, irrespective of the change in the condensing pressure.	Replace the fan speed controller.
The suction and discharge pressures do not change after startup.	The compressor is reversed or the internal air tightness of the compressor has failed.	If the compressor is reversed, exchange any two L lines of the compressor. If the internal air tightness of the compressor has failed and cannot be restored, replace the compressor.
Low suction pressure or liquid returned.	Insufficient refrigerant in the system.	Check for leaks. Seal the leaking point and add the refrigerant.
	Air filter too dirty.	Replace the air filter.
	Filter drier clogged.	Replace the filter drier.
	Improper superheating degree.	Check the control board of the Electronic Expansion Valve.

Table 8.5 Troubleshooting the Compressor and the Cooling System (continued)

Symptom	Possible Causes	Items to be Checked or Handling Method
	Sensing element of the electronic expansion valve faulty.	Replace the sensing element.
	Improper air flow distribution.	Check the air supply and return system.
	Low condensing pressure.	Check if the condenser is faulty.
Compressor too noisy.	Liquid returned.	Refer to the handling methods of “low suction pressure or liquid returned”.
	Bearing worn out due to loss of lubricating oil.	Add lubricating oil.
Compressor over temperature.	Compression ratio too high.	Check the settings of the high pressure value and low pressure value, and inspect if the condenser is clogged.
		Check that the fans of the evaporator and condenser are normal.
	Suction overheat degree too high.	Add proper amount of refrigerant.

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2778

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 Level
		Low Pressure
		High Pressure
		Remote Shutdown
		Water Underfloor
		Heater Failure
		Custom 1

Level 1 Menu	Level 2 Menu	Parameter
	Power Information	L1 Voltage
		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 SP
		Return Temp SP
		Remote Temp SP
	Hmd Settings	Supply Hmd SP

Level 1 Menu	Level 2 Menu	Parameter
Parameter Settings	Teamwork Settings	Teamwork Mode
		Unit Address
		Unit Quantity
		Standby Quantity
		Rotation Quantity
		Rotation Cycle
		Rotate Interval Daily
		Rotate At
		Manual Rotation
		Active/Standby 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 SP
		Low Supply Temp Alarm SP
		High Return Temp Alarm SP
		Low Return Temp Alarm SP
		High Return Hmd Alarm SP
		Low Return Hmd Alarm SP
		High Remote Temp Alarm SP
		Low Remote Temp Alarm SP
	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	-

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 when user tries to turn on the unit from the HMI display.
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 to Fan 4 Failure	The fan cannot work normally.
Supply Temp Sensor 1 Failure, Supply Temp Sensor 2 Failure	The temperature of the supply air is out of the detection range of the supply temp sensor.
Remote Temp Sensor 1 Failure to Remote Temp Sensor 10 Failure	The ambient temperature is out of the detection range of the remote temp sensor.
Discharge Temp Sensor Failure	The temperature of the discharge gas is out of the detection range of the discharge temp sensor.
Suction Temp Sensor Failure	The temperature of the suction gas is out of the detection range of the suction temp 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 or Fire Sensor Alarm, or it can be customized.

Appendix D: FCC Compliance Statement

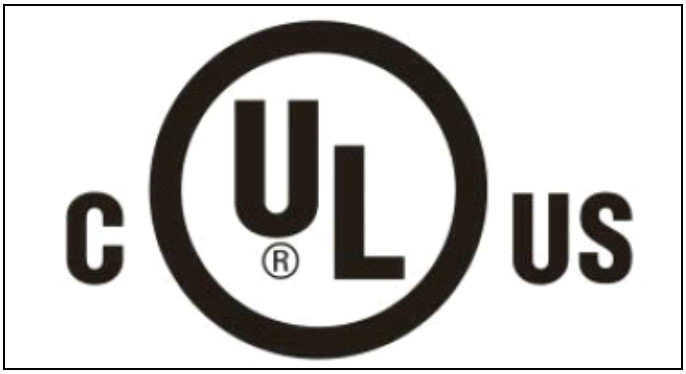
Unique Identifier: CRD100-0D00A, CRD101-0D00A, CCD100S-00A

FCC Compliance Statement (for products subject to Part 15)

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

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

Appendix E: UL Certification



Agency Listed Standard 60-Hz units are UL Certified to the harmonized U.S. and Canadian product safety standard CSA C22.2 No 236/UL 1995 for “Heating and Cooling Equipment” and are marked with the UL logo.

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