



Liebert® CRV Condenser

CCD10 Condenser User Manual

Original Instructions

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Version History

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IMPORTANT SAFETY INSTRUCTION

SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Liebert CRV. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should move, install or service this equipment.

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.

Any operation that requires opening doors or equipment panels must be carried out only by properly trained and qualified personnel.

To identify the unit model and serial number for assistance or spare parts, locate the identification label on the unit.



WARNING! Arc flash and electric shock hazard. Can cause serious injury or death. Disconnect all local and remote electric power supplies and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Verify with a voltmeter that power is Off. The Liebert® controller does not isolate power from the unit, even in the "Unit Off" mode. Some internal components still require and receive power even during the "Unit Off" mode of the controller. The factory-supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. Follow all local codes.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify that power is off with a voltmeter before working within any electric connection enclosures. The Liebert® microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® control.

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.



WARNING! Risk of 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, or building and equipment damage. 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.

For systems requiring EU CE compliance (50 Hz), the system installer must provide and install a pressure relief valve in the high side refrigerant circuit that is rated same as the refrigerant high side “Max Allowable Pressure” rating that is marked on the unit serial tag. Do not install a shutoff valve between the compressor and the field installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU “Notified Body.”



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



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



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: To ensure the safety, before welding the pipeline and patching welding, all nitrogen of air condition system must be discharged to release the system pressure.



CAUTION: Risk of improper moving, lifting and handling. Can cause equipment damage or injury. Only

properly trained and qualified personnel should work on this equipment. Use proper lifting techniques and wear appropriate, OSHA-approved PPE to avoid injury and dropping the fan module during removal. Equipment used in handling, lifting, or installing the fan assembly must meet OSHA requirements. Use handling/lifting equipment rated for the weight of the fan assembly. Use ladders rated for the weight of the fan assembly and technicians if used during installation. Refer to handling/lifting, and installation equipment operating manual for manufacturer's safety requirements and operating procedures.



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, or remove packaging from the unit in preparation for unit installation.



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!

The CCD10 outdoor unit is used with the CRD10 indoor unit, and the CRD10 Air Conditioner User Manual must be read simultaneously when the outdoor unit is installed and used.

NOTICE!

Risk of improper maintenance. Can cause equipment damage.

All maintenance must be performed only by authorized properly trained and qualified personnel.

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 Liebert® CRV contains substances and components hazardous for the environment (electronic components, refrigerating gases and oils). At the end of its useful life, the Liebert® CRV 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.

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 $\pm 10\%$ of the load nameplate nominal voltage. Also, ensure that no three-phase sources are single-phased at any time.

NOTICE!

Risk of control malfunction. Can cause improper unit operation.

Verify that all low-voltage electrical wiring has been performed per the schematic diagram provided and that all low-voltage wiring connections are tight.

NOTICE!

Risk of improper lifting. Can cause equipment damage. Make sure that the spreader bars are wider than the unit. If the spreader bars are too short, the slings may crush the unit.

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

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Chapter 1: Overview

This chapter mainly introduces the naming rules, main components and technical parameters of the Liebert CRV, CCD10 standard condenser and the introduction of Low Ambient Kit.

1.1 Naming Rules

Liebert CRV, CCD10 condenser naming rules are described in Table 1-1.

Table 1-1 Model Nomenclature of Condenser Unit

Digit	1	2	3	4	5	6	7	8	9	10	11
Example	C	C	D	1	0	0	S	-	0	0	A

Digit	Variable	Description of Variable
1	CCD	Liebert CRV Condenser
2		
3		
4	10	Model Number: 10
5		
6	0,1	0- 208/230V/1Ph/60Hz, UL 1- 230V/1Ph/50/60Hz, CE
7	S	S- Standard Temp (-15°C to 45°C [5°F to 113°F])
8	-	Separator
9	0	0- R410A refrigerant
10	0	Free digit (future)
11	A~Z	Revision

1.2 Main Components of Standard Condenser

The outdoor unit uses air cooling, and the main components include fan and heat exchanger.

1.2.1 Fan

The fan assembly uses an axial type low noise fan blades and a high performance single phase motor. The motor adapts to a wide voltage input and has a high reliability.

1.2.2 Heat Exchanger

Using finned-tube heat exchanger with a high heat dissipating efficiency and wavy-fins, convenient for cleaning and maintenance due to less dust accumulation.

1.3 Introduction of Low Ambient Kit

The refrigeration system schematic diagram with Low Ambient Kit is shown in figure 1-1. The Low Ambient Kit is consisted of receiver with electric heating belt, head pressure valve, safety valve, check valve, pressure switch, etc.

The Low Ambient Kit is designed to maintain proper operating head pressure in outdoor temperature down to -34°C (-29.2°F). It works by flooding the condenser coil with liquid refrigerant to a level that balances the system condensing requirements with the condenser coil surface available to reject the system heat. During the summer, the system requires the entire condenser coil surface for heat rejection and most of the refrigerant is stored in the receiver. In the winter, the same amount of heat can be rejected by only a fraction of the coil surface. As head pressure begins to fall, the control valve restricts the flow of liquid refrigerant existing from the condenser. This extra liquid refrigerant reduces the effective condenser surface area available for heat transfer. The head pressure valve also bypasses hot gas into the receiver to warm the liquid and maintain liquid pressure for proper operation of the expansion valve. The Low Ambient Kit is the extension configuration of standard condenser and is field installed.

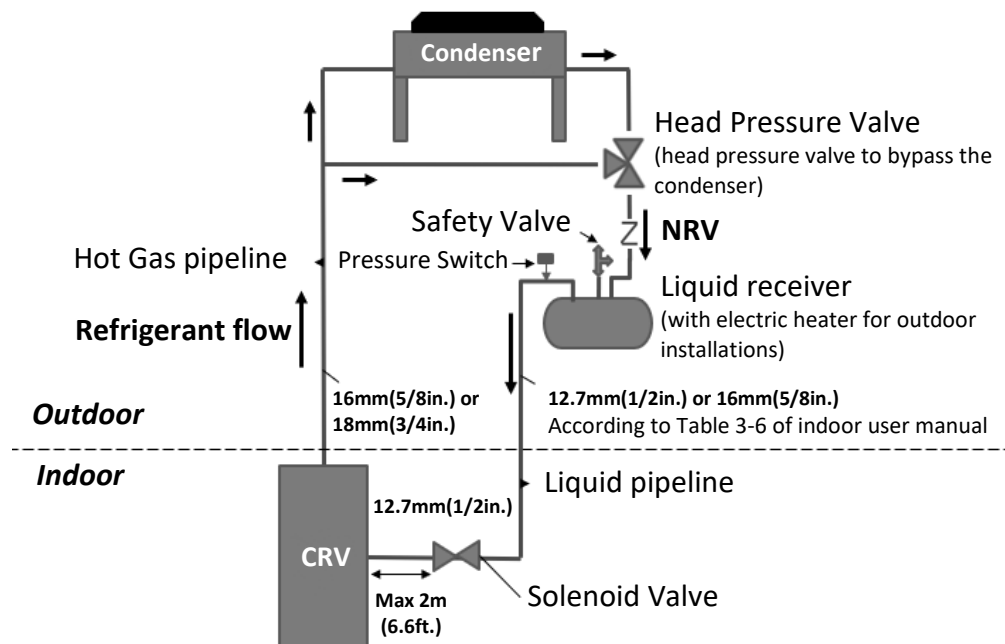


Figure 1-1 The refrigeration system schematic diagram with Low Ambient Kit

1.3.1 Liquid receiver

The liquid receiver is used to storage refrigerant liquid. The main function of the liquid receiver is to make the Low Ambient condenser meet the demand of refrigerant for low temperature load in winter and high temperature load in summer. There are three connection ports in the receiver, they are used to connect liquid input pipe, liquid output pipe and safety valve, as shown in figure 1-2. In order to observe the refrigerant level in the liquid receiver conveniently, two sight glass are installed on the receiver.

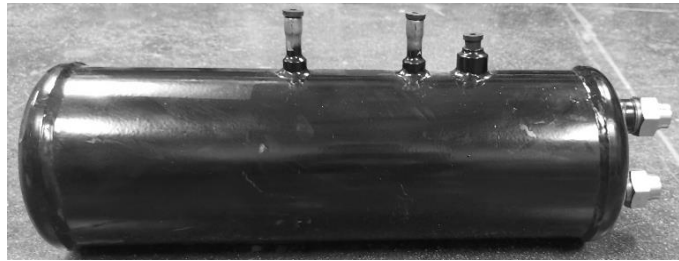


Figure 1-2 The liquid receiver

1.3.2 Head pressure valve

As shown in figure 1-4, the head pressure valve is a three way modulating valve that responds to discharge pressure, connecting compressor discharge outlet, condenser outlet and receiver inlet separately. When the outdoor ambient falls, the condensing pressure falls. This causes the discharge pressure to fall as well. When the discharge pressure falls below the set value, B and C are partially opened as shown in figure 1-3. Which allows discharge gas to bypass the condenser. Mixing the discharge gas with the liquid creates a high pressure at the condenser outlet, reducing the flow and causing liquid to back up in the condenser. Flooding the condenser reduces the area available for condensing. This reduction in effective condenser surface area results in a rise in condensing pressure. During summer conditions, the discharge pressure is higher than set value thus closing the discharge port (CD). Hence, there is full liquid flow from the condenser to the receiver (BD).

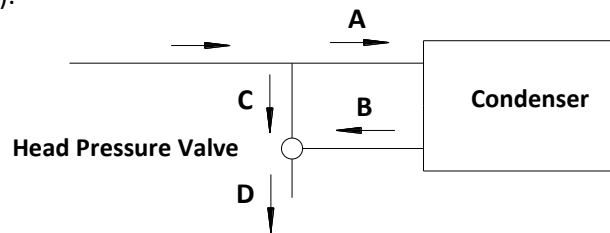


Figure 1-3 The working principle diagram of head pressure valve

The head pressure valve model used in the Low Ambient Kit of the CRD10 is LAC-4-295HP-1/2'*1/2'*1/2'. Care must be taken not to overheat and damage valves during the soldering process, and the connect direction must be correct.

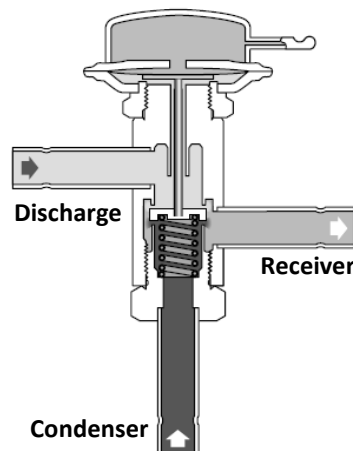


Figure 1-4 The structural diagram of head pressure valve

1.3.3 Electric heating belt

When the ambient temperature is low and the system shuts down for a long time, the refrigerant in the receiver needs to be preheated with electric heating belt. The electric heating belt start or stop working is controlled only by the pressure of refrigerant in the receiver. When the pressure is higher than 1.9MPa, the electric heating belts stops heating, and when the pressure is lower than 1.4MPa, the electric heating belt starts heating. The liquid receiver is equipped with one electric heating belt, the heating power of the electric heating belt is 150W.

For the heater, the start or stop of it only depends on the pressure of receiver, so the power supply should be always on, figure 1-6 shows the circuit between pressure switch and electrical heating belt, 1,2 point should connected to the electric heating belt breaker of condenser, as shown in the figure 1-5.

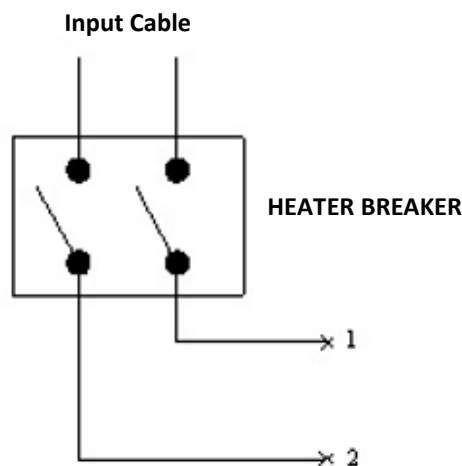


Figure 1-5 Power supply of electric heating belt

1.3.4 Pressure switch

The function of the pressure switch used in the Low Ambient Kit is to control the electric heating belt. The specifications of the pressure switch used in the Low Ambient Kit is 1.9Mpa off 1.4Mpa on. It means since the pressure switch and the electric heating belt are series circuit, so when the refrigerant pressure in the receiver is higher than 1.9MPa, the pressure switch will open, this will lead to the electric heating stop working. Similarly, the electric heating belt starts working when the refrigerant pressure is lower than 1.4Mpa.

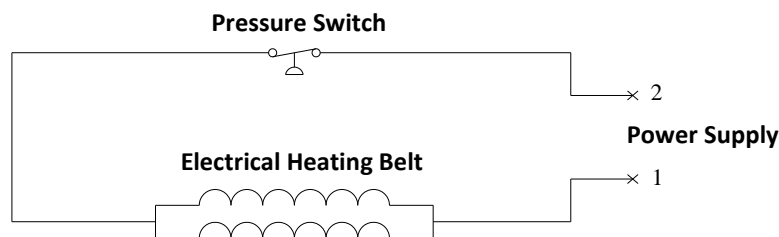


Figure 1-6 The circuit diagram between electric heating belt and pressure switch

1.3.5 Check valve

An auxiliary check valve should be used in the liquid line between the head pressure valve and the receiver to prevent the refrigerant migration to condenser. Pay attention to the arrow on the valve body as the arrow indicates the flow direction of the refrigerant in the valve. Ensure that the arrow points towards the liquid receiver.



Figure 1-7 The check valve

1.4 Technical Parameters

1.4.1 Mechanical Parameters

The outline dimensions of the condenser are shown in Figure 1-8, and the mechanical parameters are given in Table 1-2.

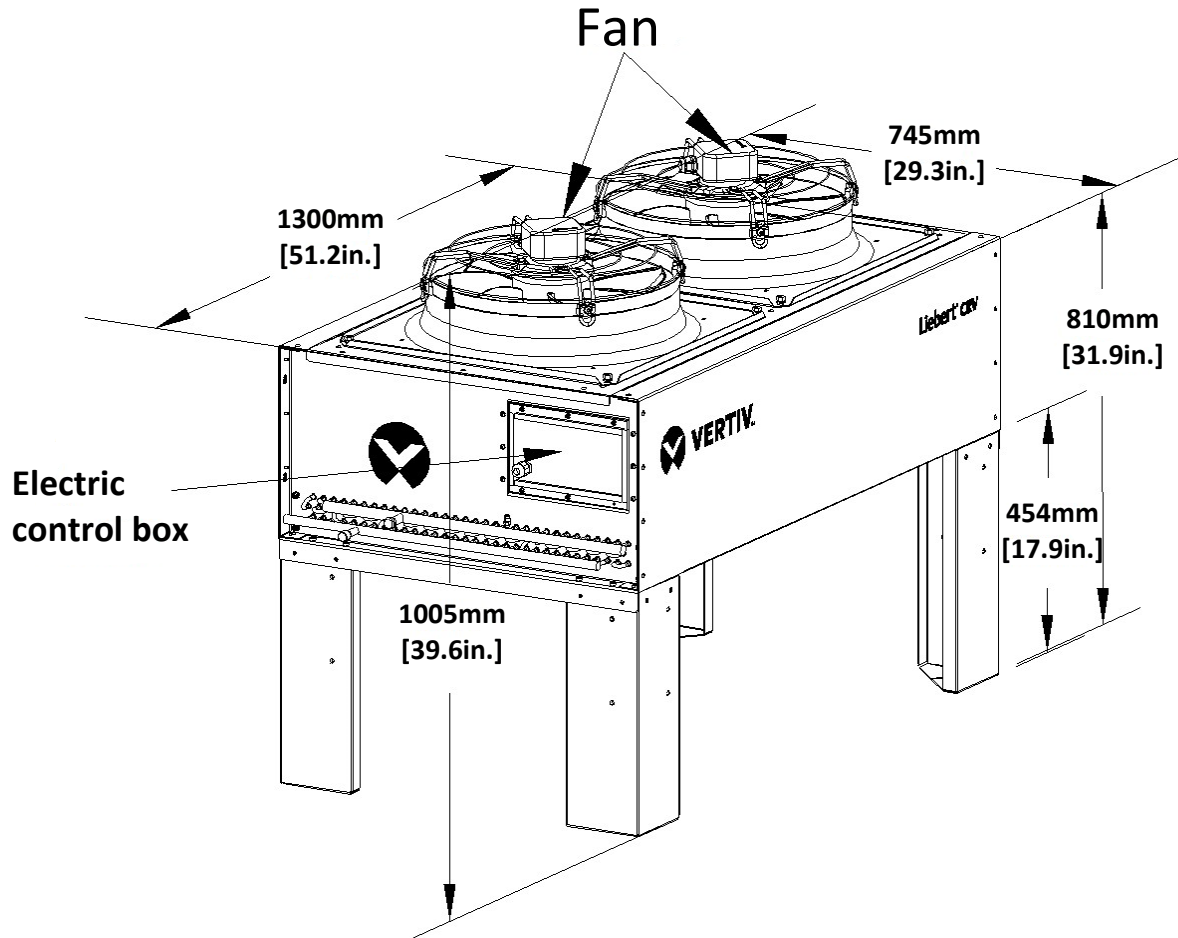


Figure 1-8 Outline Dimensions of the Condenser

Table 1-2 Mechanical Parameters of Condenser

Condenser Model	Unit Dimensions (Without legs) (W x D x H) mm(inch)	Package Dimensions (W x D x H) mm(inch)	Net weight (kg/lb)	Gross weight (kg/lb)
CCD101S-00A	1300×590×745 (51.2×23.2×29.3)	1626×666×948 (64×26.2×37.3)	66(145.5)	122(269)

14.2 Dimensions of Mounting Base

The dimensions of mounting holes of the base of the condenser are shown in Figure 1-9 and Figure 1-10.

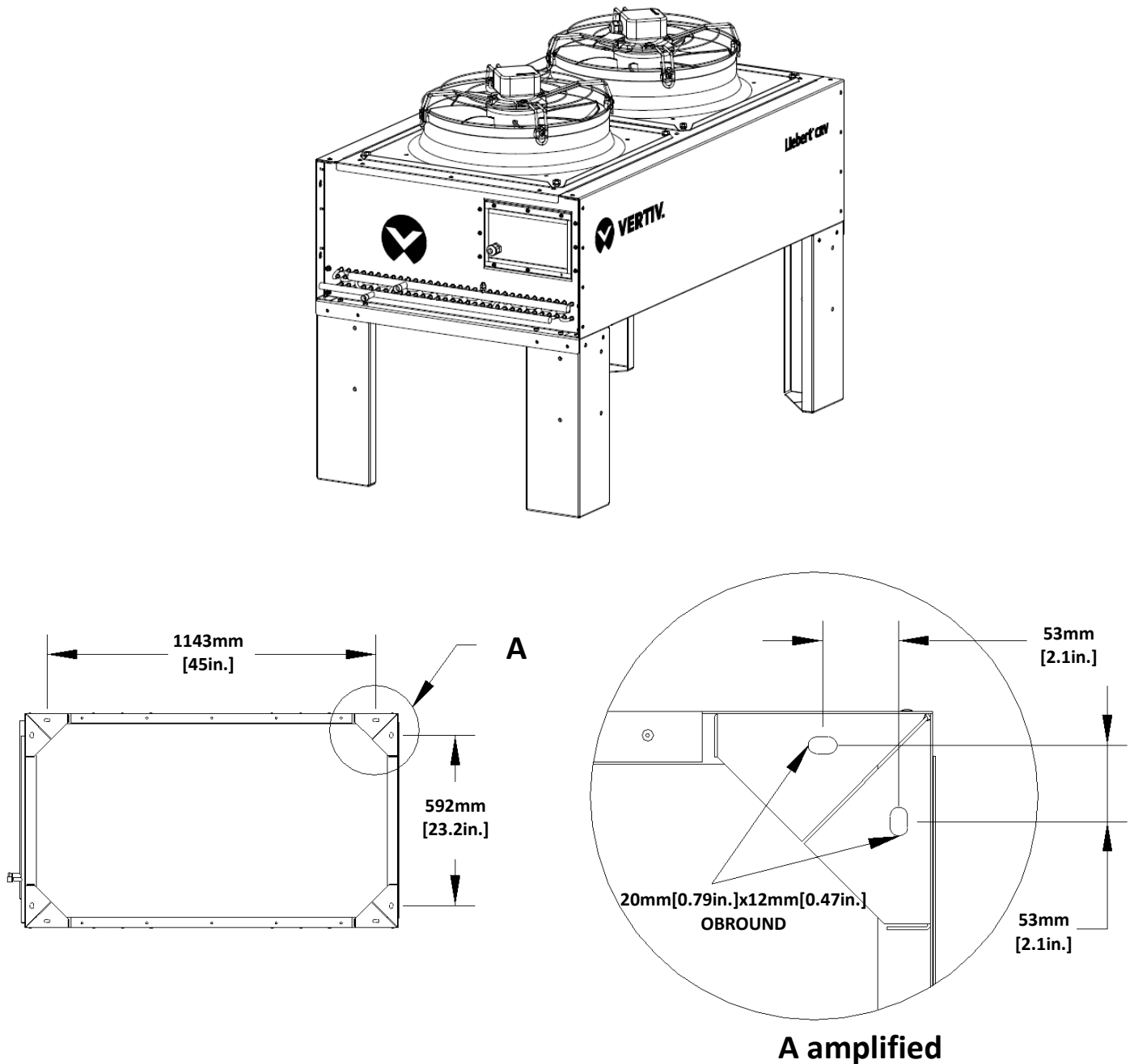


Figure 1-9 Dimensions of Mounting Holes of the Base of the Condenser (Vertical airflow installation)

For roof installation, mount the condenser on suitable curbs or other support in accordance with local codes. Secure the legs to the mounting surface using a field supplied bolt in each of the two 12mm (0.47in.) holes in each leg. See Figure 1-9 for anchor dimensions.

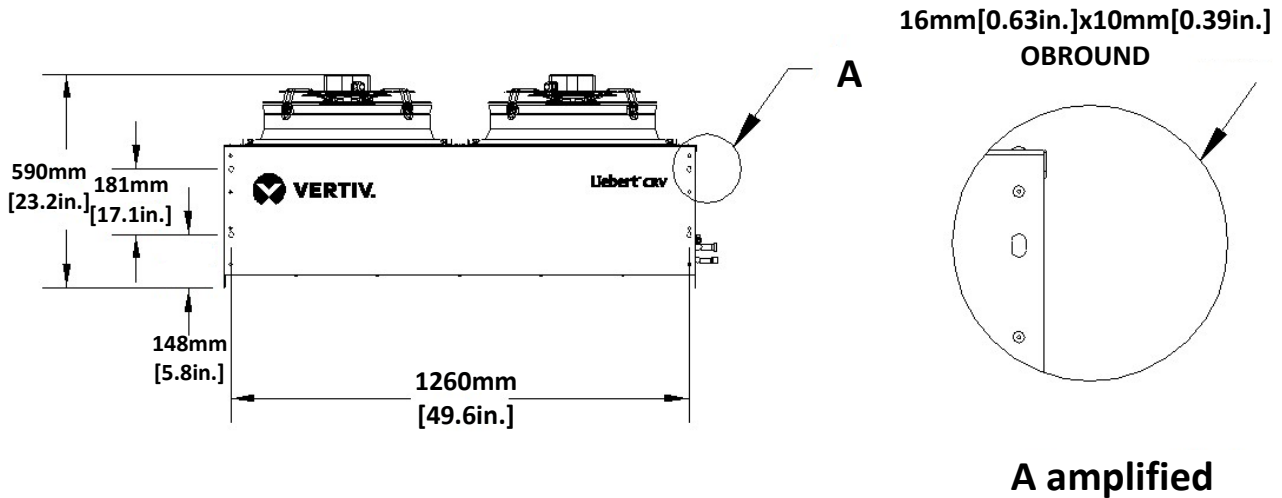
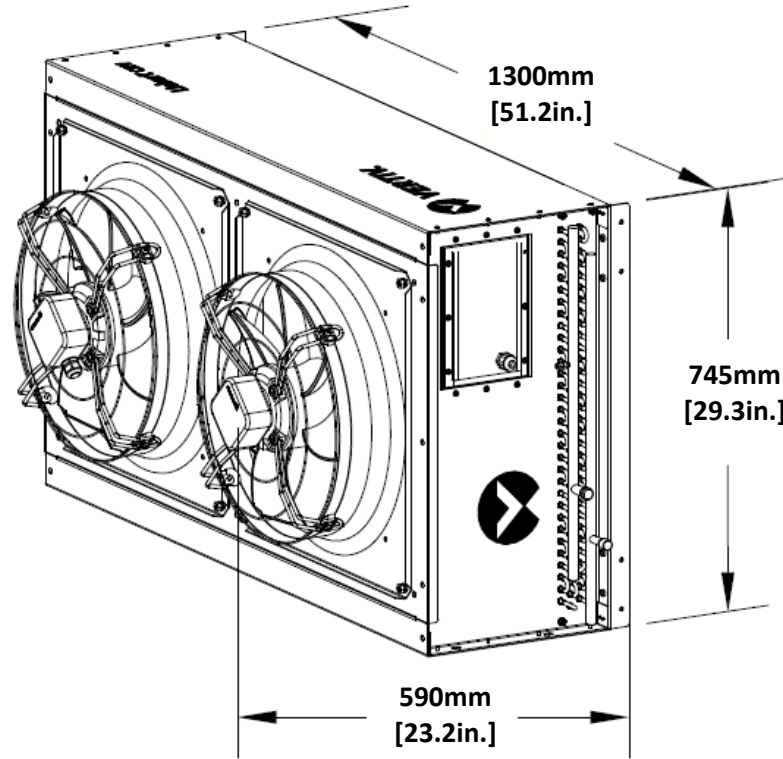


Figure 1-10 Dimensions of Mounting Holes of the Base of the Condenser (Horizontal airflow installation)

For roof installation, mount the condenser on suitable curbs or other support in accordance with local codes. Secure the legs to the mounting surface using a field supplied bolt in each of the four 10mm (0.39in.) holes in sheet metal. See Figure 1-10 for anchor dimensions.

1.5 Parameters of Operating Environment

Table 1-3 defines the operating condition parameters including the ambient temperature, protection level, altitude and voltage range.

Table 1-3 Parameters of Operation Environment

Items	Requirements
Installation position	The maximum equivalent pipe length between the indoor unit and the condenser is 91.4 m [300ft.]. Vertical difference* ΔH : $-8\text{ m} [-26.2\text{ ft.}] \leq \Delta H \leq 30\text{ m} [98.4\text{ ft.}]$.
Installation mode	Standard condenser : Horizontal airflow installation and vertical airflow installation The condenser with Low Ambient Kit: vertical airflow installation
Ambient temperature	-15 °C to +45 °C [5 °F to 113 °F]. -34 °C to +45 °C [-29.2 °F to 113 °F] with Low Ambient Kit.
Ambient humidity	Outdoor: 5% RH to 95% RH
Operation power	CCD101S: 230 V $\pm 10\%$, 1 Ph, 50/60 Hz
Altitude	$\leq 2000\text{ m} [6562\text{ ft.}]$. Derating is required if the altitude exceeds 2000 m [6562 ft.]
Protection level	IPX4
Note*: The value is positive if the condenser is installed higher than the indoor unit; otherwise the value is negative.	

1.6 Parameters of Storage Environment

Table 1-4 defines the Storage condition parameters including the ambient humidity, ambient temperature, and storage time conditions.

Table 1-4 Parameters of Storage Environment

Items	Requirements
Storage environment	Clean indoor environment with good ventilation and no dust
Ambient temperature	-40 °C to +70 °C [-40 °F to 158 °F]
Ambient humidity	5% RH to 95% RH
Storage time	The total storage time should not exceed 6 months. Otherwise, the performance needs to be re-calibrated

Chapter 2: Mechanical Installation

NOTICE!

The CCD10 outdoor unit is used with the CRD10 indoor unit, and the CRD10 Air Conditioner User Manual must be read simultaneously when the outdoor unit is installed and used.

This chapter introduces the moving, unpacking, inspection, installation notes, space requirements and installation procedures.

2.1 Moving, Unpacking and Inspection



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



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, or remove packaging from the unit in preparation for unit installation.

NOTICE!

Risk of improper lifting. Can cause equipment damage. Make sure that the spreader bars are wider than the unit. If the spreader bars are too short, the slings may crush the unit.

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

Upon arrival of the unit and before unpacking:

- Verify that the labeled equipment matches the bill of lading.
- Carefully inspect all items for visible or concealed damage.
- Report damage immediately to the carrier and file a damage claim with a copy sent to Vertiv or to your sales representative.

2.1.1 Moving

It is recommended to use mechanical transport equipment such as forklift or crane when unloading and transferring the condenser closest to the installation site.

When a forklift is used, insert the tines of the forklift as shown in Figure 2-1.

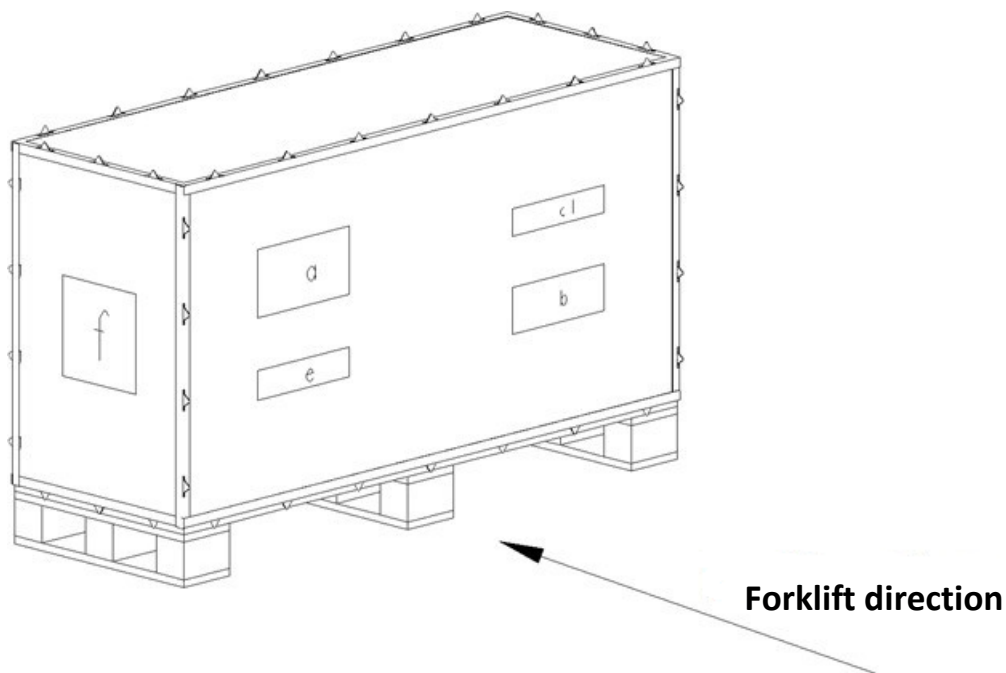


Figure 2-1 Forklift Direction

2.1.2 Unpacking

Remove the paper package and foam of the condenser but reserve the protection cardboard of fins. The protection cardboard of fins should be removed after the condenser is in its installation position.

The Low Ambient Kit uses a wood package for packing, remove top and later wooden panels of shipping crate and unscrew off fixing screws of the copper tube and the sheet metal.

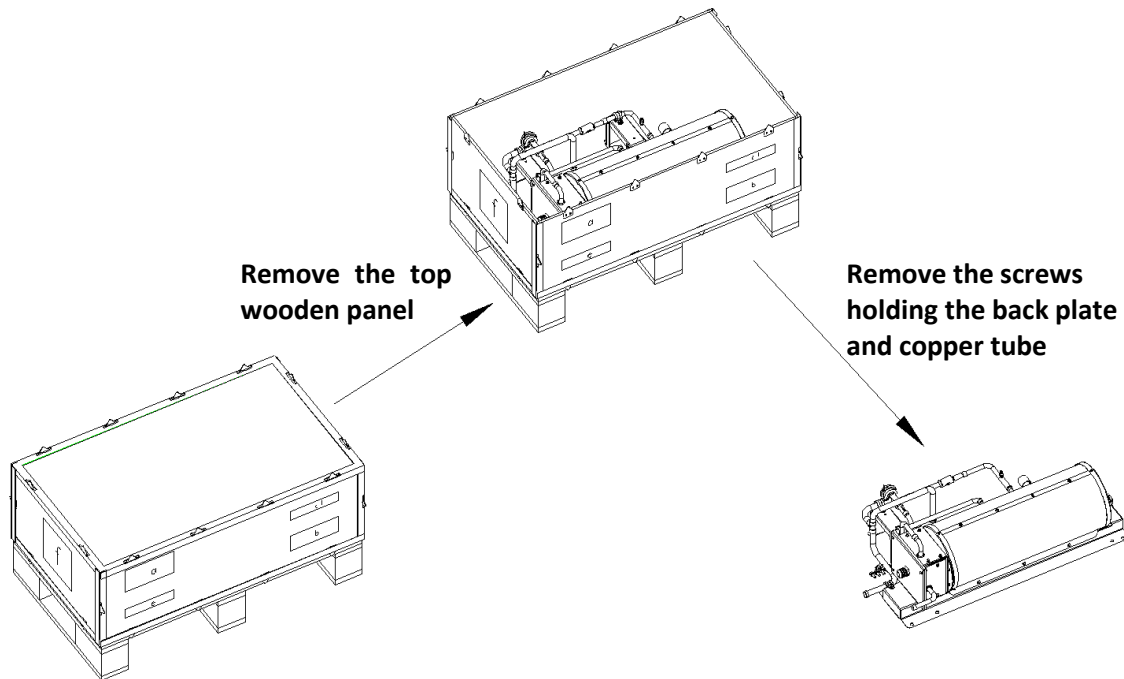


Figure 2-2 Unpacking the Low Ambient Kit package

NOTE: When moving the condenser and Low Ambient Kit by hand, to avoid distortion and system leakage, do not touch the copper pipes.

2.1.3 Inspection

After receiving the product, you should check the accessories against the packing list. If any parts are found missing or damaged, please report to the carrier immediately. If any covert damage is found, please report to the carrier and the local office of the product supplier.

2.2 Installation Notes

1. The outdoor unit should be installed in a place that is convenient for maintenance. Do not install the outdoor unit at the bottom layer of the public place and the unit should be installed far away from the residential area.
2. Do not directly install the outdoor unit in the environment with noise restrictions.
3. To ensure the heat dissipation capacity, install the condenser in a clean place that is far away from dusts and foreign objects to avoid obstruct the heat exchanger.
4. Do not place the unit close to vapors, hot gases and waste gases.
5. Keep at least 500 mm [19.7 in.] clearance between the outdoor unit and the wall, barrier or neighboring equipment.
6. Do not place the unit at the air inlet side and air discharge side where snow may be accumulated.
7. Prepare a base that can withstand the weight of the outdoor unit (see Table 1-1 for the specific weight). The height of the base should be at least 50 mm [2 in.] above the ground and should be higher than the base of unit by 50 mm [2 in.], as shown in Figure 2-4.
8. When multiple outdoor units need to be placed in overlap mode, install according to the mode as shown in Figure 2-4.
9. In order to ensure the performance of the unit, priority is given to vertical airflow installation of the outdoor unit.
10. When the ambient temperature is less than $-15\text{ }^{\circ}\text{C}$, the Low Ambient Kit should be used. And only vertical airflow is allowed for the condenser with Low Ambient Kit, and the Low Ambient Kit should be mounted in the condenser legs for proper operation.

2.3 Space Requirements

NOTE: A 4000 mm [157.5 in.] clearance is required above the condenser air outlet.

The condenser needs sufficient installation and service space around the installation place. The condenser installation space requirements are as follows:

2.3.1 Vertical airflow installation

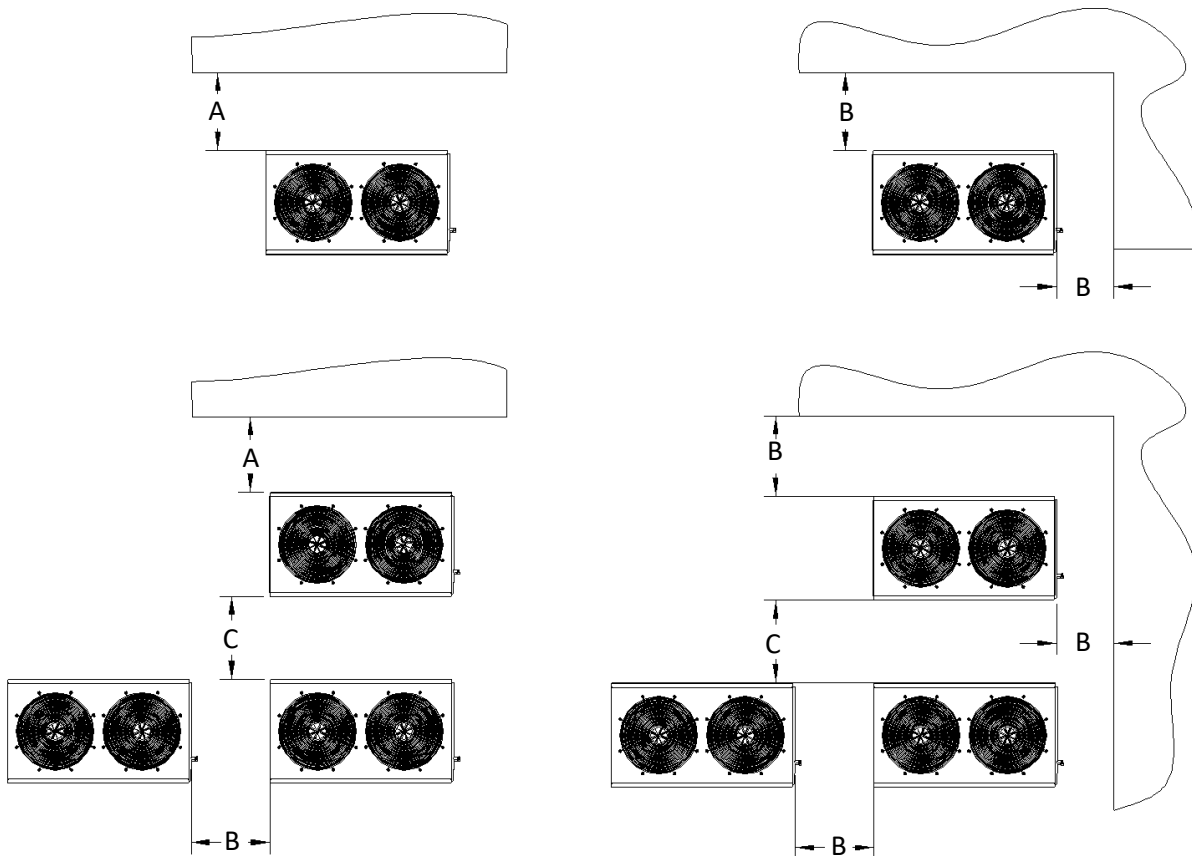
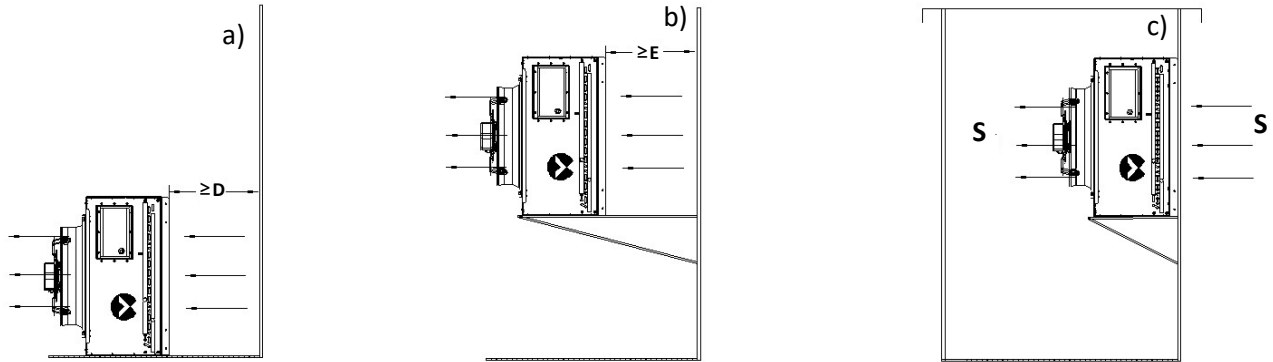


Figure 2-3 Vertical airflow installation space requirements

Table 2-1 Vertical airflow installation space dimensions

Condenser Model	Dimensions (mm[inch])		
	A	B	C
CCD101S-00A	915 [36]	915 [36]	800 [31.5]

2.3.2 Horizontal airflow installation



S= Airflow passage equivalent to or larger than the frontal surface.

Figure 2-4 Horizontal airflow installation space requirements

Table 2-2 Horizontal airflow installation space dimensions

Condenser Model	Dimensions (mm[inch])	
	D	E
CCD101S-00A	500 [19.7]	300 [11.8]

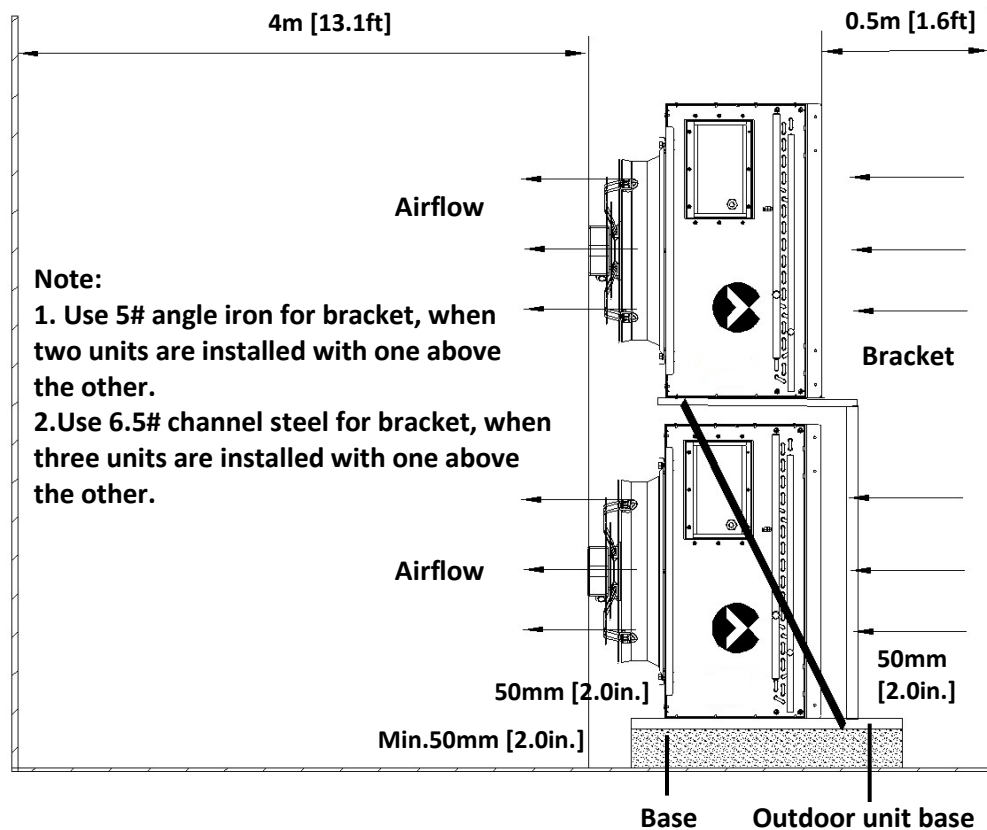


Figure 2-5 Multiple Outdoor Units Placed in Overlap Mode

2.4 Installation Procedures



CAUTION: To ensure the safety, before welding the pipeline and patching welding, all nitrogen of air condition system must be discharged to release the system pressure.

2.4.1 Installing the Low Ambient Kit

The Low Ambient Kit as the extension configuration of standard condenser, which how to install it on the condenser please refer to this section. Before installing the Low Ambient Kit, disconnect the inlet and outlet pipeline of condenser and the Low Ambient Kit as shown in Figure 2-6.

Firstly, mounting the screws, but not tight them, hang the Low Ambient Kit on the outrigger. Secondly, weld the copper pipe with the inlet and outlet of condenser. Finally, tighten the 4 pcs screws(M8X40).

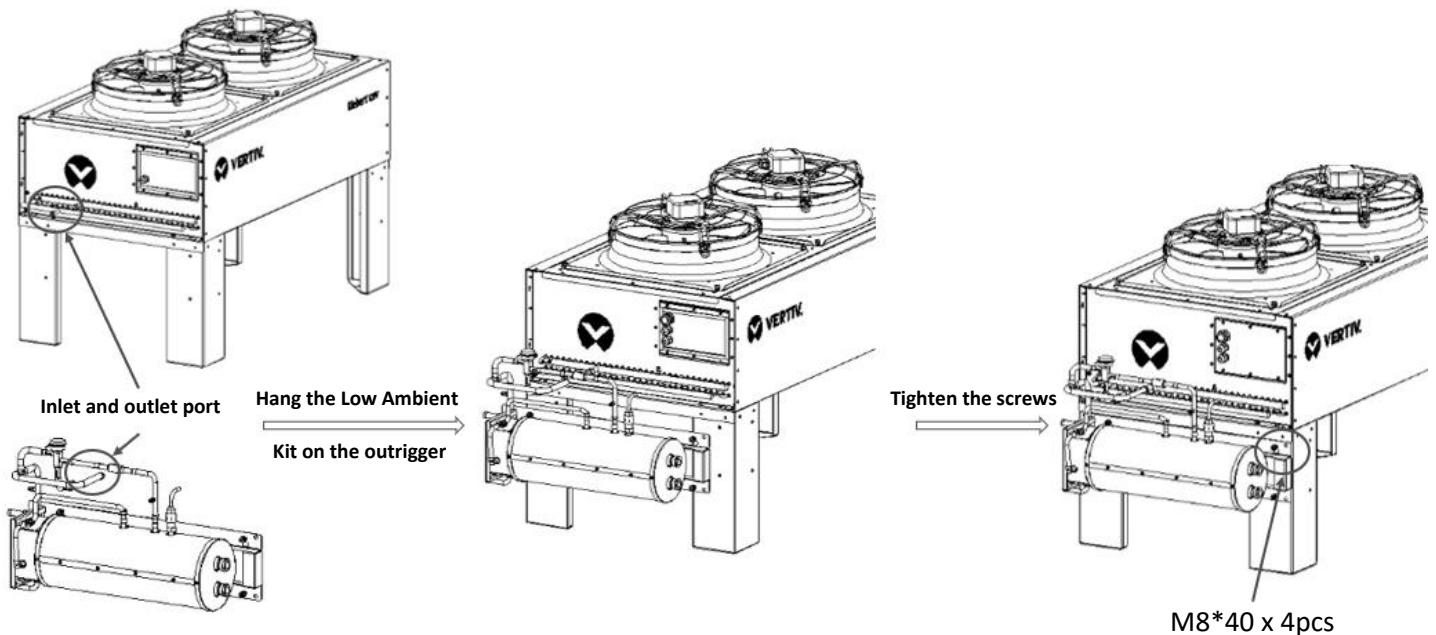


Figure 2-6 Installing the Low Ambient Kit

NOTES:

- Before disconnect the inlet and outlet pipeline of condenser and the Low Ambient Kit, the protective gas in the condenser and Low Ambient Kit must be released through three Schrader Valve on the Low Ambient Kit and one Schrader Valve on the condenser.
- When welding the copper pipe with the inlet and outlet of condenser and Low Ambient Kit, it is necessary to wrap wet cloth around the Schrader valve near the welding position to prevent the valve core from burning out.

2.4.2 Installing 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, or building and equipment damage. 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.

For systems requiring EU CE compliance (50 Hz), the system installer must provide and install a pressure relief valve in the high side refrigerant circuit that is rated same as the refrigerant high side “Max Allowable Pressure” rating that is marked on the unit serial tag. Do not install a shutoff valve between the compressor and the field installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU “Notified Body.”



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).

NOTES:

- The copper pipes should be heat preserved. When the copper pipes pass through the wall or other obstacles, take isolation measure such as using the shock pad to avoid direct contact with the wall. Prevent the dust, water vapor and solid particles from entering the copper pipes.
- All the joints of the refrigerating pipes must be silver-brazed.
- Use a flow of dry nitrogen through the piping 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.

1. Identifying the pipe sizes

Refer to Installing Unit Pipes in Liebert CRV, CRD10 Air Conditioner User Manual for pipe sizes.

2. Identifying the condenser installation height

Refer to Installing Unit Pipes in Liebert CRV, CRD10 Air Conditioner User Manual for the installation height.

3. Installing pipes

Install the pipes according to the factual conditions and industry standard.

2.4.3 Installing Line Voltage Wiring



WARNING! Arc flash and electric shock hazard. Can cause serious injury or death. Disconnect all local and remote electric power supplies and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Verify with a voltmeter that power is Off. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components still require and receive power even during the “Unit Off” mode of the controller. The factory-supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. Follow all local codes.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify that power is off with a voltmeter before working within any electric connection enclosures. The Liebert® microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® control.

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.



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



WARNING! 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.

NOTES:

- The suggestion specification for the connection cable between the indoor unit and the condenser:16AWG.
- Install a manual, electrical-disconnect switch within 5ft (1.6m) of the unit and in accordance with local codes.
- The wiring cannot contact with hot objects, such as the copper tube and water pipe without insulation, to avoid damaging the insulation layers.

- The wires should be connected in accordance with the local regulations.
- The power supply of the equipment should be installed by professional personnel on site. If the power supply wires are damaged, to avoid risk, they must be replaced by the professional personnel from the manufacturer, maintenance department or similar department of the manufacturer.

The specifications of the power supply wires of the outdoor unit is (L+N+PE), the recommended wire diameter is no less than 16AWG(1.5mm²). Connect one end of the power supply cables from the accessories to the power output terminals of the indoor unit as shown in Figure 2-7, and connect the other end to the power terminals of the condenser as shown in Figure 2-8.

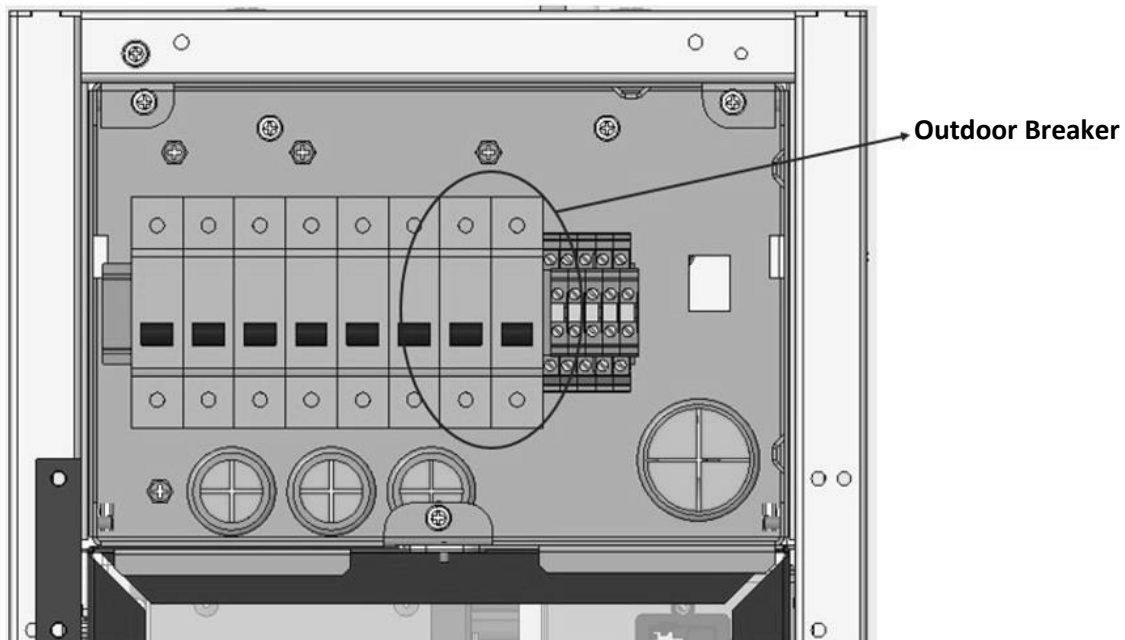


Figure 2-7 Power Output Terminals of the Indoor Unit, CRD10

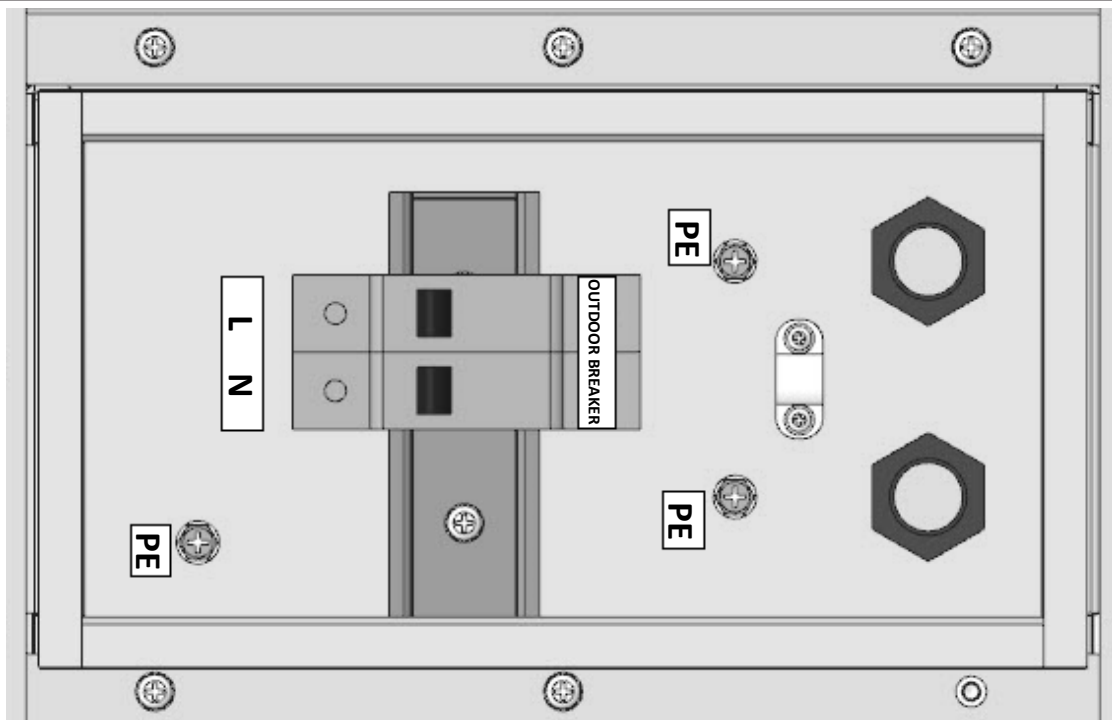
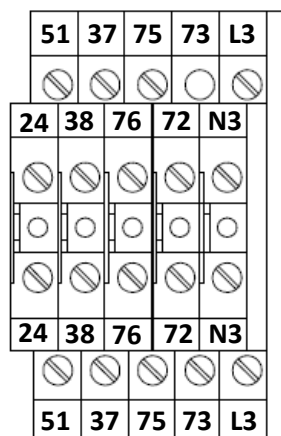


Figure 2-8 Wiring Diagram of the CCD101S Condenser Power Supply Cables

The Low Ambient Kit requires a separate line voltage electrical supply for the heating belts, the recommended wire diameter is 18AWG(1.0mm²). The installation method of line voltage wiring of the condenser with Low Ambient Kit, refer to the instruction as follows.

Due to the electronic box plate of the standard condenser is different from the condenser with Low Ambient Kit, the new plate in the delivery accessories need to be replaced. Firstly, remove the previous box plate, install and fix the HEATER BREAK into the electronic box. Secondly, connect the electric heating belt wire through the locking head on the left side of the box plate to the HEATER BREAK. Connect one end of the Low Ambient Kit power supply wires to the HEATER BREAK through the locking head on the middle as shown in Figure 2-10, and connect other end of the Low Ambient Kit power supply wires to the power output terminals(L3,N3) of the indoor unit as shown in Figure 2-9. The installing line voltage wiring of outdoor unit, please refer to the installing method of standard condenser. Finally, when all the wires are connected, fix the cover plate.



- L3,N3 : Low Ambient Kit Heater Belt
- 72,73 : LLSV
- 37,38 : Common Alarm
- 51,24 : Water Under Floor

Figure 2-9 Amplified View of Power Output Terminals of the Indoor Unit, CRD10

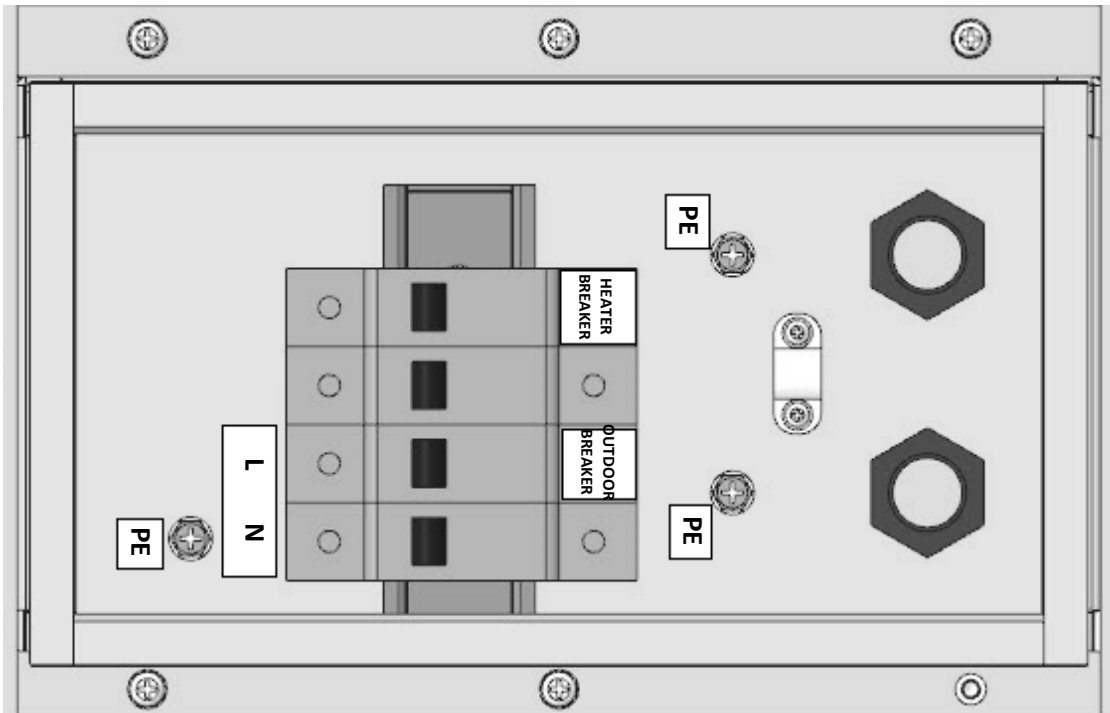


Figure 2-10 Wiring Diagram of the CCD101S Condenser Power Supply and Electric Heating Belt Cables

2.5 Charging Refrigerant and Adding Cooling 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, or building and equipment damage. 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.

For systems requiring EU CE compliance (50 Hz), the system installer must provide and install a pressure relief valve in the high side refrigerant circuit that is rated same as the refrigerant high side “Max Allowable Pressure” rating that is marked on the unit serial tag. Do not install a shutoff valve between the compressor and the field installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU “Notified Body.”



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).

Refer to Installing Unit Pipes in Liebert CRV, CRD10 Air Conditioner User Manual for charging refrigerant and adding cooling oil.

Chapter 3: Maintenance and Troubleshooting

This chapter introduces the maintenance and troubleshooting of the condenser. Users should check the condenser regularly and solve the problems in time.



WARNING! Arc flash and electric shock hazard. Can cause serious injury or death. Disconnect all local and remote electric power supplies and wear appropriate, OSHA-approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Verify with a voltmeter that power is Off. The Liebert® controller does not isolate power from the unit, even in the “Unit Off” mode. Some internal components still require and receive power even during the “Unit Off” mode of the controller. The factory-supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic.

Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available utility power. Follow all local codes.



WARNING! Risk of electric shock. Can cause serious injury or death. Open all local and remote electric power supply disconnect switches and verify that power is off with a voltmeter before working within any electric connection enclosures. The Liebert® microprocessor does not isolate power from the unit, even in the "Unit Off" mode. Some internal components require and receive power even during the "unit off" mode of the Liebert® control.

Installation, service, and maintenance work must be performed only by properly trained and qualified personnel and in accordance with applicable regulations and manufacturers' specifications. Opening or removing the covers to any equipment may expose personnel to lethal voltages within the unit even when it is apparently not operating and the input wiring is disconnected from the electrical source.



WARNING! Risk of 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.

NOTICE!

Risk of improper maintenance. Can cause equipment damage.

All maintenance must be performed only by authorized properly trained and qualified personnel.

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 Liebert® CRV contains substances and components hazardous for the environment (electronic components, refrigerating gases and oils). At the end of its useful life, the Liebert® CRV 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.

3.1 Maintenance

3.1.1 Refrigeration System

1. Check that the refrigeration pipes are firmly fixed. The refrigeration pipes shall not shake with the vibration of wall, earth or equipment frame. Otherwise reinforce the refrigeration pipes with fastening objects.
2. Check that there is no oil on the accessories of all refrigeration pipes, and make sure that the pipes do not leak.

3.1.2 Heat Exchanger

1. Clean the fin of heat exchanger regularly.
2. The best overall condenser coil cleaner to use is plain water or compressed air. If the coil has been maintained and cleaned at regular intervals, water or compressed air is sufficient to remove dirt and debris from the fins. Heavy build up on the exterior of the fins can be removed with a brush. Water pressure from a garden hose and sprayer usually works well. If the installation environment of the condenser does not allow the fins to be cleaned with water, the compressed air may be a better method. The recommended pressure for the air is about 0.3Mpa.
3. Check for damaged or bent fins and straighten them as needed.
4. Avoid snow accumulation around the condenser in winter.

3.1.3 Fan

Check that the fan runs normally and check it for problems such as abnormal noise, vibration and bearing failure.

3.2 Troubleshooting

Perform troubleshooting according to Table 3-1.

Table 3-1 Table of Alarm Troubleshooting

Fault Phenomenon	Possible Causes	Handling Method
Equipment does not start up	Equipment does not connect to the power supply	Check the input voltage
High pressure alarm	Insufficient condenser air flow	Clean away the alien objects on the coil surface or near the air inlet, and check the fan speed regulation function of the control board
	Condenser fan does not run	Check if the cable connection between the control board and outdoor unit terminals is loosened, check if the outdoor unit cable connection is loosened, and check if the condenser pressure sensor is normal

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