Vertiv™ Liebert® XDC

High Heat Density Precision Air Conditioner

User Manual

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 for additional assistance.

Product	BOM	Version	Date	Revision
XDC	31014396	1.0	17-06-2021	R1
XDC	31014396	1.0	29-01-2021	R0

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Table of Contents

1 Overview

This chapter introduces the product description, model description, product appearance and main components of Vertiv™ Liebert® XDC High Heat Density Precision Air Conditioner (hereafter referred as Liebert XDC). The Liebert XDC is a specially engineered equipment for the applications which does not permit any unauthorized and unqualified access in the system. It must be used only by professionally trained personnel if it is placed in shopping malls, light industry, or any business environment.

1.1. Product Introduction

The Liebert XDC main unit is a large, multi-connected precision environmental control equipment, suitable for the environment control of medium and large computer rooms, modular computer rooms and similar ecosystem that also calls for energy-saving, high heat density and reliability requirements. It is specifically designed to ensure precision equipment such as sensitive equipment, industrial process equipment, communication equipment and computers have a reasonable and safe operating environment.

Liebert XDC is highly effective and efficient in solving the problem of heat dissipation in server rooms with high heat density, and it is installed where cooling load changes drastically.

It is also configured with Vertiv™ Liebert® XD multi-connected air conditioners with the following features

1.1.1. Energy Saving

The Liebert XDC main unit adopts a high-efficiency variable capacity compressor, and Liebert XD terminal adopts high-efficiency EC fan, high-precision electronic expansion valve control device. The Liebert XD terminal has three types: Vertiv™ Liebert® XDH, Vertiv™ Liebert® XDV, and Vertiv™ Liebert® XDO, which can be flexibly selected for different application environments. It is placed close to the server, reducing the air supply distance; improving efficiency and energy saving.

The unit provides real-time compressor operating status, terminal operating status, indoor ambient temperature, outdoor ambient temperature, outdoor fan running status, etc., and also enable to adjust the status of each operating component of the system in real time to make the system run in the most energy-saving state. The XD multi-connected air conditioning system has a new PID optimization algorithm that significantly improves the energy efficiency ratio of the system under different compressor outputs. The system energy efficiency comparison between Liebert XD multi-connected air conditioner and traditional computer room air conditioner is shown in Figure 1-1.

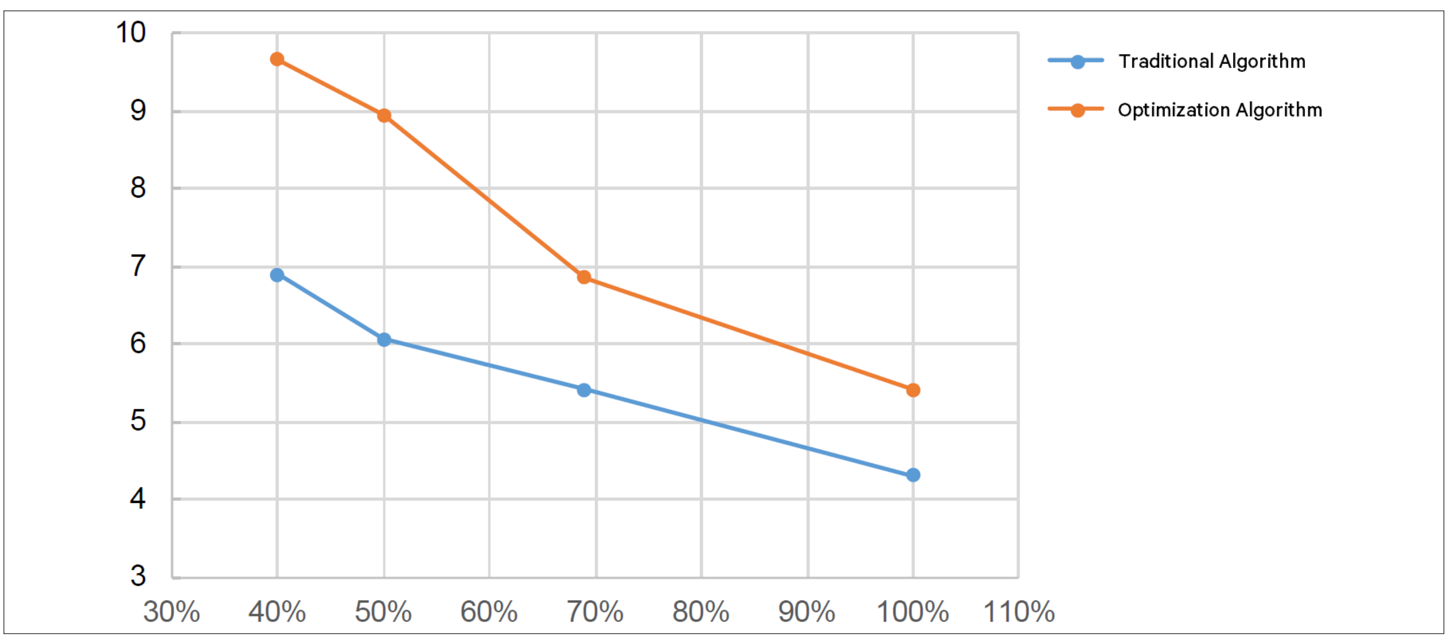


Figure 1-1 System Optimization Algorithm Comparison

1.1.2. Diversified Terminal Types

The Vertiv™ Liebert® XD terminal air conditioners are arranged close to the server, and the diversified layout can be applied to different installation and use environments, as shown in Figure 1-2, Figure 1-3, and Figure 1-4.

Note: For the related contents of the Liebert XD terminal, please refer to the user manual of the respective terminal (for example Vertiv™ Liebert® XDH, Vertiv™ Liebert® XDO, and Vertiv™ Liebert® XDV).

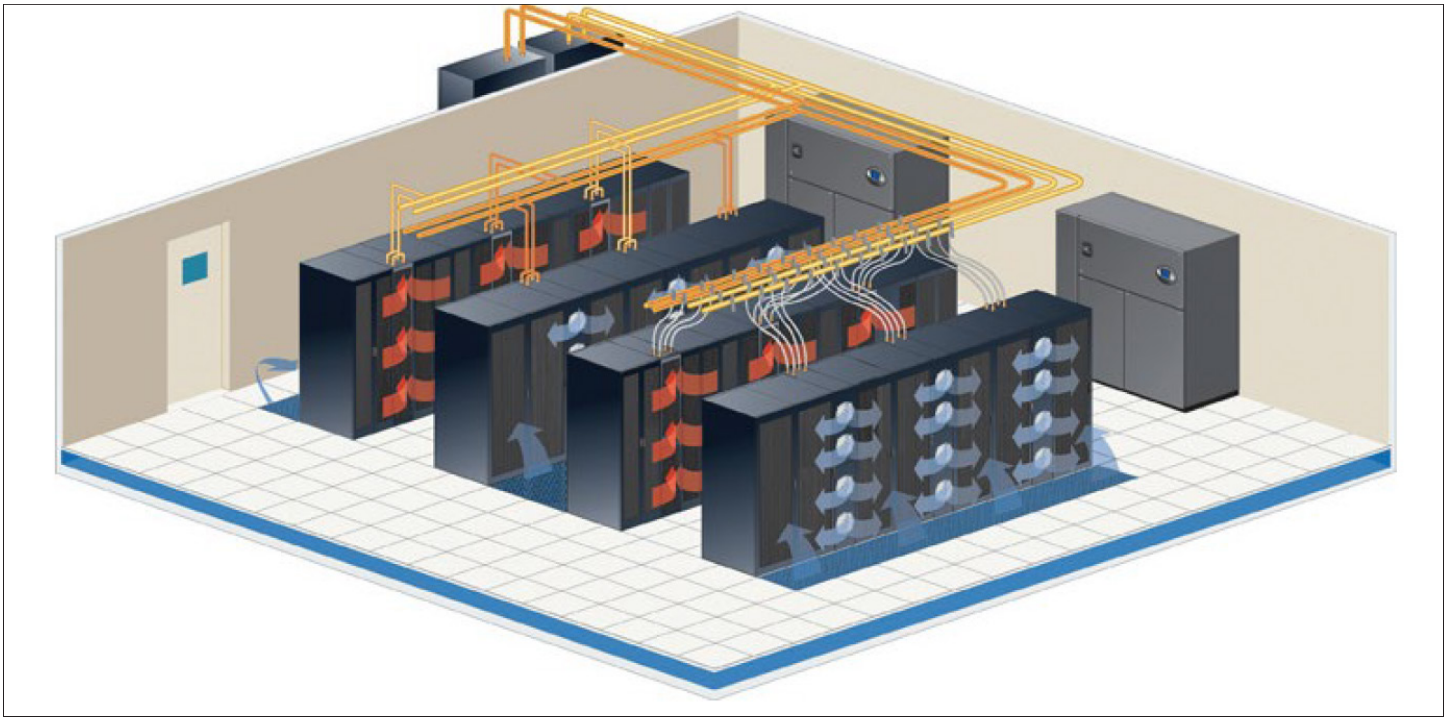


Figure 1-2 Liebert XDH Layout Diagram

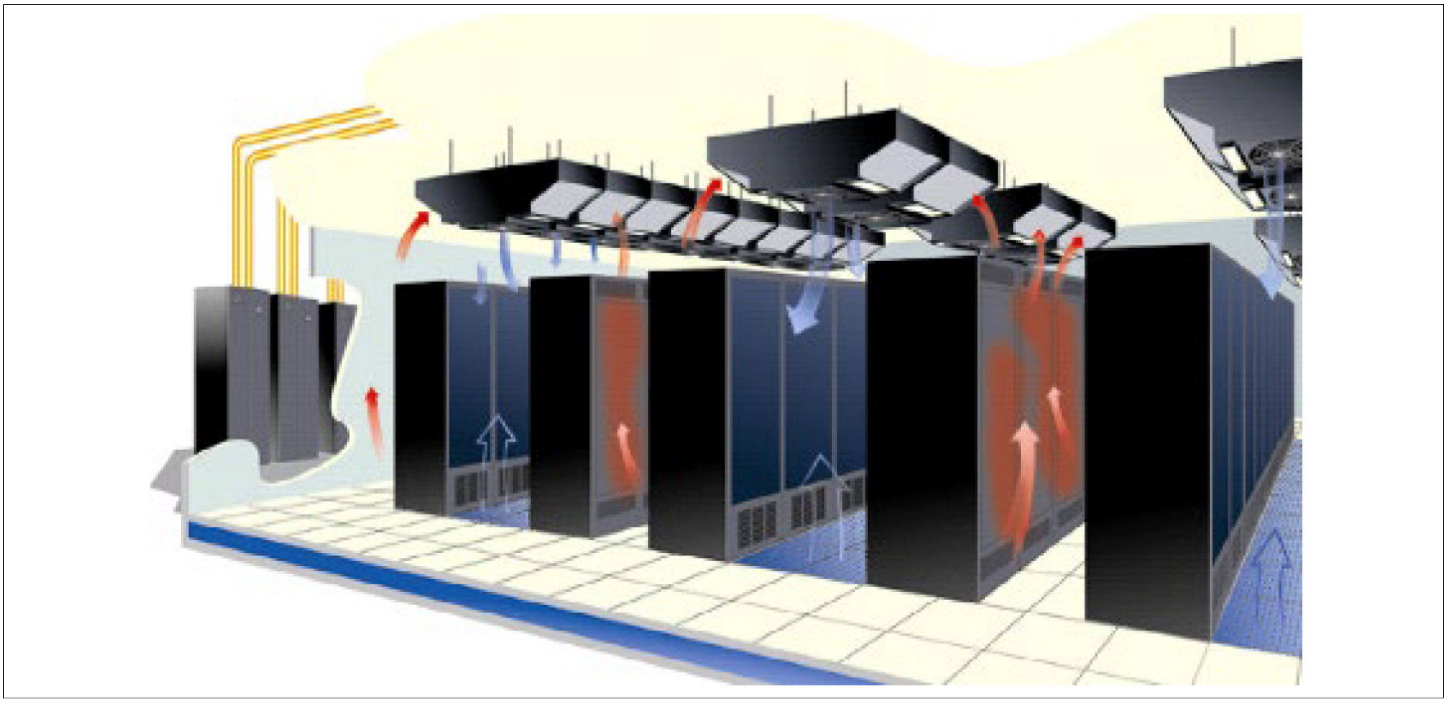


Figure 1-3 Liebert XDO Layout Diagram

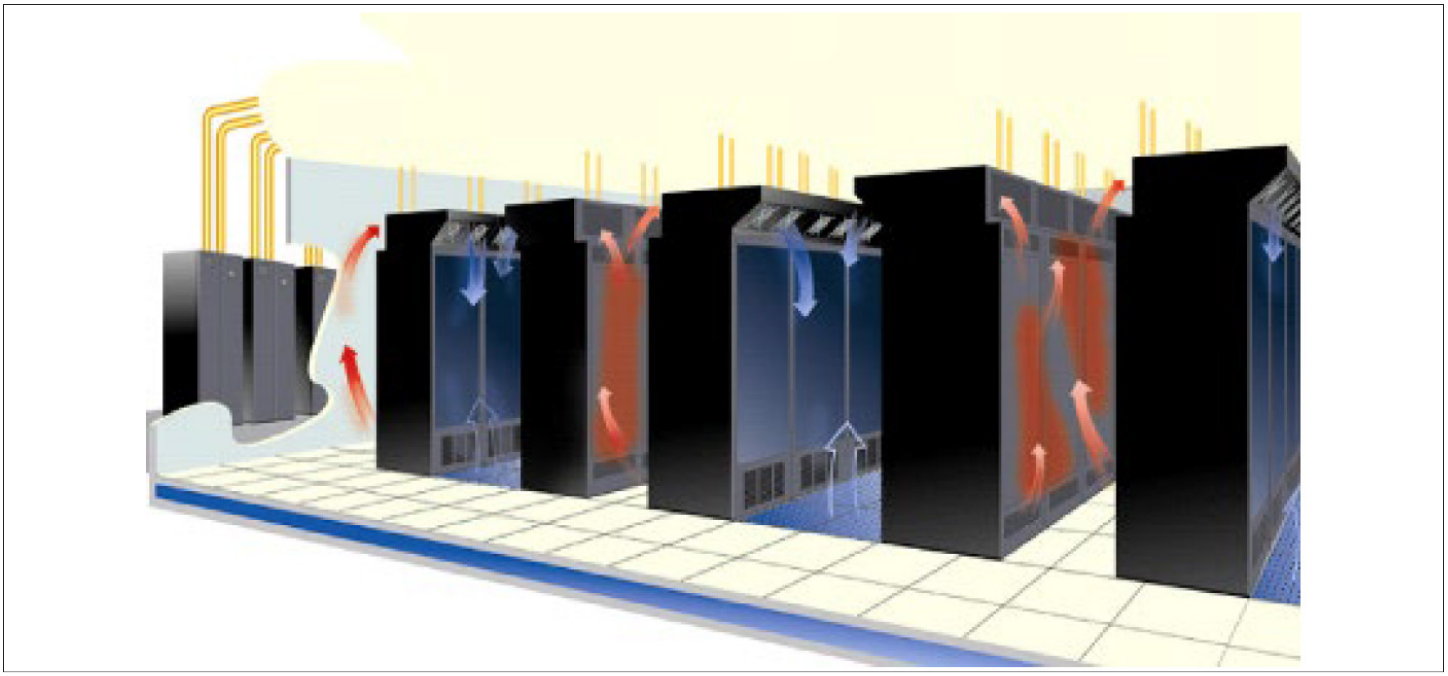


Figure 1-4 Liebert XDV Layout Diagram

- Precision Control

Vertiv™ Liebert® XD air conditioner can accurately control temperature and humidity. The indoor temperature control range is from 18 °C to 40 °C, the temperature adjustment accuracy can reach the setpoint of ±1 °C, and the temperature change rate is less than 5 °C/hour. If the temperature fluctuation exceeds the limit, the system will send a remote alarm signal. The indoor relative humidity control range is from 20% to 80% RH, and the control accuracy can reach the setpoint of ±5% RH.

- Convenient and Durable

Durable parts, compact structure, small overall sizes; unique structure design frame which is stable, strong and easy to disassemble and can be easily handled under extreme conditions.

- Highly Efficient Refrigerant

In order to meet the international requirements, the unit uses R410A a highly efficient refrigerant.

- Multiple Protection

The built-in automatic alarm and diagnosis functions protect the air conditioner unit in all aspects, and can more effectively prevent the occurrence of failures, can identify the fault location more quickly that effectively extend the service life of the air conditioner unit.

- Easy to Maintain

Vertiv™ Liebert® XDC unit adopts a front door opening arrangement which helps in accessing all the live parts for the maintenance from the front side, and also enable the compact footprint of the unit.

1.2. Model Nomenclature

The Vertiv™ Liebert® XDC is defined by twelve digits, as represented in Table 1-1.

Table 1-1 Vertiv™ Liebert® XDC Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12
X	D	C	1	3	0	R	M	1	L	A	1

Digit 1, 2 Product Model	
XD	***X-treme High Density***
Digit 3 Cooling System	
C	***Compressor***
P	Pump
Digit 4, 5, 6 Cooling Capacity kW	
0-9	130 kW
Digit 7 Redundancy	
R	***Pump Redundancy***
9	Dual Invert Compressor
Digit 8 Power Supply	
M	***380 V to 400 V, 3 Ph, 50 Hz***
N	***380 V to 415 V, 3 Ph, 50 / 60 Hz+N***
Digit 9 Refrigerant	
1	***R410A***
2	R134A
Digit 10 Installation Option	
L	***In-row Installation***
R	Perimeter Installation
Digit 11 System Type	
2	2 Way Water Valve
3	3 Way Water Valve
A	***Air-cooled***
Digit 12 Order Identifier	
1	***With Dehum function (China XDP Only)***
C	China Version
A	America Version
E	EMEA

The standard components are represented in ***'Bold Italic'*** font in

1.3. Product Appearance

The appearance of Vertiv™ Liebert® XDC main unit is shown in Figure 1-5.

High Heat Density Main Unit Between Rows

High Heat Density Main Unit in Room

Figure 1-5 Air Conditioner Appearance Drawing

1.4. Main Components

The Liebert XDC main unit mainly has a compressor, sight glass, safety control device, oil separator, compressor's driver color screen and other supporting components.

1.4.1. Compressor

The unit uses a high-efficiency variable capacity compressor, as shown in Figure 1-6. This compressor not only have the characteristics of low vibration, low noise and high reliability, but also can automatically adjust the speed and output difference capabilities according to the changes in cooling requirements, which greatly improves the overall energy efficiency of the system.

Figure 1-6 Variable Capacity Compressor

1.4.2. Sight Glass

The unit is provided with a system cycle window that allows user to observe the state of the refrigerant and to determine the moisture content of the system. When the moisture content of the system exceeds the standard, its background color changes from green to yellow.

Figure 1-7 Sight Glass

1.4.3. Color Display Screen

Liebert XDC main unit is equipped with a 7-inch HMI color screen display configuration that has a simple user interface and multi-level password protection which can effectively prevent the illegal operations. It has power-down self-recovery function, and high/low voltage protection function. It can display the running status of set parameters of the components in real time. Through the menu operation, you can accurately understand the running time of each key components.

The expert fault diagnosis system can automatically display the current fault, which helps maintenance personnel to maintain the unit. It can store up to 1000 historical event records.

Figure 1-8 Color Display Screen

1.4.4. Safety Control Device

Each Vertiv™ Liebert® XDC system is equipped with high-pressure protection, low-pressure protection and exhaust temperature protection devices. When the compressor's discharge pressure or discharge temperature is too high, an emergency alarm is triggered and protection protocol is executed; when the compressor cannot work normally due to low suction pressure, an alarm signal is triggered and protection protocol is executed.

1.4.5. Oil Separator

The unit uses a high-efficiency oil separator with oil separation efficiency of 90% or more, ensuring stable oil return from the compressor.

1.4.6. Remote Monitoring Software

Liebert XDC air conditioner is provided with the standard industrial communication protocols such as Modbus RTU protocol (default), RS485 interface, and computer to computer serial communication.

1.4.7. Outdoor Unit

For outdoor unit related information, please refer to Vertiv™ Liebert® LVC Series Condenser User Manual.

1.5. Refrigerant Requirements

- Do not use inferior quality refrigerant as it can cause an extensive damage to the system.
- Vertiv does not undertake any responsibility for all the related consequences that result from using a inferior quality refrigerant.

1.6. Environmental Requirements

1.6.1. Operating Environment

The operating environment of the Vertiv™ Liebert® XDC main unit meets the requirements of GB4798.3-2007, as shown in Table 1-2.

Table 1-2 Operating Environment Requirements

Items	Requirements	
Ambient temperature	Indoor	18 °C to 40 °C, RH<60%
	Outdoor	-15 °C to 45 °C (Please contact Vertiv when outdoor temperature below -15 °C)
Main unit protection level	IP20	
Altitude	<1000m, more than 1000m, please contact Vertiv Technology	
Operating voltage range	380 V to 415 V (-10% to +6%) V, 3 N~, 50 Hz/60 Hz	
Pollution level	Level II	

1.6.2. Storage Environment

The storage environment of the Liebert XDC main unit meets the requirements of GB4798.1-2005, see Table 1-3 for details.

Table 1-3 Storage Environment Requirements

Items	Requirements
Storage environment	Indoor, clean (no dust)
Environment humidity	<95%RH
Ambient temperature	-25°C to +55°C
Storage time	The total transportation and storage time does not exceed 6 months, and the performance needs to be re-calibrated after 6 months

2 Mechanical Installation

This chapter introduces the mechanical installation of the Vertiv™ Vertiv™ Liebert® XDC main unit, including computer room requirements, maintenance space requirements, equipment handling, unpacking, inspection, installation notes, system installation layout, installation of unit piping and installation inspection, etc.

2.1. Equipment Room Requirements

The equipment room requirements are as follows:

1. In order to ensure the normal operation of the environment control system, the equipment room should be moisture-proof and heat-insulated.
2. The equipment room must have the moisture-proof layer of the ceiling and walls must be made of polyethylene film or painted with moisture-proof paint.
3. The entry of outdoor air may increase the load of the system, so it is necessary to minimize the entry of outdoor air into the equipment room. It is recommended that the intake of outdoor air be kept below 5% of the entire indoor air circulation.
4. All doors and windows should be fully enclosed.
5. The thermal load of the computer room should not be less than 30% of the rated cooling capacity of the unit.

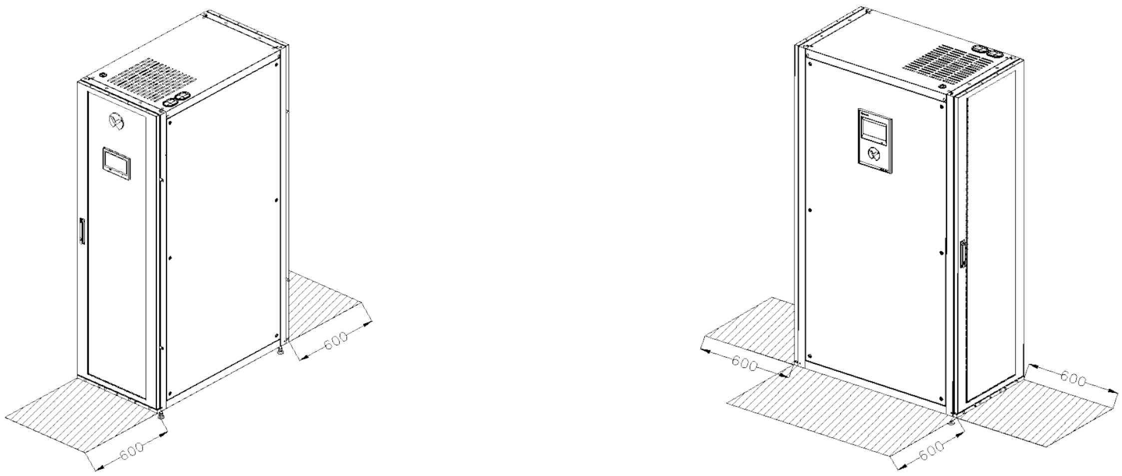
- The Liebert XDC precision air-conditioner main unit is prohibited to be used in the open harsh outdoor environment.
- Keep the unit upright, place it indoors, keep it away from damp and low-temperature places, and avoid contact damage.

2.2. Maintenance Space Requirements

The Liebert XDC unit can be installed in two ways: 'Installation between rows' and 'installation in room', customers can flexibly choose the respective model according to the actual application.

- Maintenance Space Requirements

User can choose installation between rows or installation in room, both of which require opening of the front door and the rear door for maintenance. (In some cases, the main unit requires opening of the side door with the display screen). The maintenance space of at least 600 mm should be provided at the front, rear and display side of the unit, as shown in Figure 2-1.



Maintenance space of main unit between rows | Maintenance space of main unit in room

Figure 2-1 Schematic Diagram of Unit Maintenance Space

The minimum maintenance space requirements of the unit are shown in Table 2-1.

Table 2-1 Minimum Maintenance Space (unit: mm)

Location	Minimum Maintenance Clearance
Front door	600 mm
Rear door	600 mm
Display screen side	600 mm

Note:

- These spaces are used for daily maintenance of the unit.
- The front door of the unit is defined as the side with the display screen, and the side opposite the front door is the rear door.
- The main units that are installed between the rows, only require maintenance space at the front and rear sides.
- In case of a special application, consult Vertiv local representative.

2.3. Unpacking and Inspection

2.3.1. Transportation and Handling

1. When transporting, the priority shall be given to rail or water transportation. If user choose road transportation then a road with better road conditions should be select to prevent excessive bumps.
2. Vertiv™ Vertiv™ Liebert® XDC unit is heavy. Refer Table 2-3 for weight parameters. Mechanical handling tools, such as electric forklifts are required for unloading and handling.
3. When transporting, transport the unit to the place closest to the installation site. Figure 2-2 illustrates the forklift lifting the unit and the fork should be at the center of gravity to prevent tipping of the unit.

Figure 2-2 Forklift Position to Lift the Unit

While moving the indoor unit, keep the obliquity within the range of 75° to 105°, as shown in Figure 2-3.

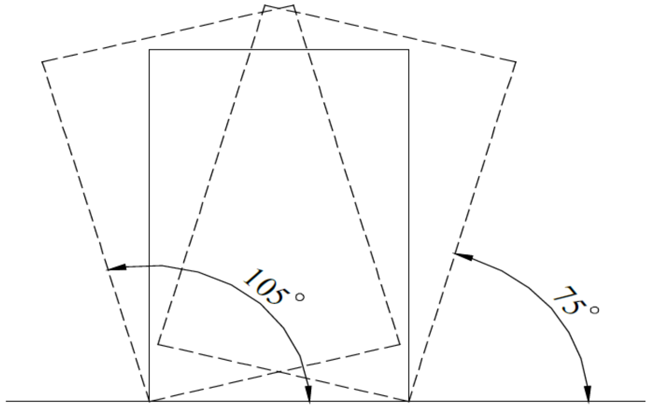


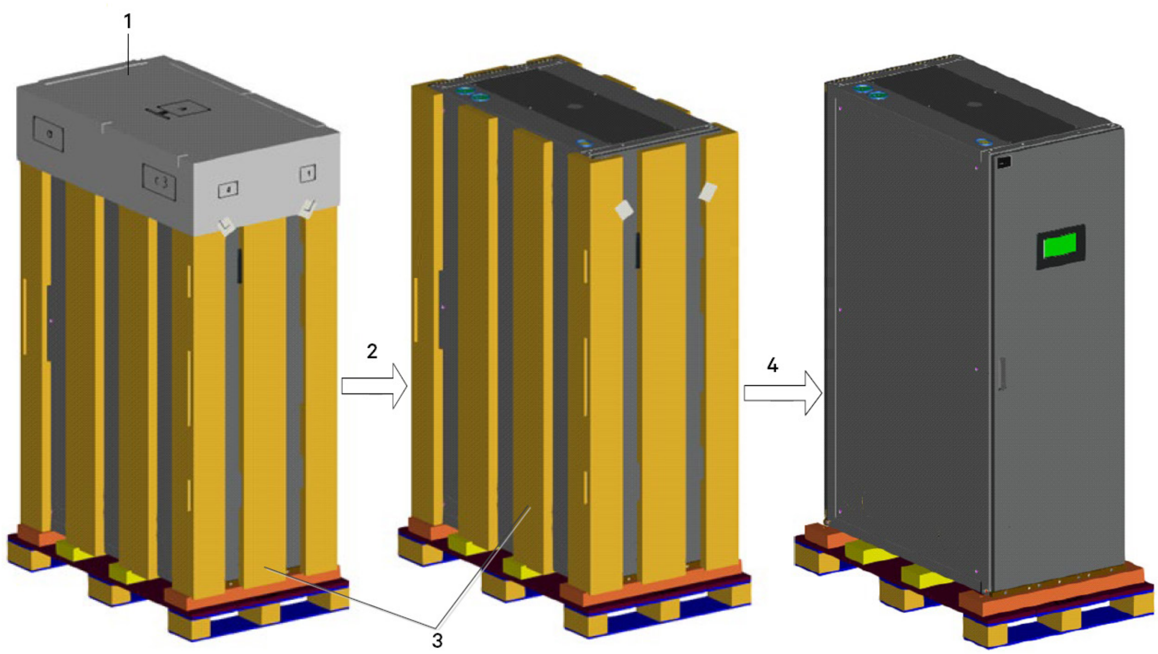
Figure 2-3 Handling Angle

2.3.2. Unpacking

The unit's cabinet is packed with honeycomb cardboard and stretch film. After moving the unit to the place closest to the final installation site, unpack it.

The unpacking procedures are as follows:

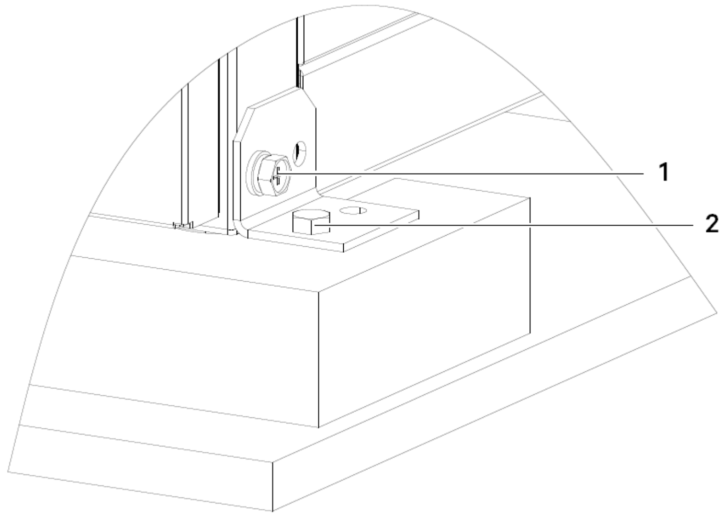
1. First remove the top cover and winding stretch film, then remove the honeycomb cardboard, as shown in Figure 2-4.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Top cover	3	Honeycomb cardboard
2	Remove the top cover	4	First remove the winding stretch film and then remove the honeycomb cardboard

Figure 2-4 Unpacking the Unit

2. Remove the bottom pallet, the unit is fixed on the bottom pallet with M8x20 and M8x80 screws (as shown in Figure 2-5), and a 17 mm open wrench, ratchet wrench or socket can be used for disassembly.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Screw GB9074_13-88_M8 x 20	2	Hexagon head bolt GB/T 5782-2000_M8 x 80

Figure 2-5 Bottom Pallet Screw Fixing Position

2.4. Inspection

After unpacking, check whether the accessories are complete according to the packing list (the Vertiv™ Liebert® XDC accessories list is shown in the following Table 2-2), and check whether any part is obviously damaged.

If any part is found to be missing or damaged during inspection, or if any concealed damage is identified, it should be reported immediately to the carrier, Vertiv local representative and product supplier.

Table 2-2 Liebert XDC Accessories List

Name	Specifications	Quantity	Usage
User manual	Paperback (A4 Booklet)	1	On-site reference use.
Engineering sight glass	Connection size 16	2	To be welded on the main liquid piping at site, one for each refrigerant piping system. It is use to see while charging the refrigerant and to observe the state of the refrigerant in the system.
L-shaped cabinet parts and matching screws	Screw specifications GB819_1_2000_M5x12	4	If the Liebert XDC main unit is installed between the rows, user can fix it with the adjacent cabinets by combining the cabinets.

2.5. Installation Notes

1. The Liebert XDC main unit is recommended to be installed between the rows or on the floor of the equipment room or the computer room. According to the diversified types of Vertiv™ Liebert® XD terminals, user can choose Vertiv™ Liebert® XDH floor installation, Vertiv™ Liebert® XDO (ceiling mounted at cold aisle), Vertiv™ Liebert® XDV placed on the server rack.
2. Prior to installing the unit, confirm whether the installation environment meets the requirements (refer Section 1.6 Environment Conditions), and confirm whether the building need any modification to match the requirement of pipeline's layout, for more details consult Vertiv local representative.
3. The installation must strictly follow the design drawings, and reserve maintenance space for daily maintenance and repairs. Refer to the engineering dimension drawing provided by the manufacturer.

2.6. System Installation Layout

2.6.1. Overall System Layout

Vertiv™ Liebert® XDC air conditioner contains at least two cooling systems. The installation and application methods of these two cooling systems are same, but the pipelings are completely independent. The overall system layout is shown in Figure 2-6.

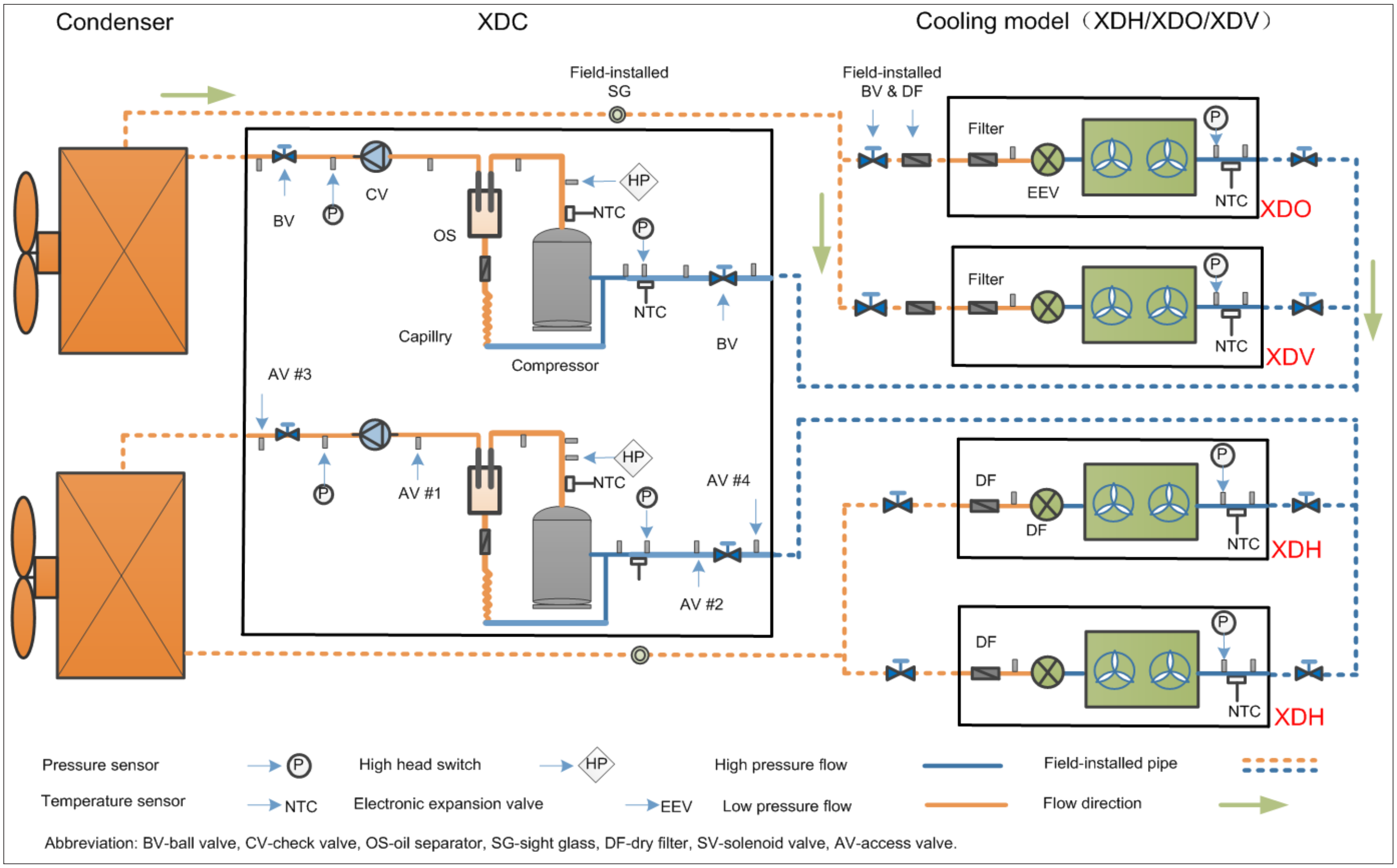


Figure 2-6 Overall layout of the system

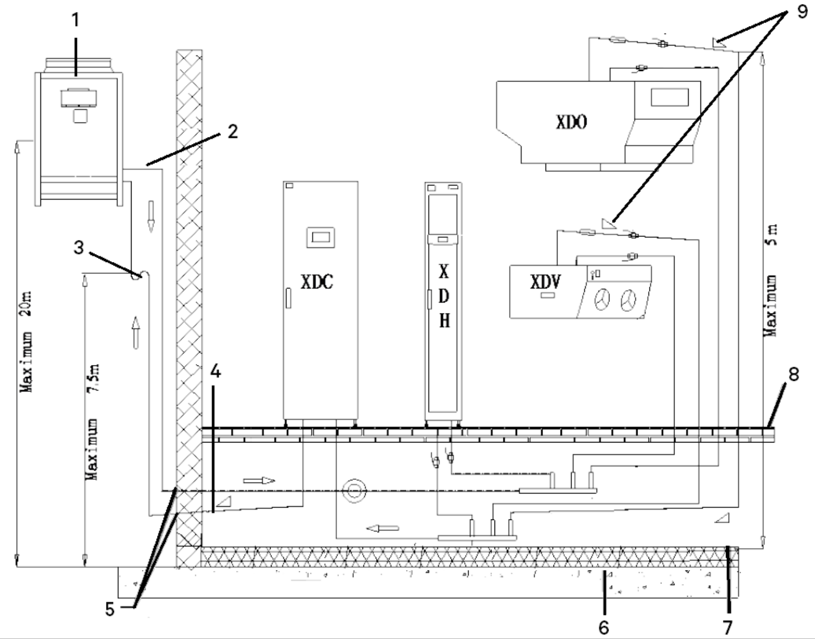
Note: Figure 2-6 shows a schematic diagram of Liebert XDC with a Terminal Fan, in actual practise the number of fans may be more than 2.

Note: Each system of the Liebert XDC main unit can be equipped with multiple cooling terminals. In Figure 2-6, one system is equipped with 2 terminals, which is only for an example.

Note: The terminal type is not limited to Vertiv™ Liebert® XDH, Vertiv™ Liebert® XDV, Vertiv™ Liebert® XDO, consult Vertiv Technical Team for more details.

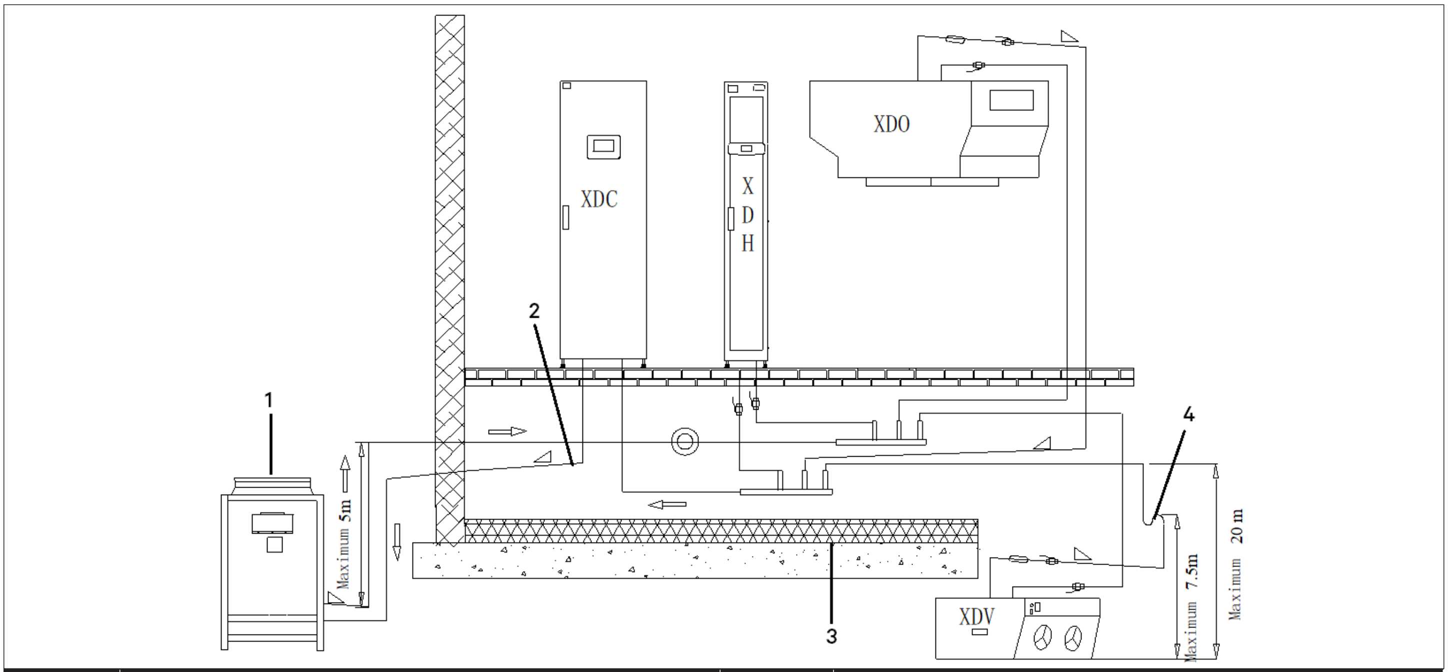
2.6.2. System Installation Diagram

The bottom piping of Vertiv™ Liebert® XDC unit is in the outlet mode that supports at least two cooling systems. The installation and application methods of these two cooling systems are same, but the pipelines are completely independent. Figure 2-7 shows the installation of the piping when the outdoor unit is placed higher than the indoor unit with single system and Figure 2-8 shows the installation of the piping when the outdoor unit is placed lower than the indoor unit with single system.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Condenser	6	Floor
2	No direct sunlight	7	Heat insulation
3	Oil return bend	8	Floor
4	Slope	9	Slope
5	Seals		

Figure 2-7 Installation of Terminal or Outdoor Unit Higher than Liebert XDC



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Condenser	3	Floor
2	Slope	4	Oil return bend

Figure 2-8 Installation of Terminal or Outdoor Unit Lower than Liebert XDC

Note: Refer to the installation diagram to ensure that the relevant pipeline is at least 1/100 inclination.

Note: Refer to the installation diagram. When the outdoor unit is higher than Liebert XDC, or the terminal is lower than Liebert XDC, pay attention to install an oil trap on the air pipe.

2.7. Installation of the Unit

2.7.1. Mechanical Parameters

The Vertiv™ Liebert® XDC unit dimensions and mechanical parameters are shown in Figure 2-8 and Table 2-3.

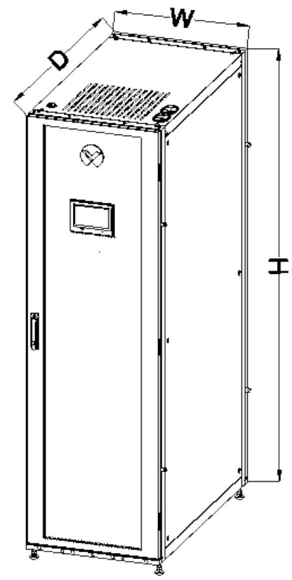


Figure 2-9 Dimension of Liebert XDC

Table 2-3 Mechanical Parameters of Vertiv™ Liebert® XDC

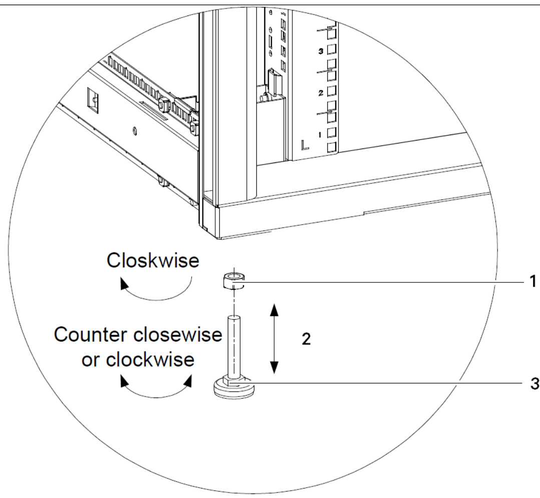
Product Model	Mechanical Parameters (WxDxH) (mm)	Net Weight of Equipment (kg)
XDC1309N1LAC	600x1100x1944	320
XDC1309N1RAC		

Note: The total cabinet height including leveling feet is 2000 mm; and total height excluding leveling feet is 1944mm.

2.7.2. Leveling the Cabinet

The followings are steps to level the Liebert XDC cabinet

1. Place the unit on the open floor of the installation site.
2. Use an adjustable wrench to loosen the fastening nuts on the 4 hexagonal bolts in a clockwise direction (refer Figure 2-10).
3. Turn the hexagonal bolt at the bottom of the foot until the foot is raised or lowered to the desired position. Use a spirit level to ensure that the cabinet is in a horizontal position, as shown in Figure 2-11.



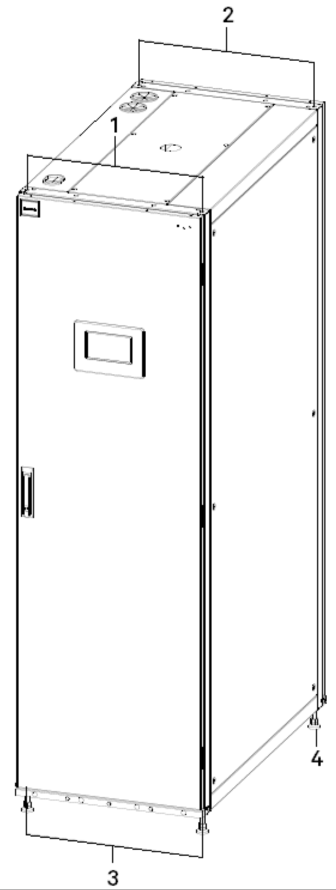
ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Fixing nut	3	Hexagon bolt
2	The feet rise or drop		

Figure 2-10 Leveling Feet

4. Tighten the fastening nut on the anchor screw counterclockwise to complete the adjustment. If there is a mounting bracket in the equipment room, user needs to remove the leveling feet and fix the cabinet on the mounting bracket.

2.7.3. Removing Leveling Feet and Fixing Cabinet

To avoid personal injury and damage to the unit, the operation should be performed by two trained professional.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Front top fixing hole	3	Front bottom fixing hole
2	Rare top fixing hole	4	Rare bottom fixing hole

Figure 2-11 Cabinet Fixing Holes

- Remove the Leveling Feet

1. Use an adjustable wrench to loosen the fastening nuts on the 4 hexagonal bolts in turn clockwise.
2. Turn the hexagonal bolt at the bottom of the leveling foot clockwise until the foot falls off the cabinet frame.

- Fix the Cabinet

There are two holes on each side of the top, bottom, front, and rear, as shown in Figure 2-11. Four bottom holes are bolted to the floor bracket in the equipment room (front fixing holes at the bottom of the cabinet are symmetrical to the rear fixing holes, and only the front fixing holes are shown in the figure). The four holes at the top can be connected to the top bracket of the room after they are installed with bolts.

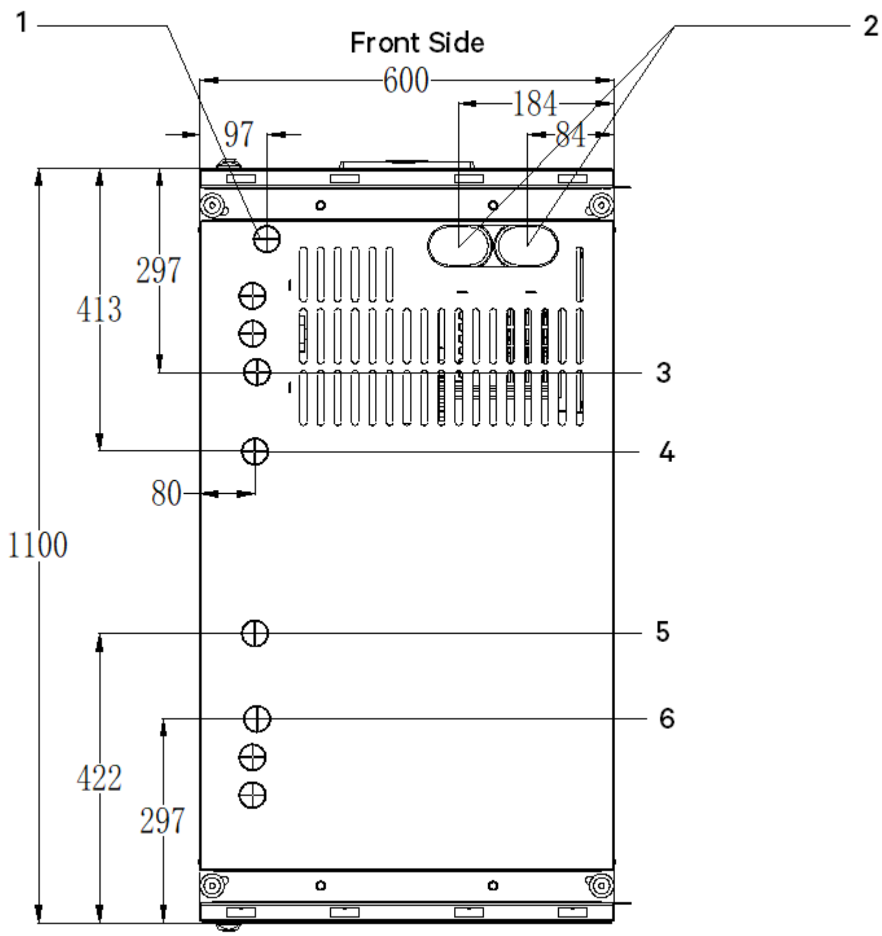
- Location of the Piping Outlet Position and Sizes on Bottom Plate

Table 2-4 shows the outlet piping specifications of the Vertiv™ Liebert® XDC host.

Table 2-4 Liebert XDC Piping Outlet Specifications

Pipeline Type	Pipe Size (OD, mm)
Suction Line	28
Discharge Line	22

The location and dimensions of the inlet and outlet piping of the unit at the bottom plate are shown in Figure 2-12



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Control cable entry	4	#1 Discharge
2	Power input entry	5	#2 Suction
3	#1 Suction	6	#2 Discharge

Figure 2-12 Inlet and Outlet Location on the Bottom Plate of the unit

Note

The front side of the unit is defined as the side with the display screen, and the opposite side is the rear side.

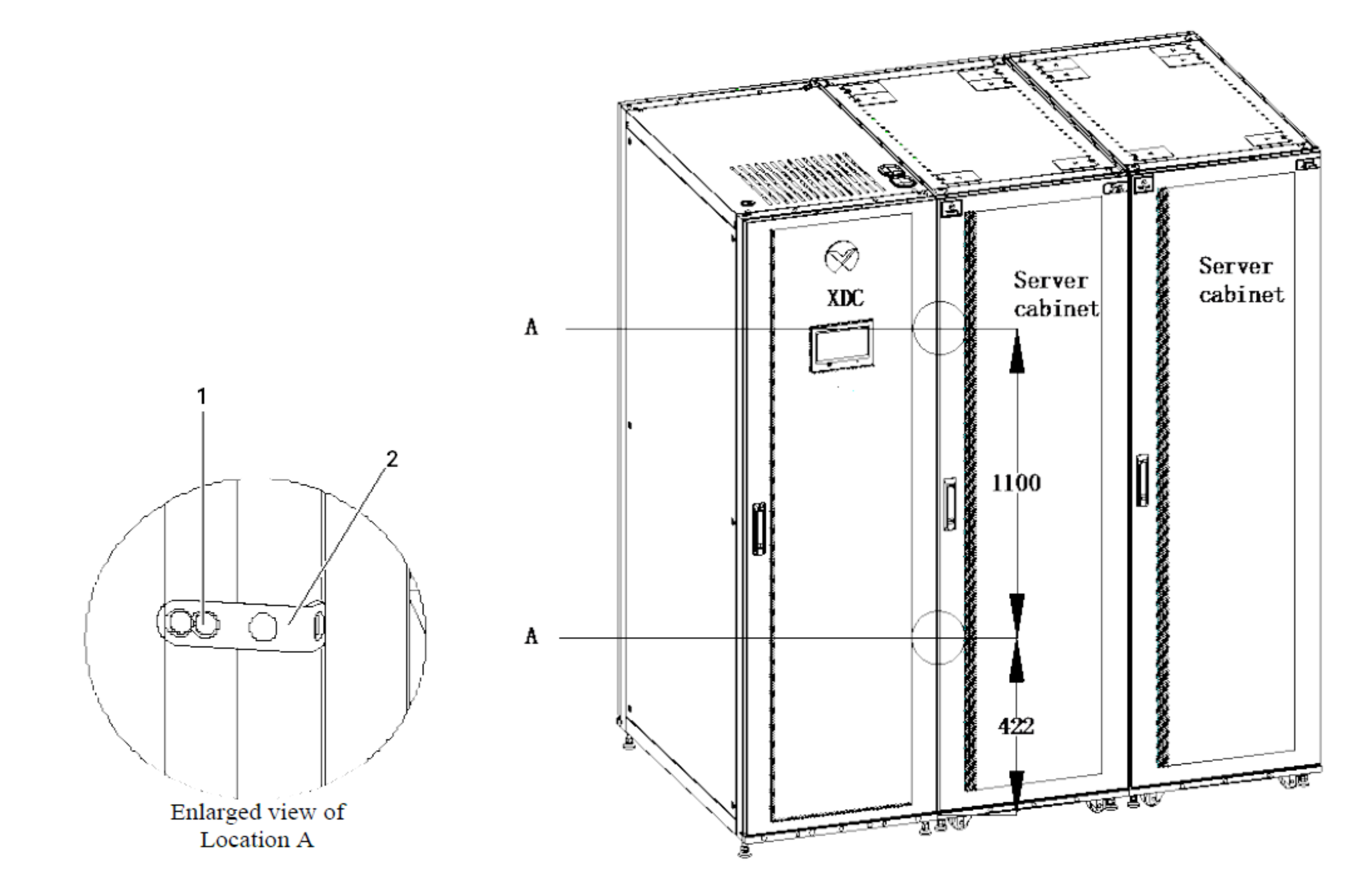
2.7.4. Parallel Connecting Cabinets

If the Vertiv™ Liebert® XDC is installed between the rows, it needs to be combined with the server rack. There are connecting parts which helps in connecting the cabinet in parallel to the server racks, where users can easily fix them with adjacent cabinets.

Note: Ensure to level the cabinets, before connecting the cabinets in parallel. For the adjustment method, refer Section 2.7.2 Leveling the Cabinets.

Following are the steps for connecting the cabinets in parallel

1. Remove the L-shape combined cabinet part from the unit accessories kit. Figure 2-13 shows position A (left) of the L-shape combined cabinet parts.
2. Use M5 countersunk screws to fix the cabinet parallel connecting parts (L-shaped) on the unit frame (hinge side) and the installation holes of the adjacent server rack, as shown in Figure 2-13.
3. Repeat the Step 1 and Step 2 for all other cabinets.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Mounting screw GB819_1_2000_M5 x 12	2	Parallel kit

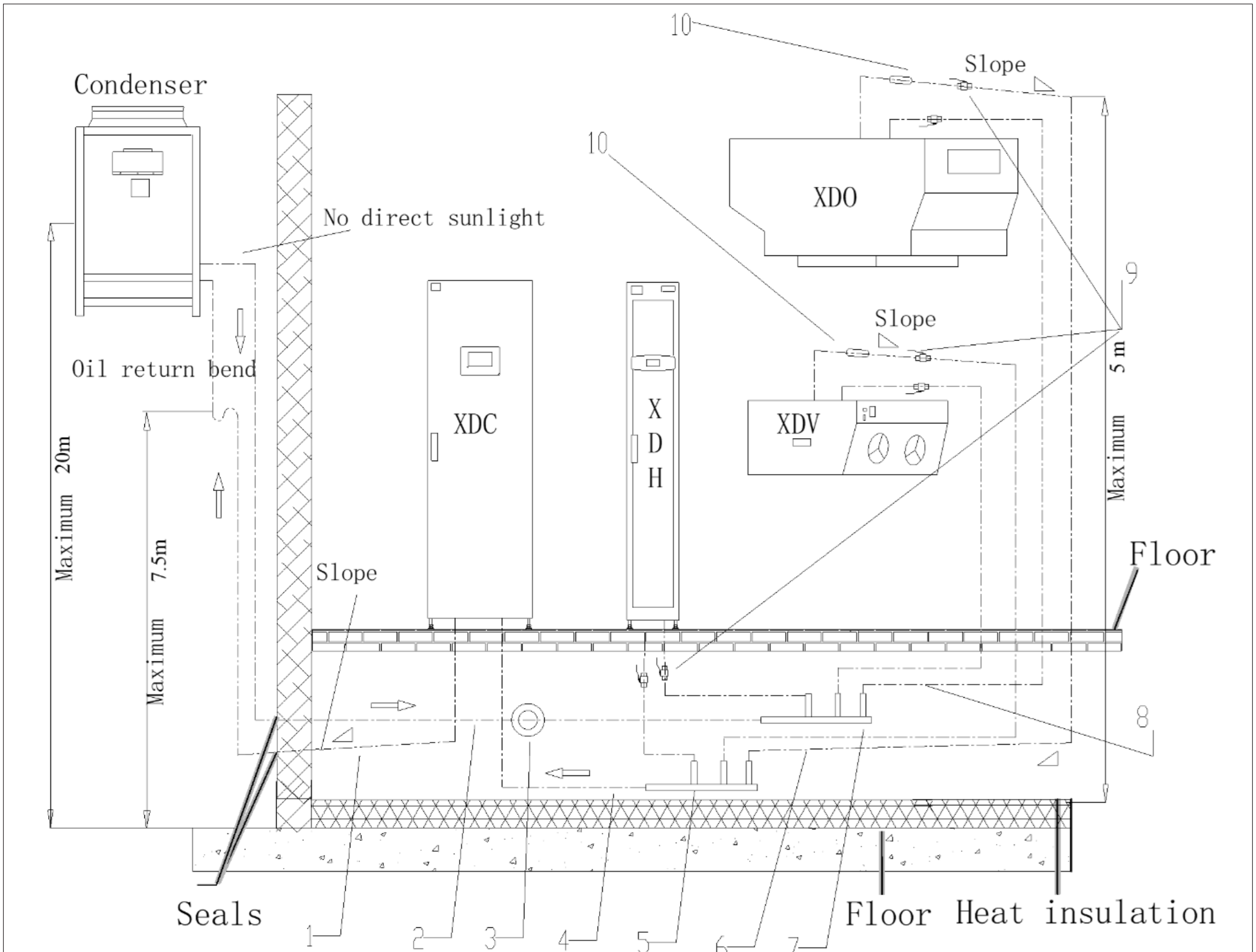
Figure 2-13 Connecting the Unit and Server Racks in Parallel

2.8. Unit Piping Installation

2.8.1. Connecting Refrigeration Piping

Prior to the piping installation, user needs to calculate the length and height difference of each pipes, and the piping specifications are provided in Table 2-5.

Figure 2-14 shows the piping connection that needs to be consider, including: Discharge pipe L1, Liquid return pipe L2, Suction pipe L3, branch liquid pipe L4, and branch suction pipe L5.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Discharge pipe	6	Branch suction pipe
2	Liquid pipe	7	Liquid distributor
3	Sight glass	8	Branch liquid pipe
4	Suction pipe	9	Ball valves
5	Suction distributor	10	Dry filter for XDO and XDV

Figure 2-14 Engineering Pipeline Diagram

Table 2-5 Maximum Allowable Difference

Parameters			Maximum Allowable Value(m)
Maximum length of pipeline	Maximum equivalent length of discharge pipe L1		70
	Maximum equivalent length of liquid return pipe L2		130
	Maximum equivalent length of suction pipe L3		60
	Maximum equivalent length of branch liquid pipe L4		40
	Maximum equivalent length of branch discharge pipe L5		40
Height difference	Height difference between main unit and condenser H1	Condenser on top	20
		Condenser at bottom	5
	The height difference between terminal and condenser H2	Condenser on top	40
		Condenser at bottom	10
	Height difference between terminal and main unit H3	Main unit on top	20
		Main unit at bottom	5
	Height difference between terminals H4		15

Note: For the applications with larger piping lengths or height differences, consult Vertiv local representative.

Example

The calculation of the piping equivalent length are as follows:

For the discharge pipe L1, if the actual length is 30 m, then 90° elbows; two oil traps are used; and the pipe diameter is 25 mm, the equivalent length of the discharge pipe is: 30 + 0.5 x 10 + 3.4 x 2 = 41.8 (m)

Refer to Table 2-6 to confirm the local equivalent length according to the pipe diameter.

Table 2-6 Local Equivalent Length

Pipe Diameter		Local Equivalent Length (m)			
(mm)	(inch)	90°elbow	45°elbow	“T” Shaped 3-way Connector	Oil Trap
9.52	3/8	0.21	0.10	0.76	1.3
12.7	1/2	0.24	0.12	0.76	1.5
16	5/8	0.27	0.15	0.76	2.0
19	3/4	0.3	0.18	0.76	2.4
22	7/8	0.44	0.24	1.1	3.0
25	1	0.5	0.27	1.2	3.4
28	1-1/8	0.56	0.3	1.4	3.7
32	1-1/4	0.62	0.34	1.6	4.0
35	1-3/8	0.68	0.38	1.8	4.4

2.8.2. Dimension Refrigerant Piping

According to the rated cooling capacity and equivalent piping length of the Vertiv™ Liebert® XDC with the rated single system, select the specifications of discharge pipe L1, Liquid return pipe L2, and Suction pipe L3, from Table 2-7, Table 2-8, and Table 2-9 respectively.

According to the terminal type, the rated cooling capacity of the terminal and the equivalent piping length, select the specifications of the branch liquid pipe L4 and the branch gas pipe L5 from Table 2-10.

Table 2-7 Discharge Pipe Diameter Requirements

Liebert XDC Rated Cooling Capacity of Single System (kW)	Equivalent Pipe Length L (m)	Discharge Pipe L1 OD (m)
35≤A≤50	0-20	19
	20-40	22
	40-70	25
50 <A≤65	0-20	22
	20-40	25
	40-70	28

Table 2-8 Diameter Requirements of Liquid Return Pipe

Rated Cooling Capacity of Single Liebert XDC System (kW)	Equivalent Pipe Length L (m)	Liquid Return Pipe L2 - OD (m)
35≤A≤50	0-30	16
	30-60	16
	60-90	19
	90-140	22
50 <A≤65	0-30	16
	30-60	19
	60-90	22
	90-140	25

Table 2-9 Diameter of the Suction Pipe

Rated Cooling Capacity of Single Vertiv™ Liebert® XDC System (kW)	Equivalent Pipe Length - L (m)	Suction Pipe L3 - OD (m)
35≤A≤50	0-20	25
	20-40	28
	40-60	32
50 <A≤65	0-20	28
	20-40	32
	40-60	35

Table 2-10 Diameter of Branch Gas Pipe and Branch Liquid Pipe

Rated Cooling Capacity of Terminal (kW)	Equivalent Pipe Length - L (m)	Branch Liquid Pipe L4 - OD (m)	Branch Gas Pipe L5 - OD (m)
XDV010	0-20	12.7	19
	20-40	12.7	22
	40-60	16	22
XDO020	0-20	16	22
	20-40	16	25
	40-60	19	28
XDH030	0-20	16	22
	20-40	16	25
	40-60	19	28

The wall thickness requirements of copper piping at site are shown in Table 2-11.

Table 2-11 Wall Thickness Requirements of Piping

Piping Size (Outer Diameter mm)	Wall Thickness (mm)
16	≥1
19	≥1
22	≥1
25	≥1.1
28	≥1.2
32	≥1.5
35	≥1.5

Note: The sizes of copper piping are shown in Table 2-11, it must be a hard pipe (Y) specified in the national standard GB/T18033-2007. If a semi-hard or soft copper pipe is used at the site, consult Vertiv technical team for the wall thickness selection, otherwise it may cause system leakage or pipe burst.

Improper selection of the piping material may cause system leakage or piping burst, contact Vertiv local representative for more details.

2.8.3. Branch Manifold

As shown in Figure 2-15 and Figure 2-16, when connecting the main piping and the branch piping, a branch manifold installation is required. If the branch manifold is not available then a T-shaped 3-way connector with suitable pipe diameter can be used.

Before connecting the branch manifold, cut the branch manifold according to the pipe diameter of the branch pipe.

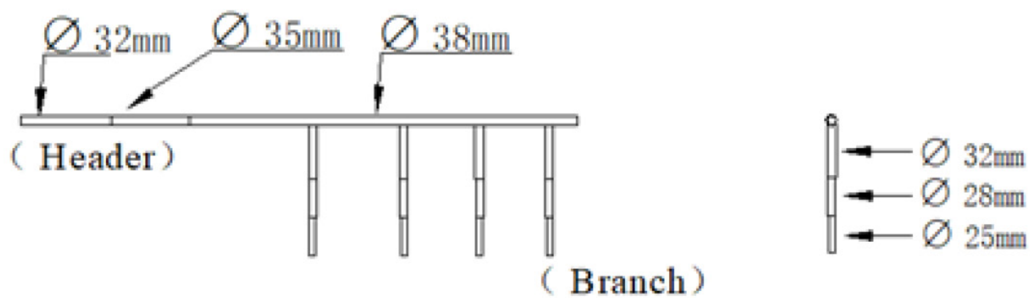


Figure 2-15 Branch Manifold of Suction Pipe

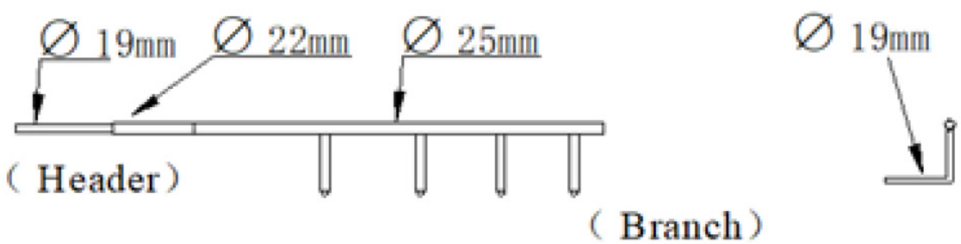
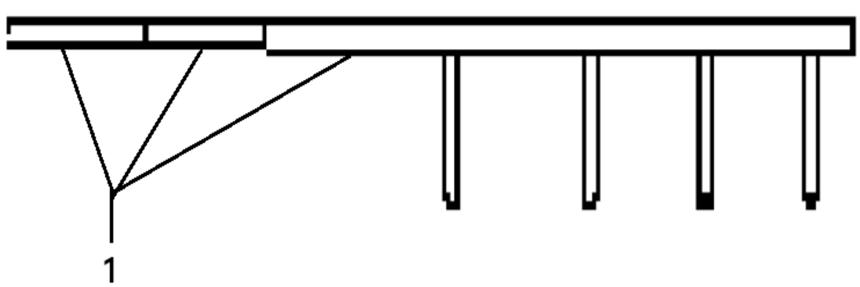


Figure 2-16 Branch Manifold of Liquid Return Pipe

After selecting the appropriate pipe diameter, use a micro cutter to break the piping according to the actual piping on site, refer Figure 2-17 for better understanding.



ITEMS	DESCRIPTION
1	Interrupt according to the actual situation on site

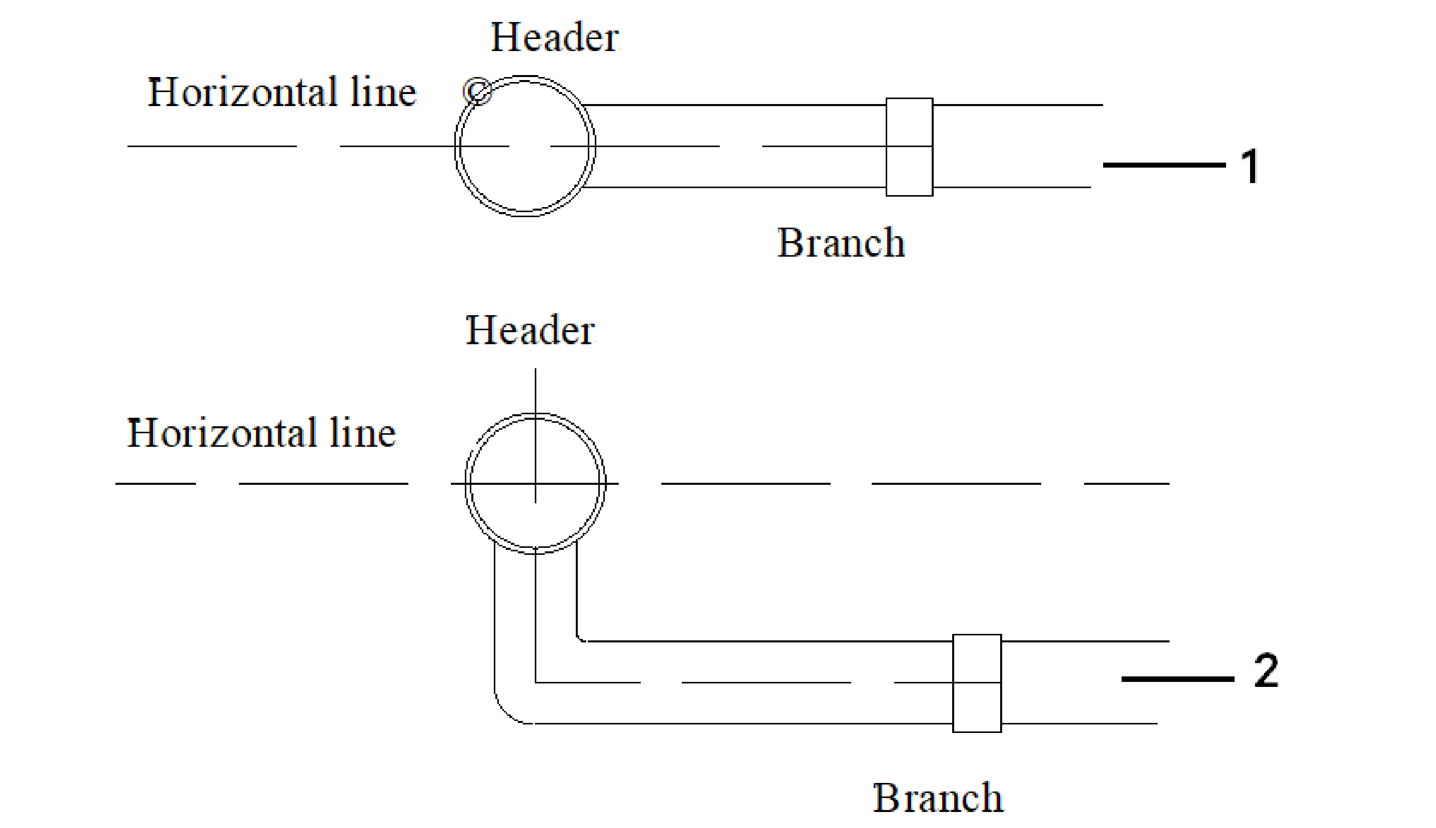
Figure 2-17 Branch Manifold Processing

Note: Remove the residual burrs after cutting the piping to avoid choking in the piping.

2.8.4. Connecting Refrigerant Piping

When connecting the refrigerant pipeline, the following requirements must be strictly observed:

1. Before brazing all the copper pipes, release the air present in the piping by opening each ball valves at least for 15min to avoid absorption of moisture with the compressor's lubricating oil.
2. All refrigeration pipe joints must be silver brazed;
3. During pipe brazing, if necessary pipe support fixture is required, fill the pipe with nitrogen, preventing excessive oxidation during brazing and forming an oxide film on the inner wall of the pipe.
4. Ensure a certain inclination when installing the pipeline.
5. When installing the branch manifold, ensure that the branch piping are in horizontal, as shown in Figure 2-18;
6. Corresponding labels are affixed to the pipe joints. Avoid burning the labels when brazing;



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Suction distributor	2	Liquid distributor

Figure 2-18 Horizontal Placement of Branch Manifold

When brazing, fill the refrigerant piping with nitrogen to prevent the formation of the oxide scaling due to brazing process that may damage the compressor.

2.8.5. Air Tightness Test

After completion of the brazing of piping, the nitrogen gas must be used for leak detection and to ensure that the system does not have any sign of leakage. The system must strictly follow the segmented leak detection:

1. According to the valve labeling (refer Figure 2-6), close the suction and discharge ball valves of the two Vertiv™ Liebert® XDC systems, a total of 4 Nos; open all the ball valves at theVertiv™ Liebert® XD cooling terminal.

Once all ball valves are open, each system is divided into two sections:

a) The inside of Liebert XDC is the low-pressure section. Check the pipeline for the sign of leakage which including compressor, oil separator and connecting piping.

b) The outside of Liebert XDC is the high-pressure section. Check the pipeline for the sign of leakage, including the condenser, all cooling terminals and connecting piping.

2. To detect the sign of leakages in the low pressure section, pressurize the schrader valve2 to 31 bar.
3. To detect the sign of leakages in the high pressure section, simultaneously pressurize schrader valve3 and schrader valve4 to 40 bar.
4. At the mentioned pressure, if there is no leakage in the system, retain the pressure for 24 hours then the leak detection process is completed; otherwise, fixed the leak point and repeat the Step 2, Step3 and Step 4.
5. After the leak detection is completed, release the nitrogen gas and add refrigerant oil.

Note: Ensure the pressure of the leak detection in the low pressure section must not exceed the value higher than 32.8 bar, otherwise the compressor will be damaged.

After the leak detection is completed, the nitrogen pressure must be released slowly and the pressure must be released at the designated location to prevent the nitrogen from carrying out the lubricating oil in the system.

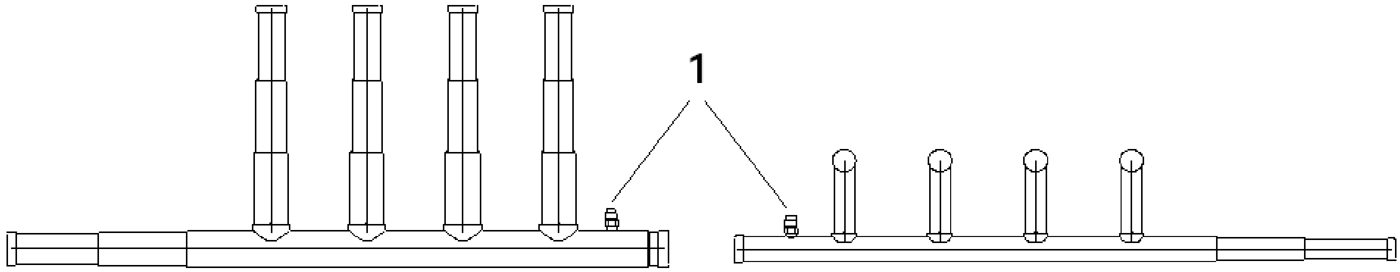
2.8.6. Charging Refrigerant Oil

The Liebert XD system must be recharged with refrigerant oil as per the requirement before commissioning the unit for the first time. The amount of refrigerant oil added must be according to the actual length of the connecting piping on site.

1. Select the correct type of refrigerant oil.
2. The addition of refrigerant oil must as per to the actual length of the liquid return piping, not the equivalent length.
3. When the actual length of the liquid return piping is less than or equal to 30 m, each system needs to be supplemented with 1.5 Liters of refrigerant oil.
4. When the actual length of the liquid return piping is more than 30 m then calculate the amount of refrigerant oil to be added according to the actual piping length and piping diameter, as provided in Table 2-12.
5. Recharge the refrigerant oil for each system through the schrader valve reserved on the branch manifold, as shown in Figure 2-19.

Table 2-12 Additional Amount of Refrigerant Oil

Liebert XDC130	
Actual Pipe Length < 30 m	**Actual Pipe Length > 30 m**
Each system must be supplemented with refrigerant oil of 1.5 Liter	Each system: Charged amount of refrigerant oil = 1.5 Liter + (the actual length of the liquid return pipe - 30 m) * the amount of refrigerant charged per unit length x 6%



ITEMS	DESCRIPTION
1	Access valve

Figure 2-19 Oil Injection Schrader Valve

Charged amount of refrigerant oil = 1.5L + (the actual length of the liquid return pipe-30m) x the amount of refrigerant charged per unit length x 6%

Table 2-13 provides the amount of refrigerant charged per unit length as per the diameter and the length of return piping.

Table 2-13 Amount of Refrigerant Charged per Unit Length

Outer Diameter of Liquid Return Pipe (mm)	Charged Amount of Refrigerant per Unit Length (kg/m)
16	0.169
19	0.238
22	0.315
25	0.415

Note: Before commissioning the Liebert XD system for the first time, it must be recharged with refrigerant oil as per the requirement. The lack of refrigerant oil will cause the damage to the compressor.

Note: Ensure to select the appropriate refrigerant oil recommended by manufacturer, otherwise the compressor will be damaged.

Note: For refrigerant oil charging details of other Vertiv™ Liebert® XDC systems, contact Vertiv local representative.

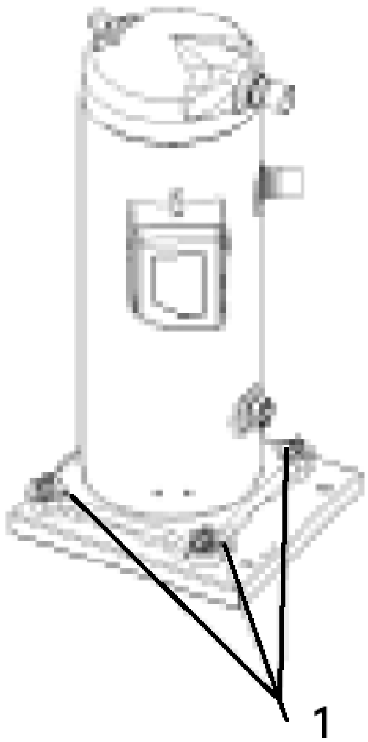
For any consequences resulting from inferior quality refrigerant, Vertiv does not assume warranty responsibility. Select the type of lubricant oil in accordance with the compressor manufacturer’s specification.

2.9. Remove Transportation Fixing Plate of Compressor

Damping cushions are added to the base of the compressor to reduce vibration and noise during operation. However, such method cannot resist the vibration while transporting the unit and may result in loosening connections and wearing of certain parts. Hence to ensure the rigidity of the compressor during transportation, three U-shaped fixing plates are added to the compressor base.

Note1: Remove the three U-shaped fixing plates after installation, and then restore the bolts and washers in reverse sequence of the disassembly process.

Note2: The fastening torque of the bolts is (12±1) Nm.



ITEMS	DESCRIPTION
1	U-Shape Plate

Figure 2-20 "U"-shaped Fixing Plate

2.10. Mechanical Installation Checklist

Initiate the inspection checks after the mechanical installation is completed. Pre-check and confirm that there are no discrepancies or faults. Ensure that all the points in the checklist (refer Table 2-14 for installation checklist) are complying accordingly..

Table 2-14 Mechanical Installation Checklist

Check Items	Results
Leave enough space around the installed unit to facilitate unit maintenance.	
The unit is placed vertically, and the installing fasteners are firmly fixed.	
The piping connecting the indoor and outdoor units have been installed properly, and the ball valves of the condenser, the Liebert XDC unit, and the terminal have been fully opened.	
The cold drain pipe at the cooling terminal is firmly connected.	
All piping joints are tightened and leak proof.	
All supporting fasteners used for transportation have been removed.	
After the unit is installed, the debris inside or around the unit has been removed (such as transportation materials, mechanical parts, materials, tools, etc.)	

Everything is checked and verified, follow the electrical installation.

3 Electrical Installation

This chapter introduces the electrical installation of Vertiv™ Liebert® XDC unit, including brief introduction of key components, installation notes, cabling and electrical inspection for the unit.

Note: Liebert XDC unit is a professional equipment, used in industrial, commercial or other professional environment, and is not sold to the general public.

Note: Its total rated power is greater than 1 kW and complies to the IEC61000-3-12 standard. It is necessary to provide an interface between the user's power supply and the grid with a short-circuit ratio greater than or equal to 350.

Note: The user needs to obtain permission from the local power supply department to ensure that the air conditioner is connected to the power supply with short-circuit ratio greater than or equal to 350.

3.1. Installation Tasks and Cautions

3.1.1. Cabling Connection at the Site

1. Liebert XDC unit power cables and control cables.
2. Outdoor unit (air-cooled): control signal cable and power cable.
3. Unit input and output control cables.

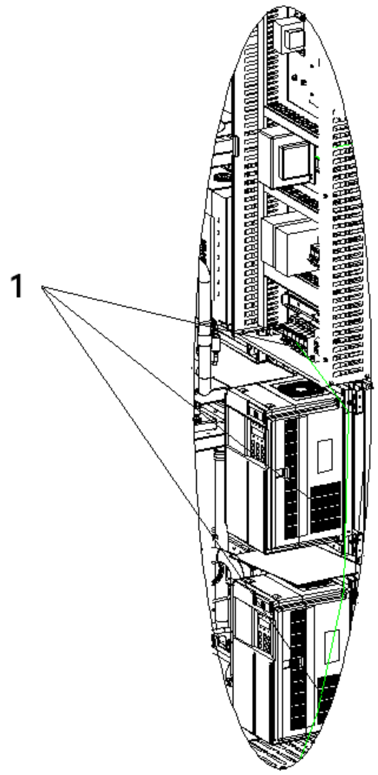
3.1.2. Installation Notes

1. The connection of all power cables, control cables, and ground cables must comply with the national and local electrician regulations.
2. For full load current, refer to the unit's nameplate. The cable size should comply with local cabling/wiring regulations.
3. Main power supply requirement: 380 V to 415 V (-10% to +6%)V, 50 Hz, 3 N~.
4. The power supply cord adopts Y-type connection. If the power supply cord is damaged, it must be replaced by professional maintenance personnel.
5. The electrical installation and maintenance must be performed by authorized and trained professionals.
6. Before connecting the circuit, use a voltmeter to measure the input power voltage, and ensure the power supply is off.
7. The unit needs to be fixed firmly with screws, guide rails or other methods during installation to avoid shaking during startup or operation.
8. The emergency power supply off and emergency stop requirements of the air conditioner should be considered in the power distribution system, and a suitable all-pole disconnection device for disconnection of the power supply should be provided.
9. Appropriate RCD should be installed according to the actual installation situation.
10. Without the confirmation of Vertiv technical personnel, the user cannot install electrical devices, such as electric meters, in the unit.

3.2. Cabling of the Unit

3.2.1. Electrical Interface Location of the Unit

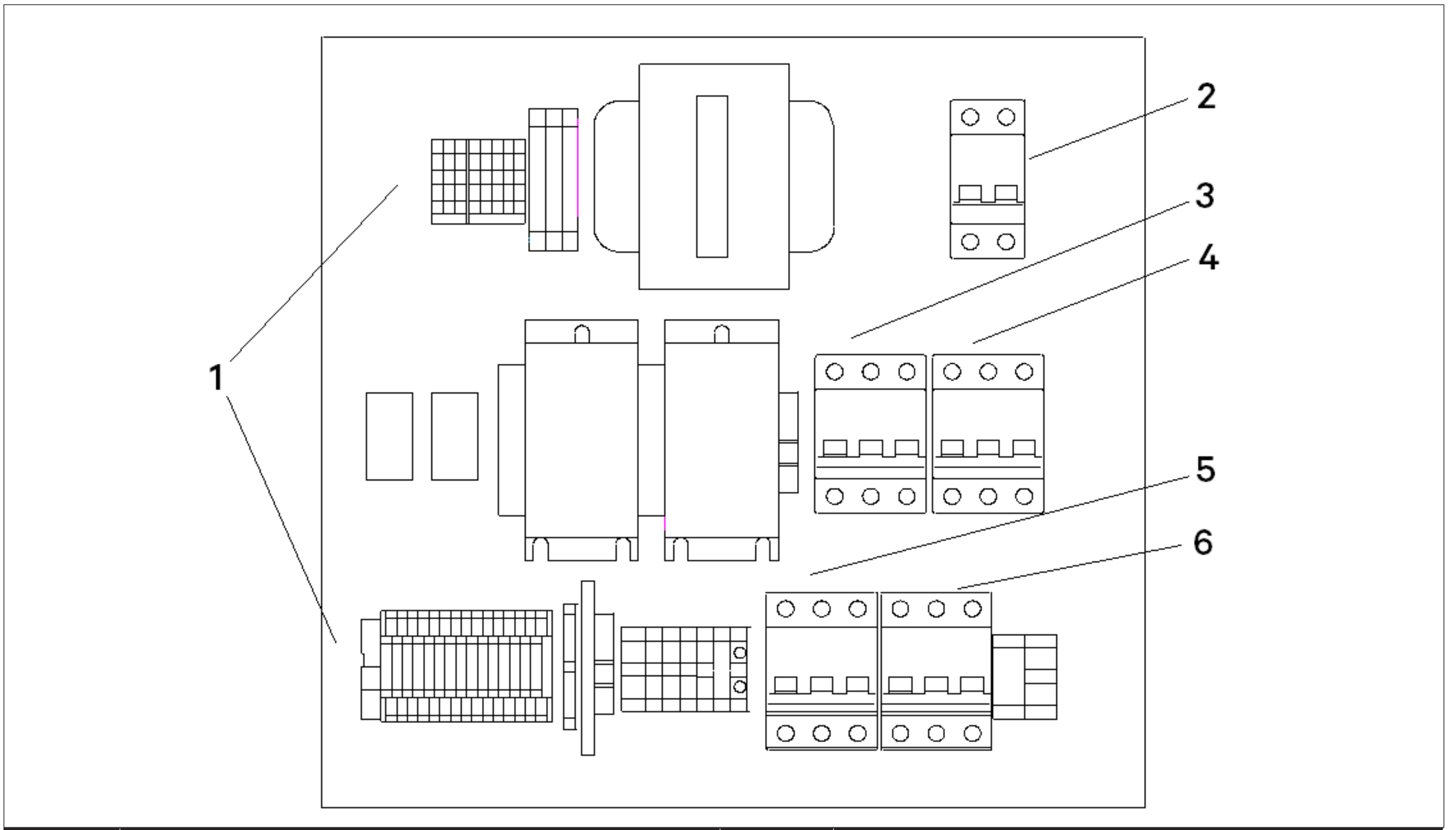
The user's power supply inlet cables should be connected firmly according to the position and labels of the cable shown in Figure 3-1.



ITEMS	DESCRIPTION
1	Input access cable should be fixed

Figure 3-1 Electrical Control Box and User Cabling

Open the front door of Vertiv™ Liebert® XDC unit and the user can see the specific distribution position of the low-voltage components. The detailed distribution information of low-voltage electrical components is provided according to the labels attached to the cabinet, as shown in Figure 3-2.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Terminal blocks	4	Compressor breaker 2
2	Transformer breaker	5	Main breaker
3	Compressor breaker 1	6	Condenser breaker

Figure 3-2 Unit Electric Control Box

3.2.2. Connection of Unit Power Supply Cables

The specific location of the power supply interface of the Vertiv™ Liebert® XDC unit is shown in Figure 3-2. L1~L3, N and PE are connected to the corresponding ends of the external power supply terminals respectively. A certain margin for the incoming cable should be provided to fix it on the cable fixing clamp, which is fixed on the inner panel of the unit.

Refer to the rated full load current value (FLA) of the unit for the selection of cabling model, Table 3-1 provides the FLA values of the unit.

Table 3-1 Full Load Current Value of the Unit (unit: A)

Model	Current (Amp)
XDC1309N1LAC	75
XDC1309N1RAC	

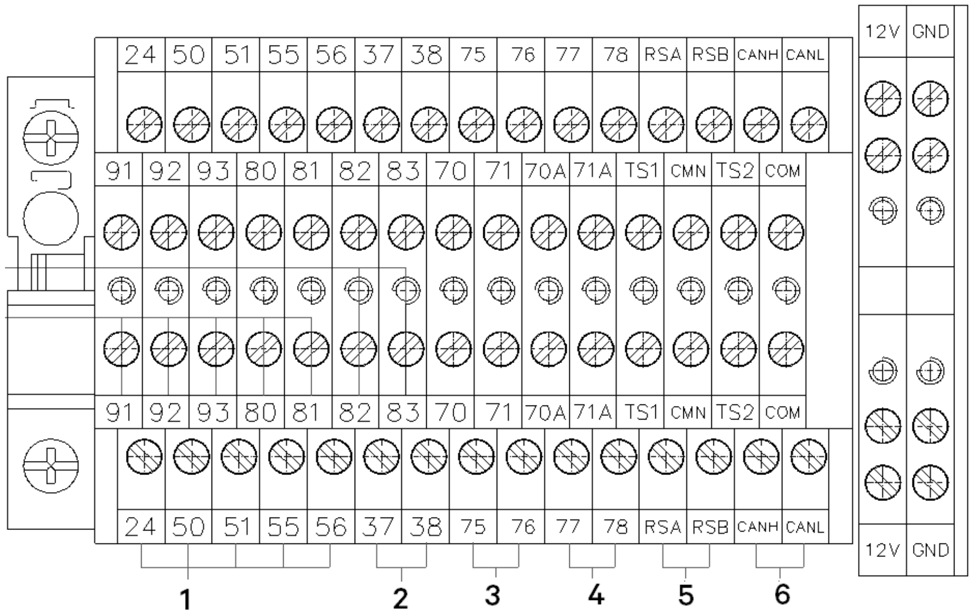
Note: The cable size should comply with local and national regulations.

Note: The above full load current value does not include the outdoor unit and Liebert XD terminal.

3.3. Control Cables Connections

Figure 3-3 shows the location of the cabling terminals used for field cabling/wiring.

Before connecting the control cables, the person who carries out cabling work must take corresponding anti-static measures.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Customized Alarm	4	RS-485 interface
2	Remote On/Off	5	RS-485 to condenser
3	Common Alarm	6	CAN to cooling modules

Figure 3-3 Field Cabling Terminal

- Communication cables

CAN communication is used between the Vertiv™ Liebert® XDC unit and the cooling terminal, and the user needs to connect the cables on site. The communication cables are from the CANH/CANL terminal of the unit and further connected in series with the CANH/CANL on each terminal block of the terminal.

RS485 communication is used between the Liebert XDC unit and the condenser, and the user needs to connect the cables on site, lead the cables from the host RSA/RSB terminal, and then connect in series with the J11 terminal of the condenser.

The connection of the communication cable should a series connection, as shown in Figure 3-4.

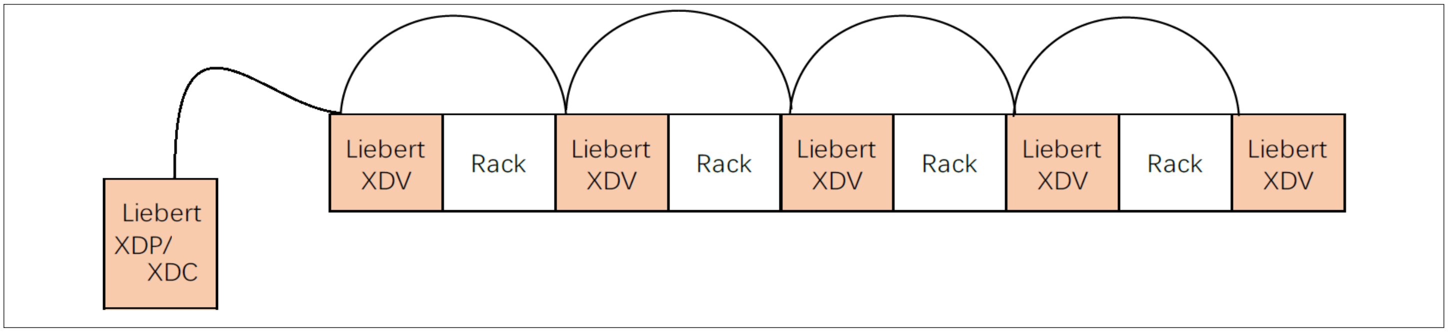


Figure 3-4 Control Cable Connection

Note: The communication cable must be a shielded twisted pair, away from strong interference sources, and ensure that both ends of the shielding layer are grounded.

Note: The communication cables and power cables must be routed separately.

- Remote shutdown

Figure 3-3 shows the terminals 37# and 38# that can be connected to the remote shutdown switch. The terminals have been short-circuited in the factory. When a remote shutdown is required, remove the short-circuit cables.

Note: When the 37# and 38# terminals are disconnected, the unit will shut down.

- Self-defined alarm terminal

Terminals 50#, 51#, 55# can be connected to 3 kinds of sensor inputs, and terminal 24# is a common terminal. It can also be defined as a fire sensor, etc. After the external alarm signal is connected to the self-defined terminal, the corresponding self-defined alarm content needs to be set in the Liebert PACC controller. Refer to the Liebert PACC self-defined alarm setting in Appendix II.

When the contact is disconnected and there is no external alarm, the self-defined terminal input state is On. When the contact is closed, after an external alarm occurs, the self-defined terminal input is in a short-circuit state, the air conditioning system will sound an alarm, and the Liebert PACC controller LCD display will display the corresponding alarm content.

A smoke alarm switch can be connected between the 50# and 24# terminals.

Remote alarm can be connected between 37# and 38# terminals.

- External general alarm terminals

The external general alarm can be connected to the 75# and 76# terminals, and its output is used to trigger the external alarm devices, such as alarm lights. When a major alarm occurs, the contact is closed. This can be used to send out remote alarms, signal to the building management system or automatically dial the paging system. The user needs to provide the power supply of the external public alarm system circuit.

For other terminal definitions, refer *Appendix I Liebert XDC Circuit Diagram*.

3.4. Electrical Inspection Checklist

After the electrical installation is completed, check and confirm according to Table 3-2.

Table 3-2 Electrical Installation Checklist

Check Items	Results
The power supply voltage is the same as the rated voltage on the unit's nameplate	
There is no open or short circuit in the electrical circuit of the system	
The power supply and ground cables are firmly connected to the disconnect switches	
The rated value of the circuit breaker or fuse is correct	
The control cable is connected	
All cables and circuit connectors have been tightened, and the tightening screws are not loose	

After confirming the above points, user can start the commissioning.

Users are prohibited from powering on the unit before the professional and technical personnel authorized from Vertiv have checked and confirmed the electrical connections.

4 System Startup and Commissioning

This chapter introduces the system startup and commissioning, including the position of the MCB and the specific operation steps for startup and commissioning the unit.

4.1. Startup and Commissioning

4.1.1. Preparation Before Commissioning

- Mechanical Part

1. According to the instruction label at the valve, ensure that all valves of the Vertiv™ Liebert® XDC unit and all cooling terminals are open.
2. The refrigerant piping system has passed the air tightness test and confirmed that there is no leakage.
3. The drainage pipe system at the cooling terminal has been reliably connected and leak-checked in accordance with the specified material requirements.
4. The compressor heating belt has been preheated for more than 12hours.
5. The temperature of the equipment room is above 20 °C and has a certain thermal load. If not available, other heating devices should be used to preheat the environment of the equipment room to ensure the necessary thermal load for the commissioning.

- Electrical Parts

1. Confirm that the input voltage of the main power supply is within the nominal range of rated voltage 380 V t0 415 V (-10% to +6%) V; the power isolation switch of the outdoor unit air-cooled condenser is closed.
2. Confirm that all electrical or control connections are correct, and firmly fixed all electrical and control connections.
3. Confirm that the power supply cables and low-voltage control cables are arranged separately.

4.1.2. Vacuuming

As Liebert XDC unit and the cooling terminal are connected and used together to form a system, both should be powered on, started, and commissioned at the same time.

1. Release the pressure-holding nitrogen and open all the ball valves in the system
2. Ensure that the air switches of compressor 1 and compressor 2 of the unit are disconnected to prevent the starting of the compressor by mistake
3. Power on the unit and all terminals at the same time, and keep them in ready state
4. Ensure that the unit enters the vacuuming mode and the electronic expansion valve at the terminal is open;
5. The positions of the schrader valve for vacuuming are schrader valve 3, schrader valve 4, as shown in Figure 2-6;
6. The #1 and #2 systems need to be vacuumed separately to ensure that the vacuum time of each system is more than 3hours and the vacuum degree reaches -1 bar.

Note: During the vacuuming process, if the unit exits the vacuuming mode, ensure that the system enters the vacuuming mode again through the settings.

Note: If the vacuum cannot reach -1 bar, it is necessary to stop vacuuming and check the system for any sign of leakages.

Note: If it is not possible to ensure that the unit is powered on during vacuuming, ensure that the schrader valves 1, 2 and the two schrader valves of the inlet and outlet pipes at the terminal are simultaneously vacuumed at the four positions.

4.2. MCB Position

The positions of the main isolation switch and MCB of the dual system unit are shown in Figure 3-2, distinguish them according to the label instructions on the actual cabinet.

4.3. Static Refrigerant Charge

After the vacuuming is completed, the refrigerant can be charged statically:

1. Ensure that the air switches of compressor 1 and compressor 2 of the unit are disconnected to prevent the starting of the compressor by mistake.
2. Power on the unit and all terminals at the same time, and keep them in ready state.
3. Ensure that the unit enters the vacuum mode.
4. Ensure that the position of the schrader valve for static refrigerant charging is at schrader valve 3, as shown in Figure 2-6.
5. Carry out static refrigerant charge for #1 and #2 systems respectively.
6. Until the refrigerant cannot be charged into the system, the static charging ends.

Note: The hose connected to the composite pressure gauge must be vented.

Note: Ensure to charge the refrigerant statically at the required position, and avoid static charge of the refrigerant at the compressor suction port.

Note: In the process of static refrigerant charging, if the unit exceeds the vacuum mode, user must ensure that the system enters the vacuum mode again through the settings.

Note: The longer on-site connecting pipe, the greater the requirement for static charging.

Note: After the static charging is finished, ensure that the compressor crankcase heating belt is preheated for more than 12 hours before starting up, or use a dryer to heat the lower part of the compressor shell for about 30minutes.

4.4. Dynamic Refrigerant Charging

After completing the static charging of refrigerant, and after preheating the compressor as required, dynamic refrigerant charging can be performed:

1. Close the compressor MCB to make the unit enter the running state.
2. The position of the schrader valve for dynamic refrigerant charging is at schrader valve 4, as shown in Figure 2-6.
3. Perform dynamic refrigerant charging for #1 and #2 systems respectively
4. After the unit is stably operating, ensure that the sight glasses of the #1 and #2 systems are free of bubbles, and the subcooling in front of the valve reaches above 6 °C.
5. After the operation is stable, ensure that the exhaust superheat of the unit is within the range of 25 °C to 40 °C .
6. If there is no problem with the above commissioning, the whole unit debugging is completed.

Note: The hose connected to the composite pressure gauge must be vented.

Note: After the dynamic refrigerant charging is completed, the subcooling in front of the valve must be ensured, otherwise the system may run abnormally.

4.5. Commissioning Inspection Checklist

After debugging, check and confirm according to Table 4-1.

Table 4-1 Commissioning Inspection Checklist

Inspection Items	Results
All output functions are automatic	
The temperature and humidity settings and control accuracy are correct	
Whether there is any abnormal alarm	
Other settings are correct	

5 Color Display Screen Operating Instructions

This chapter introduces the characteristics, appearance, main interface, alarm menu, and system settings of the display color screen of Vertiv™ Liebert® XDC unit.

5.1. Features

The 7-inch color screen display has the following characteristics:

1. The LED screen uses menu-style operation to monitor and display the operating status of precision cooling and air conditioner unit, so that the control environment is maintained within the set range.
2. Provide power-down self-recovery function, as well as high and low voltage protection, phase failure protection, reverse phase protection and other functions.
3. Through the menu operation, user can accurately understand the main parameters and operating status of the system.
4. Expert level troubleshooting system, that can automatically display the current fault content, which is convenient for maintenance personnel to maintain the unit.
5. It can store up to 1000 PCS historical alarms.
6. The unit has a CAN interface and adopt CAN communication protocol.

Note: The color display screen used by Liebert XDC unit is a resistive screen. When the user touches the screen to perform related operations, if the screen does not respond in time, thus user needs to use fingertips to try again.

5.2. Appearance

Figure 5-1 shows the appearance of the 7-inch display color screen.

Figure 5-1 Color Screen Appearance

5.3. Color Screen Interface

5.3.1. Startup Interface

After the unit is powered on, the color screen displays the startup interface, as shown in Figure 5-2.

Figure 5-2 Startup Interface

5.3.2. Main Interface of the Color Screen

- The display color screen defaults setting is in Chinese. Click the unlock button and enter the user password to unlock, then the setting button and power on/off button will appear for parameter setting and power on/off setting.
- The top half of the color screen displays the home button, alarm status, setting button, time & date, and the power on/off keys, and unlock keys.
- The middle part displays the main operating status of the unit; the rightmost part displays the output status of the main adjustment components of the unit (such as compressor, outdoor unit), as shown in Figure 5-3 and Figure 5-4.

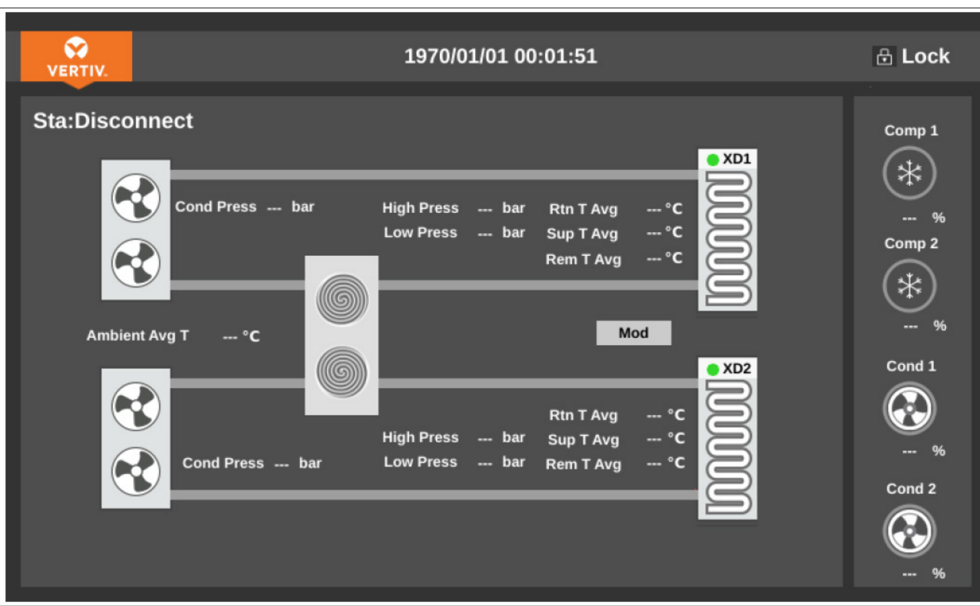


Figure 5-3 Color Screen Interface-locked

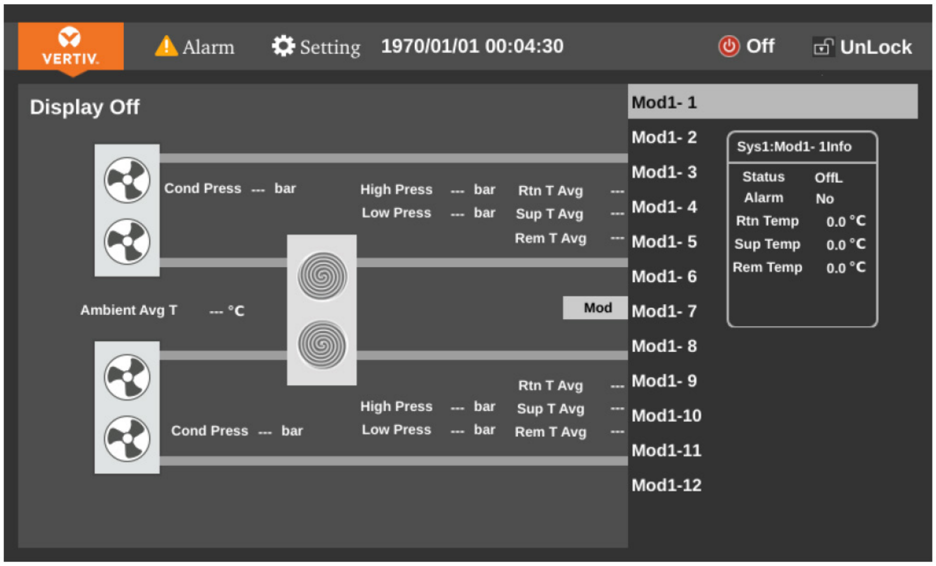


Figure 5-4 Color Screen Interface-unlocked

- When browsing the menu, tap the corresponding menu key to view related parameters. The function description of each touch key on the interface is provided in Table 5-1.

Table 5-1 Touch Key Function Description

Touch Key	Function Description
Main interface button	Click this button to enter the main interface and learn about the main data readings of the system.
Set button	This button will be displayed after unlocking, click this button to enter the temperature and humidity setting page, user can set the temperature and humidity of the system, and the control mode.
On/Off button	This button will be displayed after unlocking, the unit is in shutdown state, click this button for at least 2sec, the unit will turn on; the unit is running, click this button for at least 2sec, the unit will shut down.
Lock button	Click this button and enter the user password to unlock. After unlocking, the setting button and power on/off button will appear, and then parameter settings, and power on/off settings can be performed.
Connection status	Display the connection status between the unit and the terminals.
Alarm status	Display the alarm status of the unit.
Status bar	Display the output status of the compressor and outdoor unit.
Outdoor unit status	Display the relevant status of the outdoor unit.
Main unit status	Display the relevant status of the main unit.
Terminal status	Display the relevant status of the terminal.

5.3.3. Operation Example

Example 1: Enter the password to enter the main menu.

After powering on, user can enter the main menu through the following operations in the normal interface.

1. Click the unlock button to enter the password interface.
2. Enter the user login password in the password interface.
3. After entering correct password, access the main interface to modify the corresponding parameters of the unit.

Example 2: Modify parameters

Take the setting of the **Supply Air High Temperature** alarm value menu item in the **Alarm Value** setting menu as an example.

1. Click the **Setting** button on the main unit interface.
2. Enter the alarm menu interface, turn the page to the **Alarm Setting** interface.
3. In the alarm setting interface, set according to the corresponding alarm value.
4. After the parameters are selected, press **ENTER** to confirm, then the parameter takes effect.
5. Press the exit key to return to the previous menu interface.

Note: After changing the parameters, if user does not press ENTER to confirm, the supply air high temperature alarm value will keep the original parameters.

Password Interface

Click the unlock icon in the upper right corner to display the password interface, as shown in Figure 5-5.

Figure 5-5 Password Interface

The password to enter the menu has only one level, and the specific description is shown in Table 5-2.

Table 5-2 Password Level

Password Level	User	Initial Password	Remark
Level 1	Ordinary operator	1490	Can browse all menu information. Can only set the temperature and humidity, and cannot change other values and settings.

For the specific operation of password input, refer to Section 5.3.3 Operation Example. If the wrong password is entered, the operator can press the CLR (clear) key to change.

Note: In the password interface, directly press the enter key without typing any password, user can view the set value of each menu, but user cannot change any parameters.

5.4. Other Interfaces

5.4.1. Alarm Status

Click the **Alarm Status** icon to enter the interface shown in Figure 5-6, including current alarms and historical alarms.

- Active alarm

The **Active Alarm** page is used to monitor the current alarm status record of the air-conditioner unit, prompting no alarm or specific alarm status information. The specific alarm status information includes serial number, alarm content, and alarm occurrence time.

- Historical alarm

The **Historical Alarm** page is used to query the historical alarm information of the air conditioner unit, including the serial number, alarm occurrence time, alarm elimination time, and alarm content.

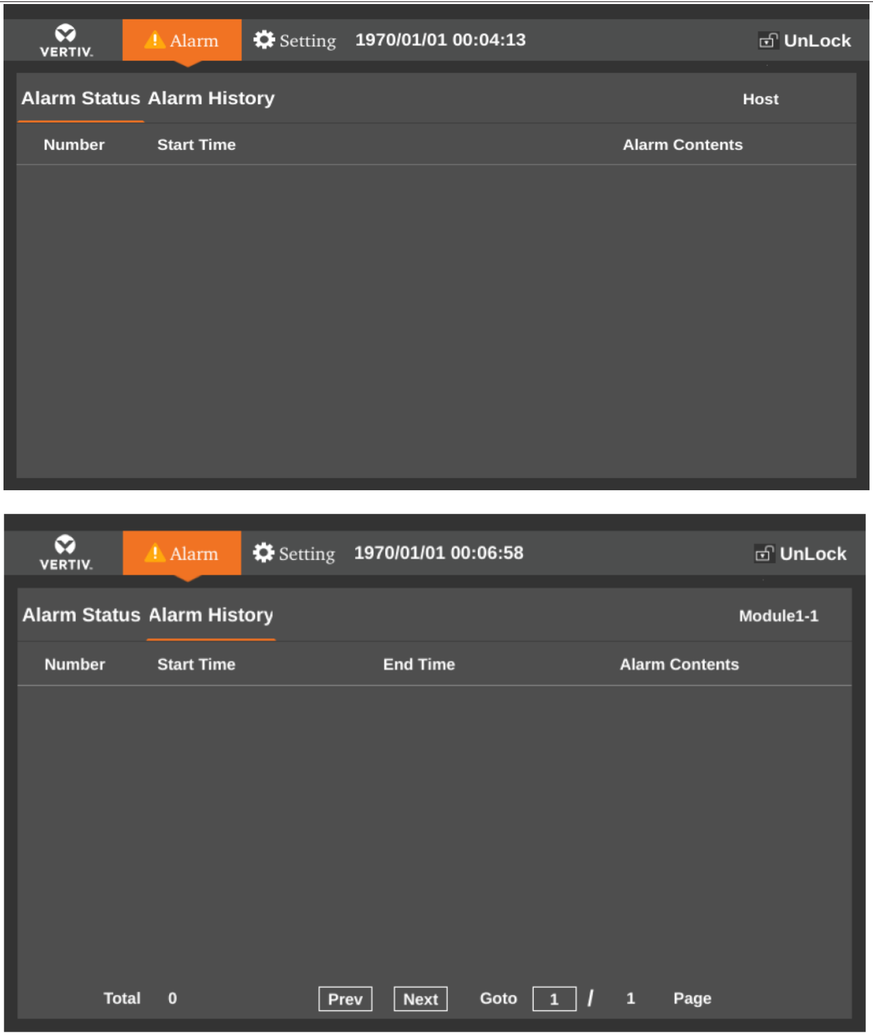


Figure 5-6 Alarm Status & History Interface

5.4.2. Main Unit Menu

Click the **Main Unit** icon to enter the interface shown in Figure 5-7 and Figure 5-8, the unit icon on the left is lit, user can view the main unit operating status and set related parameters.

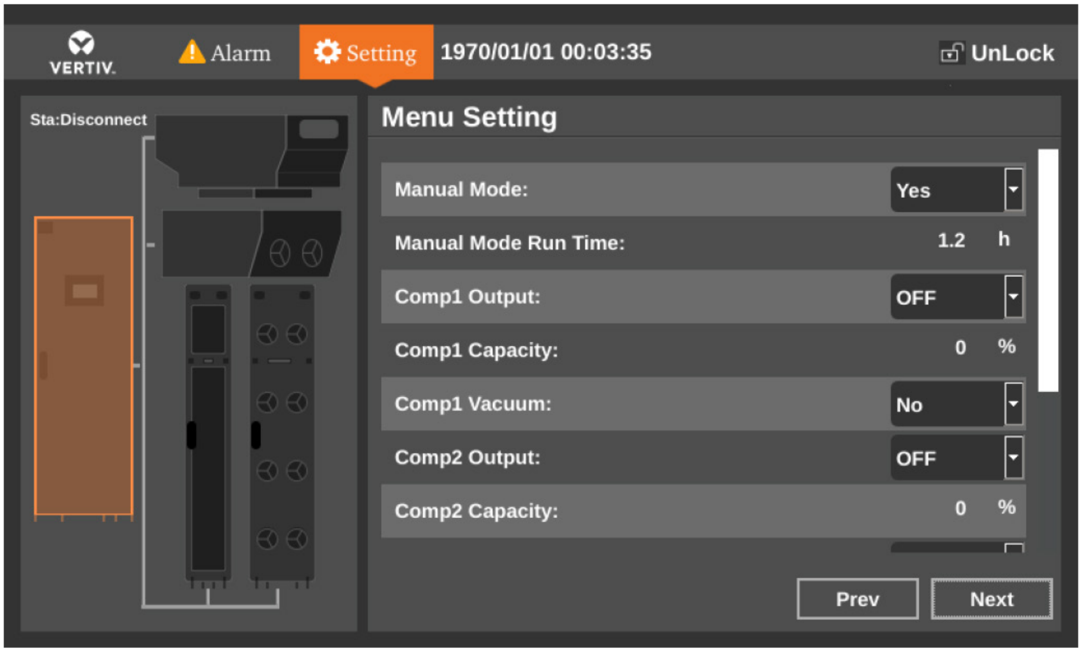


Figure 5-7 Menu Setting Interface

Figure 5-8 Run Information Interface

5.4.3. Terminal Menu

Click the **Terminal** icon to enter the interface shown in Figure 5-9, Figure 5-10, and Figure 5-11. The left terminal icon is lit, user can view the running status of the terminal and set related parameters.

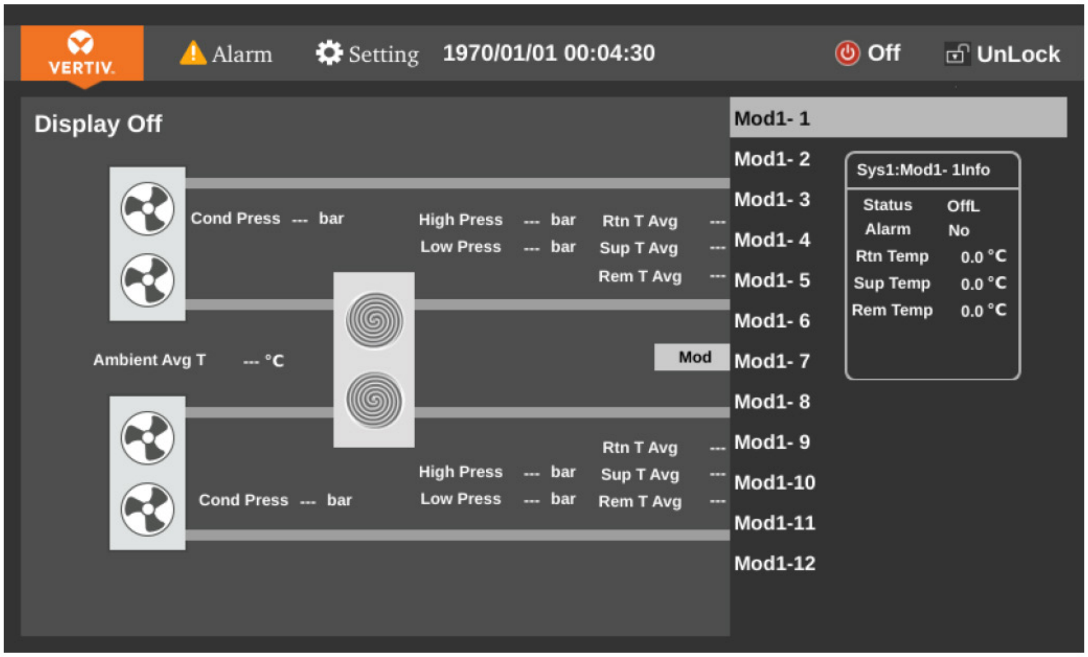


Figure 5-9 Basic Terminal Status Interface

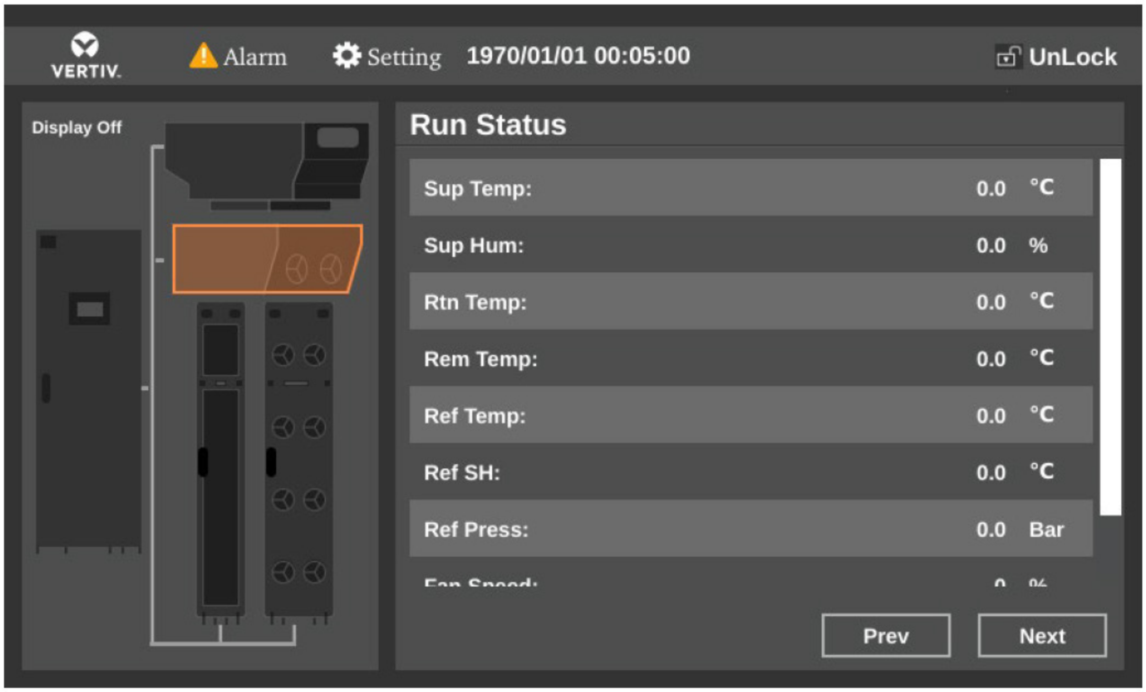


Figure 5-10 Terminal Run Status Interface

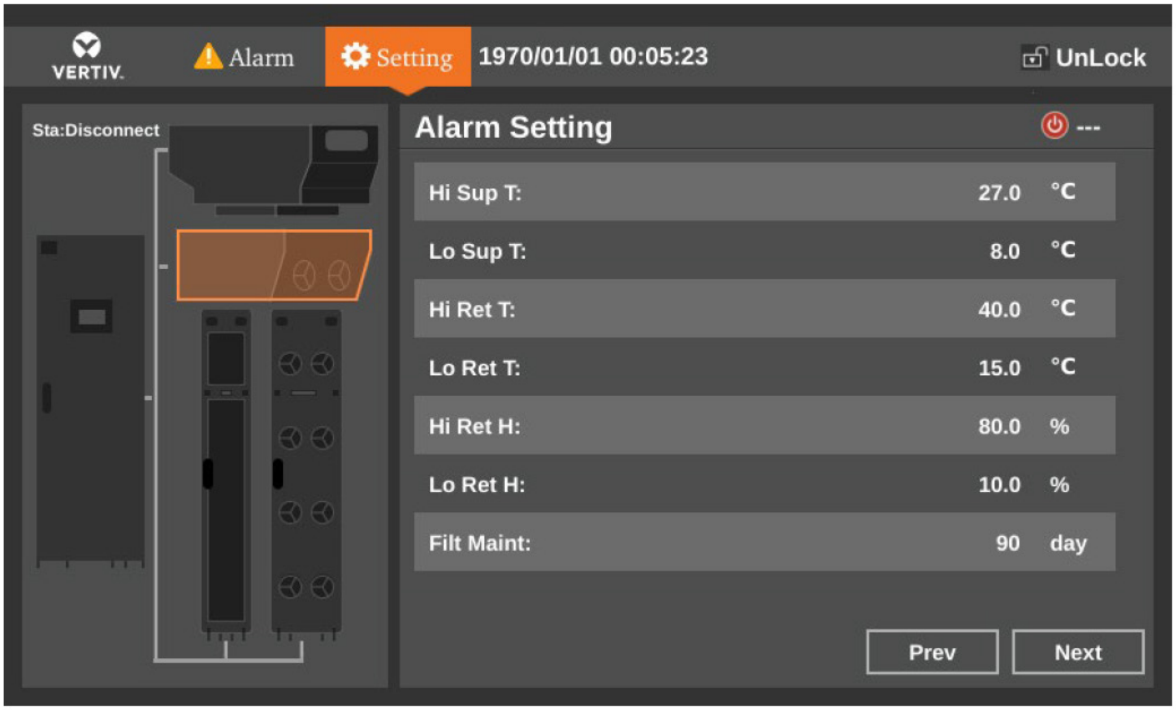


Figure 5-11 Terminal Alarm Setting Interface

5.4.4. Run Time

Figure 5-13 shows the RUN Time interface of the unit.

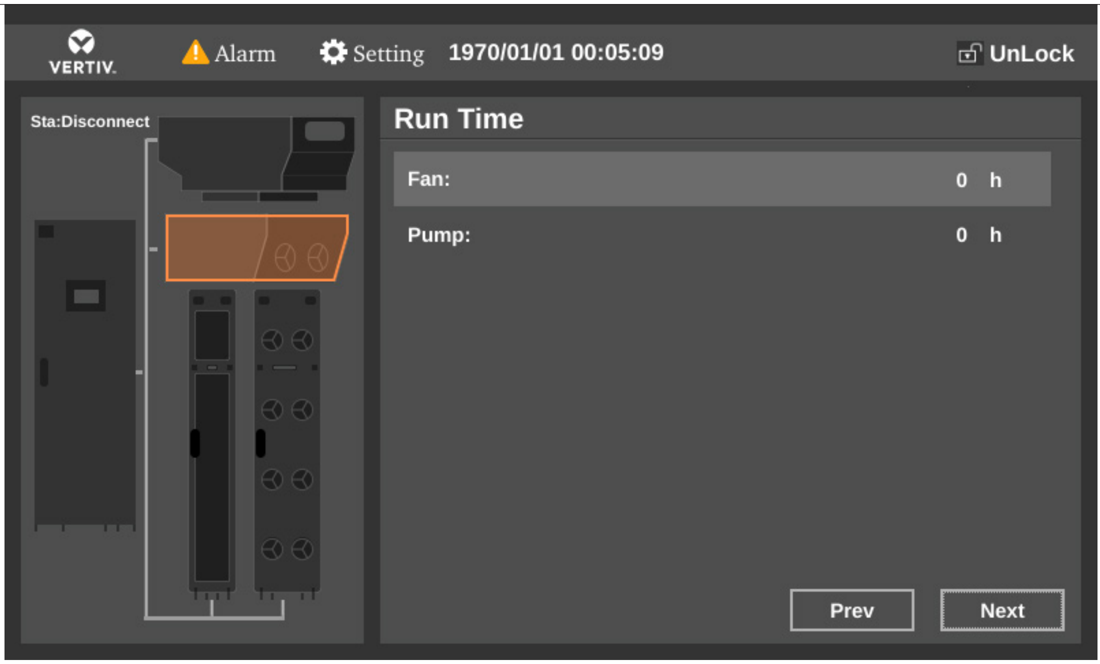


Figure 5-12 Run Time Interface

5.4.5. About

Figure 5-14 shows the About interface of the unit.

Figure 5-13 About Interface

6 System Operation and Maintenance

Regular system maintenance is essential to ensure product reliability and effectiveness. This chapter introduces the operation and maintenance of Vertiv™ Liebert® XDC unit, including routine maintenance inspections, system troubleshooting tests, and maintenance of filter net, fan components, cooling systems, and drainage systems.

- It is recommended that the load of Liebert XDC system should not be less than 30%. If the load is lower than the requirement, consult Vertiv local representaive.
- During the operation of Liebert XDC precision air conditioner, lethal voltage may exist in the unit. Prior to operating, ensure to read all notes and warning information on the parts and also those which are mentioned in the manual, otherwise it may cause casualties.
- Only qualified and authorized repair and maintenance personnel can perform system maintenance.

6.1. Routine Maintenance Inspection (Monthly)

Check the system components monthly, focusing on checking whether the system functions normally and whether the components have any sign of wear. Refer to Table 6-1 for the monthly routine maintenance inspection items.

Table 6-1 Monthly Routine Inspection Items List

Parts		Inspection Items	Remark
Liebert XDC unit	Compressor part	Check for any sign of leakages	
		Listen to the running sound and observe the running vibration	
	Cooling cyclic system	Check the suction pressure	
		Check exhaust pressure	
		Check the refrigerant line	
		Check the moisture contents of the system (observe through sight glass)	
Cooling terminal	Electronic expansion valve	Whether the refrigerant pressure and temperature detection are accurate	
		Check if it is blocked or stuck	
	Fan	Whether the fan is running with abnormal noise	
	Water pump filter net	Check if there is any foreign matter in the drip tray	
		Check the water pump filter	
	Filter net	Check whether the filter net is damaged or blocked	
		Clean the filter net	
Outdoor unit	Air-cooled condenser (air-cooled unit)	Cleanliness of condenser fins	
		Whether the fan installation base is firm	
		Whether the fan cushion is aged or damaged	
		The refrigerant pipeline is properly supported	

6.2. Routine Maintenance Inspection (Semi-annual)

Table 6-2 provides the details of semi-annual routine maintenance and inspection items of Vertiv™ Liebert® XDC unit.

Table 6-2 Semi-annual Routine Inspection Items List

Parts		Inspection Items	Remark
Liebert XDC unit	Compressor part	Check for any sign of leakages	
		Check and tighten circuit connectors	
		Listen to the running sound and observe the running vibration	
	Cooling cyclic system	Check the suction pressure	
		Check exhaust pressure	
		Check the refrigerant line	
		Check the moisture content of the system (observe through sight glass)	
Electrical control	Electrical control part	Check fuse and MCB	
		Check and tighten circuit connectors	
		Check control program	
		Check the closing condition of the contactor	
Cooling terminal	Electronic expansion valve	Whether the refrigerant pressure and temperature detection are accurate	
		Check if it is blocked or stuck	
	Fan	Whether the fan impeller is deformed	
		Check and tighten circuit connectors	
	Water pump filter	Check if there is any foreign matter in the water pan	
		Check the water pump filter	
	Filter	Check whether the filter is damaged or blocked	
		Clean the filter	
Outdoor unit	Air-cooled condenser (air-cooled unit)	Cleanliness of condenser fins	
		Whether the fan installation base is firm	
		Whether the fan cushion is aged or damaged	
		Speed controller adjustment function	
		Whether temperature and pressure detection are accurate	
		The refrigerant pipeline is properly supported	
		Check and tighten circuit connectors	

6.3. System Troubleshooting Test

The microprocessor controller has a manual mode, which provides on-site troubleshooting functions for manually opening and closing various components to detect the status of system functional components,

6.4. Electrical Connection Inspection

6.4.1. Electrical Maintenance

1. Perform visual inspection and treatment to electrical connections according to the following items:
2. Electrical insulation test of the whole system: Find defective contacts and correct the defects. During the test, disconnect the fuse or MCB of the control section to avoid damage to the control panel due to high voltage.
3. Statically check whether each contactor is flexible and jammed.
4. Use a brush or dry compressed air to remove dust from electrical and control components.
5. Check whether the contacts of the contactor are drawn for arcing and have burn marks. If it is serious, replace the corresponding contactor.
6. Fasten the electrical connection terminals.
7. Check whether the fan’s quick-to-plug terminals are in good contact. If any looseness is found, replace the terminals.
8. If the power cord is damaged, in order to avoid danger, it must be replaced by a professional from the manufacturer’s maintenance department.

6.4.2. Control Maintenance

Perform visual inspection, simple function inspection and processing of the control part according to the following items:

1. Check the appearance of the transformer and check the output voltage.
2. Check the appearance of the terminal transformer and power supply module, and check the output voltage.
3. Check the control interface board, control board, temperature and humidity sensor board, fuse board and other surfaces for obvious sign of aging.
4. Clean the dust and dirt on the electrical control components and control panel, and clean it up with a brush and electronic dust remover.
5. Check and tighten the output and input plugs of the control interface board, including the connection between the control board and the control interface board and the connection between the control interface board and each sensor.
6. Check the connection between the user cabling terminals (such as A/B, H/L, etc.) and the control terminal block.
7. Check the output connection of the control interface board to each contactor, and the input connection of the high voltage switch, exhaust temperature sensor, high pressure sensor, etc. Pay special attentions to the high-voltage switches and other plug-in terminals. If there is looseness, poor contact, failure, etc., they should be replaced immediately.
8. Replace the control fuse (or MCB), control board and other electrical components that have detected problems.
9. Check the specifications and aging conditions of the control cable or power cable of the main unit, and replace the cable if necessary.
10. Adjust the setpoints, and detect the action of each functional component according to the control logic.
11. Simulate and detect the running status of the protection units such as the Vertiv™ Liebert® XDC unit.
12. Check whether the cabling and numerical display of each sensor are normal.

6.5. Cooling System

1. Check the refrigerant pipes and fixing brackets every six months; the refrigerant pipes must have proper brackets, and it is not allowed to lean against the wall, the floor or the fixed frame where it vibrates; at the same time, it is necessary to check whether the pipe insulation cotton is damaged. If any, cotton needs to be refilled in time.
2. The components of the cooling system must be inspected monthly to see if the system is functioning properly and for signs of wear. Since the device failure or damage is often accompanied by corresponding failures, regular inspections are the main means to prevent most system failures.
3. The refrigerant pipeline must have proper support, and it is not allowed to lean against the wall, floor or fixed frame vibration. Check the refrigerant pipeline and fixing brackets every six months.
4. Each system is equipped with a sight glass, which is convenient to observe the flow of liquid refrigerant and the moisture content of the system. When the moisture content in the system exceeds the standard, the background color of the sight glass changes from green to yellow. When there are too many bubbles in the sight glass, the refrigerant charge may be insufficient.
5. When the refrigeration system fails, the fault can be judged according to some parameters of the system operation.

6.5.1. Suction Pressure

When the suction pressure drops below the protection value set by the low pressure sensor, it may cause the compressor to stop. On the other hand, too high suction pressure will also reduce the cooling of the compressor motor by the refrigerant, which may cause damage to the compressor. The minimum (low pressure alarm setting) and the maximum (design operation) suction pressure settings are shown in Table 6-3.

Table 6-3 Suction Pressure

System	Minimum pressure kPa (PSIG), R410A	Maximum pressure kPa (PSIG), R410A
Air cooling (speed controller stepless speed regulation)	370 (53.7)	1580 (229)

6.5.2. Exhaust Pressure

The exhaust pressure may increase or decrease due to load conditions or condenser efficiency. When the exhaust pressure reaches the set value of the pressure switch, the action of the high pressure switch will stop the compressor. Refer Table 6-4 for more details.

Table 6-4 Exhaust Pressure

System Design	kPa (PSIG)
High pressure switch action value	4100 (595)

6.6. Terminal Electronic Expansion Valve

The automatic adjustment of the electronic expansion valve ensures that enough refrigerant is supplied to the evaporator to meet the requirements of loading conditions. By observing and measuring the temperature of superheat and the opening of the electronic expansion valve , user can determine whether the electronic expansion valve is operating normally.

Note: The temperature of suction superheat has a greater impact on the compressor life. If the compressor has run for a long time under the condition of low or no suction superheat, it may cause the compressor to produce “liquid impact” and break the scroll of the scroll compressor.

Note: If abnormal opening or adjustment of the electronic expansion valve is found at the application site, contact Vertiv local representative and Vertiv technical support.

6.7. Terminal Fan

Regular inspections include the running status of the motor, the status of the fan impeller, the fixing of fan components, and the clearance between the fan and the air guide ring, etc.

Pay special attention to whether the fan assembly and the air guide ring are firmly installed, and whether there is the possibility of touching the nearby sheet metal parts when the blades rotate. At the same time, any abnormal airflow channel blocking factors should be eliminated in time to avoid the any damage to the cooling system and other system components from the reduction of airflow volume.

The terminal fan needs to input the main power of 48 Vac, and at the same time rely on the 0 V to 10 V DC analog signal output by the control board to adjust the speed. When the fan is abnormal or does not rotate, check the analog signal, main power supply, and filter net blockage.

The steps to replace the fan are as follows:

1. Cut off the power supply of the whole unit.
2. Remove the screws fixing the fan mounting plate, and remove the fan.
3. Reinstall the replaced fan. During the installation process, pay attention to the terminal corresponding relationship and check if the contacts are firmly connected.

Note: Do not maintain the fan during the operation of the fan to avoid injury.

Note: During the operation of the unit, it is forbidden to touch the fan net cover to prevent mechanical damage caused by the operation of the fan.

6.8. Air-cooled Condenser

Refer to the related information in Maintenance in “Vertiv™ Liebert® LVC Condenser User Manual”.

6.9. Compressor

The Vertiv™ Liebert® XDC units use variable capacity compressors, which are highly reliable and require engineering construction to strictly follow correct procedures.

- The compressor motor is rarely burned out due to insulation failure. In the event that the motor is indeed burned out, most are caused by poor mechanical or lubrication, that is, high temperature and overheating.
- If the problems that may cause compressor failure can be detected and corrected early, most compressor failures can be avoided. The maintenance personnel should regularly conduct maintenance and inspection of abnormal operation conditions that may occur. Instead of replacing the compressor after a failure, it is better to take the necessary steps to ensure the normal operation of the system. This is not only easier but also much cheaper.

When troubleshooting the compressor, check whether all electrical components of the compressor are operating normally:

1. Check all fuses and circuit breakers.
2. Check the operation of the high voltage switch and low pressure sensor.
3. If the compressor malfunctions, find out whether the compressor malfunction is caused by an electrical failure or a mechanical failure.

When replacing the compressor, avoid skin contact or contact with refrigerant and lubricating oil. If contact with refrigerant or lubricating oil, it can cause severe burns or frostbite to the skin. Wear long-sleeved gloves when handling contaminated parts.

6.10. Mechanical Failure

The mechanical failure of the compressor cannot be determined by burning smell. User should try to rotate the motor. If a mechanical failure is confirmed, the compressor must be replaced. If the motor is burned out, eliminate the factors that caused the motor to burn out and clean the system.

Pay high attention to the compressor motor burnout, that is usually caused by improper system cleaning.

6.11. Electrical Failure

Electrical failure can be determined by the obvious pungent smell. If severe burns occur, the lubricant will turn black and become acidic. In the event of electrical failure and the complete burnout of the compressor motor, measures must be taken to clean the system to eliminate acidic substances in the system and avoid such failures in the system in the future.

Note: The replacement of the compressor needs to be carried out under the guidance of professionals. For replacement, contact Vertiv technical support engineer.

Note: The damage caused to the compressor due to improper cleaning will not be covered in the warranty and related details are mentioned in the warranty clause.

When the compressor is completely burned out, the compressor should be replaced along with the filter, and followed by checking of the electronic expansion valve at the terminal. If the electronic expansion valve fails, it should be replaced. Prior to the replacement, it is necessary to clean the system. If user are not sure about the cleaning method, consult the Vertiv local representative.

7 Troubleshooting

This chapter introduces troubleshooting and fault handling of Vertiv™ Liebert® XDC unit.

Certain circuits have lethal high voltages, and only professional technicians are allowed to operate the unit. You must be especially careful when troubleshooting with power on.

Note: When using jumpers for troubleshooting, always remember to remove the jumpers after the repair work is completed. The remaining connected jumpers may overrun the control function and cause equipment damage.

Table 7-1 provides the troubleshooting and treatment of each component of Liebert XDC unit.

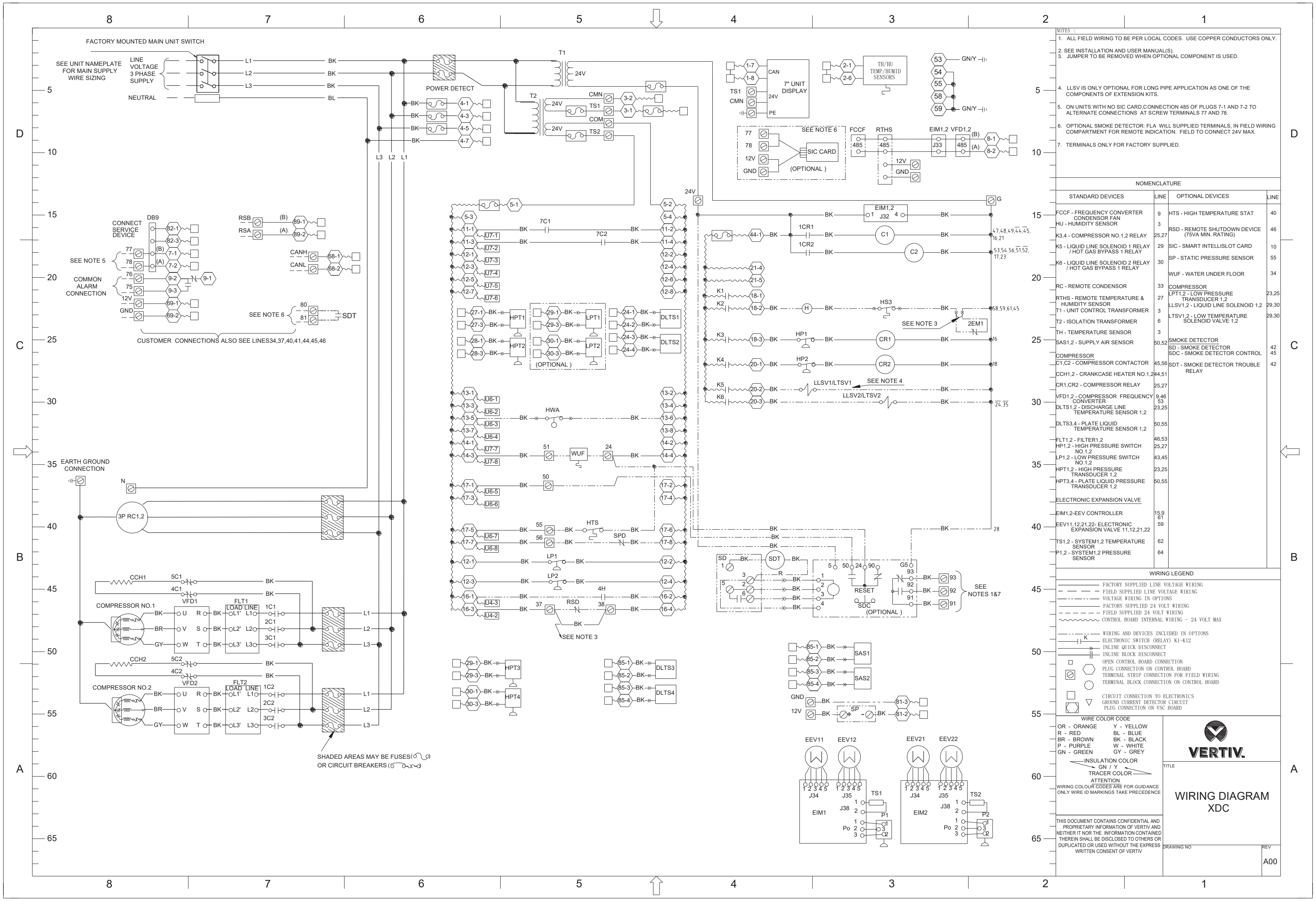
Table 7-1 Troubleshooting Compressor and Cooling System

Symptom	Possible Cause	Items to be Checked or Handling Method
Compressor cannot start	No power (shutdown)	Check the main power switch, fuse or circuit breaker and connecting wires
	MCB tripped due to overload	Manual reset, check the average current
	Loose circuit connection	Fasten the circuit connector
	Compressor coil is short-circuited and burned out	Check the motor windings, if any defect is found, replace them immediately
The contactor is not closed and the compressor is not running	No cooling demand output	Check the PACC controller status
	High voltage switch action	Check the high voltage switch, whether there is a high voltage alarm
	Contactor failure	Check the contactor, check whether there is 24Vac between the terminals of J18-3 (compressor 1) and J20-1 (compressor 2) and G
	Low pressure sensor failure (11 minutes after shutdown)	Check whether the low-pressure sensor wiring of the system is intact and the reading is normal
	Motor drive failure (11 minutes after shutdown)	Check whether the wiring is normal, whether the current is too large, check whether the ventilation of the motor drive is normal
	Motor drive communication failure (11 minutes after shutdown)	Check whether the wiring of the RS458 communication line of the motor drive is intact, then re-power on and reset or the panel will eliminate this fault alarm

Symptom	Possible Cause	Items to be Checked or Handling Method
The contactor is closed, the compressor is not running	MCB tripped	Check the line voltage after checking the circuit breaker and contactor
	Compressor built-in protector disconnected	Check whether the compressor coil is open. If open, wait for the coil to cool down and reset automatically
	Detect exhaust air temperature sensor	Is there an alarm for low exhaust air superheat/high temperature
	Detect low pressure sensor	Check whether there is a low voltage alarm in the history alarm
	Low pressure sensor failure (11 minutes after shutdown)	Check whether the low-pressure sensor wiring of the system is intact and the reading is normal
	Motor drive failure (11 minutes after shutdown)	Check whether the wiring is normal, whether the current is too large, check whether the ventilation of the motor drive is normal
	Motor drive communication failure (11 minutes after shutdown)	Check whether the wiring of the RS458 communication line of the motor drive is intact, then re-power on and reset or the panel will eliminate this fault alarm
The compressor stops after running for 5 minutes	Refrigerant leak, low pressure detection is too low/abnormal	• Check the suction pressure; • Check the circuit where the low-pressure sensor is located; • Check whether the reading of the low pressure sensor and the actual pressure are within ±0.3bar (the value of the high and low pressure sensor can be read in the maintenance menu/troubleshoot setting and displayed as absolute pressure)
High pressure protection	Dirty condenser Inlet water temperature is too high or water flow is too small (water cooling)	Clean the condenser or change the plate type exchanger; Check the water system (water cooling)
	Condenser equipment does not operate	Air cooling system, check the condenser fan; Water cooling system, check the water system
	Excessive refrigerant charge	Check whether the subcooling is too high
	Improper adjustment of electric ball valve (water cooling)	• It is necessary to check whether the reading of the high pressure sensor and the actual value are within the range of ±0.6bar (the value of the high and low pressure sensor can be read in the maintenance menu/troubleshoot setting and displayed as absolute pressure); • It is necessary to check whether the electric ball valve of the plate type heat exchanger is operating normally
Low exhaust pressure	The water flow is too large or the inlet water temperature is too low (water cooling)	Check the water system
	Refrigerant leak	Check for leaks and repair and add refrigerant

Symptom	Possible Cause	Items to be Checked or Handling Method
Low exhaust pressure	The outdoor fan speed controller is faulty, and the output voltage is always full load voltage, and does not change with the change of condensing pressure (air cooling)	If defects are found, replace the speed controller immediately
After starting, there is no change in suction and exhaust pressure	Compressor runs reversely or internal air blistering	If the compressor runs reversely, replace any two L wires of the compressor (inverter output terminal); if internal air leakage occurs and cannot be recovered, the compressor needs to be replaced
Low suction pressure or liquid backflow	Insufficient refrigerant in the system	Check for leaks. If yes, repair and add refrigerant
	Filter net of the terminal is too dirty	Replace the filter net
	Clogged dry filter	Replace the dry filter
	Improper setting of the superheat of the electronic expansion valve of the terminal	Operate strictly in accordance with the design superheat of the unit
	Electronic expansion valve device of the terminal failure	Replace electronic expansion valve
	Poor air distribution	Check the air supply and air return system
	Condensing pressure is too low	Check the condenser
Compressor noise is too loud	Liquid backflow	See “Low suction pressure or liquid backflow” handling method
	Poor lubrication	Add lubricant
	The compressor transportation fixture is not removed	Remove the transportation fixture
Compressor overheated	Compression ratio is too high	• Check the settings of the high pressure and low pressure switches, check whether the condenser is dirty or blocked; • Check whether the evaporator and condenser fan of the terminal are operating normally
	Suction superheat is too high	Adjust the setting of the electronic expansion valve of the terminal or add a proper amount of refrigerant

Appendix I: Circuit Diagram of Vertiv™ Liebert® XDC



Appendix II: Alarm Output Menu

Parameter	Min	Default	Max	Hysteresis
Alarm attribute	0	-	2	-
High pressure alarm value (Bar)	-	42.0	-	9
Low pressure alarm value (Bar)	-	3.7	-	1.9
Exhaust high temperature alarm value (°C)	110.0	120.0	130.0	50.0
Low exhaust superheat alarm value (°C)	5.0	10.0	20.0	-
Power frequency deviation alarm value (Hz)	-	3.0	-	1.5
Power overvoltage alarm value (V)	-	415Vx(1+6%)	-	380Vx3%
Power supply undervoltage alarm value (V)	-	380Vx(1-10%)	-	380Vx3%
Low voltage alarm start delay (s)	30	180	600	-
Low exhaust superheat alarm activation delay (s)	30	300	600	-
Self defined 1 type	0	0	2	-
Self defined 2 type	0	0	2	-
Self defined 3 type	0	0	2	-
Self defined 1 polarity	NC	NO	NO	-
Self defined 2 polarity	NC	NO	NO	-
Self defined 3 polarity	NC	NO	NO	-
Remote shutdown polarity	NC	NC	NO	-
Common alarm polarity	NC	NC	NO	-
Reset alarm lock	N	N	Y	-
Clear alarm history	N	N	Y	-
Remarks: Self defined type: 0: other; 1: smoke alarm; 2: fire alarm. Except for “Others”, the self defined alarm input type cannot be repetitive.				

Appendix III: Hazardous Substance Content

Date: ___________________________ Prepared by: ___________________________

Model: ___________________________ Serial No.: ___________________________

Filter net of terminal:

___ 1. Check if the filter net is damaged or blocked

___ 2. Check the filter net blockage switch

___ 3. Clean the filter net

Terminal fan part

___ 1. Whether the fan impeller is deformed

___ 2. Whether the bearing is worn

___ 3. Is the fan running sound abnormal?

Compressor part

___ 1. Check for leaks

___ 2. Listen to the running sound and observe the running vibration

___ 3. Compressor drive

Air-cooled condenser

___ 1. Cleanliness of condenser fins

___ 2. Whether the fan mounting base is firm

___ 3. Whether the fan cushion is aged or damaged

___ 4. Whether the lightning protection board is still effective (if there is a lightning protection board. It is best to check once a week for the thunderstorm season)

__ 5. The refrigerant pipeline is properly supported

_

Cooling cyclic system

___ 1. Check the suction pressure

___ 2. Check the exhaust pressure

___ 3. Check the refrigerant pipeline

___ 4. Check the moisture content of the system (observe through sight glass)

___ 5. Check the terminal electronic expansion valve

Signature____

Note: Please copy this form for record archive.

Appendix IV: List of Maintenance Inspection Items (Semi-annual)

Date: ____________________________

Model: ____________________________

Prepared by: ___________________________

Serial No.: _____________________________

Filter net of terminal:
___ 1. Check if the filter net is damaged or blocked
___ 2. Check the filter net blockage switch
___ 3. Clean the filter net

Terminal fan part
___ 1. Whether the fan impeller is deformed
___ 2. Whether the bearing is worn
___ 3. Is the fan running sound abnormal?
___ 4. Check and fix the circuit connectors

Compressor part
___ 1. Check for leaks
___ 2. Listen to the running sound and observe the running vibration
___ 3. Check and fix the circuit connectors
___ 4. Compressor drive

Air-cooled condenser
___ 1. Cleanliness of condenser fins
___ 2. Whether the fan mounting base is firm
___ 3. Whether the fan cushion is aged or damaged
___ 4. Whether the lightning protection board is still effective (if there is a lightning protection board. It is best to check once a week for the thunderstorm season)
___ 5. Speed controller voltage regulation function
___ 6. The temperature switch is at the specified setting value
___ 7. The refrigerant pipeline is properly supported
___ 8. Check and fix the circuit connector

Water-cooled condenser (if used)
___ 1. Cleaning the water piping system
___ 2. Check the function of the electric ball valve
___ 3. Check the water system for leakage

Cooling cyclic system
___ 1. Check the suction pressure and superheat
___ 2. Check the exhaust pressure and condensing super-cooling
___ 3. Check the refrigerant pipeline
___ 4. Check the moisture content of the system (observe through sight glass)
___ 5. Check the terminal electronic expansion valve
___ 6. Check if you need to add refrigerant (observe through sight glass)

Electrical control part
___ 1. Check the fuse and MCB
___ 2. Check and tighten circuit connectors
___ 3. Check the control program
___ 4. Check the closing condition of the contactor

Signature____
Note: Please copy this form for record archive.

Appendix V: Toxic and Hazardous Substances or Elements

Parts Name	Toxic and Hazardous Substances or Elements					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Polybrominated Biphenyl	Polybrominated Diphenyl Ether
Cabinet	○	○	○	○	○	○
Cooling parts	○	○	○	○	○	○
Electronic control unit	x	○	○	○	○	○
Display screen	x	○	○	○	○	○
Copper tube	○	○	○	○	○	○
Cables	○	○	○	○	○	○

O: Indicates that the content of this toxic and hazardous substance in all homogeneous materials of this part is below the limit requirement specified in SJ/T-11363-2006;

X: Indicates that the content of the toxic or hazardous substance in at least one of the homogeneous materials of the part exceeds the limit requirement specified in SJ/T11363-2006.

Vertiv is committed to the design and manufacture of environmentally friendly products. We will continue to reduce and eliminate toxic and hazardous substances in our products through continuous research. The following components or applications contain toxic and hazardous substances that are limited to the current state of the art and cannot be reliably replaced or have no mature solutions:

Reasons for lead contained in the above components: lead in high temperature solder in diodes; lead in resistor glass uranium (exempt); lead in electronic ceramics (exempt)

Description of the environmental protection use period: The environmental protection use period of this product (identified on the product body) refers to a period from the date of production, in which the toxic and hazardous substances contained in this product does not seriously affect the environment, person and property under normal use conditions and compliance with the safety precautions of this product.

Scope of application: Vertiv™ Liebert® XDC Series Air Conditioner

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