Vertiv™ Liebert® XDV

High Heat Density Precision Air Conditioner

User Manual

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Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures. Visit https://www.vertiv.com for additional assistance.

Product	BOM	Version	Date	Revision
XDV	31014397	1.0	17-06-2021	R1
XDV	31014397	1.0	29-01-2021	R0

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Table of Contents

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1 Overview

Vertiv™ Liebert® XDV High Heat Density Precision Air Conditioner (hereafter referred as Liebert XDV). The Liebert XDV is a specially engineered unit 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 a shopping mall, light industry, farm or commercial environment.

1.1. Product Introduction

The Liebert XDV unit is a small and medium-sized precision environmental control system that is suitable for the environmental control of small and medium-sized modified computer rooms, modular computer rooms, and large computer rooms that require energy saving and high heat density. It is designed to ensure precision equipment such as sensitive, industrial processing, communication, and computers have a controlled operating environment.

The Liebert XDV units can be directly installed on the top of the cabinet (Vertiv™ Liebert® VE Cabinet or cabinet from other manufacturers), or it can be placed on the server cabinet without occupying additional cabinet area, improving the efficiency of the customer's cabinet space usage. It also has features such as high reliability, high sensible heat ratio, and large air volume; it uses R410A an environment efficient refrigerant to meet the international environmentally safe requirements. The finned tube heat exchanger with a sophisticated design and layout provides excellent heat exchanging performance. The EC fan with large air volume and low energy consumption makes the system run more energy-efficient. The electronic expansion valve (EEV) intelligently controls the uniform distribution of refrigerant flow and effectively solving the heat dissipation problem of the high heat density server cabinet.

1.2. Product Appearance

The appearance of Liebert XDV unit is shown in Figure 1-1.

Figure 1-1 Appearance of Liebert® XDV Unit

1.3. Model Nomenclature

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

Table 1-1 Liebert XDV Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12
X	D	V	0	1	0	C	S	1	5	H	C

Digit 1, 2 Product Model	
XD	***X-treme High Density***
Digit 3 Cooling System	
H	Horizontal Cabinet Inrow Installation
V	***Vertical on Rack***
O	Overhead Rack
Digit 4, 5, 6 Cooling Capacity kW	
0-9	10 kW
Digit 7 XD Modular Type	
B	Standard Cabinet Pump System Terminal
C	***Standard Cabinet compressor System Terminal***
Digit 8 Power Supply	
S	***220 V to 240 V, 1 Ph, 50 Hz/ 60 Hz***
N	380 V to 415 V, 3 Ph, 50 / 60 Hz+N
M	380 V to 415 V, 3 Ph, 50 Hz
Digit 9 Refrigerant	
1	***R410A***
2	R134A
Digit 10 Condensate Pump	
L	Without Condensate Pump
5	***With Condensate Pump***
Digit 11 Air Discharge	
R	With Air Direction Grille
H	***Without Air DIrection Grille***
Digit 12 Order Identifier	
1~9	Version
C	***China Version***
A	America Version
E	EMEA

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

1.4. Main Components

The main components of Vertiv™ Liebert® XDV terminal unit include evaporator, EC fan, electronic expansion valve, filter net, dry filter, drain pump, and power module.

1.4.1. Evaporator

The finned tube heat exchanger with high heat dissipation efficiency, and the V-shaped symmetrical layout is adopted with an elegant design that improves the efficiency of the heat exchange.

1.4.2. EC Fan

The unit is equipped with highly energy efficient fans with large air volume, high air pressure, low power consumption, real-time adjustable fan speeds in accordance to the terminal cooling demand, which provide more energy-saving and more reliable performance.

1.4.3. Electronic Expansion Valve (EEV)

The unit is provided with electronic expansion valve to adjust the flow of refrigerant more accurately and ensure the uniformity of flow distribution at each terminal. This also helps in monitoring the temperature and pressure signals of the flow simultaneously.

Figure 1-2 Electronic Expansion Valve (EEV)

1.4.4. Filter Net

Liebert XDV unit is provided with a filtration net, which is highly efficient in protecting the unit by filtering the impurities and dust in the air.

1.4.5. Dry Filter

The dry filter can effectively filter the moisture and impurities generated in the long-term operation of the system to ensure the normal operation of the system.

1.4.6. Drain Pump

Vertiv™ Liebert® XDV unit adopts a self-priming drainage pump with small size, low noise and high reliability; the rated voltage required for the system is 220 Vac. It also includes the idling protection and overload protection functions to ensure timely rapid discharge of condensate water.

1.4.7. Power Module

The power module has high efficiency, low electrical loss, reliable and stable operation, ensuring the normal operation of the terminal unit.

1.5. Temperature and Humidity Sensors

Vertiv™ Liebert® XDV units are equipped with return air temperature and humidity sensor, and supply air temperature sensor as standard options. These sensors enable controller to control and modulate the cooling capacity of the unit and also help in monitoring and triggering alarms if any threshold value exceeds the setup parameters.

1.6. 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.

1.7. Environmental Requirements

1.7.1. Operating Environment

The operating environment of Vertiv™ Liebert® XDV 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%
Unit protection level	IP20	
Altitude	1000 m, more than 1000 m, please contact Vertiv local representative	
Operating voltage range	220 V to 240 V ±10%, 50 Hz / 60 Hz, 1 N~	
Pollution level	Level II	

1.7.2. Storage Environment

The storage environment of the Liebert XDV unit meets the requirements of GB4798.1-2005, as shown in Table 1-3.

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 Vertiv™ Liebert® XDV 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. 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 and the gap should be as small as possible.
5. In order to ensure the normal application of Liebert XDV, it is recommended that the equipment room be equipped with a dehumidifier.
6. When the Liebert XDV needs to be installed on a ceiling, the ceiling of the equipment room must have enough strength to meet the load-bearing requirements of Liebert XDV.

The Liebert XDV precision air-conditioner unit is prohibited to be used in the open harsh outdoor environment.

2.2. Maintenance Space Requirements

The Liebert XDV is a set of high heat density cooling unit, which is firmly on the top of the heat dissipating cabinet or above the cabinet to form a “hot aisle-cold aisle” layout. The fan draws hot air from the cabinets, passes through the cooling coils on the two sides, and then provides cold air to the cabinets. The air outlet of the unit is located in the cold aisle.

2.2.1. Maintenance Space Requirements

When installing, ensure to reserve a maintenance space of at least 600 mm in the front and rear sides, and a maintenance space of at least 250 mm must be provided on the top sides of the unit, as shown in Figure 2-1.

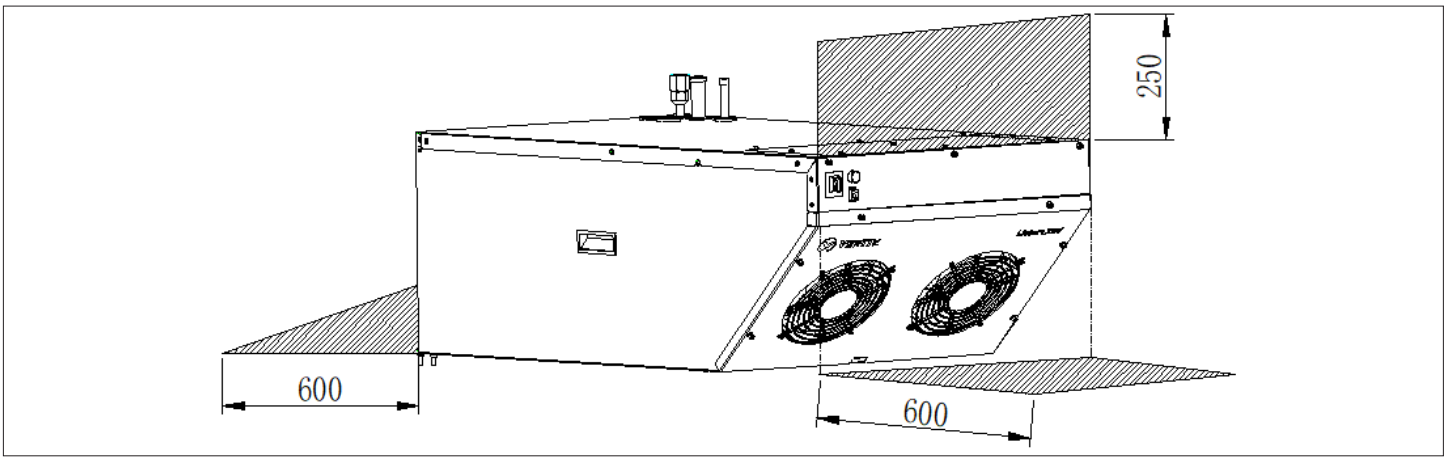


Figure 2-1 Maintenance Space of the Unit

Table 2-1 represents the minimum maintenance space requirements of the unit.

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

Spatial Location	XDV010CS15HC
Front	600 mm
Rear	600 mm
Top	250 mm

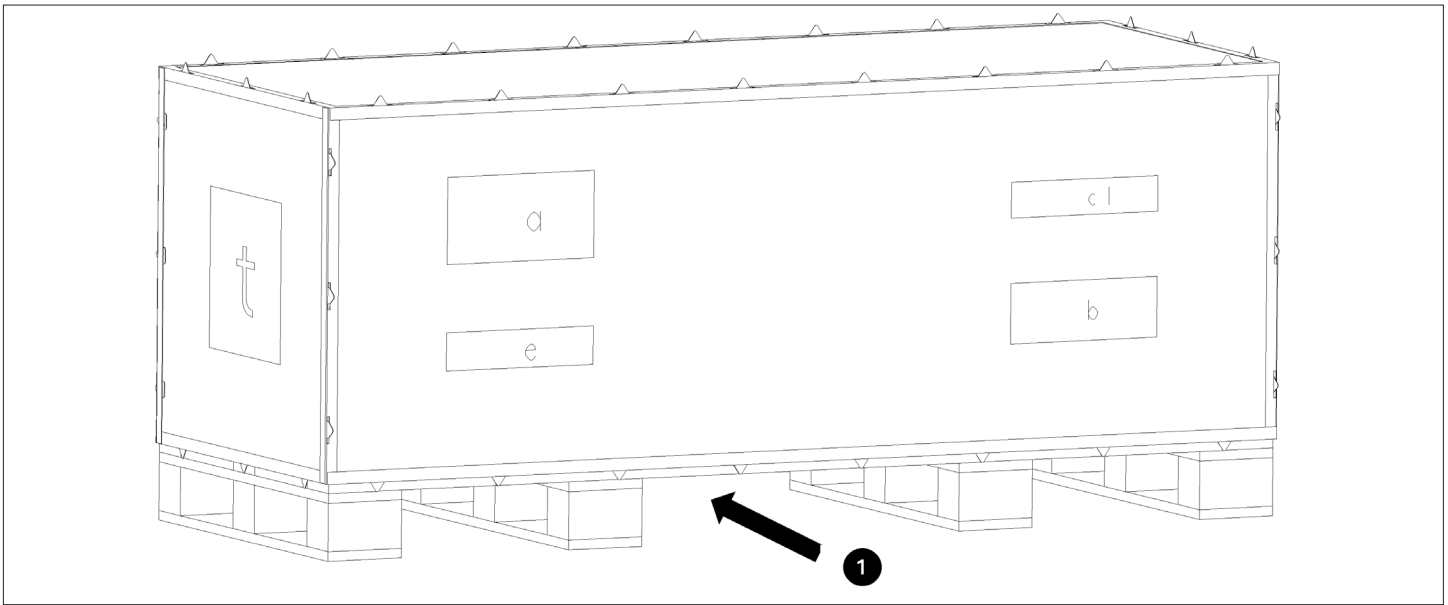
Note 1: The side with the operation indicator light is defined as the front of the unit, and the other side is defined as the rear of the unit. These spaces are used for regular maintenance, such as replacing filters, fans, electronic expansion valves, and maintaining electronic control boxes.

Note 2: 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™Liebert® XDV 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.



ITEMS	DESCRIPTION
1	Direction of Fork

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.

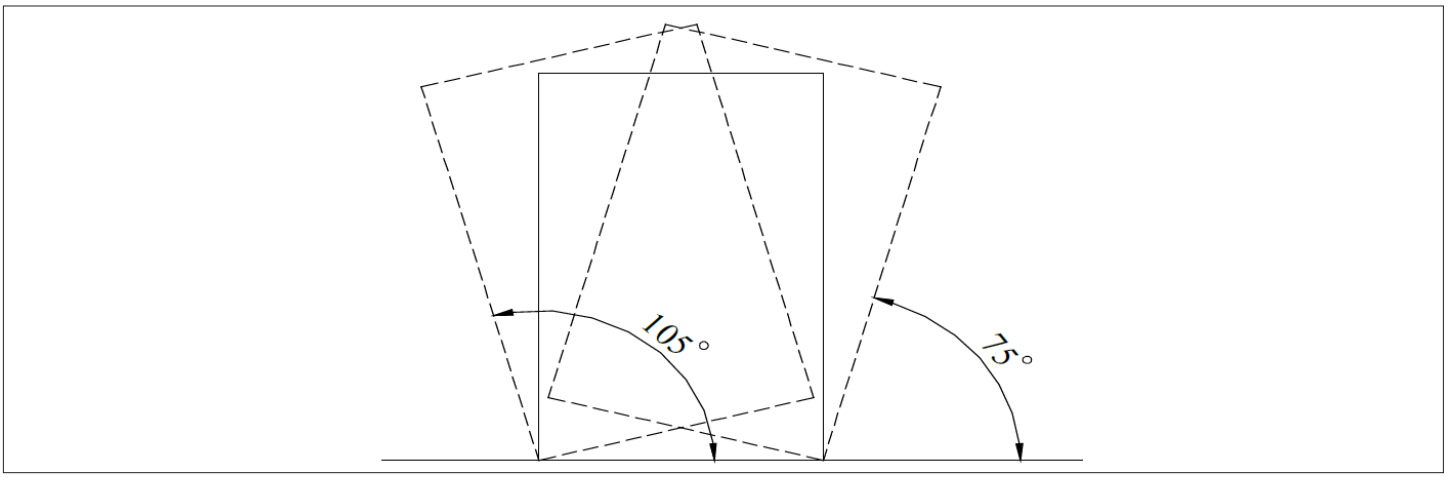


Figure 2-3 Handling Angle

2.3.2. Unpacking

Vertiv™ Liebert® XDV cabinet is packed with wooden boxes. After moving the unit to the nearest place of final installation, unpack the unit.

The unpacking procedures are as follows:

1. First remove the top cover and winding stretch film, then remove the the EPE (Expand aple Poly Ephylene) and cardboard, as shown in Figure 2-4.

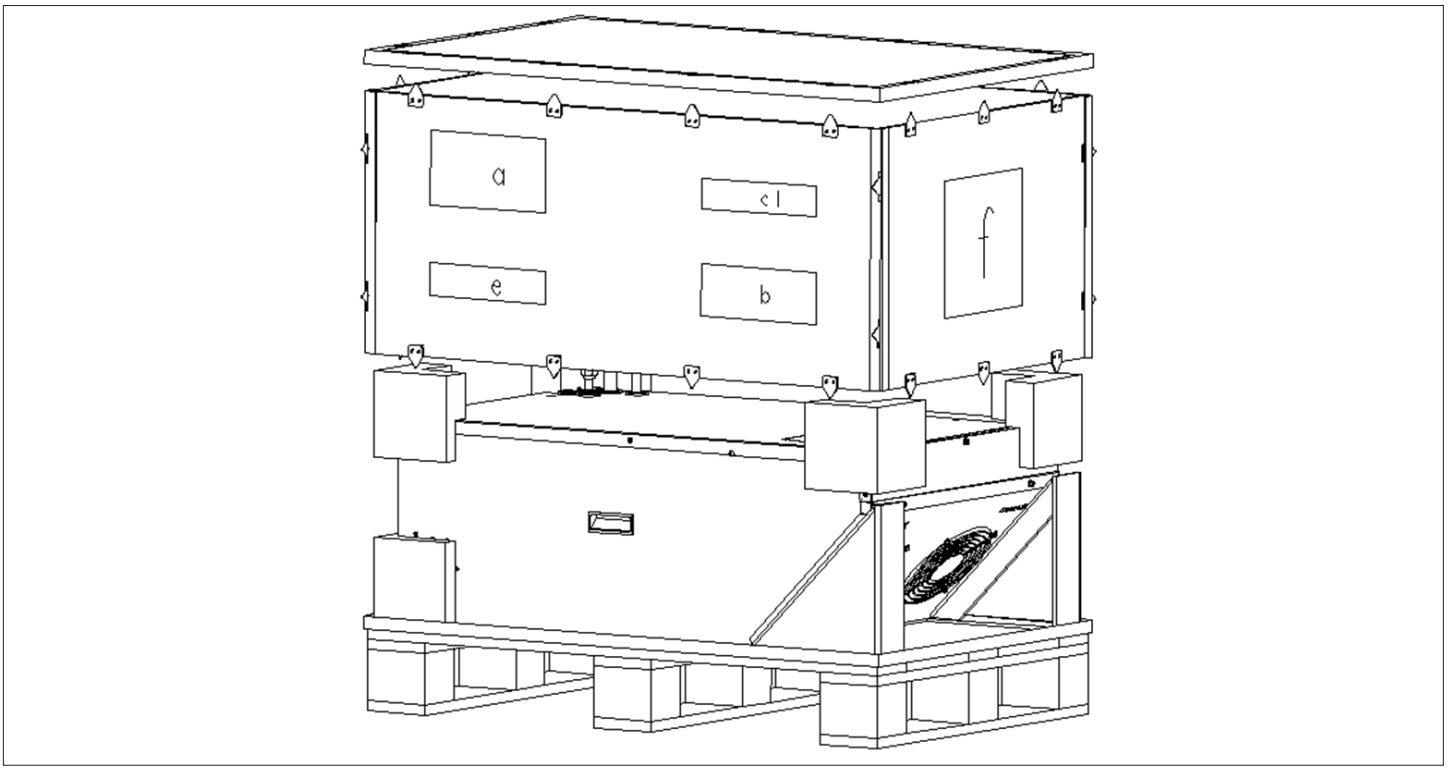
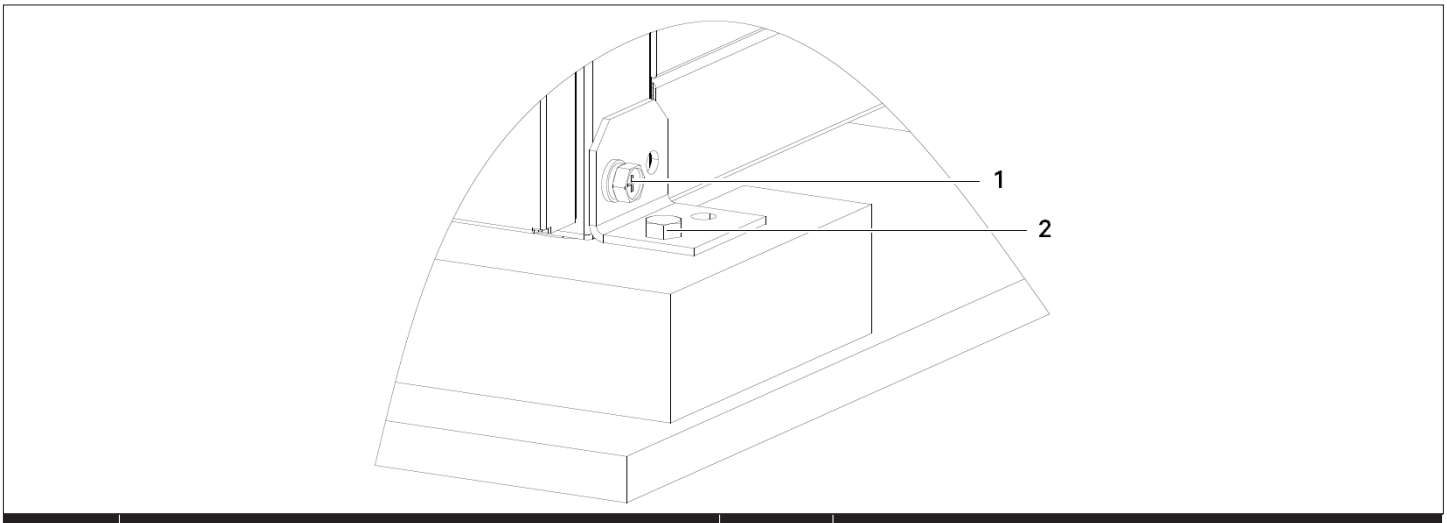


Figure 2-4 Unpacking the Unit

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 accessories kit (refer Table 2-2 for accessories checklist) and check whether any part is 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 and Vertiv local representative and product supplier.

Table 2-2 Checklist of Accessories in the Kit

Particulars	Specification	Quantity	Usages
User manual	A4	1	On-site installation and use of the unit and Vertiv™ Liebert® VE cabinet
Hexagon head bolt	M6X25_GB5781-2000	6	
Type I non-metallic insert hexagon lock nut	M6	4	
Large washers	6_GB96.1-2002_6	6	
Standard spring washer	6_GB93-87	6	
External installation	73×25×20	2	Usage

2.5. Installation

In order to realize the design performance of the unit and maximize its service life, proper installation is essential. The content of this section should be applied in conjunction with the current mechanical and electrical installation regulations

- Installation Notes

1. Vertiv™ Liebert® XDV unit is installed on the top of the cabinet, the unit has the risk of falling, which may cause personal injury or death or property damage. Liebert XDV has a very high center of gravity, therefore be extremely careful while handling and installing this unit.
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 piping 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.

4. System Installation Layout

2.5.1. Overall System Layout

Refer to the relevant content of the overall system layout in “Vertiv™ Liebert® XDC multi-connected air conditioner main unit User Manual”.

2.5.2. System Installation Diagram

Refer to the relevant content of the system installation diagram in “Vertiv™ Liebert® XDC multi-connected air conditioner main unit User Manual”.

2.6. Installation of the Unit

2.6.1. Mechanical Parameters

The Liebert XDV unit dimensions and mechanical parameters are shown in Figure 2-6 and Table 2-3.

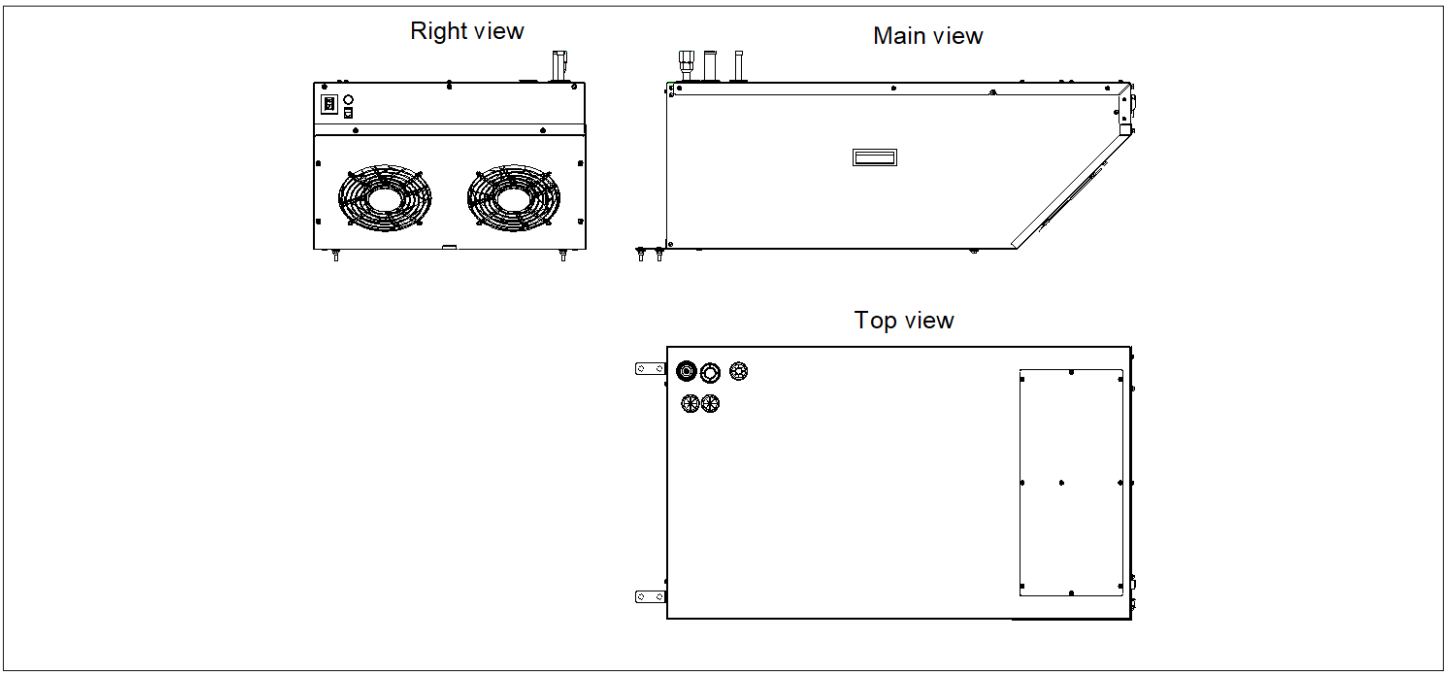


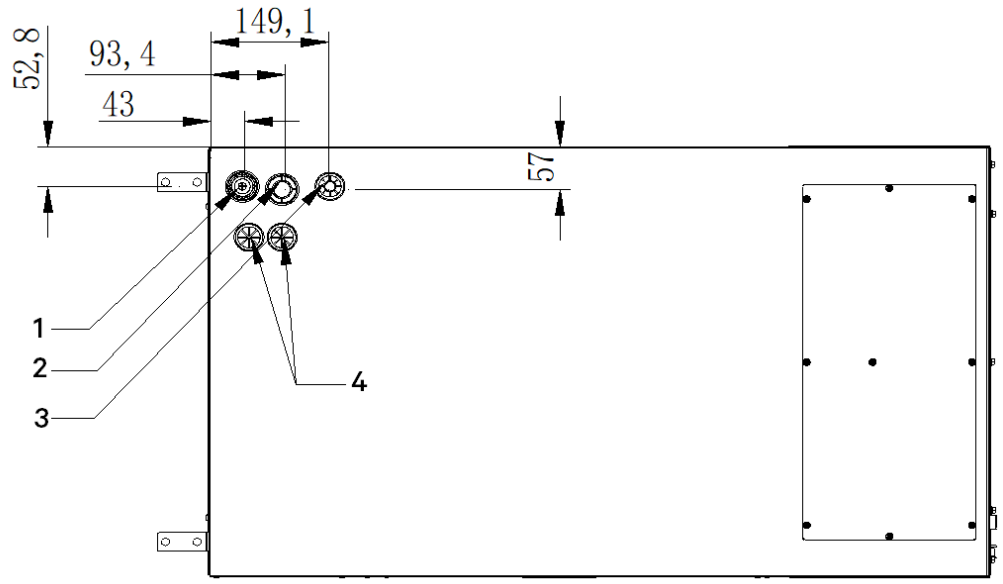
Figure 2-6 Dimension of Liebert XDV Unit

Table 2-3 Mechanical Parameters of Liebert XDV Unit

Product Model	Mechanical Parameters (WxDxH) (mm)	Packing Material Parameters (W×D×H) (mm)	Net Weight of Unit (kg)	Gross Weight of Unit (kg)
XDV010CS15HC	580×995×355	660×1070×600	60	80

2.7. Pipe Outlet Position Size on Top Plate

The location and positioning dimensions of the inlet and outlet pipes of the unit top plate are shown in Figure 2-7.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Drain	3	Refrigerant inlet
2	Refrigerant outlet	4	Inlet cable

Figure 2-7 Outlet Position of the Unit's Top Plate

2.8. Installing the Unit

2.8.1. Installation Location Requirements

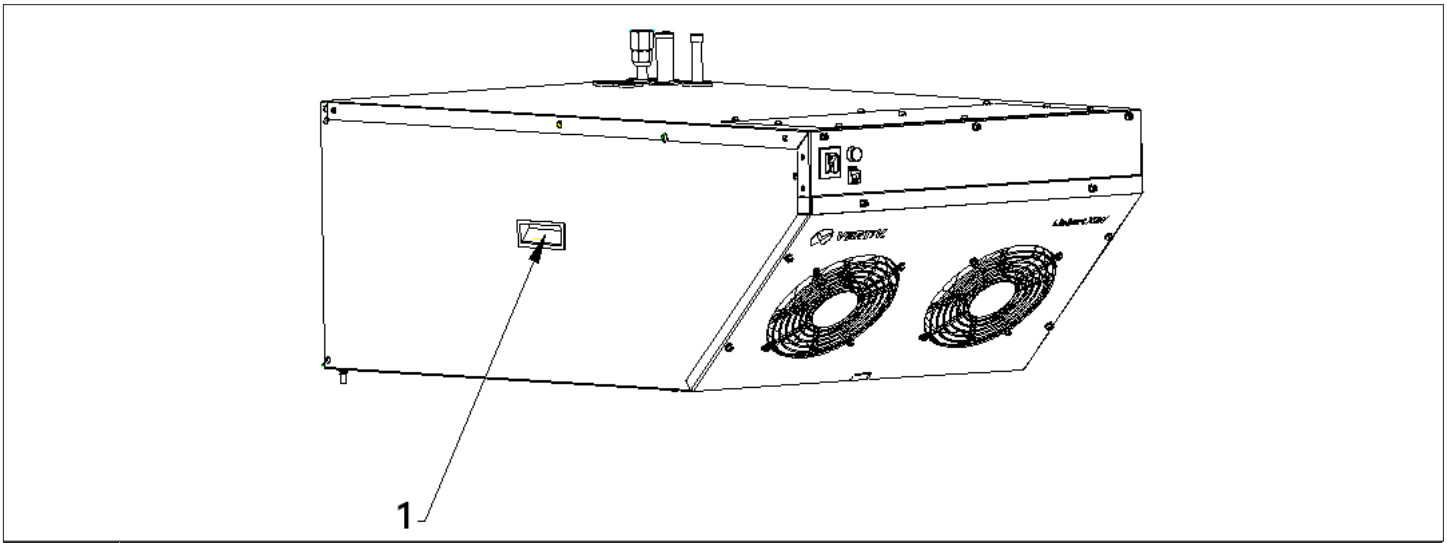
Vertiv™ Liebert® XDV should be placed on top or above the cabinet that will generate the most heat. If the thermal load is evenly distributed in the room, the place the unit accordingly. Depending on the actual use of the unit on site, the following installation methods are available:

1. Install the unit on the top of the cabinet (standard installation recommended by Vertiv): Liebert XDV accessories have mounting bolts and bars, which can be installed directly on the top of the Vertiv™ Liebert® VE cabinet, and the unit does not need to be drilled. If the cabinets are of other manufacturers, then cabinets may need to be drilled on site.
2. Install the unit as a ceiling-mounted above the cabinet (alternative installation method): Liebert XDV can be ceiling-mounted above the cabinet which requires an optional installation kit, for details contact Vertiv local representative.

- When Vertiv™ Liebert® XDV is installed on the top of the cabinet, the top of the cabinet must be able to bear at least weight of 65 kg. The Liebert VE cabinet meets the load-bearing requirements.
- When the Liebert XDV is installed on the top of the cabinet, the center of gravity of the lightly loaded cabinet may be too high, causing the cabinet to tip over, which may result in serious injury. Prior to installing the Liebert XDV on the cabinet, confirm whether the cabinet needs additional fixing. If necessary, fix the cabinet to the floor to prevent it from tipping over.
- The Liebert XDV terminal must be firmly installed at the ceiling. Therefore, the building structure of the ceiling and the support of the existing building need to be reinforced.
- Ensure to stabilize the top of the suspension rod and ensure that all nuts are firmly tight.

2.8.2. Requirements for Handling Location

It is recommended to use a motorized forklift or manual forklift to transport the unit to the installation site, or at least two trained personnel are needed to carry it. The location requirements for personnel handling the unit are shown in Figure 2-8. To avoid the leakage or breaking of the piping, do not use the side panels or external piping of the unit to directly lift or move the unit.



ITEMS	DESCRIPTION
1	Handle

Figure 2-8 Unit Handling Position Requirements

2.8.3. Installation on the Top of the Cabinet

The Liebert XDV can be installed on the top of the cabinet with the help of attached bolts, nuts and two external mounting parts. Liebert XDV has mounting holes under the fan, which match the holes on the top of Vertiv™ Liebert® VE cabinet. For cabinets of other manufacturers, drilling may be required to match the mounting holes of Liebert XDV.
Following are the steps to install the unit on the top of the cabinet.

1. Figure 2-9 shows the correct installation position of Liebert XDV on the top of the cabinet, such that the front edge of the unit should be matched with the front edge of the cabinet.

Note: It is recommended to use mechanical lift or at least two trained personnel to place the unit on the cabinet.

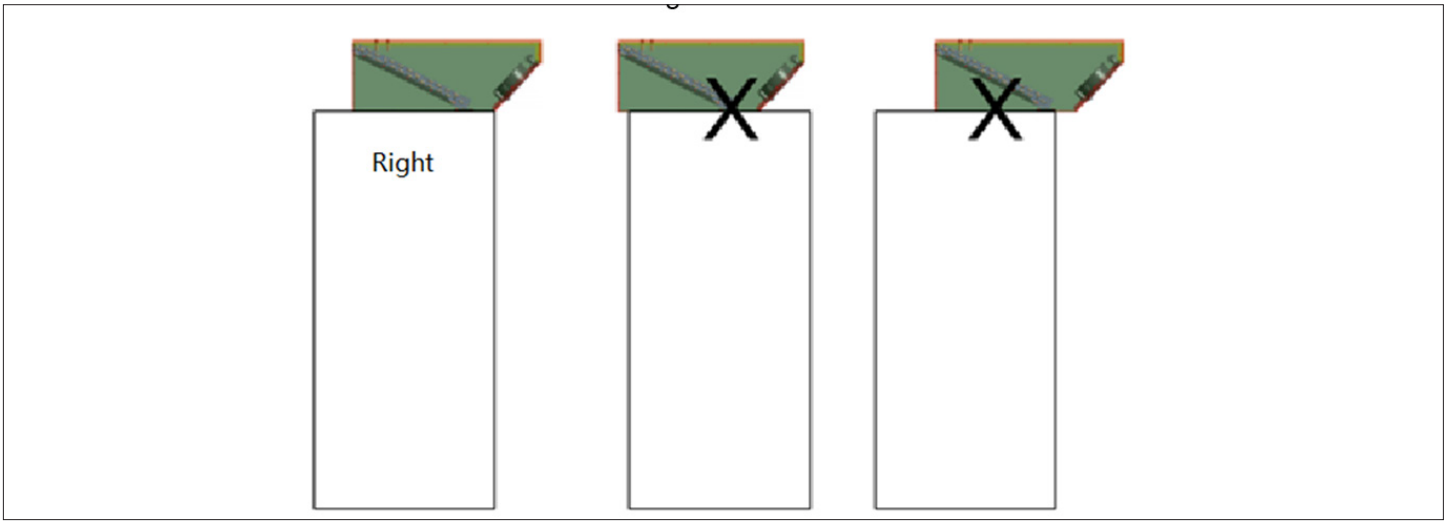
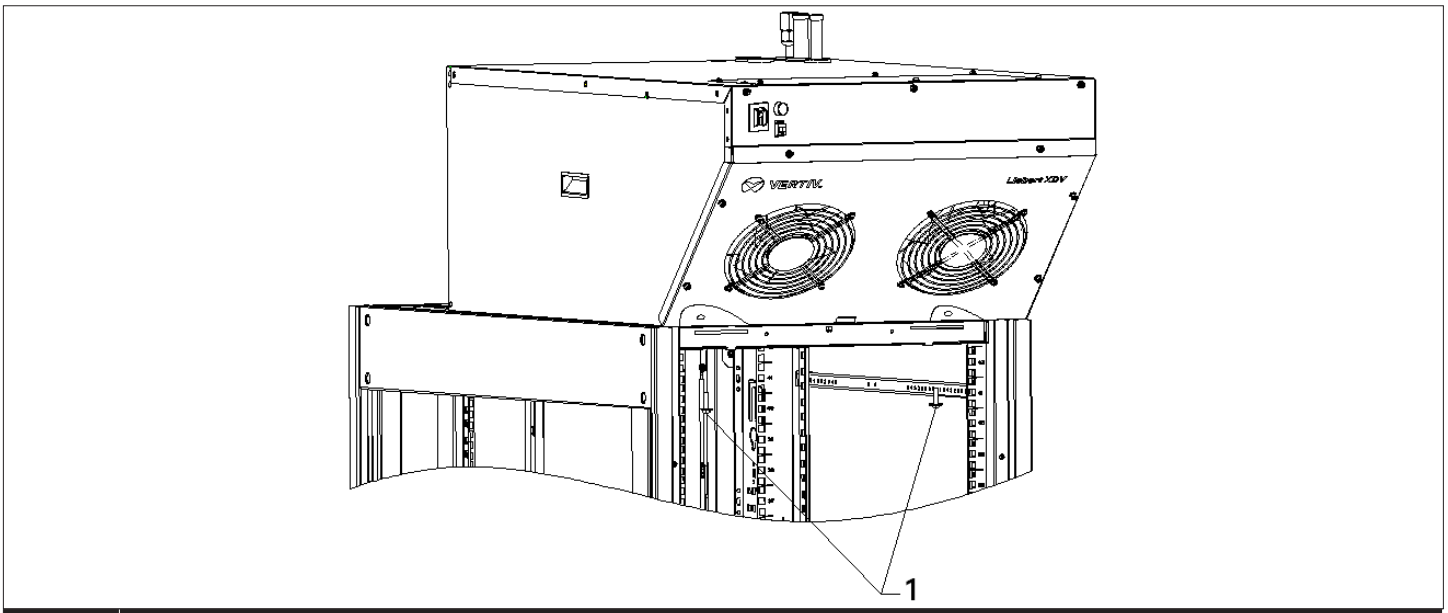


Figure 2-9 Correct Installation Position of Unit

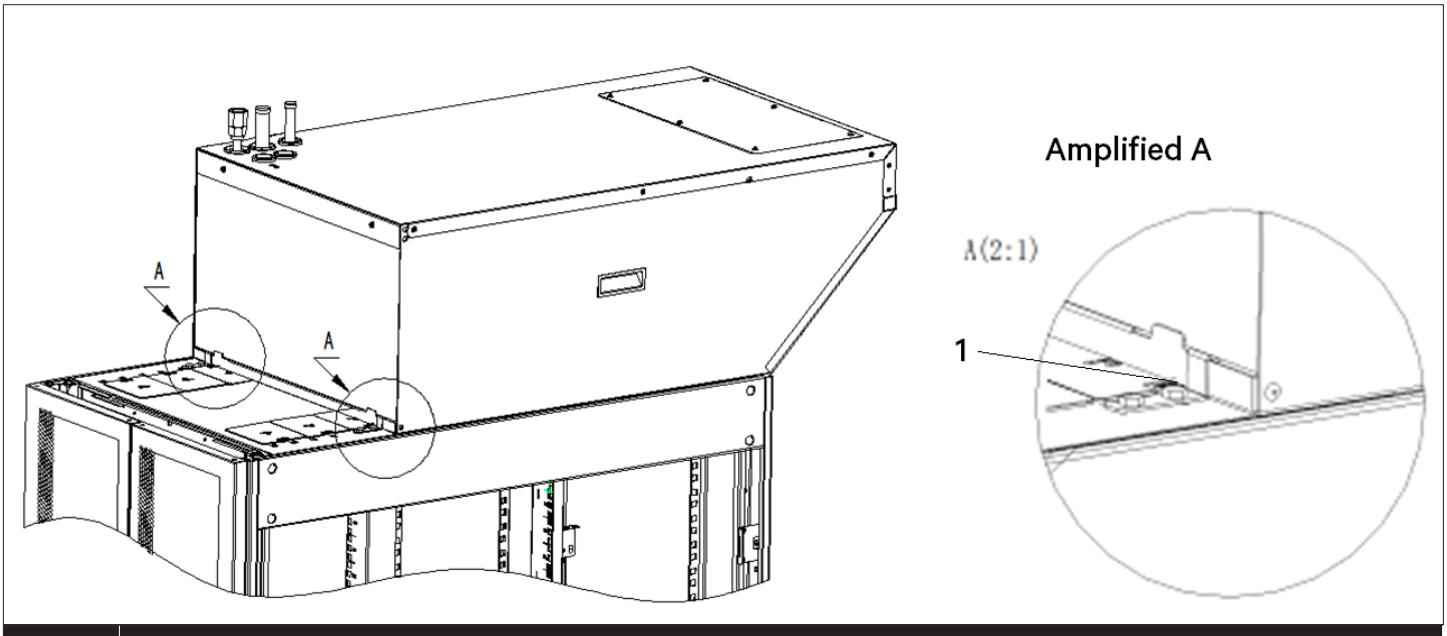
2. After proper alignment, if the cabinet has mounting holes that match Vertiv™ Liebert® XDV mounting holes, then insert two bolts under the fan at the bottom of the unit, and firmly tight the bolts with a lock nuts, refer Figure 2-10.



ITEMS	DESCRIPTION
1	Bolts

Figure 2-10 Bolt Fixing the Cabinets and the Unit

3. The unit is provided with mounting strips in the accessories kit, fix one end of the two mounting strips in the groove on the back of the Liebert XDV and fix the other end to the top of the cabinet, as shown in Figure 2-11. Once the mounting strips are placed properly, firmly tight the bolts.



ITEMS	DESCRIPTION
1	Mounting Strip

Figure 2-11 Unit Hoisting and Fixing Locations

4. If the mounting holes of the cabinet do not match those of the Liebert XDV, four ø7 holes need to be drilled on the top of the cabinet to match the holes at the bottom of the Liebert XDV unit. The hole size at the bottom and the usage of the unit are shown in Figure 2-12. The location and dimension details of holes are provided in Table 2-4.

5. For the cabinets other than Liebert® VE Cabinets, in order to prevent metal shavings or particles from falling into the equipment cabinet or Liebert XDV, a vacuum cleaner or other methods should be used to collect these metal shavings or particles when drilling. After drilling the holes, insert M6 bolts from the bottom of the cabinet and tighten them.

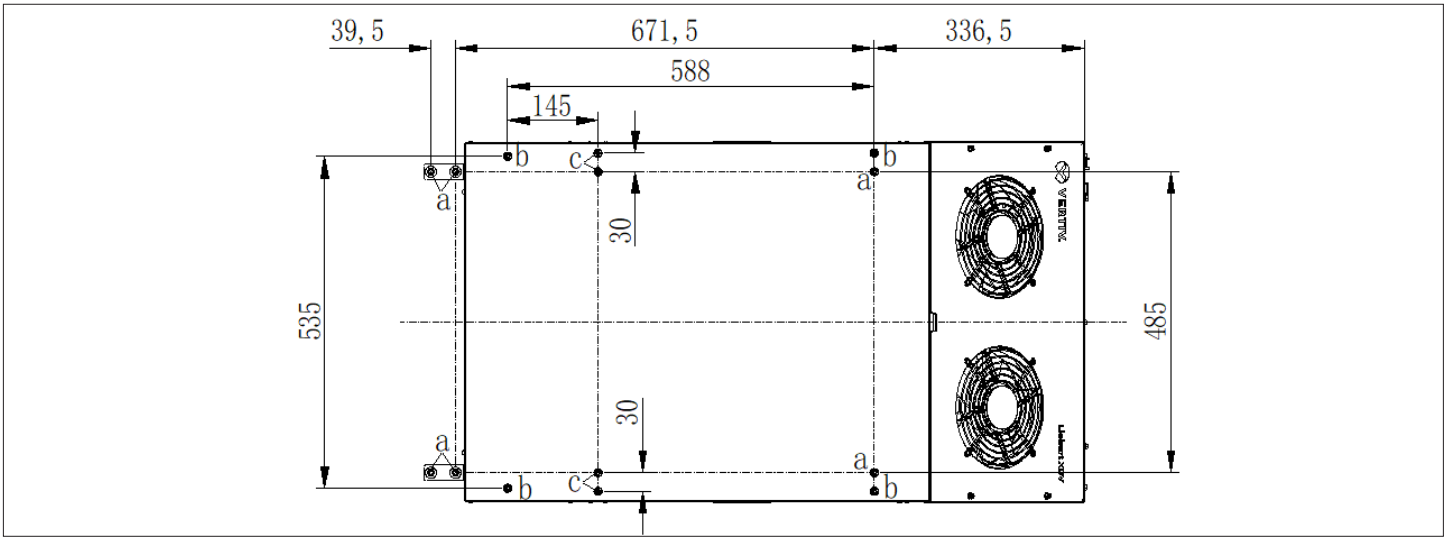


Figure 2-12 Dimensions of Fixing Holes of the Unit

Note 1: Prior to lifting, ensure that the lifting capacity of the lifting equipment is greater than the weight of the unit.

Note 2: The lifting of the unit is a dangerous operation, which must be handled by skilled technicians, and non-professional operations are strictly prohibited.

Table 2-4 Holes Dimension of Liebert® XDV Unit

Installation Method	Position of Holes	Number of Holes and Hole Sizes
Connection between Vertiv™ Liebert® XDV and Vertiv™ Liebert® VE cabinet	4 holes at position "A" on the mounting bar and 2 holes at position "A" below the unit fan	6×ø7
Connection between Liebert XDV and other manufacturers cabinet	4 holes at position "B" at the bottom of the unit	4×ø7
Ceiling connection between Liebert XDV and external suspension bracket	4 holes at position "C" at the bottom of the unit and 2 holes at position "B" and 2 at position "A" under the fan	8×ø7

2.9. Ceiling Mounting of the Unit

The Liebert® XDV unit can be installed on the bridge or ceiling above the cabinet through the optional external suspension bracket (as shown in Figure 2-13 and Table 2-5). Each method requires the front edge of the Liebert XDV unit to be aligned with the front edge of the cabinet and meet the requirements of Figure 2-9. With the suspension installation method, the installation kit needs to be strong enough to bear the weight of Liebert XDV and refrigerant (65 kg).

To ensure effective cooling, a baffle or similar configuration must be installed between the suspended Liebert XDV and the cabinet (as shown in Figure 2-15) to prevent the XDV from inhaling the cold air it releases

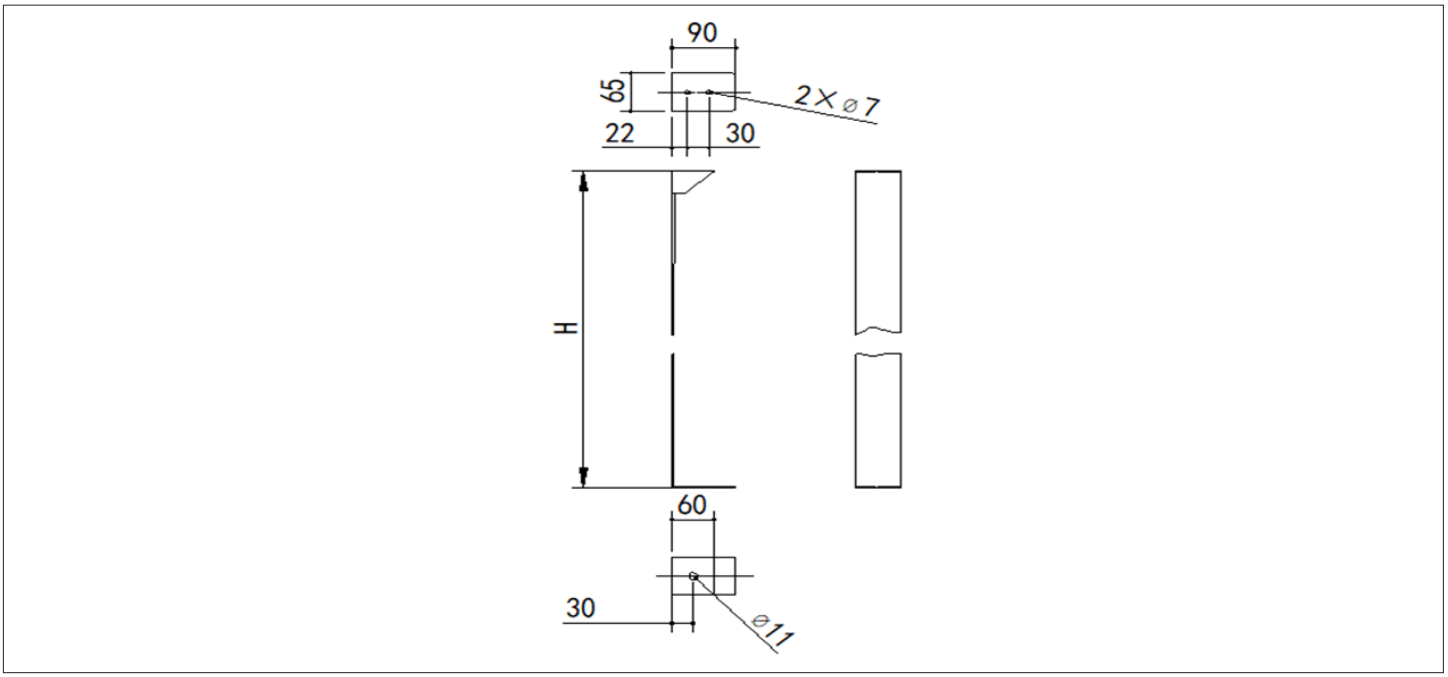


Figure 2-13 External Suspension for the Unit (Optional)

Table 2-5 Description of the External Suspension (Optional)

Number of Liebert XDV Units to be Suspended	Number of External Suspension/Set	"H" Height Dimension (mm)
Single layer	4	508
Two layers	8	1113

2.9.1. Suspended Mounting on the Bridge

Th unit can be bolted to the bridge in the equipment room, as shown in Figure 2-14. The height of the bridge above the cabinet must be sufficient to accommodate the combined height of Vertiv™ Liebert® XDV and the baffle.

Following are the step for installation of suspension bridge arrangement:

1. Fix the suspension brackets to the four corners of the Liebert XDV with bolts, and insert the bolts that come with the accessory kit into the mounting holes at the bottom of the Liebert XDV.
2. Tighten all bolts, be careful not to over tighten them.
3. Use lifting equipment to raise the Liebert XDV with bracket to a suitable height, and then fasten the bracket to the bridge with bolts.

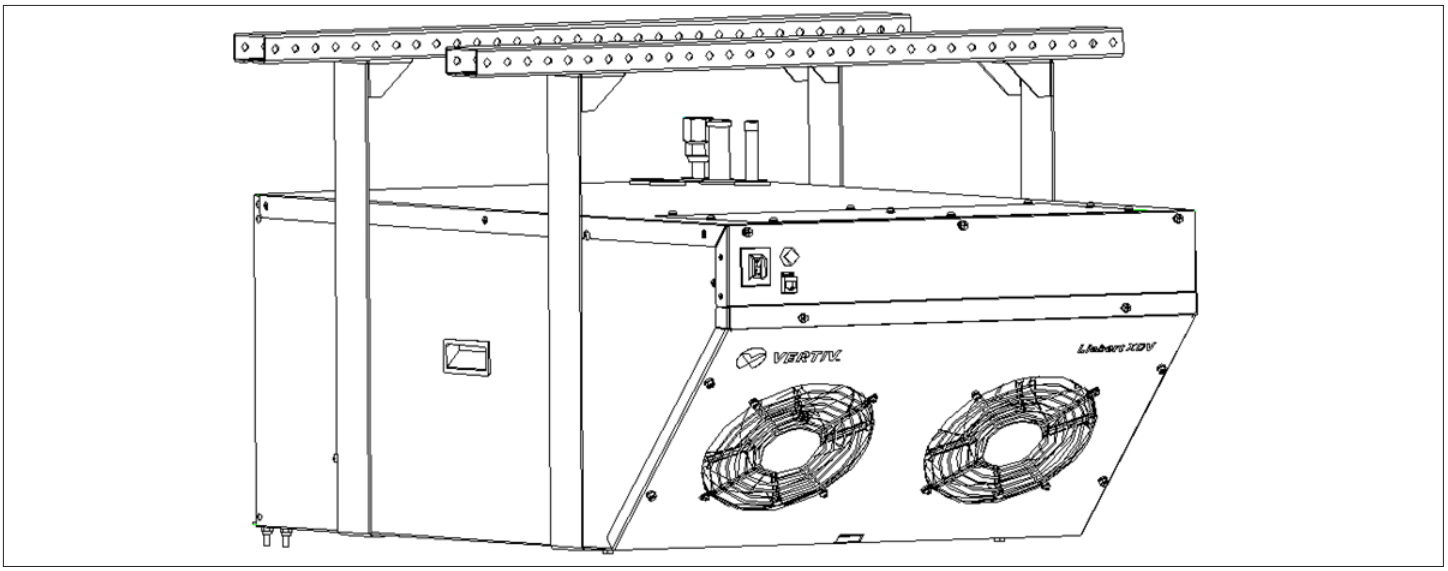


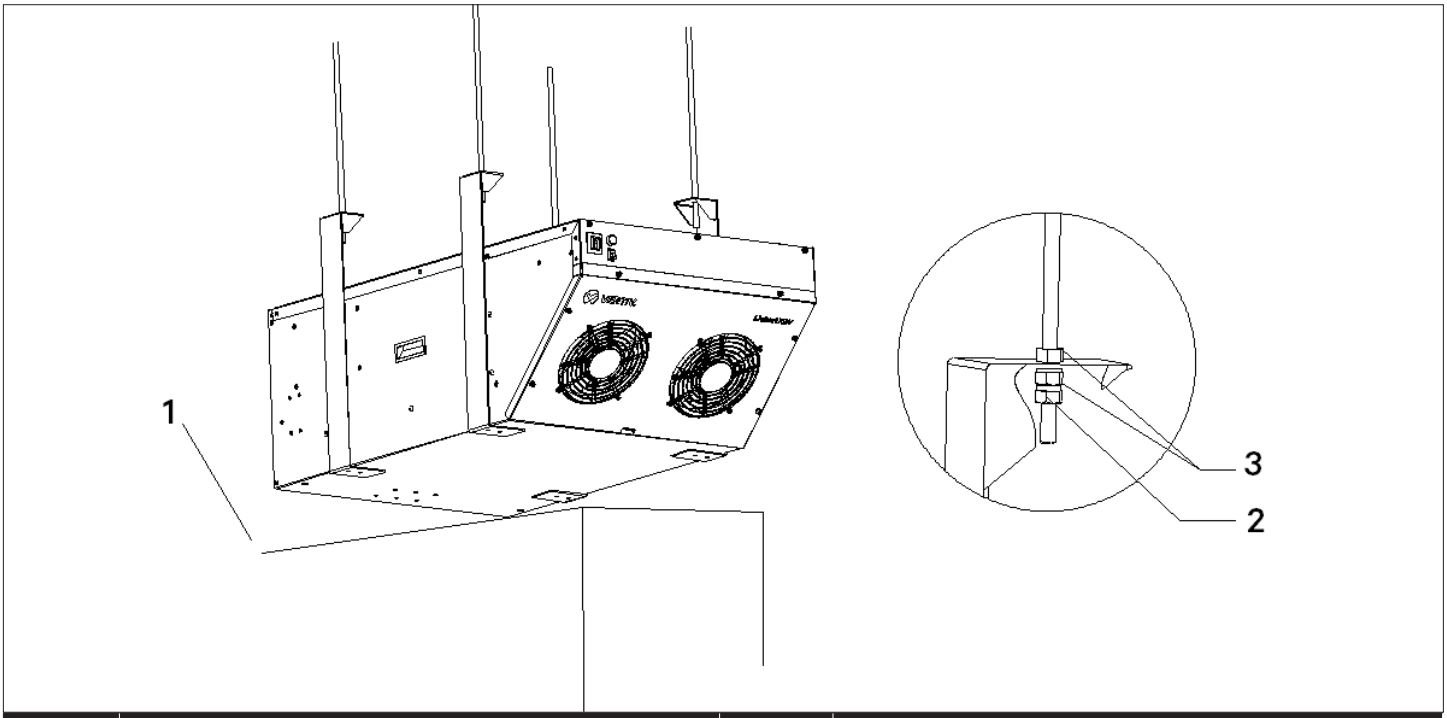
Figure 2-14 External Suspended on the Bridge (Optional)

2.9.2. Suspended Mounting from the Ceiling

If Liebert® XDV is to be suspended from the ceiling of the room, as shown in Figure 2-15, an optional external suspension bracket and the M10 threaded rod should be provided on site along with matching nuts and washers.

Following are the step for installation of suspension mounting from the ceiling:

1. Fix the suspension bracket to the four corners of the Liebert XDV with bolts, and insert the bolts that come with the accessory kt into the mounting holes at the bottom of the Liebert XDV.
2. Tighten all bolts, be careful not to over tighten them.
3. Install the M10 threaded rod provided on site to the ceiling and firmly tight it, while ensuring that the threaded rod is aligned with the holes of the external suspension bracket.
4. Using a lifting device, raise the Liebert XDV and insert the threaded rod into the threaded hole of the external suspension bracket.
5. Use the nuts and washers provided on site to fasten the external suspension bracket of the unit to the threaded rod.
6. Adjust the fastening nut of the threaded rod until the unit is in a horizontal position and rigidly connected.



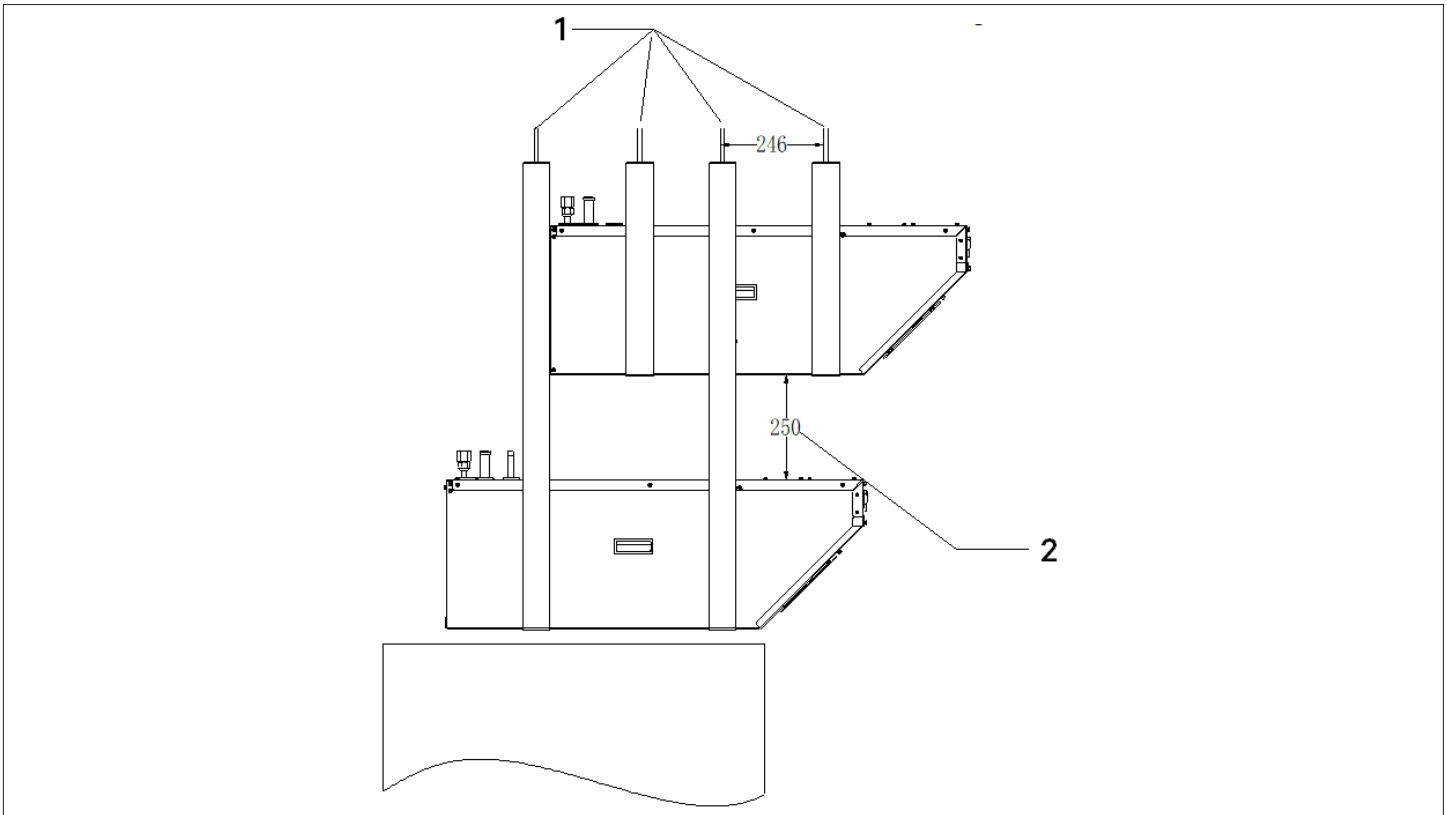
ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	To prevent air bypass the gap between the Liebert XDV and the cabinet must be blocked	3	Adjusting nut
2	Fastener nut		

Figure 2-15 External Suspended from the Ceiling (Optional)

2.10. Stacked Installation of the Unit

The Vertiv™ Liebert® XDV units can also be stacked install to improve the heat dissipation efficiency of the system. The stacking can be performed on the original system or later can be added to an existing configuration. When Liebert XDV is suspended on the bridge or ceiling of the room, it can be stacked. The external suspension bracket has two lengths for suspending single-layer or double-layer Liebert XDV unit(s).

The upper Liebert XDV must be located directly in front of the lower Liebert XDV unit, and the height distance between the upper Libert XDV and the lower Liebert XDV must be greater than 250 mm to meet the heat dissipation efficiency and maintenance requirements. In addition, the gap between the two Liebert XDV units and the gap between the Liebert XDV and the cabinet should be blocked with baffles to prevent the recirculation of cold air, as shown in Figure 2-16.

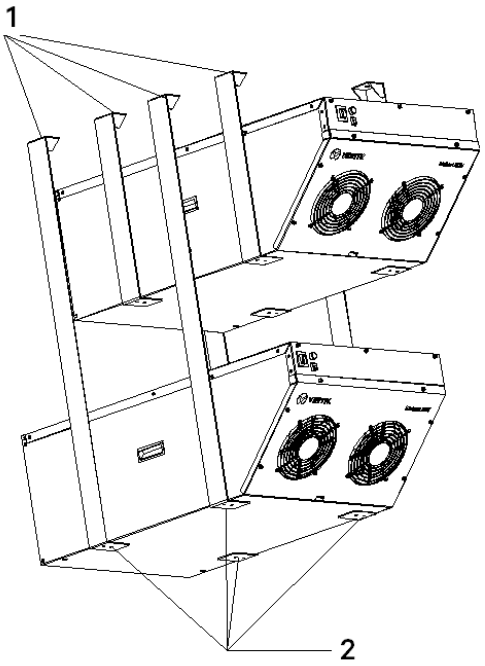


ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Liebert XDV suspension mounted on the bridge or ceiling of the machine	2	There must reserve maintenance space

Figure 2-16 Offset of Stacked Installation

2.10.1. Stacked Installation Suspended on the Bridge

The upper Liebert XDV in the stacked arrangement must be in front of the lower Liebert XDV, this will require two sets of bridges in the room. The second set of bridge must be installed 246 mm in front of the first set, as shown in Figure 2-17 and Figure 2-18. This stacking arrangement must meet the air intake standards shown in Figure 2-9 and Figure 2-16.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Connect the external suspension to the four corners of the Vertiv™ Liebert® XDV	2	Use M6 hexagon head screws to fix the bottom mounting holes

Figure 2-17 Fixed Installation and External Suspension

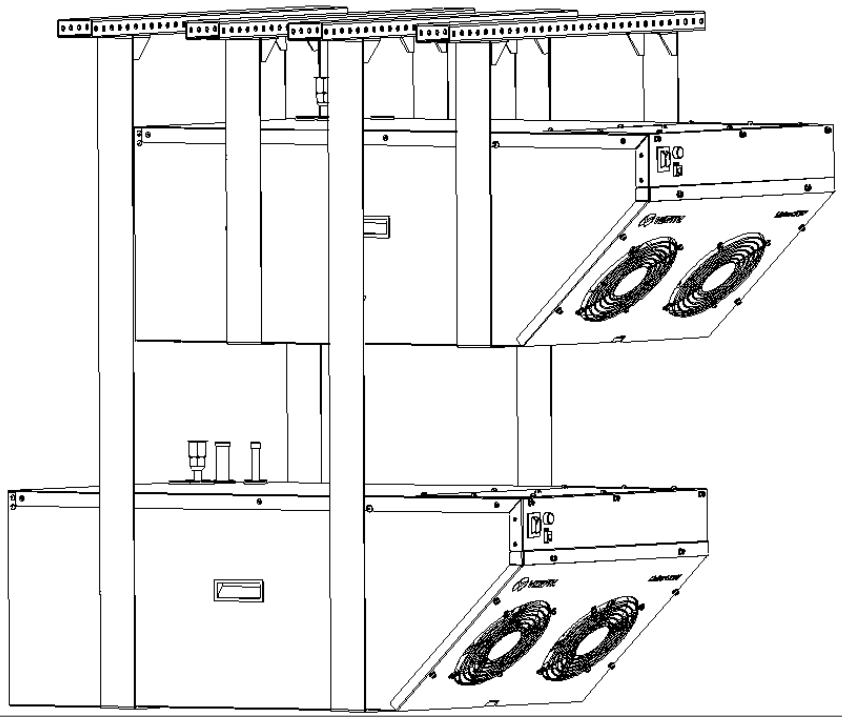
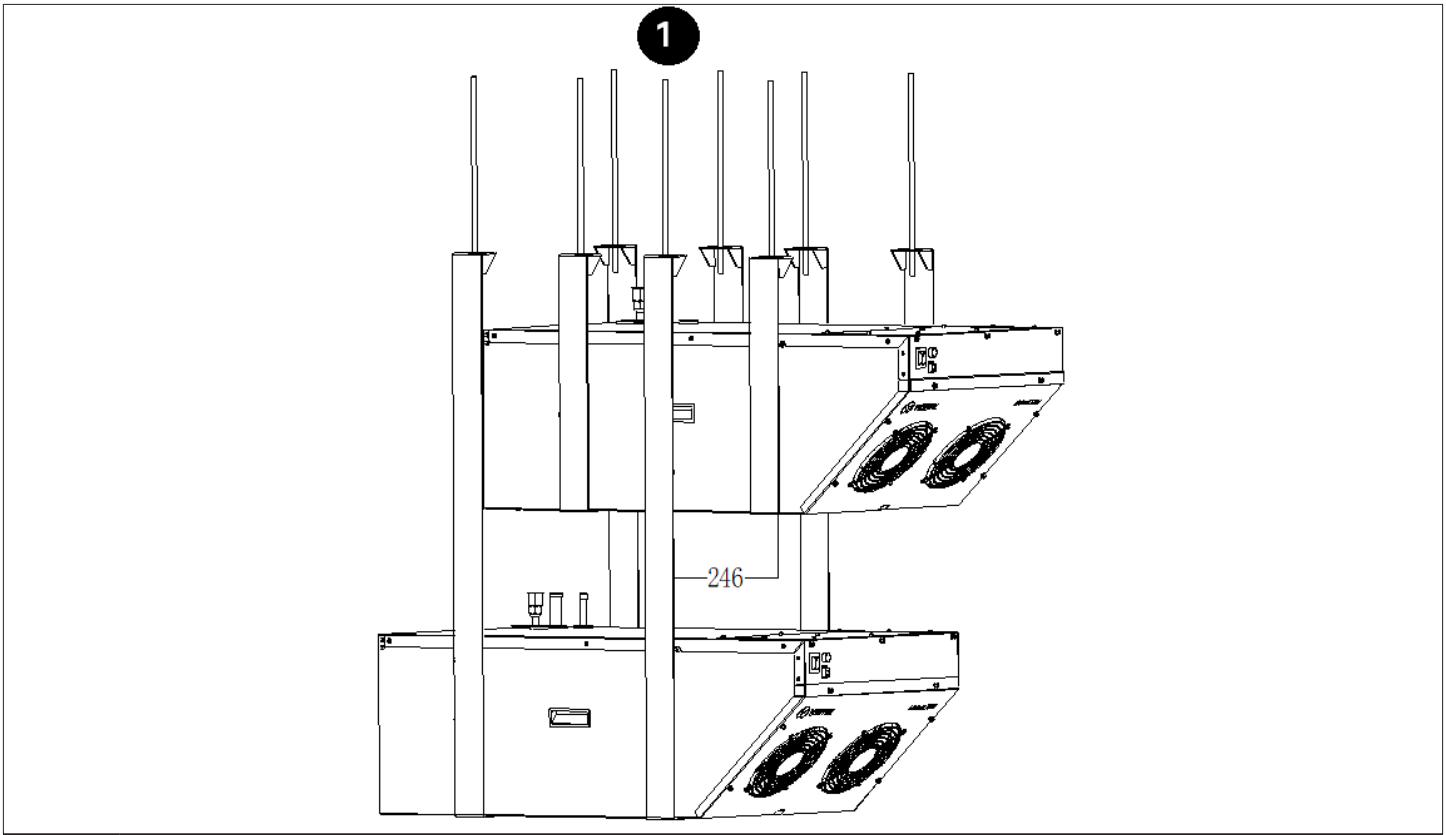


Figure 2-18 Fixed Installation and External Suspension Bracket Arrangement

2.10.2. Suspending the Stacked Unit from the Ceiling

The upper Vertiv™ Liebert® XDV of the stacked arrangement must be in front of the lower Liebert XDV, the suspension bracket connecting the ceiling must be adjusted accordingly. The connection position of the second row must be 246 mm in front of the installation position of the suspension bracket of the first row. As shown in Figure 2-19.

After determining the connection position of the ceiling, hang the units as shown in Figure 2-15. This stacking arrangement must meet the air intake standards shown in Figure 2-9 and Figure 2-16.



ITEMS	DESCRIPTION
1	M10 full thread screw

Figure 2-19 Fixed Installation from the Ceiling and External Suspension

2.11. Installing Unit Piping

2.11.1. Assembling the Piping Accessories

- **Dry filter**

Figure 2-20 shows a dry filter available in the unit accessories kit. Install the dry filter to the liquid piping inlet, or it can be connected to the branch piping of the connecting pipes of the terminal unit. When connecting the dry filter, note that the direction of the dry filter is the same as the flow direction of the refrigerant, and must not be connected reversely.

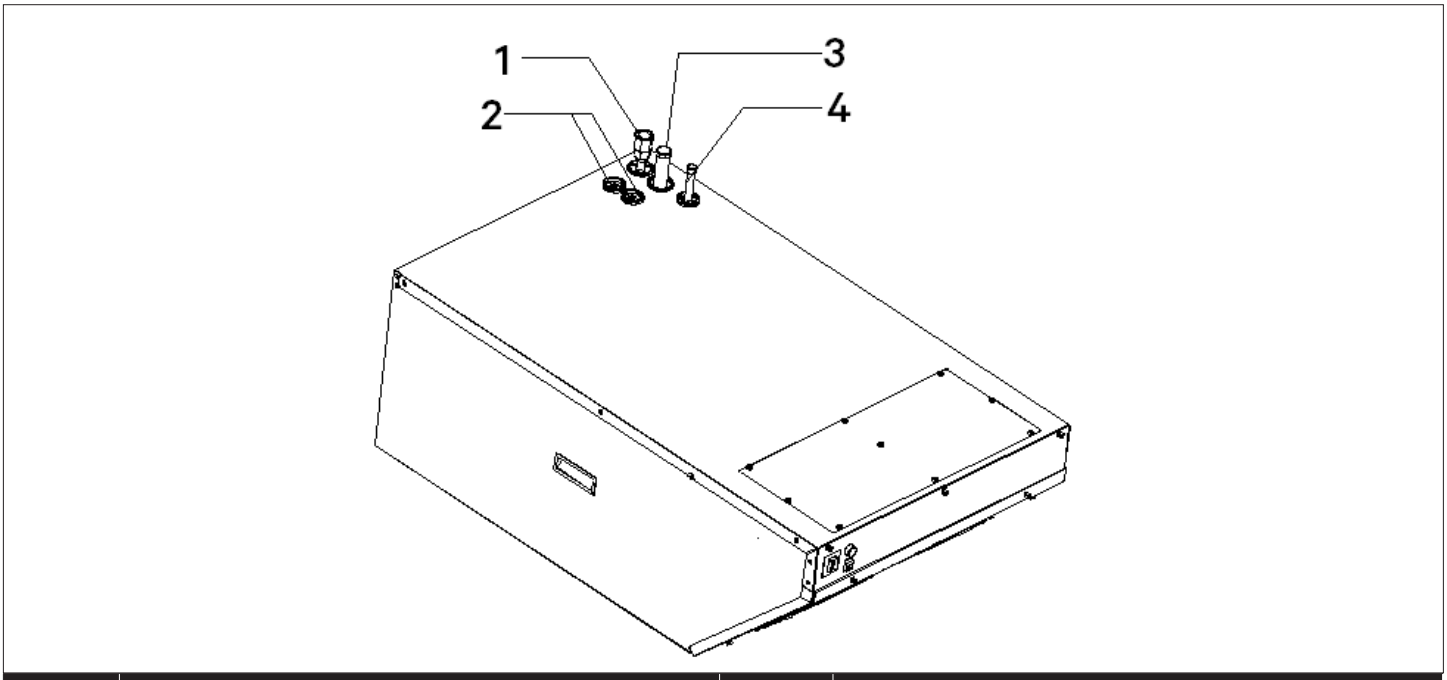
Figure 2-20 Dry Filter

2.11.2. Internal Piping Specifications

Vertiv™ Liebert® XDV terminal is installed with the upper running piping. The installation piping includes the refrigerant inlet piping, the refrigerant outlet piping and the condensate drain piping. The specifications of the three piping are shown in Table 2-6, and the locations of the piping are shown in Figure 2-21.

Table 2-6 Internal Piping Specifications of the Unit

Pipeline Type	Pipe Size OD
Refrigerant inlet pipe (upper and lower)	12.7 mm
Refrigerant outlet pipe (upper and lower)	22 mm
Condensate pipe	12.7 mm



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Drain	3	Refrigerant outlet pipe
2	Cable Inlet /Outlet hole	4	Refrigerant inlet pipe

Figure 2-21 Unit Piping Location

2.11.3. Connection Between the Main Unit and the Terminal

Refer to the relevant content of the overall system layout in “Vertiv™ Liebert® XDC multi-connected air conditioner main unit User Manual”.

2.11.4. Air Tightness Test

Refer to the relevant content of the overall system layout in “Vertiv™ Liebert® XDC multi-connected air conditioner main unit User Manual”.

2.11.5. Condensate Drain Piping Connection

In the dehumidification mode, the drain pan collects the condensed water of the evaporator and the drain pump discharges it through the drainage piping. The drainage copper piping of the upper drainage unit has its own check valve to prevent back flow of the water in the engineering piping from the unit’s drain pan. The unit has a water pump and the user needs to drain water from the top of the unit. Connect the external drain piping to the upper drain hole on the top of the cabinet as shown in Figure 2-21 (pipe joints, 3/4”-BSP have been installed). The external piping must be done from customer end, and the recommended material is PVC that should be used for piping.

Note: To avoid water leakage, use Teflon tape between the flexible pipe and the joint.

2.12. 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 2-7 for installation checklist) are complying accordingly.

Table 2-7 Mechanical Installation Checklist

Check Items	Results
Reserve maintenance space for easy equipment maintenance.	
The ceiling-mounted unit is installed horizontally, and the installing fasteners parts have been locked firmly.	
The connecting pipe between the main unit and the terminal has been properly installed, and the engineering ball valve in the terminal has been fully opened.	
Condensate drain piping is connected properly.	
All piping joints are rigidly tightened.	
Piping fasteners are checked and fixed reliably.	
After the unit is installed, the debris and external materials inside or around the unit have been removed (such as transportation materials, mechanical parts materials, tools, etc.)	
After the unit is installed, the debris and external materials inside or around the unit must be 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® XDV unit, including installation notes, cabling and electrical inspection for the unit.

Note1: Liebert XDV unit is a professional unit, used in industrial, commercial or other professional environment, and is not sold to the general public.

3.1. Installation Tasks and Cautions

3.1.1. Cabling Connection at the Site

1. Power supply cables at the terminal.
2. The control cables at the terminal:

- The communication cables between the main unit and the terminal;
- Remote switch cables;
- Floor overflow sensor cables;
- External general alarm cables.

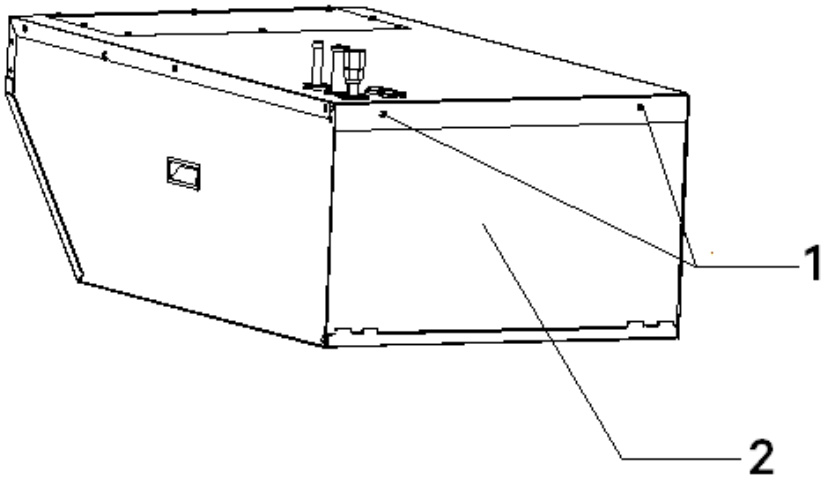
3.1.2. Installation Notes

3. The connection of all power cables, control cables, and ground cables must comply with the national and local electrician regulations.
4. For full load current, refer to the unit's nameplate. The cable size should comply with local cabling/wiring regulations.
5. Main power supply requirement: 220 V to 240 V (±10%)V, 1N, 50 Hz/60 Hz; power grid system: TN/TT.
6. The power supply cord adopts Y-type connection. If the power supply cord is damaged, it must be replaced by professional maintenance personnel.
7. The electrical installation and maintenance must be performed by authorized and trained professionals.
8. Before connecting the circuit, use a voltmeter to measure the input power voltage, and ensure the power supply is off.
9. The unit needs to be fixed firmly with screws, guide rails or other methods during installation to avoid shaking during startup or operation.
10. 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.
11. 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 Terminal

3.2.1. Removing the Filter Net

Prior to connecting the power cables of the terminal, the filter must be removed. The filter net is located on the back of the unit. Loosen the two M4 fixing screws to replace the filter net, as shown in, as shown in Figure 3-1.

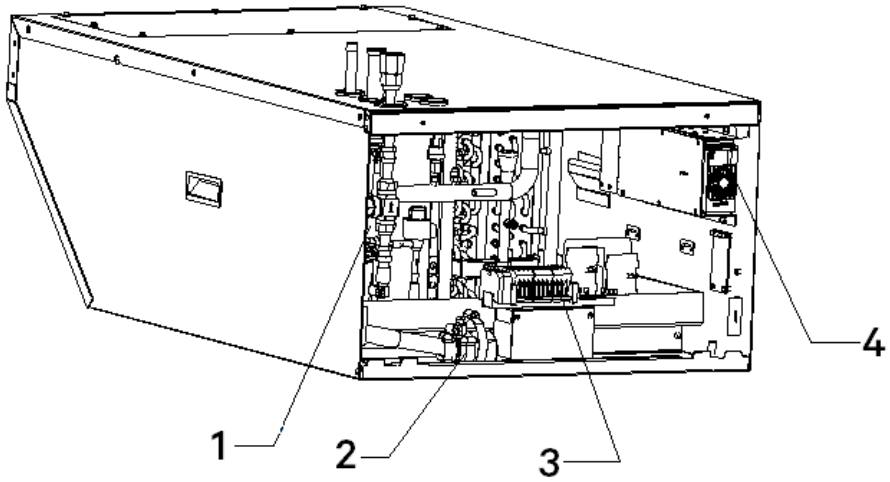


ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Loosen the two M4 fixing screws to replace the filter net	2	Filter net

Figure 3-1 Remove Filter Net

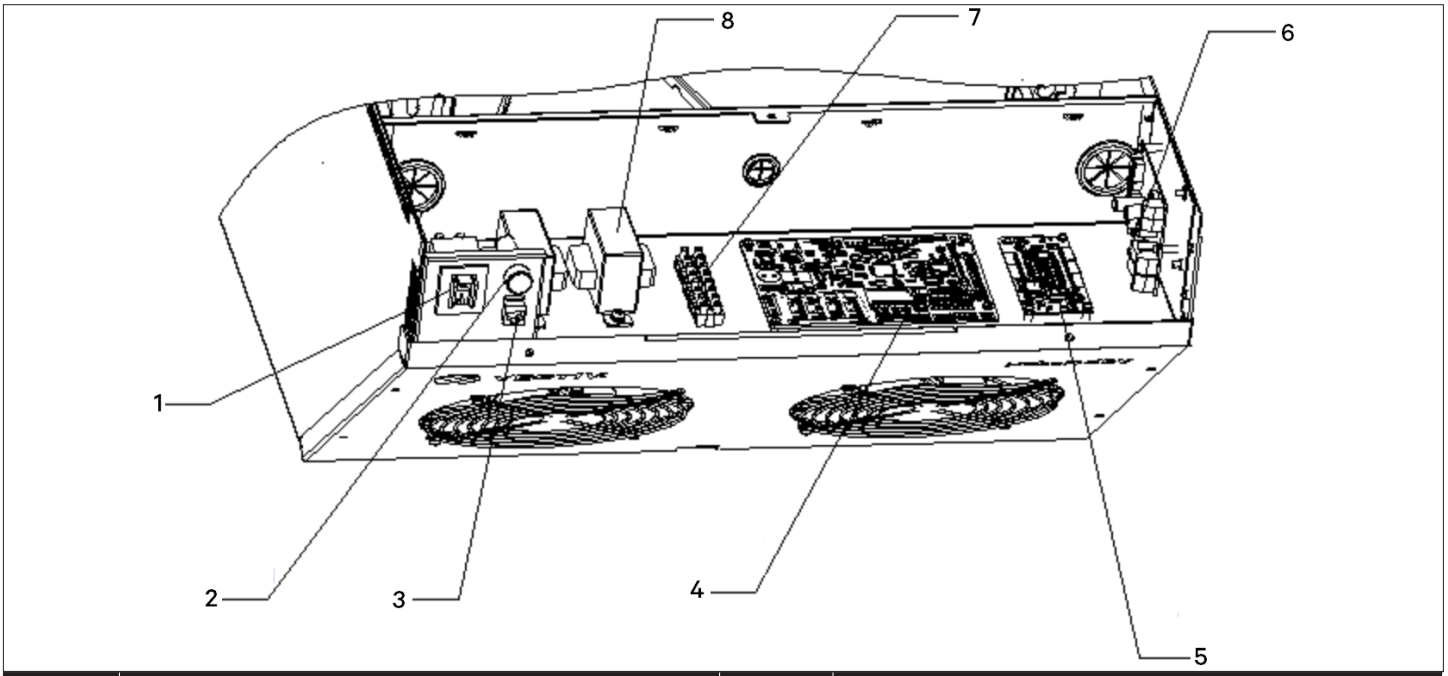
3.2.2. Electrical Interface Location of the Terminal

Open the back side panel of Vertiv™ Liebert® XDV and the top panel of the electric control box, and user can see the specific distribution positions of the low-voltage devices, as shown in Figure 3-2 and Figure 3-3. The detailed distribution information of low-voltage electrical components is distinguished according to the labels attached to the cabinet.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Power module for pump	3	Terminal block
2	Pump	4	Power module for fans

Figure 3-2 Layout of the Rear Electric Control Box



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Rocker switch	5	10DI
2	Indicator light	6	EEV control board
3	Connector	7	Terminal
4	Control board	8	Transformer

Figure 3-3 Low Voltage Device Layout Diagram

3.2.3. Connection of Unit Power Supply Cables

The specific location of the power interface of Vertiv™ Liebert® XDV terminal unit is shown in Figure 3-1. L, N, and PE are connected to the corresponding ends of the external power supply. Leave a certain margin for the incoming cable and fix it on the cable fixing clamp, which is fixed on the inner panel of the unit. The top inlet/outlet holes and the bottom inlet holes are shown in Figure 3-4.

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	Standard Unit
XDV010CS15HC	2

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

3.3. Control Cables Connections

Figure 3-4 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.

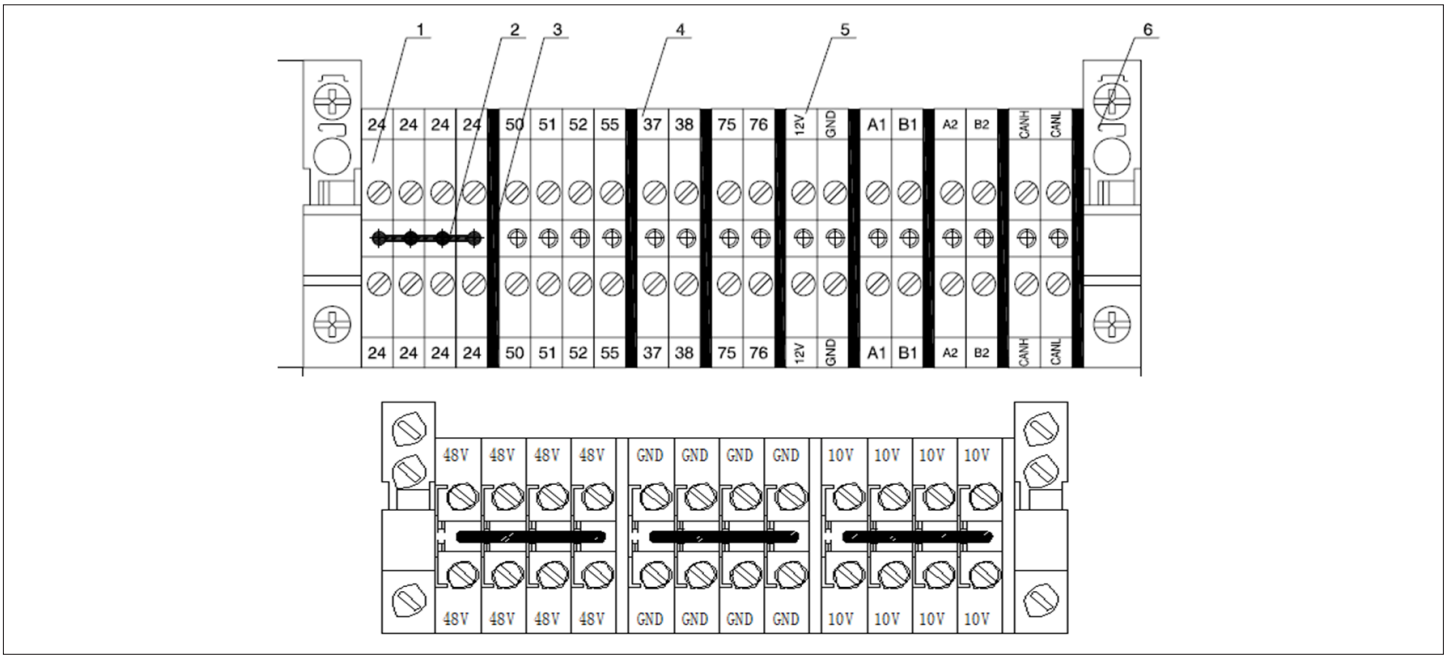


Figure 3-4 Field Cabling Terminal

- **Communication cables between main unit and terminal**

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

- **Remote shutdown**

As shown in Figure 3-4, the 37# and 38# terminals can be connected to the remote shutdown switch. The terminal has been default short-circuited in the factory. When a remote shutdown is required, remove the short-circuit wire/cable.

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

- **Floor water leak detection sensor**

The unit accessories are equipped with a floor water leakage detection sensor. When user uses it, connect one end to the 51# terminal of the terminal block and the other end to the 24# common end. Each device can be connected to any number of detection sensors in parallel, but there is only one floor water leak alarm, and the alarm information is confirmed through the controller.

The water leak detection sensor is recommended to be installed at a low point on the floor under the base of the unit, and the farthest distance from the unit should not exceed 0.5 m. At the same time, the water leak detection sensor should be placed away from a wet water trap or floor drainage.

- Prior to tightening any assembly connections and cabling/wiring connections, ensure that the power supply of the control unit is turned off.
- It is forbidden to use the water leak detection sensor near flammable liquids.
- It is prohibited to use the water leak detection sensor to detect flammable liquids.

- **External general alarm terminals**

The external general alarm can be connected to the 75# and 76# terminals, and its output is used to connect 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 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, see "Appendix I: Circuit Diagram of Vertiv™ Liebert® XDV".

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 nameplate.	
There is no open circuit or short circuit in the electrical circuit of the system.	
The power supply cabling and ground cabling to the disconnect switch have been properly connected.	
The rated value of the circuit breaker or fuse is correct (please refer to the current value in Table 3-1 to select a suitable circuit breaker or fuse)	
The control cabling is firmly connected.	
All cables and circuit connectors have been rigidly 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 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 main unit and Vertiv™ Liebert® XDV terminals are open.
2. The refrigerant piping system has passed the air tightness test and confirmed that there is no leakage.
3. Ensure that the total charge of the system has been roughly calculated.
4. The condensate drain piping system has been reliably connected and check if there is any sign of leakage.
5. The temperature of the equipment room is above 18 °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

6. Confirm that the input voltage of the main power supply is within ±10% of the nominal range of rated voltage and the power isolation switch of the outdoor unit air-cooled condenser is closed.
7. Confirm that all electrical or control connections are correct, and firmly fixed all electrical and control connections.
8. Confirm that the power supply cables and low-voltage control cables are arranged separately.
9. Confirm that the high water level cable has been connected correctly.
10. Confirm that the ground cabling/wiring of the unit is reliably connected.

4.1.2. Commissioning Procedures

Since Vertiv™ Liebert® XDC main unit and Liebert XDV terminals are connected as a system and are used together, the main unit and terminal adopt the same commissioning method. Refer to the related contents of the startup and commissioning in the “Vertiv™ Liebert® XDC multi-connected air conditioner main unit User Manual”.

4.2. 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 Controller Operation Instructions

Vertiv™ Liebert® XDV unit is not equipped with a display screen, and each terminal can be operated from the color screen of Vertiv™ Liebert® XDC main unit (such as system parameter setting, status parameter and alarm information viewing, etc.).

Refer to the relevant content of the Controller Operation Instruction in “Vertiv™ Liebert® XDC multi-connected air conditioner main unit User Manual”

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® XDV terminal, 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 XDV system should not be less than 30%. If the load is lower than the requirement, consult Vertiv local representative.
- During the operation of Liebert XDV unit, 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

Part	Inspection Items	Remark
Filter net	Check whether the filter net is damaged or blocked.	
	Clean the filter net regularly	
Fan	Check whether the fan impeller is deformed or damaged	
	Check whether the fan is running with abnormal noise.	
	Check whether if any single fan is stopped or interrupted.	
Cooling system	Check whether the evaporator surface is clean and free from small particles (if any).	
	Check whether it is necessary to add refrigerant (observe through the sight glass of the liquid storage tank in the main unit).	
Water pump filter net	Check if there is any foreign matter in the drain pan	
	Check the drain pump filter net	

6.2. Routine Maintenance Inspection (Semi-annual)

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

Table 6-2 Semi-annual Routine Inspection Items List

Part	Inspection Items	Remark
Cooling system	Check whether the evaporator surface is clean and free from small particles (if any).	
	Check the refrigerant pipeline for leaks and proper support	
	Check whether it is necessary to add refrigerant (observe through the sight glass of the liquid storage tank in the main unit).	
Electronic expansion valve	Check if the wiring and coil of the control board of the electronic expansion valve are loose	
Fan	Whether the fan impeller is deformed	
	Whether the fan is running with abnormal noise	
	Whether a single fan is stopped	
	Check and tighten circuit connectors	
Filter	Check whether the filter is damaged or blocked	
	Check whether the system has maintenance alert for filter net	
	Clean the filter	
Electrical control part	Check whether the power terminal wiring and the power module circuit breaker wiring are loose	
	Check and tighten circuit connectors	
	Check whether the wiring and readings of various types of sensors are normal	
Water pump filter net	Check if there is any foreign matter in the drain pan	
	Check the water pump filter	

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, such as manual adjustment of fans and electronic expansion valves.

6.4. Electrical Connection Inspection

6.4.1. Electrical Maintenance

Perform visual inspection and treatment to electrical connections according to the following items:

1. 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.
2. Statically check whether each contactor is flexible and jammed.
3. Use a brush or dry compressed air to remove dust from electrical and control components.
4. Check whether the contacts of the contactor are drawn for arcing and have burn marks. If it is serious, replace the corresponding contactor.
5. Fasten the electrical connection terminals.
6. Check whether the fan's quick-to-plug terminals are in good contact. If any looseness is found, replace the terminals.
7. If the power supply cable 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 control interface board, control board, temperature and humidity sensor board, fan failure detection board, electronic expansion valve control board and other surfaces for any sign of aging.
3. Clean the dust and dirt on the electrical control components and control panel, and clean it with help of a brush and electronic dust remover.
4. Check and firmly connect the output and input plugs of all control interface board such as temperature and humidity sensor board, fan failure detection board, and electronic expansion valve control board.
5. Check the connection between the user cabling/wiring control terminals (37#, 38#, CANH/CANL, etc.), and the control interface board.
6. Check whether the contact and connection of the fan power supply cables, signal cables, and speed feedback signal interfaces are connected firmly.
7. Check the connection of the control interface board to the its corresponding terminals of the temperature and pressure sensors. If the connection is loose, or has poor contact, failure, etc., replace it immediately.
8. Replace the control fuse (or MCB), control board and other electrical components that have been detected with problems.
9. Use temperature and humidity measuring instruments with higher measurement accuracy to measure and calibrate the readings of temperature and humidity sensors.
10. Adjust the setpoints and check the action of each functional component according to the control logic.

6.5. Maintenance of Filter Net

1. To ensure the effective operation of the filter net, the unit controller is provided with a filter net maintenance alarm logic.
2. The default fan running time is 2160 hours (the running time can be set according to the local operating environment), which corresponds to the filter net maintenance alarm trigger point.
3. The filter net must be checked once a month during use, and the user should replace it in time according to the status of the filter net.
4. Turn off the power supply before replacing the filter net. After replacing the filter net, reset the fan running time to zero. There is a filter net at the front and the rear of the unit, located under the electric control box. Loosen the two M5 fixing screws to replace the filter net.

6.6. Maintenance of Fan Components

The regular inspections include the status of the fan impeller, the fixation of fan components, abnormal fan noise, and fan-related cabling connections.

1. Pay special attention to whether the fan assembly and the wind guide ring are firmly installed, and if there is any possible chance of rubbing the nearby sheet metal parts with the rotating blades.
2. Check for any sign of abnormal airflow channel blockage, if identified eliminate it immediately to prevent any harm to the cooling system and other relevant system components from the reduction of air volume.
3. Check if the EC fan is abnormal or does not rotate properly, if identified then check the analog signal cabling, speed feedback cabling or power supply cabling of the power module, and also check the power module as well.
4. The automatic adjustment of the electronic expansion valve (EEV) 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 EEV , user can determine whether the EEV is operating normally.

Note1: Do not operate and maintain the fan during the rotation of the fan blades to avoid injury.

Note2: During the operation of the unit, it is forbidden to touch the fan net cover to prevent mechanical damage caused by the rapid rotation of the fan

6.7. Maintenance of Cooling System

The components of the cooling system must be inspected monthly to check if the system is functioning properly and for the sign of wearing. Since the unit failure or damage is often accompanied by corresponding failures, regular inspections are the main means to prevent most system failures.

1. The surface of the evaporator should be kept clean and there should be no reversal films.
2. The EEV is mainly subjected to electrical and mechanical faults.

- The electrical faults include electronic expansion valve control board power supply, coil faults, control board cabling loosening, and pressure & temperature sensor faults.
- The mechanical faults include electronic expansion valve body blockage and clogging, so if the EEV fails, check whether the control panel power supply, control panel wiring, pressure and temperature sensor wiring is loose or not, and whether the valve body itself is malfunctioning.

3. Check whether the refrigerant piping have the proper support, or it is leaned against the wall, floor or its frame is vibrating. If identified in such a condition fixed it immediately.
4. Check the refrigerant piping and fix the brackets in every six months.

Note: It is not recommended that customers adjust the EEV by themselves. If user need some adjustment, contact Vertiv local representative or technical support engineer.

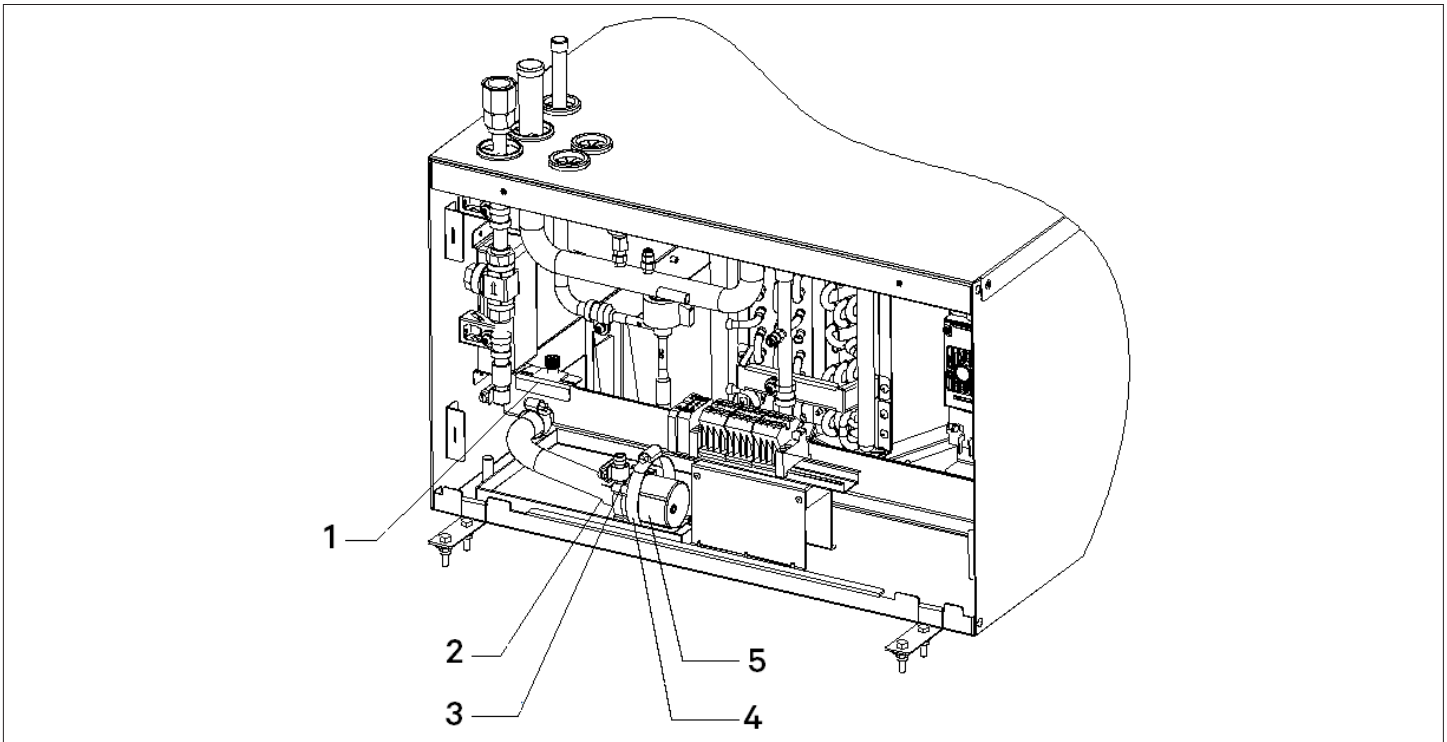
6.8. Maintenance of Drainage System

In order to ensure the normal drainage, it is necessary to check the drainage pan regularly.

- To ensure that there are no large scaling, debris, or leakages in the drain pan. Regularly check and cleaning of the drain pan filter is imperative.
- To prevent poor drainage caused by blockage, as shown in Figure 6-1. Regularly check whether the drain pump power supply is normal and whether the cabling is firmly connected.

The procedures for replacing condensate pump:

1. Cut off the power supply of the unit.
2. Open the rear door, unscrew the hose clamp and pull out the drain pipe of the water pan.
3. Unscrew the hose clamp fixing the water pump.
4. For reinstall the water pump, reverse the above steps.



ITEMS	DESCRIPTION	ITEMS	DESCRIPTION
1	Drain filter baffle	4	Hose clamp
2	Drain hose clamp	5	Pump
3	Outlet hose clamp		

Figure 6-1 Condensate Pump Removal

Note: Regularly check whether the drain filter net of the water pan is blocked by any foreign matter and clean it immediately.

7 Troubleshooting

Troubleshooting is to be performed by the trained and qualified service personnel. However, the checklists have been provided just for reference purposes.

- Prior to troubleshooting, the lethal voltage may be present in the unit which can be fatal. All notes, warnings, and cautions marked on the unit as well as the ones mentioned in the manual must be considered, otherwise, it may lead to injury and fatality.
- Extreme care and caution is required while troubleshooting on-line.

Note1: Qualified and professional maintenance personnel are the one supposed to troubleshoot and handle the unit.

Note2: If jumpers are used for troubleshooting, remember to remove the jumpers after the troubleshooting, failing to remove connected jumpers may bypass certain control functions and increase the risk to the unit.

7.1. Troubleshooting and Fault Handling of EC Fan

The troubleshooting of EC fan is explained in the Table 7-1.

Table 7-1 Troubleshooting of the Key Components of the EC Fan

Symptom	Possible Causes	Items to be Checked or Handling Method
EC fan cannot start	MCB trip	Check whether the fan circuit breaker is closed properly.
	Fan power module failure	Check the alarm light of the fan power module to determine whether there is a fault.
	Cabling/wiring failure	Check whether the cables from the main control board, fan fault detection board, and power module to the control terminal block are correctly connected.

7.2. Troubleshooting and Fault Handling of Electronic Expansion Valve

The Electronic Expansion Valve (EEV)is a key component that adjusts system refrigerant and cooling capacity. Thus, its normal operation is very important. The troubleshooting of EEV is explained in the Table 7-2.

Table 7-2 Troubleshooting of the Key Components of the EEV

Symptom	Possible Causes	Items to be Checked or Handling Method
Electronic Expansion Valve adjustment failure	Temperature sensor, pressure sensor failure	Check whether the sensor wiring is loose. Check whether the sensor wiring position on the control board is correct.
	Control board power down	Check whether the transformer output fuse is burned out. Check whether the input power of the electronic expansion valve control board has 24 V power supply.
	Control board cabling/wiring	Check the valve body wiring on the electronic expansion valve control board for errors; Check whether the communication cable between the electronic expansion valve control board and the main control board is cabled incorrectly.

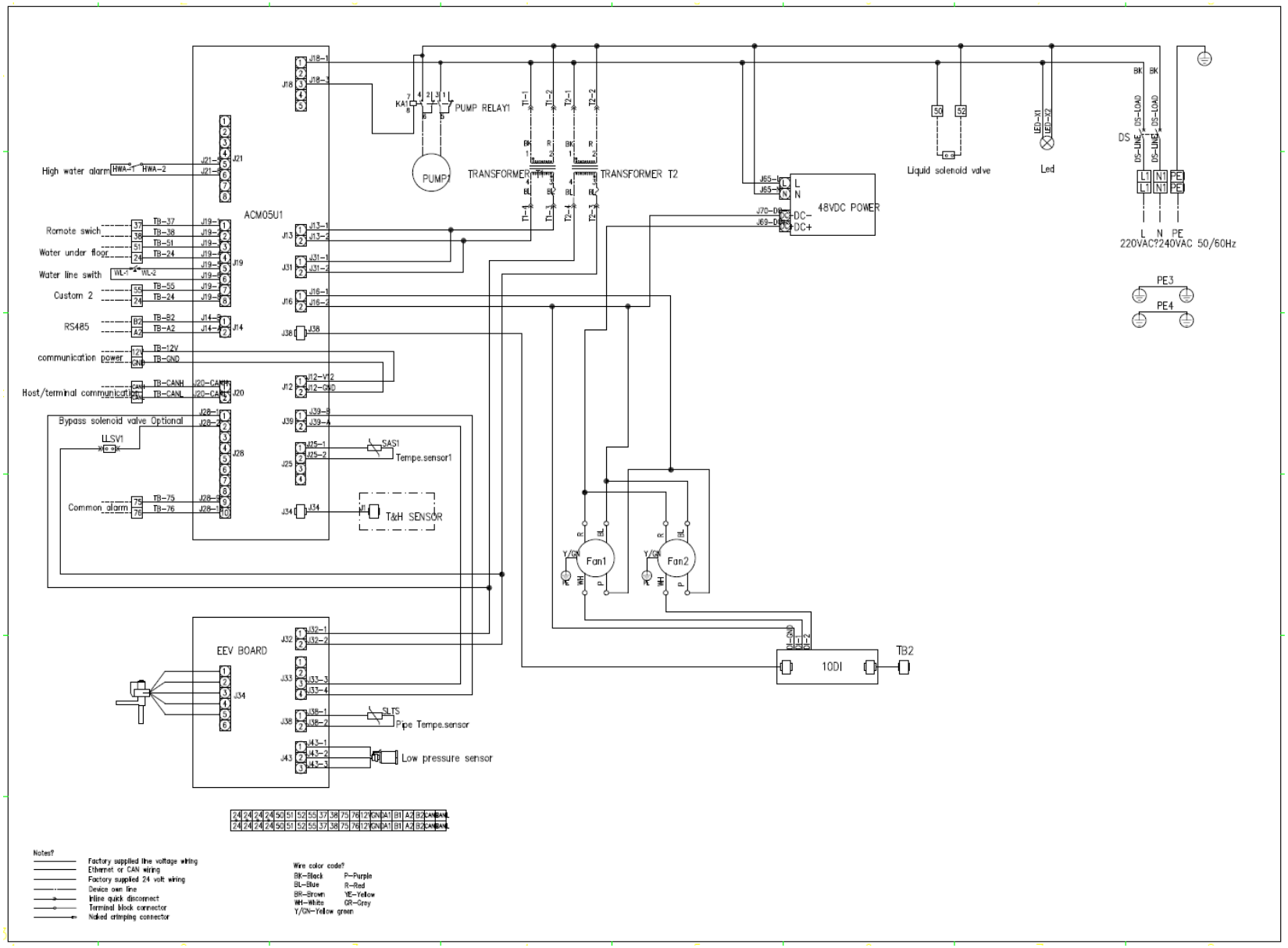
7.3. Troubleshooting and Fault Handling of Cooling System

When a cooling system component fails, analyzed and dealt with the cause immediately to avoid the abnormal operation of the units. The troubleshooting and fault handling of the cooling system are provided in the Table 7-3.

Table 7-3 Troubleshooting of the Key Components of the EEV

Symptom	Possible Causes	Items to be Checked or Handling Method
Condensation on the surface of the evaporator	Whether the surface of the evaporator is dirty and blocked	Check the cleanliness of the surface of the evaporator. Dirt blockage on the surface may cause the condensate not to drain properly.
Airflow volume is reducing	Dirty and blocked filter net	Regularly check the cleanliness of the filter and replace it to avoid reduction of air volume caused by clogging of dirty filter.
	Fan failure	Check whether the fan is malfunctioning.
	Dirty or blocked evaporator	Check the cleanliness of the surface of the microchannel evaporator, and clean it regularly.

Appendix I: Circuit Diagram of Vertiv™ Liebert® XDV



Appendix II: Alarm Output Menu Table

Main Unit Loss Alarm	Air Return High Temp Alarm	Air Return Temp Sensor Fault Alarm	Repetitive Address Alarm
Floor Flood Alarm	Air Return Low Temp Alarm	Air Return Hum. Sensor Fault Alarm	Fan Fault Detection Board Comm. Fault Alarm
High Water Level Alarm	Air Supply Low Temp Alarm	Air Supply Temp. Sensor Fault Alarm	
Fan Fault Alarm	Air Supply High Temp Alarm	Remote Temp. Sensor Fault Alarm	
Power Module 1 Fault Alarm	Air Return High Hum. Alarm	Electronic Expansion Valve Fault Alarm	
Air Flow Loss Alarm	Air Return Low Hum. Alarm	Electronic Expansion Valve Comm. Fault Alarm	
Filter Maintain Alarm	Remote High Temp Alarm	Pressure Sensor Fault Alarm	
Self Defined 1 Alarm	Remote Low Temp Alarm	Temp. Sensor Fault Alarm	
Repetitive Address Alarm	Remote High Hum. Alarm		
Fan Fault Detection Board Comm Alarm	Remote Low Hum. Alarm		

Appendix III: List of Maintenance Inspection Items (Monthly)

Date: _____

Prepared by: _____

Model: _____

Serial No.: _____

Filter net:
___ 1. Check if the filter net is damaged or blocked
___2. Clean the filter net

Fan part
___ 1. Whether the fan impeller is deformed
___ 2. Whether there is abnormal noise in the operation of the fan
___ 3. Is there a single fan stall

Electronic expansion valve
___ 1. Check whether the wiring cables and coils of the electronic expansion valve are loose

Drain pump
___ 1. Check for impurities, debris, etc. in the water pan
___ 2. Check if the drain pump filter net is blocked

Cooling system part
___ 1. Check the cleanliness of the evaporator surface
___ 2. Check whether it is necessary to add refrigerant (observe through the sight glass of the liquid storage tank)

Signature_____
Note: Please copy this form for record archive.

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

Date: _____

Prepared by: _____

Model: _____

Serial No.: _____

Filter net:
___ 1. Check if the filter net is damaged or blocked
___ 2. Check if the unit has filter net maintenance reminders
___ 3. Clean the filter net

Fan part:
___ 1. Whether the fan impeller is deformed
___ 2. Check and tighten circuit connectors
___ 3. Whether there is abnormal noise in the operation of the fan
___4. Is there a single fan stall

Electronic expansion valve part:
___ 1. Check whether the wiring and coil of the electronic expansion valve control board are loose

Cooling cyclic system:
___ 1. Check the cleanliness of the evaporator surface
___ 2. Check the refrigerant pipeline for leaks and proper support
___ 3. Check whether it is necessary to add refrigerant (observe through the sight glass of the liquid storage tank)

Electrical control part:
___ 1. Check whether the wiring of the main MCB and the power module MCB is loose
___ 2. Check and tighten circuit connectors
___ 3. Check whether the wiring and readings of various types of sensors are normal

Drain pump
__ 1. Check if the drain pump filter net is blocked
__ 2. Check whether the water pump cable is loose
__ 3. Check whether there are impurities, debris, etc. in the water pan

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
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Cabinet	○	○	○	○	○	○
Cooling parts	○	○	○	○	○	○
Fan unit	○	○	○	○	○	○
Electronic control unit	x	○	○	○	○	○
Display screen	○	○	○	○	○	○
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® XDV Series

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