



Liebert[®] XDM

Installer/User Guide

Refrigerant to Chilled Fluid Cooling Distribution Unit

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

Vertiv recommends installing a monitored fluid detection system that is wired to activate the automatic closure of field-installed coolant fluid supply and return shut off valves, where applicable, to reduce the amount of coolant fluid leakage and consequential equipment and building damage. Refer to local regulations and building codes relating to the application, installation, and operation of this product. The consulting engineer, installer, and/or end user is responsible for compliance with all applicable laws and regulations relating to the application, installation, and operation of this product.

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

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

Technical Support Site

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

TABLE OF CONTENTS

1 Important Safety Instructions	1
2 Nomenclature and Components	9
2.1 Model Number Nomenclature	9
2.2 Component Location	12
2.2.1 Vertiv™ Liebert® Coolant Chiller	12
2.2.2 Determining Cooling Equipment Needs	13
2.3 Cooling Configuration	14
2.3.1 Vertiv™ Liebert® XDM Minimum Load	18
3 Pre-installation Preparation and Guidelines	19
3.1 Planning Dimensions	21
3.2 Unit Weights	21
4 Equipment Inspection and Handling	23
4.1 Packaging Material	23
4.2 Storing Before Installation	24
4.3 Handling Units While Packaged	24
4.3.1 Recommended Unit Handling Equipment	24
4.4 Unpacking the Vertiv™ Liebert® XDM Domestic Units	26
4.4.1 Shipping Bracket Removal	28
4.5 Optional Panel Removal	31
4.6 Removing Units from the Skid for Handling Using Fork Lift Option	32
4.7 Removing Unit from Skid for Handling Using Gantry	34
4.8 Methods of Moving Unit to Installation Location	36
4.8.1 Method 1: Fork Lift	36
4.8.2 Method 2: Gantry	38
4.8.3 Method 3: Dolly Carts	40
4.9 Placing the Unit on a Floor Stand	41
5 Piping and Refrigerant Requirements	43
5.1 Piping Connection Sizes	44
5.2 Fluid and Refrigerant Connection Locations	45
6 Refrigerant Requirements	49
6.1 Refrigerant Piping and Charging	49
6.1.1 Refrigerant Piping Guidelines for Air Cooled Systems	50
6.1.2 Piping Layout and Condenser Positioning	51
6.1.3 Refrigerant Line Sizes and Equivalent Lengths	52
6.1.4 Refrigerant Charge Requirements for Air Cooled Systems	52
6.2 Additional Oil Requirements for Scroll and Digital Scroll Compressors	54
6.3 Evacuation, Leak Testing, and Charging Air Cooled Systems	56

- 6.4 Evacuation and Leak Testing Air Cooled Systems 56
 - 6.4.1 Break Vacuum 57
- 6.5 Charging Vertiv™ Liebert® XDM Air Cooled Systems (without receivers) 57
 - 6.5.1 Additional Compressor Oil 59
- 7 Secondary Fluid Circuit Requirements 61**
- 7.1 Interconnection with Cooling Modules 61
- 7.2 Fluid Requirements 61
- 7.3 Secondary Fluid Loop Piping Guidelines 61
 - 7.3.1 Flanged Connections 63
 - 7.3.2 Secondary Fluid Top and Bottom Circuit 65
 - 7.3.3 Recommended Secondary Fluid Pipe Sizes 66
 - 7.3.4 Fluid Volume for Unit and Connection Piping 67
 - 7.3.5 Field Piping Connection Volumes 67
 - 7.3.6 Air Bleeders 67
 - 7.3.7 Piping Mains 68
 - 7.3.8 Secondary Fluid Flow Considerations 68
- 7.4 Fluid Quality Requirements 68
- 7.5 Filling Secondary Fluid Circuit 69
 - 7.5.1 Leak Check before Commission and Operation 71
- 8 Draining Secondary Fluid Circuit 73**
- 9 Electrical Connections 75**
- 9.1 Power Supply Cable Connection Guidelines 76
- 9.2 Wiring Connection Guidelines 76
- 9.3 Electrical Field Connections 77
- 10 Checklist for Completed Installation 79**
- 10.1 Start the Vertiv™ Liebert® XDM 79
- 10.2 Checks to Perform after Start-up 79
- 10.3 Electrical Installation Checks 79
- 10.4 Vertiv™ Liebert® DX Piping Installation Checks 80
- 10.5 Vertiv™ Liebert® Secondary Circuit Piping Installation Checks 80
- 11 Troubleshooting 81**
- 12 Initial Start-up Checks and Commissioning Procedure for Warranty Inspection 83**
- 13 Maintenance 85**
- 13.1 Safety Instructions 85
- 13.2 Maintenance Schedule 87
- 13.3 Fluid and Piping Maintenance 87
- 13.4 Spare Parts 88
- 13.5 Compressor Oil 88
- 13.6 Compressor Electrical Failure (Motor Burnout) 88
 - 13.6.1 Replacing a Compressor with Electrical Failure (Motor Burnout) 89

13.6.2 Compressor Mechanical Failure90

13.6.3 Replacing a Compressor with Mechanical Failure 90

13.7 Flow Sensor 92

14 Preventive Maintenance Checklist 95

Appendices 101

Appendix A: Technical Support and Contacts101

Appendix B: Submittal Drawings 103

This page intentionally left blank

1 Important Safety Instructions

SAVE THESE INSTRUCTIONS

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

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

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

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

The unit model and serial number are located inside of the display panel. Use the unit model and serial number when obtaining assistance or spare parts.



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

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

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



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

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



WARNING! Risk of short circuits and electric shock. Can cause serious injury or death. Building and equipment damage can result from cut insulation or damaged wires. Can cause overheated wiring, smoke, fire, activation of fire suppression systems and EMS personnel, and loss of power to fans. Verify that all wiring connections are tight and that all wiring is contained within the junction box prior to closing and securing the cover.

Insert CSA-certified or UL-listed bushings into holes and/or knockouts used to route wiring through metal panels to protect the wire insulation from contact with sheet metal edges.



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

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



WARNING! Risk of explosive discharge of high-pressure refrigerant. Can cause serious injury or death. Building and equipment damage may also result. Neutral and service ports on the compressor service valves do not have a valve core. Front-seat the service valves and relieve pressure from the compressor before loosening a part or a component attached to the service valve. Follow local codes to properly reclaim refrigerant.



WARNING! Risk of improper moving. Can cause serious injury or death. Building and equipment damage may also result. Use only lifting equipment that is rated for the unit weight by an OSHA-certified rating organization. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator. Shipping weights and unit weights are listed in the tables in **Table 3.3** on page 21 .



WARNING! Risk of top-heavy unit falling over when improperly lifted or moved. Can cause serious injury or death. Building and equipment damage may also result. Read all of the following instructions and verify that all lifting and moving equipment is rated for the weight of the unit before attempting to move, lift, remove packaging from the unit, or preparing the unit for installation.



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



WARNING! Risk of improper wire sizing/rating and loose electrical connections causing overheated wire and electrical connection terminals resulting in smoke or fire. Can cause serious injury or death. Building and equipment damage may also result. Use correctly sized copper wire only and verify that all electrical connections are tightened before turning power on. Check all electrical connections periodically and tighten as necessary.



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



CAUTION: Risk of excessive refrigerant line pressure. Can cause equipment damage or injury resulting from tubing and component rupture. Do not close off the refrigerant line isolation valve for repairs unless a pressure-relief valve is field- installed in the line between the isolation valve and the check valve. The pressure relief valve must be rated 5% to 10% higher than the system design pressure. An increase in ambient temperature can cause the pressure of the isolated refrigerant to rise and exceed the system design pressure rating (marked on the unit nameplate).



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



CAUTION: Risk of heavy unit falling into defective raised floor. Can cause injury and equipment damage. Prior to installation, all floor tiles immediately around floor stand are to be removed and inspected. Make sure tiles are not cracked, and ribs have not been cut. If free from defects, re-install. Replace with new tiles if defects are found.



CAUTION: Risk of improper piping installation, leak checking, fluid chemistry and fluid maintenance. Can cause injury. Building and equipment damage may also result. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE.

NOTICE

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

NOTICE

Risk of improper refrigerant charging. Can cause equipment damage.

Refrigerant charge must be weighed into air-cooled compressorized systems before they are started. Starting scroll and digital scroll compressors without proper refrigerant charging can cause the compressors to operate at less than 5°F (-15°C) evaporator temperature and at less than 52 psig (358 kPa). Operation for extended periods at less than 52 psig (358 kPa) can cause premature compressor failure.

NOTICE

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

NOTICE

Risk of improper electrical connection of three-phase input power. Can cause backward pump rotation and unit damage. Service technicians should use a gauge set on the system during the initial start up to verify that the three-phase power is connected properly. Three-phase power must be connected to the unit line voltage terminals in the proper sequence so that the pump rotates in the proper direction. Incoming power must be properly phased to prevent pump from running backward. We recommend checking the unit's phasing with proper instrumentation to ensure that the power connections were made correctly. We also recommend verifying discharge and suction pressures during start up to ensure that the pumps are running in the correct direction.

NOTICE

Risk of frozen pipes and corrosion from improper coolant mixture. Can cause water leaks resulting in equipment and building damage.

When the cooling unit or piping may be exposed to freezing temperatures, charge the system with the proper percentage of glycol and water for the coldest design ambient temperature. Automotive antifreeze is unacceptable and must NOT be used in any glycol fluid system. Use only HVAC glycol solution that meets the requirements of recommended industry practices. Do not use galvanized pipe.

NOTICE

Risk of piping system corrosion and freezing fluids. Can cause leaks resulting in equipment and very expensive building damage. Cooling coils and piping systems are at high risk of freezing and premature corrosion. Fluids in these systems must contain the proper antifreeze and inhibitors to prevent freezing and premature coil and piping corrosion. The water or water/glycol solution must be analyzed by a competent local water treatment specialist before start up to establish the inhibitor and antifreeze solution requirement and at regularly scheduled intervals throughout the life of the system to determine the pattern of inhibitor depletion.

The complexity of water/glycol solution condition problems and the variations of required treatment programs make it extremely important to obtain the advice of a competent and experienced water treatment specialist and follow a regularly scheduled coolant fluid system maintenance program.

Water chemistry varies greatly by location, as do the required additives, called inhibitors, that reduce the corrosive effect of the fluids on the piping systems and components. The chemistry of the water used must be considered, because water from some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation. Sediment deposits prevent the formation of a protective oxide layer on the inside of the coolant system components and piping. The water/coolant fluid must be treated and circulating through the system continuously to prevent the buildup of sediment deposits and/or growth of sulfate reducing bacteria. Proper inhibitor maintenance must be performed in order to prevent corrosion of the system. Consult glycol manufacturer for testing and maintenance of inhibitors. Commercial ethylene glycol, when pure, is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the water from which it is prepared and may become increasingly corrosive with use if not properly inhibited.

We recommend installing a monitored fluid detection system that is wired to activate the automatic closure of field installed coolant fluid supply and return shut-off valves to reduce the amount of coolant fluid leakage and consequential equipment and building damage. The shutoff valves must be sized to close off against the maximum coolant fluid system pressure in case of a catastrophic fluid leak.

NOTICE

Risk of no flow condition. Can cause equipment damage.

Do not leave the water/coolant fluid supply circuit in a no-flow condition. Idle fluid allows the collection of sediment that prevents the formation of a protective oxide layer on the inside of tubes. Keep unit switched on and water/coolant fluid supply circuit system operating continuously.

NOTICE

This unit may require an external water supply to operate. Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in catastrophic and expensive building and equipment damage and loss of critical data center equipment.

Do not locate unit directly above any equipment that could sustain water damage.

We recommend installing a monitored fluid detection system to immediately discover and report coolant fluid system leaks.

NOTICE

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

NOTICE

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

NOTICE

Risk of improper storage. Can cause unit damage.

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

NOTICE

Risk of improper control circuits. Can cause equipment damage.

When using jumpers for troubleshooting, always remove jumpers when maintenance is complete. Jumpers left connected could override controls and cause equipment damage.

NOTICE

Condenser fans should be operated manually if they have not run for an extended time in an outdoor environment. Before enabling the condenser for normal cooling operation fans should be run at full speed for at least three hours once a month to move the bearings and allow any condensate that may have ingressed to evaporate.

Condenser firmware release 1.06.045 & later include settings to operate condenser fans if they have been inactive for more than 30 days.

NOTE: The Vertiv™ Liebert® XDM indoor cooling unit has a factory installed high pressure safety switch in the high side refrigerant circuit. Consult your local building code to determine whether the refrigerant piping will require additional field supplied pressure relief devices.

Agency Listed

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



Notice to European Union Customers

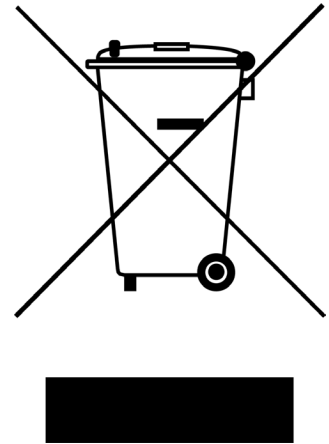
This product uses components that are dangerous for the environment, such as electronic cards and other electronic components. Any component that is removed must be taken to a specialized collection and disposal center. If this unit must be dismantled, this must be done by a specialized center for collection and disposal of electric and electrical appliances or other dangerous substances.

This product has been supplied from an environmentally aware manufacturer that complies with the Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/CE.

The "crossed out wheeled bin" symbol is placed on this product to encourage you to recycle whenever possible. Please be environmentally responsible and recycle this product through your recycling facility at the end of its life. Do not dispose of this product as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE.

For information regarding the scrapping of this equipment, please browse www.Vertiv.com or call our world wide technical support.

- Toll Free: 00 80011554499
- Toll Number Based in Italy: +39 0298250222



This page intentionally left blank

2 Nomenclature and Components

This section describes the model number for Vertiv™ Liebert® XDM (Xtreme Density Module Distribution) units and components.

2.1 Model Number Nomenclature

Table 2.3 below describes each digit of the 36 digit configuration number. The 14 digit model number consists of the first 10 digits and last four digits of the configuration number.

Table 2.1 Vertiv™ Liebert® XDM Model Number Example, Part 1

Model # Part 1 Model Details																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
X	D	M	2	0	0	R	D	A	T	3	2	A	D	1	0	L	L	B	0	0

Table 2.2 Liebert® XDM Model Number Example, Part 2

Model # Part 2 Model Details														
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.3 Model Number Digit Definitions for Liebert® XDM

Digit and Description
Digits 1, 2 = The base unit Liebert® XD = Extreme Heat Density System
Digit 3 = System type M = Modular Distribution Unit
Digit 4, 5, 6 200 400
Digit 7 = Primary to secondary fluid type R = Refrigerant AC to water
Digit 8 = Load device D = Door cooling
Digit 9 = Power supply options A = 460, 3 phase, 60 Hz
Digit 10 = Cooling configuration Options T = Tandem with digital, R-410A

Table 2.3 Model Number Digit Definitions for Liebert® XDM (continued)

Digit and Description
Digit 11 = Condenser Matchup 3 = Liebert® MCV330 4 = Liebert® MCV440
Digit 12 = Display 2 = Liebert® iCOM™ high definition
Digit 13 = Motor Selection A = 7.5 HP B = 5 HP
Digit 14 = Customer Piping Location D = Bottom connection U = Top connection
Digit 15 1 = Color standard 2 = Color optional
Digit 16 = Seismic 0 = None
Digit 17 = High voltage options L = Locking disconnect S = Dual locking disconnect with reversing starter and condenser subfeed with buffer
Digit 18 = Option packages L = Low voltage terminal package
Digit 19 = Monitoring B = Base comms and connectivity
Digit 20 = Sensors 0 = None
Digit 21 = Packaging 0 = None
Digit 22 = Low Ambient Outdoor Freeze Protection 0 = None L = Outdoor Ambient less than -18°F
Digit 23 = None 0 = None
Digit 24 = None 0 = None
Digit 25 = None 0 = None

Table 2.3 Model Number Digit Definitions for Liebert® XDM (continued)

Digit and Description
Digit 26 = Power meter 0 = None P = Power meter
Digit 27 = None 0 = None
Digit 28 = None 0 = None
Digit 28 = None 0 = None
Digit 28 = None 0 = None
Digit 29 = None 0 = None
Digit 30 = Remote sensor 3 = 30' Remote temp and humidity sensor 6 = 60' Remote temp and humidity sensor 9 = 90' Remote temp and humidity sensor 2 = 120' Remote temp and humidity sensor 5 = 5' Remote temp and humidity sensor
Digit 31 = None 0 = None
Digit 32 = None 0 = None
Digit 33 = None 0 = None
Digit 34 = None 0 = None
Digit 35 = None 0 = None
Digit 36 = None 0 = None

2.2 Component Location

The unit component locations are described in the submittal documents included in the [Submittal Drawings](#) on page 103.

The following table lists the relevant documents by number and title.

Table 2.4 Component Location Drawings

Document Number	Title
DPN005063	Liebert® iCOM™ Component Location Diagram

2.2.1 Vertiv™ Liebert® Coolant Chiller

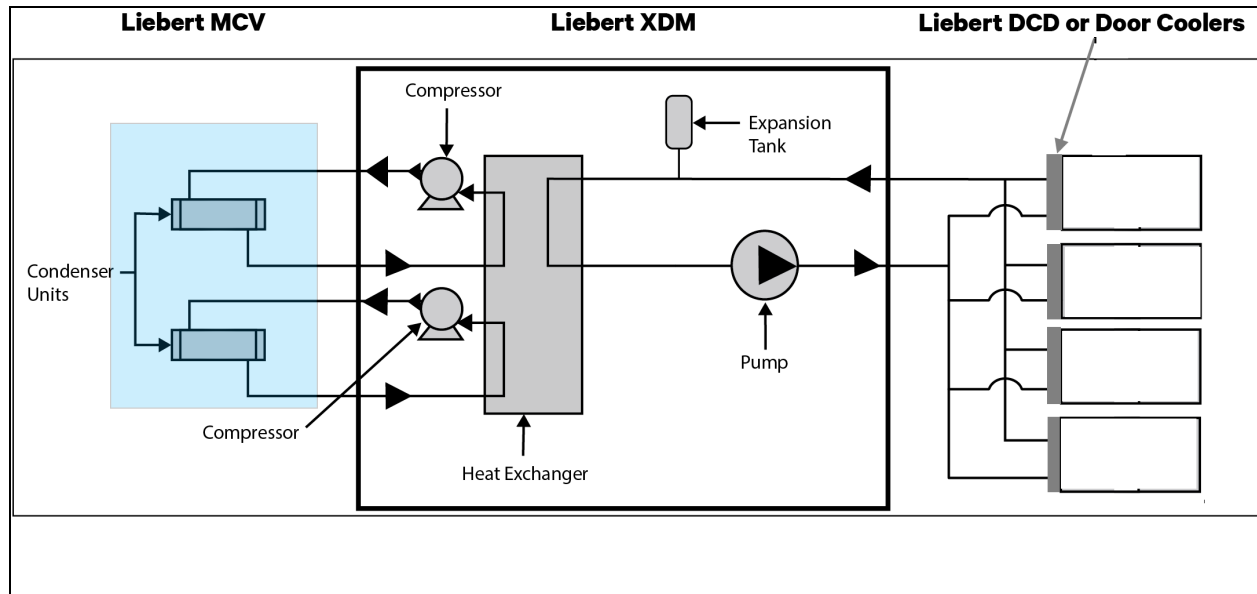
The Vertiv™ Liebert® XDM is an indoor chiller that connects directly to the Vertiv™ Liebert® DCD cooling modules and provides circulation and control. The Liebert® XDM keeps the coolant temperature above the room dew point by using sensors.

The Liebert® XDM is a chiller with two distinct circuits:

- A R-410A circuit. This circuit is a dual direct expansion circuit. It contains tandem scroll compressors, expansion valves, brazed plate heat exchanger, and piping.
- A water/glycol circuit. The water/glycol circuit uses a circulating pump, a brazed plate exchanger, and piping.

Heat removal is accomplished by using condensers connected to the dual direct expansion circuit. Heat rejection is an outdoor air cooled condenser. See **Figure 2.1** below.

Figure 2.1 Liebert® XDM System



The advanced control enables users to monitor essentially all aspects of the Liebert® XDM system from operating status to maintenance. Please refer to the Liebert® iCOM™ Installer User Guide for the Liebert® XDM.

2.2.2 Determining Cooling Equipment Needs

In order to determine cooling equipment needs, the following questions need to be considered.

1. Who will be involved in this project, who are the stakeholders?
2. What heat load growth is anticipated over the next few years?
3. Is there an existing computer room environmental cooling system for humidity control and filtration?
4. Is the vapor barrier sufficient?
5. Is the hot/cold aisle approach being used for this room design or can it be applied to this room design?
6. How much power is available for cooling equipment?
7. Is redundant cooling equipment required?
8. Is adequate space available for a Liebert® XDM installation?
9. What is the area available for the remote condenser?
10. Are there access considerations for indoor and outdoor components? (Are there possible rigging problems?)
11. How are the cabinets going to be populated (density of heat generation)?
12. Is the solution matched to a Vertiv™ Liebert® DCD load device that is appropriately sized for the cabinet density and heat generation?
13. What is the maximum distance between the Liebert® XDM unit and the farthest Liebert® DCD in the proposed layout? Is the piping sized so that the available Liebert® XDM pump head pressure is sufficient for this run?
14. If multiple Liebert® XDM units feed a common header, is the header a large enough diameter to minimize the back pressure on the units in the middle? Expect a 10-15% flow reduction depending on the header size and number of units supplying it.
15. What is the minimum outdoor design temperature? If it is below -18° F (-28° C), verify the required glycol percentage to protect the Liebert® XDM evaporator. Please refer to 10025700.
16. Do you have a bypass valve if the minimum flow rate needed is less than what the Liebert® XDM can reduce to?
17. What is the expectation for the load variation? Is there an SLA that must be met? If so, you may need a ride through tank for step load changes.
18. What is the minimum opening size you need to protect the secondary components from debris? Plan for a strainer or filter to meet that requirement.
19. How will you ensure air is easily removed from the water loop in a timely fashion when starting up the Liebert® XDM pump?
20. What monitoring requirements are desired or needed?
21. What will be the load when the units are first started up? How will a load be introduced to the cooling loop during start-up and commissioning?
22. Who is going to service these units after commissioning is over? Schedule them to be on-site during start-up and commissioning.

2.3 Cooling Configuration

Best practice is to place equipment racks in alternating rows of cold aisles and hot aisles. This is best accomplished when the layout of the computational infrastructure is being planned. It is more difficult to accomplish when the computer room is already populated with operating hardware.

In the cold aisle, the equipment racks are arranged face to face. This is so that cooling air from the computer room cooling unit is discharged up through the perforated floor tiles and then drawn up into the face of the computer hardware. It is then exhausted out of the back of the equipment rack into the adjacent hot aisles. Cooling configuration may also include row air handling units.

Hot aisles are hot because the objective of the alternating cold and hot aisle design is to separate the source of cooling air from hot air discharge which returns to the computer room cooling unit. Because of this, no perforated tiles should be placed in hot aisles. This would mix hot and cold air, lowering the temperature of the air returning to the cooling units, reducing their usable capacity.

Table 2.5 Legend, Dual System, Single Common Loop Reversed Return

Figure	System	Loop	Style	Redundant	Teamwork
Dual System, Separate CW Loops Interlaced. Figure 23 on the facing page	Dual	Dual	Interlaced	Yes (Some)	No
Single System See Figure 22 on the facing page	Single	Single	Simple	No	No
Dual System, Single Common Loop Reversed Return See Figure 24 on page 16	Dual	Single	Reverse return	Yes	Yes

Figures illustrate some piping alternatives suitable for small installations. Larger multi-module layouts are possible with a wide variety of piping configurations to support redundancy, maintainability, and other considerations.

Figure 2.2 Single System

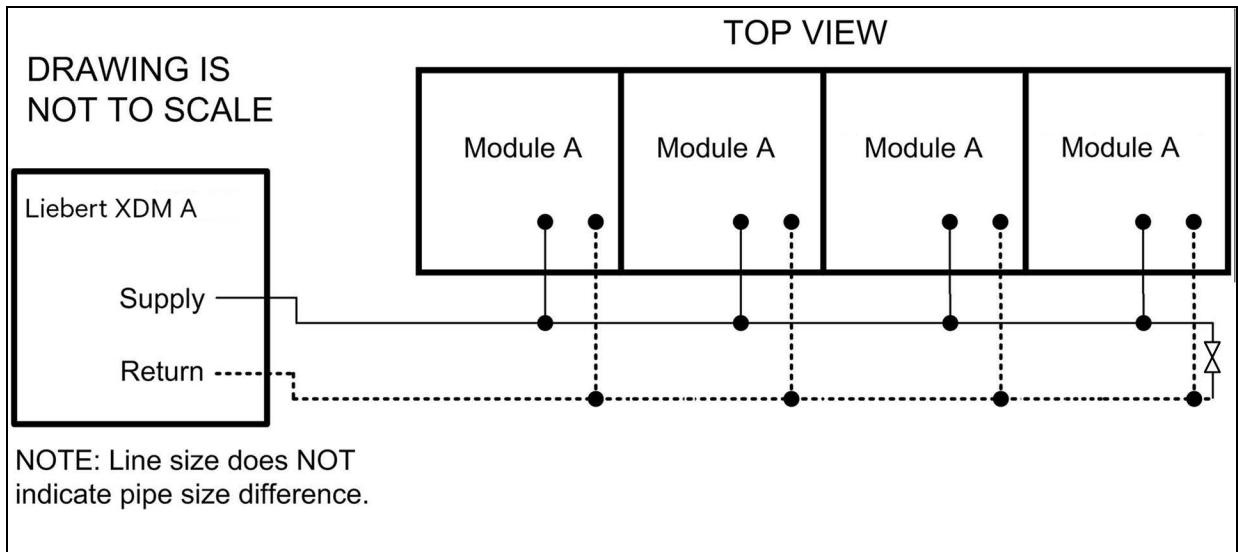


Figure 2.3 Separate CW Loops Interlaced

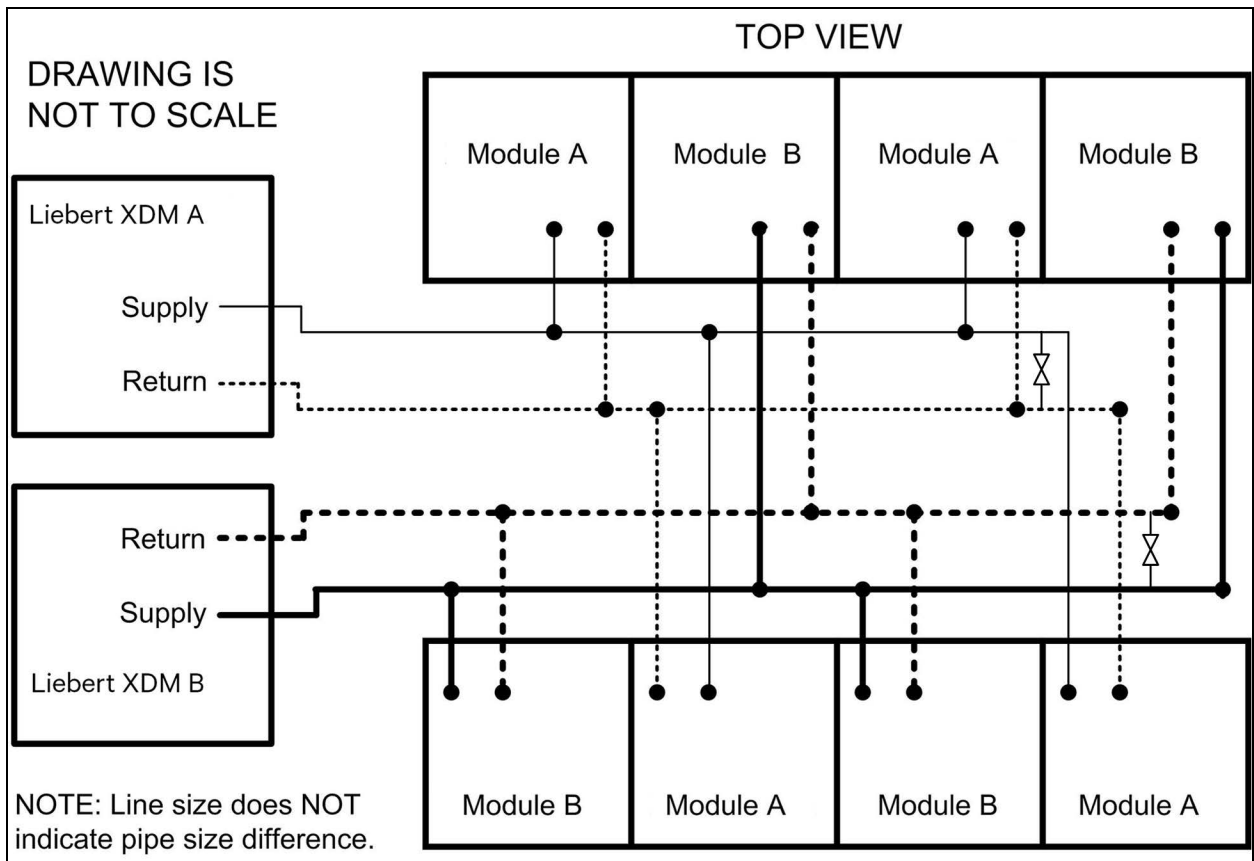


Figure 2.4 Dual Single Common Loop Reversed Return

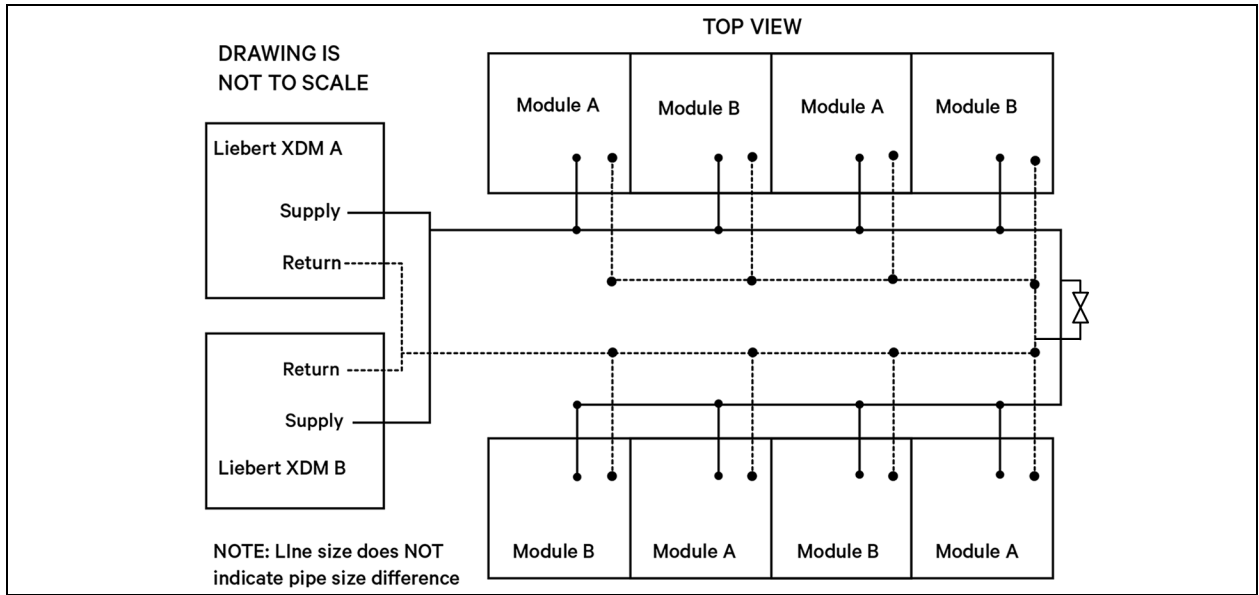
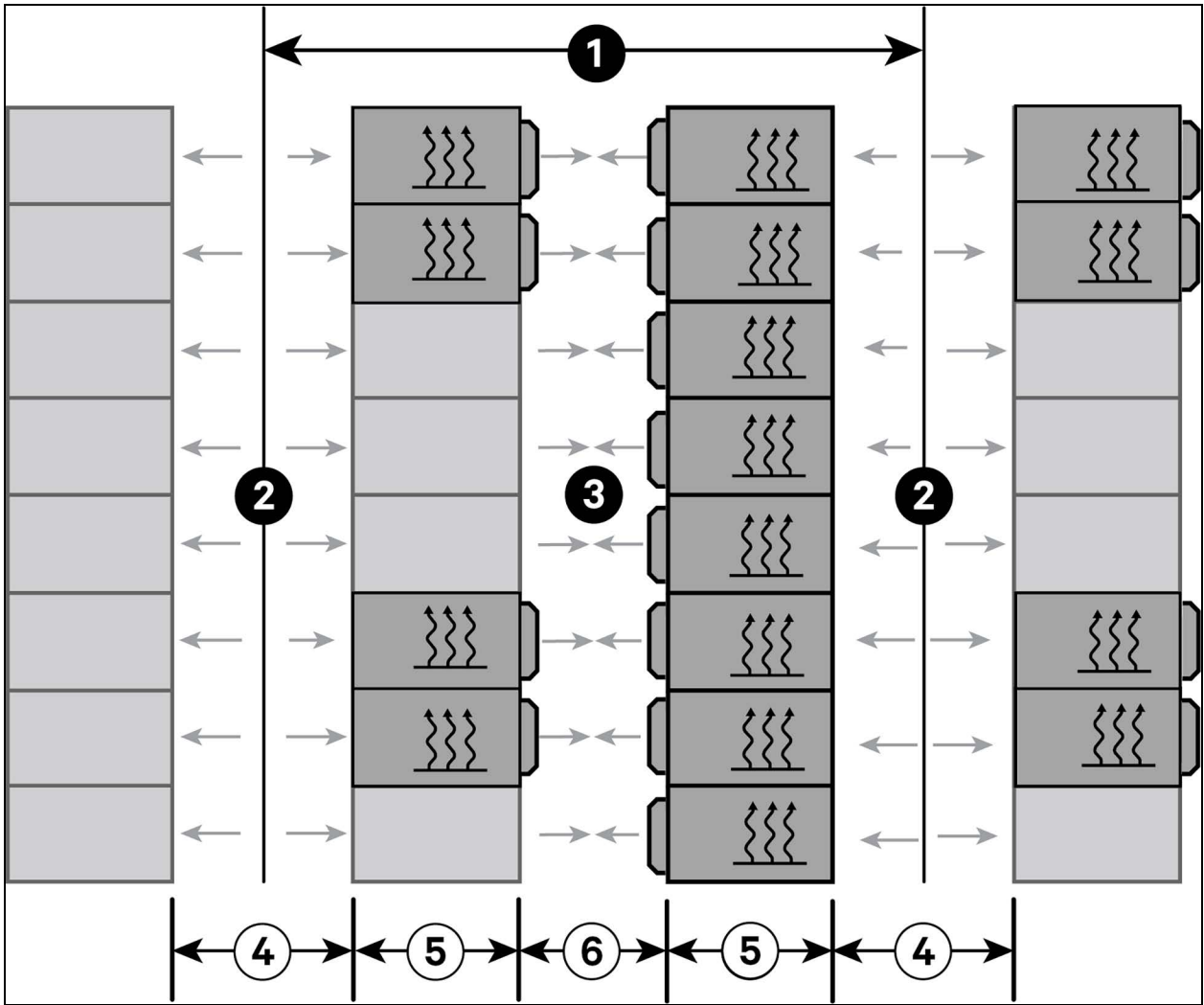


Figure 2.5 Vertiv™ Liebert® DCD or Chip Cooler in Hot/Cold Aisle Application



Item	Description
1	Aisle pitch, 7 tiles, 14 ft. (4.3 m)
2	Cold aisle
3	Hot aisle
4	Cold aisle, 4 ft. (1.2 m)
5	Rack, 42 in. (1067 mm)
6	Hot aisle, 3 ft. (0.91 m)

2.3.1 Vertiv™ Liebert® XDM Minimum Load

The Liebert® XDM minimum recommended operating load is 10% of system nominal capacity.

- The minimum load for an Liebert® XDM 200 60Hz system is 20kW.
- The minimum load for an Liebert® XDM 400 60Hz system is 40kW.

Loads below minimum values unfavorably affect system operation.

NOTE: Unit may cycle with over cooling at low loads during some outdoor conditions.

3 Pre-installation Preparation and Guidelines

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

Refer to [Model Number Nomenclature](#) on page 9 and the appropriate submittal drawings to determine the type of system being installed and anticipate building alterations, piping, and duct work needed.

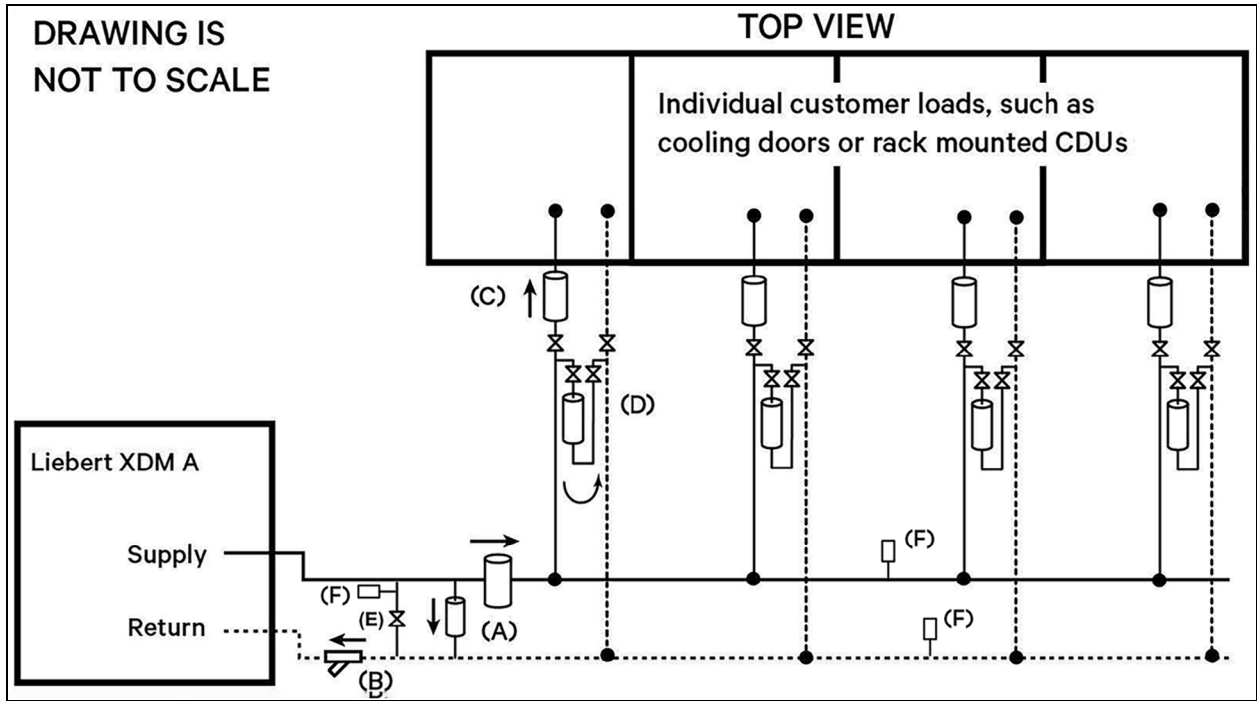
The unit dimensions, pipe connection locations, and piping schematics are described in the submittal documents included in the [Submittal Drawings](#) on page 103 .

For initial start-up runtime of the customer fluid loop, consider the options listed in **Table 3.1** below , dependent upon the situation.

Table 3.1 Initial Start-up Runtime Options for Customer Loop

Option	Detailed Explanation	Requirement	Refer to Diagram of Initial Start-up Runtime Options (below)
1. Filters and strainers	Per customer requirements, there may be micron filters or additional strainers specified by the customer or their consulting engineer, as a requirement for their unique application. This requirement may be driven by an equipment supplier (e.g., liquid cooled servers or rack mounted CDUs) or it may be best practices for the CW loop (to maintain water quality).	Follow CW loop design by others.	A
2. Field provided 30-40 mesh strainer at inlet of Liebert® XDM	This Y-strainer is required near the Vertiv™ Liebert® XDM at the CW return line to prevent debris or particulates from entering the XDM heat exchanger. This is to reduce the likelihood of a flow blockage in the heat exchanger. The biggest culprit may be construction debris so after initial operation, the strainer should no longer require cleaning.	Always required with Liebert® XDM installations.	B
3. Strainer or micron filter at cooling load	Heat exchangers with fine passages may need to be protected from construction debris. So a filter or strainer should be provided to allow that debris to be caught and removed as part of the initial fill and start up operation. The rating of this filter or strainer will be specified by the heat exchanger requirements.	Per heat exchanger manufacturer's specifications.	C
4. Loop to flush piping	Include a loop or bypass located at the branch locations to individual loads, to flush debris prior to load connections.	Best practice for heat exchangers with fine passages.	D
5. Bypass arrangement	Field supplied and installed for rear door heat exchanger application is where the fluid flow rate is less than minimum recommendation.	Field supplied and installed.	E
6. Auto-vent for air in fluid loop	Long horizontal pipe runs and high points of fluid piping tend to trap air and make it hard for the unit to run effectively. It is recommended to place automatic air vents in several places around the loop for an easier start-up process.	Field supplied and installed	F

Figure 3.1 Diagram of Initial Start-up Runtime Options for Customer Loop



- Verify that the floor is level, solid, and sufficient to support the unit. See [Liebert® XDM Shipping Dimensions and Unit Weights, Domestic](#) on the facing page, for unit weights.
- Confirm that the room is properly insulated and has a sealed vapor barrier.
- For proper humidity control, keep outside or fresh air to an absolute minimum (less than 5% of total air circulated in the room).
- Install the units as close as possible to the largest heat load.
- Allow at least the minimum recommended clearances for maintenance and service. See the appropriate submittal drawings for dimensions.
- We recommend installing an under floor leak detection system. Contact your Vertiv representative for information.

3.1 Planning Dimensions

The unit and floor stand dimensions are described in the submittal documents included in [Submittal Drawings](#) on page 103.

The following table lists the relevant documents by number and title.

Table 3.2 Vertiv™ Liebert® XDM Dimension Planning Drawings

Document Number	Title
DPN005228	Liebert® XDM Standard Features
DPN005230	Liebert® XDM Optional Features
DPN005062	Liebert® XDM Cabinet Dimensional Data 200kW
DPN005066	Liebert® XDM Cabinet Dimensional Data 400kW
Floor Stand	
DPN005214	Liebert® XDM Floor Stand Dimensional Data 200kW
DPN005226	Liebert® XDM Floor Stand Dimensional Data 400kW

3.2 Unit Weights

Table 3.3 Liebert® XDM Shipping Dimensions and Unit Weights, Domestic

Domestic Packaging		Dry Weight, lb (kg)	Packaging Weight, lb (kg)	Total Weight, lb (kg)
Model No.	Shipping Dimensions, in. (mm)			
Liebert® XDM 200	72 x 54 x 85	1800	213	2013
	(1829 x 1372 x 2159)	(816)	(97)	(913)
Liebert® XDM 400	136 x 54 x 85	3205	329	3534
	(3454 x 1372 x 2159)	(1454)	(149.2)	(1603)

Table 3.4 Liebert® XDM Shipping Dimensions and Unit Weights, Export

Export Packaging		Dry Weight, lb (kg)	Packaging Weight, lb (kg)	Total Weight, lb (kg)
Model No.	Shipping Dimensions, in. (mm)			
Liebert® XDM 200	72.5 x 54.5 x 86	1800	404	2204
	(1842 x 1384 x 2184)	(816)	(183)	(1000)
Liebert® XDM 400	136.5 x 54.5 x 86	3205	611	3816
	(3658 x 1384 x 2184)	(1454)	(277)	(1731)

This page intentionally left blank

4 Equipment Inspection and Handling



WARNING! Risk of improper moving. Can cause serious injury or death. Building and equipment damage may also result. Use only lifting equipment that is rated for the unit weight by an OSHA-certified rating organization. The center of gravity varies depending on the unit size and selected options. The slings must be equally spaced on either side of the center of gravity indicator. Shipping weights and unit weights are listed in **Table 3.3** on page 21. Use the center of gravity indicators on the unit to determine the position of the slings.



WARNING! Risk of top heavy unit falling over. Improper handling can cause equipment damage, injury, or death. Read all of the following instructions and verify that all lifting and moving equipment is rated for the weight of the unit before attempting to move, lift, remove packaging from, or prepare the unit for installation.



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

NOTICE

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

NOTICE

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

NOTICE

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

Upon arrival of the unit and before unpacking:

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

4.1 Packaging Material



All material used to package this unit is recyclable. Please save for future use or dispose of the material appropriately.

4.2 Storing Before Installation

If storing the unit for long periods before installation:

- Remove all packaging except unit bag. Clearance is to be maintained around the unit to prevent incidental contact.
- Inspect the unit periodically for condensation or other effects from the storage environment.
- If storing at low temperatures, install electric heaters near the unit to prevent condensation.

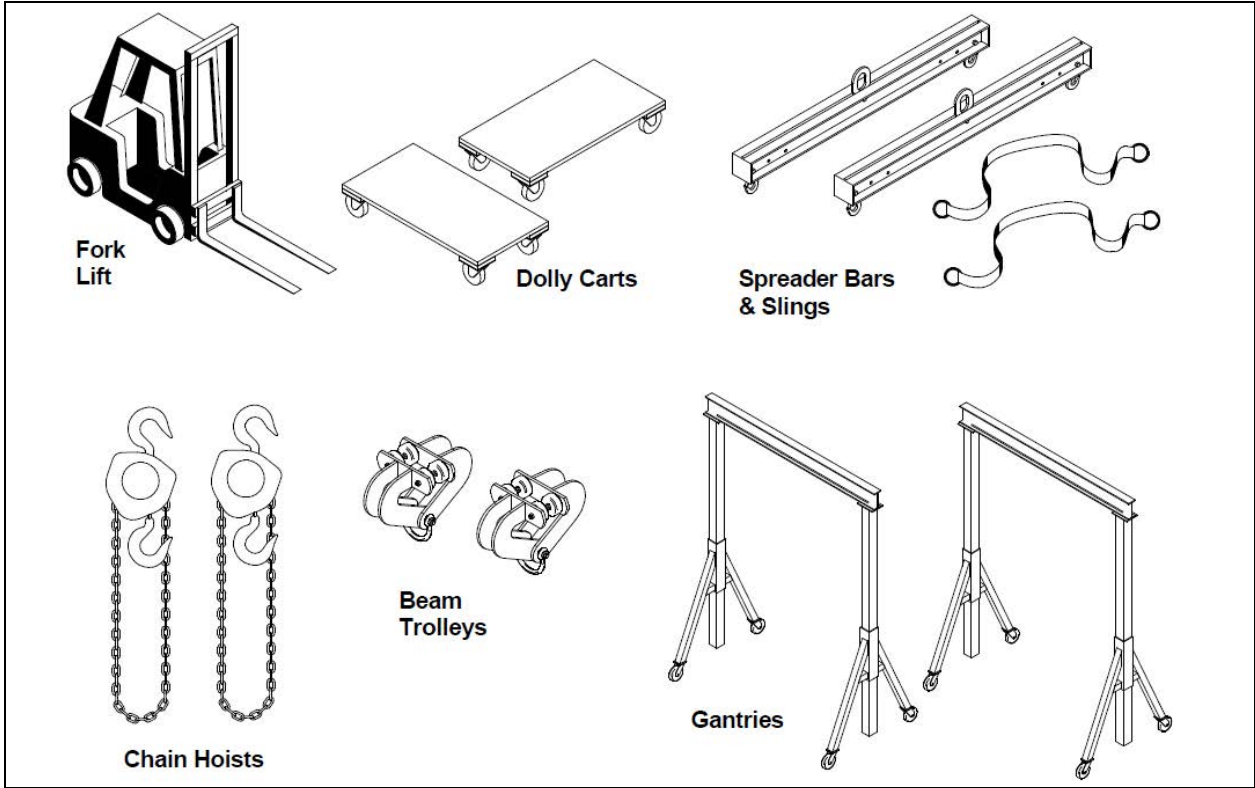
4.3 Handling Units While Packaged

1. Transport the packaged unit using a fork lift.
2. When using a fork lift, make sure the lift has adjustable forks. Forks are to be spread to the widest allowable distance to still fit under the skid. Make sure the fork length is suitable for skid length.
 - **Liebert® XDM 200:** Skid length is 72 in. (1829mm).
 - **Liebert® XDM 400:** Skid Length is 136 in. (3454mm).
3. When using a fork lift, the unit shall not be lifted any higher than 2 in. to 4 in. (51 to 102mm) off of the ground when handled. Bystander personnel shall not stand closer than 12 ft. (3.7m) to the packaged unit.
4. If circumstances require the unit to be lifted higher than 4 in. (102mm), great care shall be exercised. Bystander personnel shall be no closer than 20 ft. (5m) to the lift point of the unit.

4.3.1 Recommended Unit Handling Equipment

- Fork lift
- Dolly carts
- Spreader bars and slings
- Chain hoists
- Beam trolleys
- Gantries

Figure 4.1 Recommended Unit Handling Equipment



4.4 Unpacking the Vertiv™ Liebert® XDM Domestic Units

Remove the exterior packaging material from the units.

Figure 4.2 Packaged Liebert® XDM 200

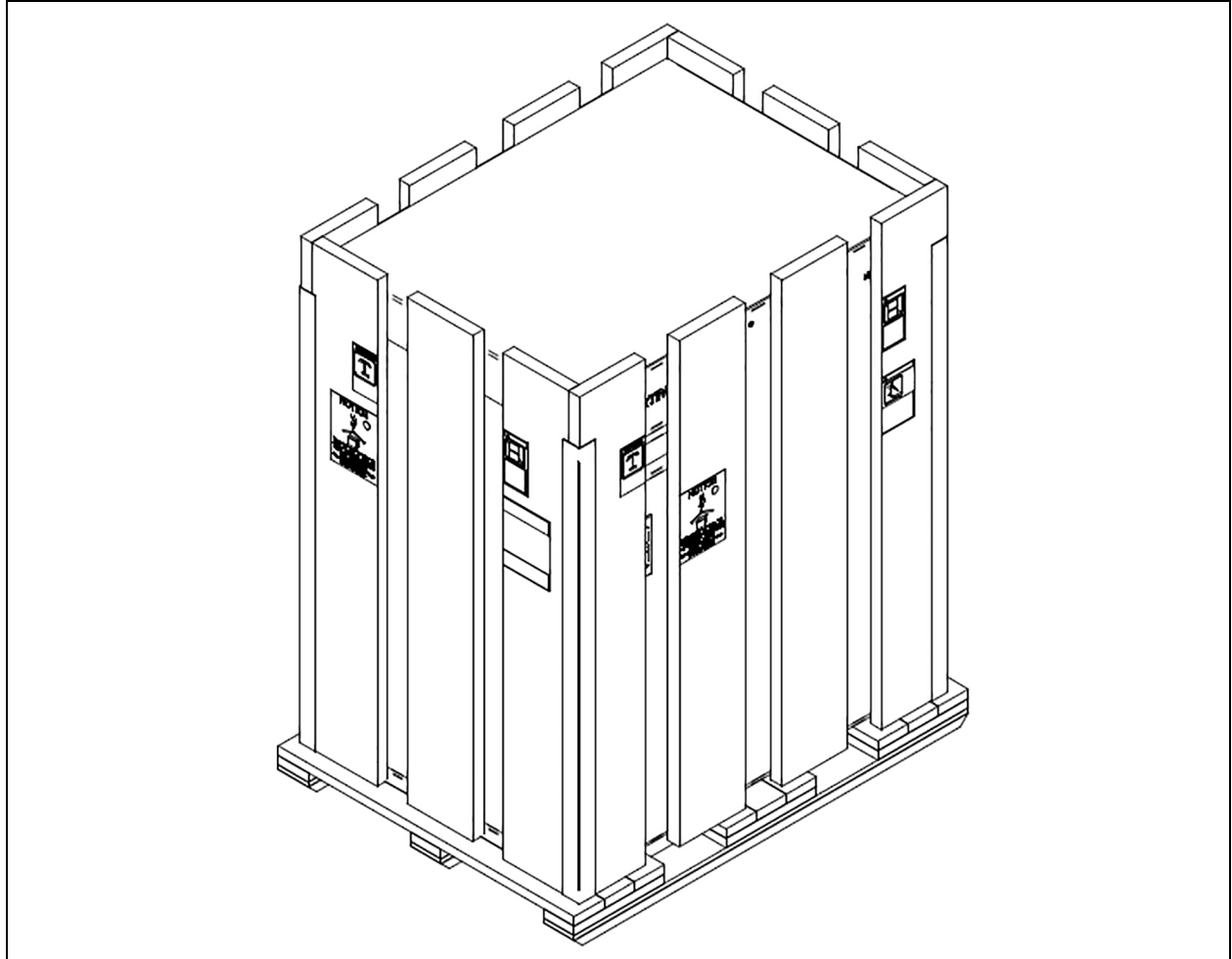
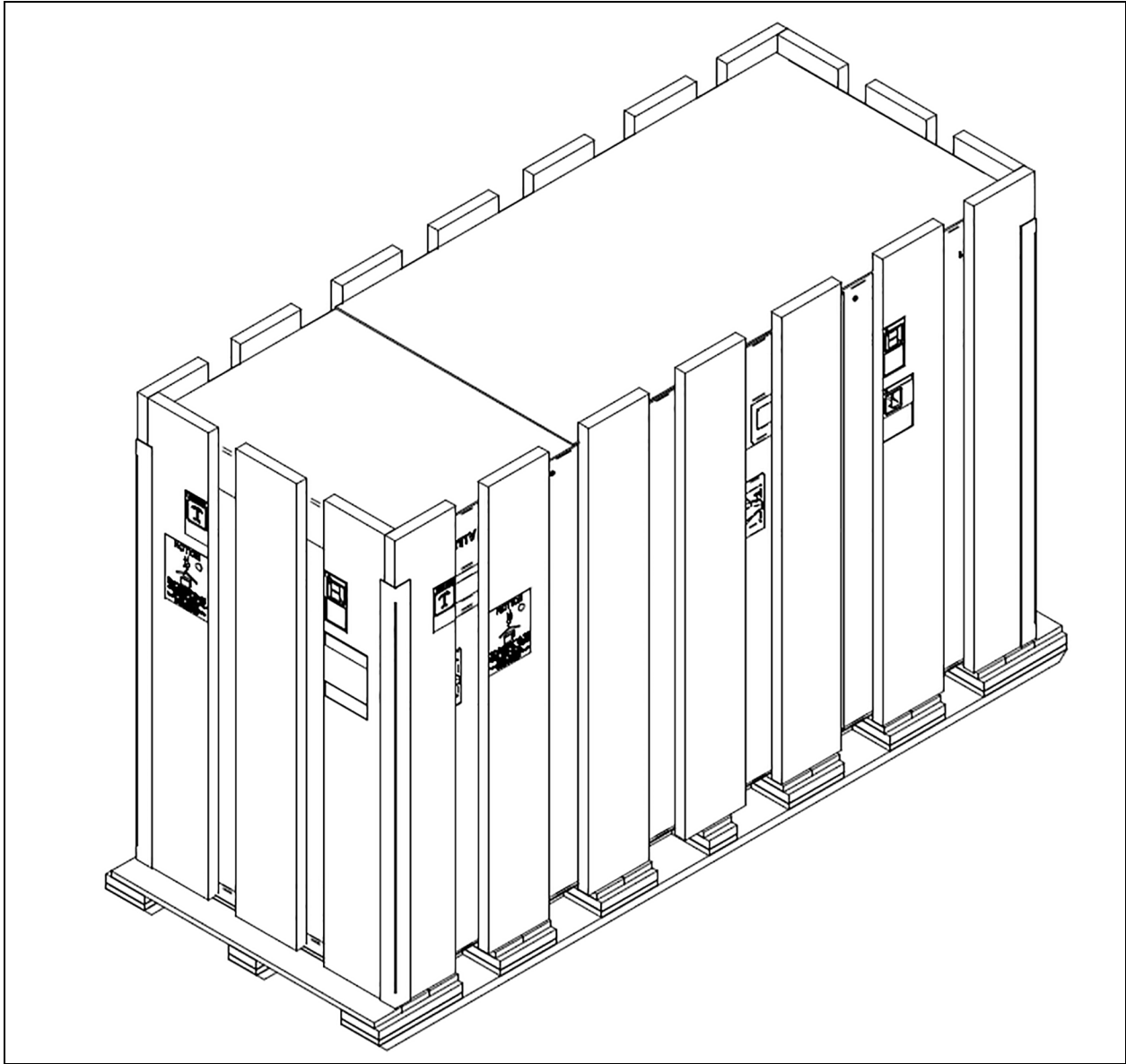


Figure 4.3 Packaged Vertiv™ Liebert® XDM 400



4.4.1 Shipping Bracket Removal

- Use a 9/16-in. socket drive to remove 12 lag screws from two shipping brackets.
- Refer to Detail A in the following figures.
- Remove two shipping brackets. The unit is no longer attached to the skid.

Figure 4.4 Vertiv™ Liebert® XDM 200 Shipping Bracket Removal

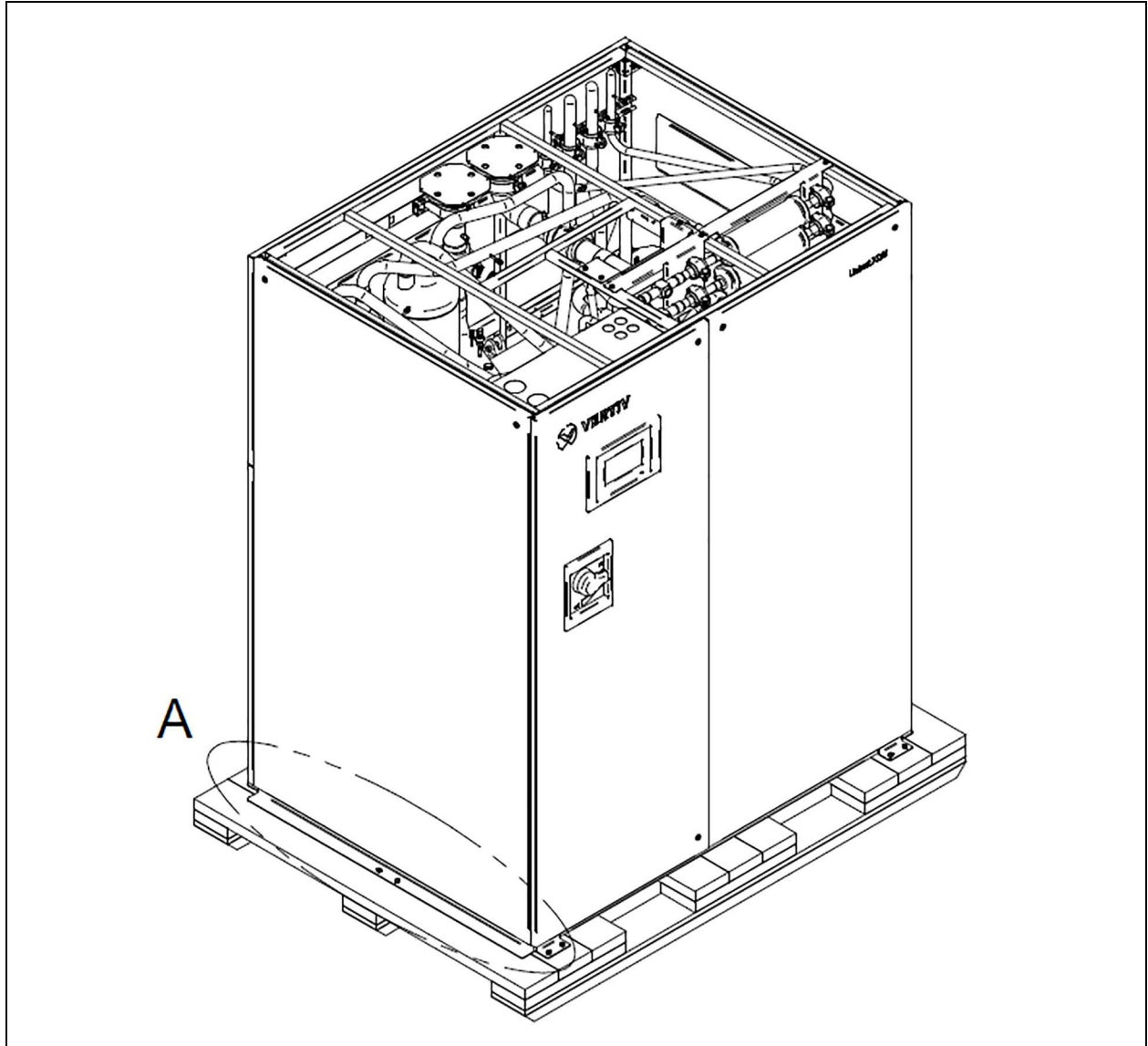


Figure 4.5 Vertiv™ Liebert® XDM 200 Shipping Bracket Removal Detail A Enlargement

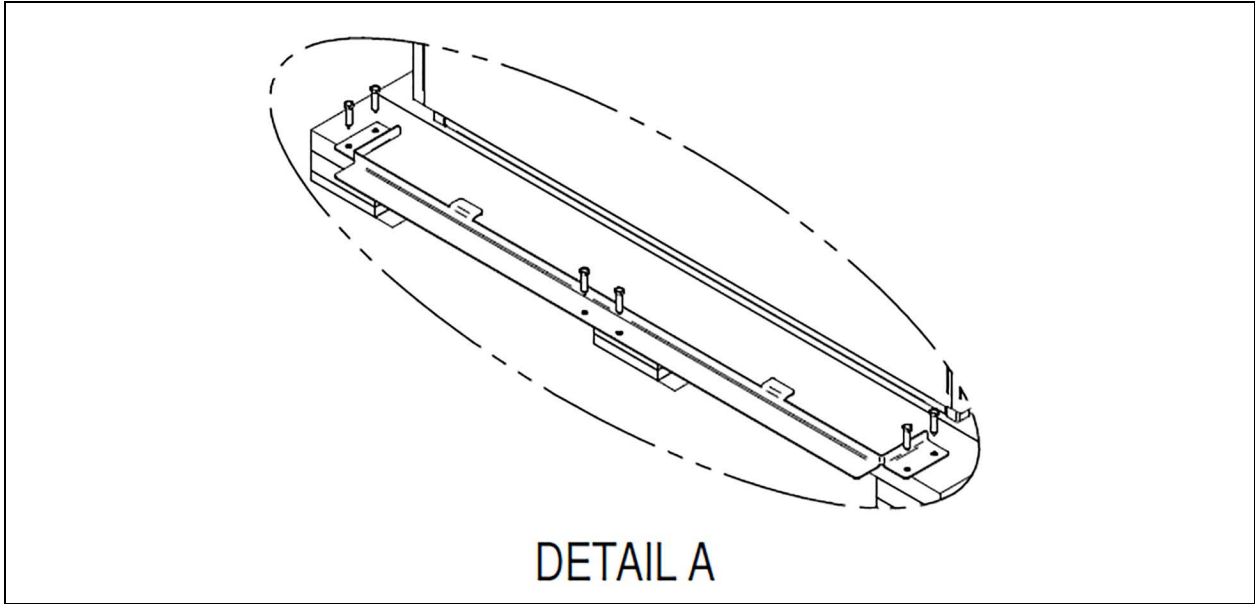


Figure 4.6 Vertiv™ Liebert® XDM 400 Shipping Bracket Removal

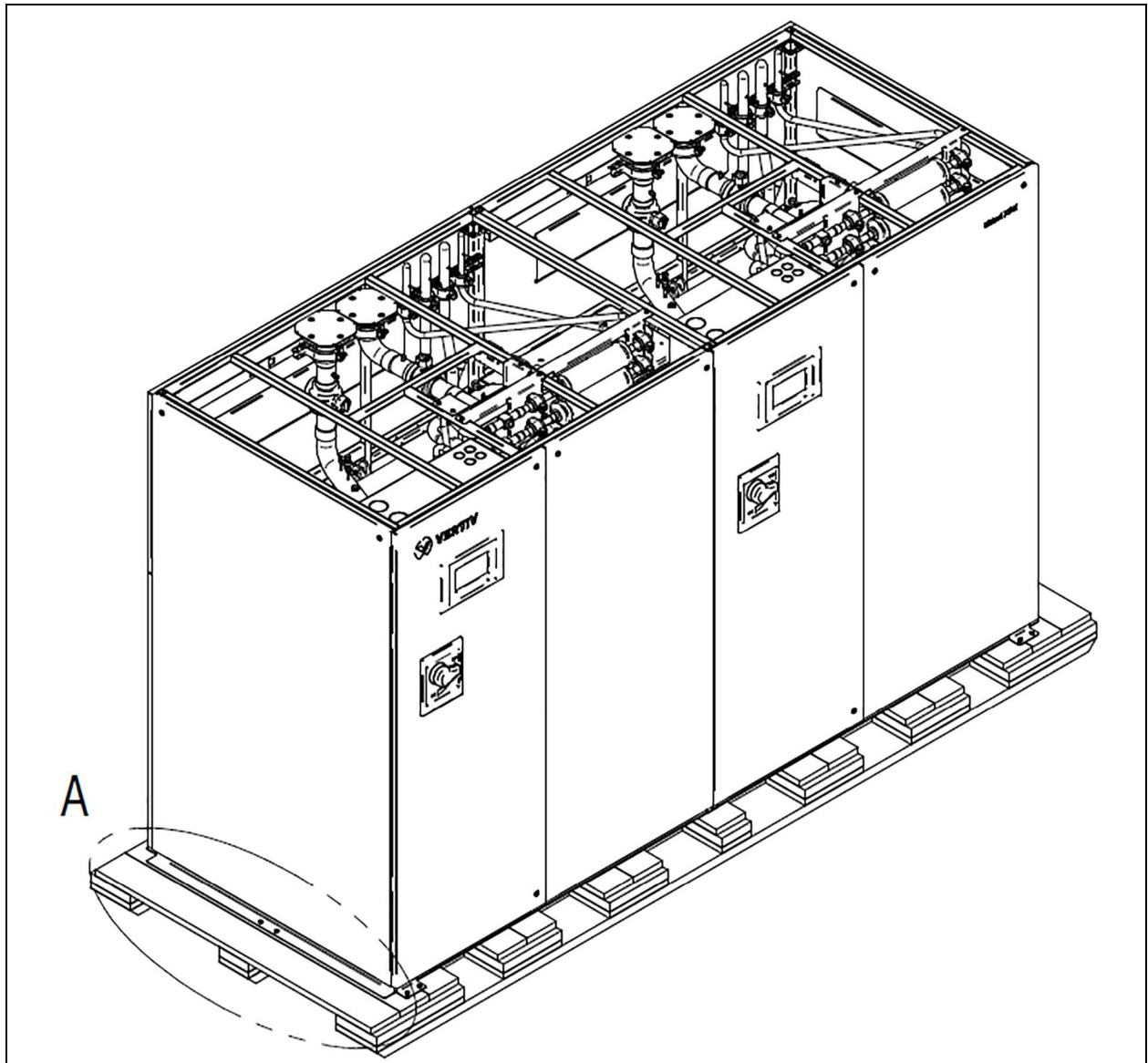
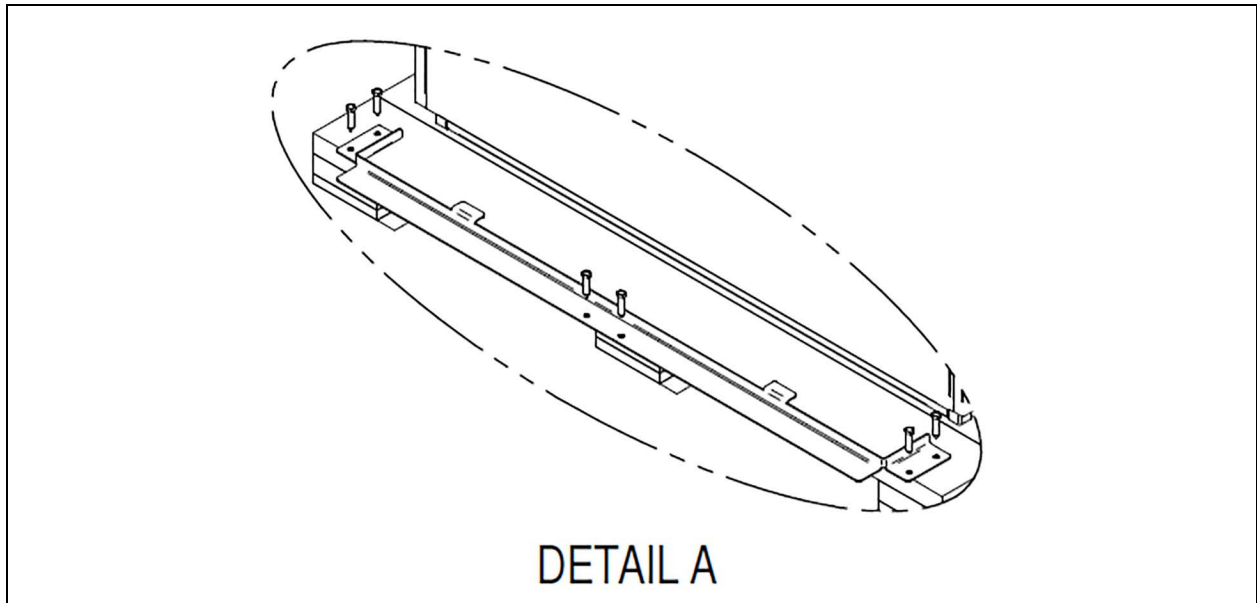


Figure 4.7 Vertiv™ Liebert® XDM 400 Shipping Bracket Removal Detail A Enlargement

4.5 Optional Panel Removal

- Unit panels may be removed prior to off-loading unit from skid and moving to installation location.
- Remove panels from unit using a 3/16-in. hex wrench.
- Place panels in a secure location until ready to re-install.

4.6 Removing Units from the Skid for Handling Using Fork Lift Option

1. Insert fork lift tines under unit frame between openings of the skid.
2. Fork lift tines to be of a length to span beyond width of a unit.
3. Make sure to take great care, insert fork lift tines flat (not angled) without contacting unit frame.
4. Do not raise fork lift tines until they extend beyond opposite ends of the unit.
5. Raise unit to a height where skid is no longer supporting weight of unit.
6. Remove skid from under unit.
7. Lift the unit off blocks just enough so that unit weight is not on the blocks.
8. Remove the blocks and skid out from under the units.

See **Figure 4.8** below and **Figure 4.9** on the facing page .

Figure 4.8 Fork Lift Option for Handling the Vertiv™ Liebert® XDM 200 Unit

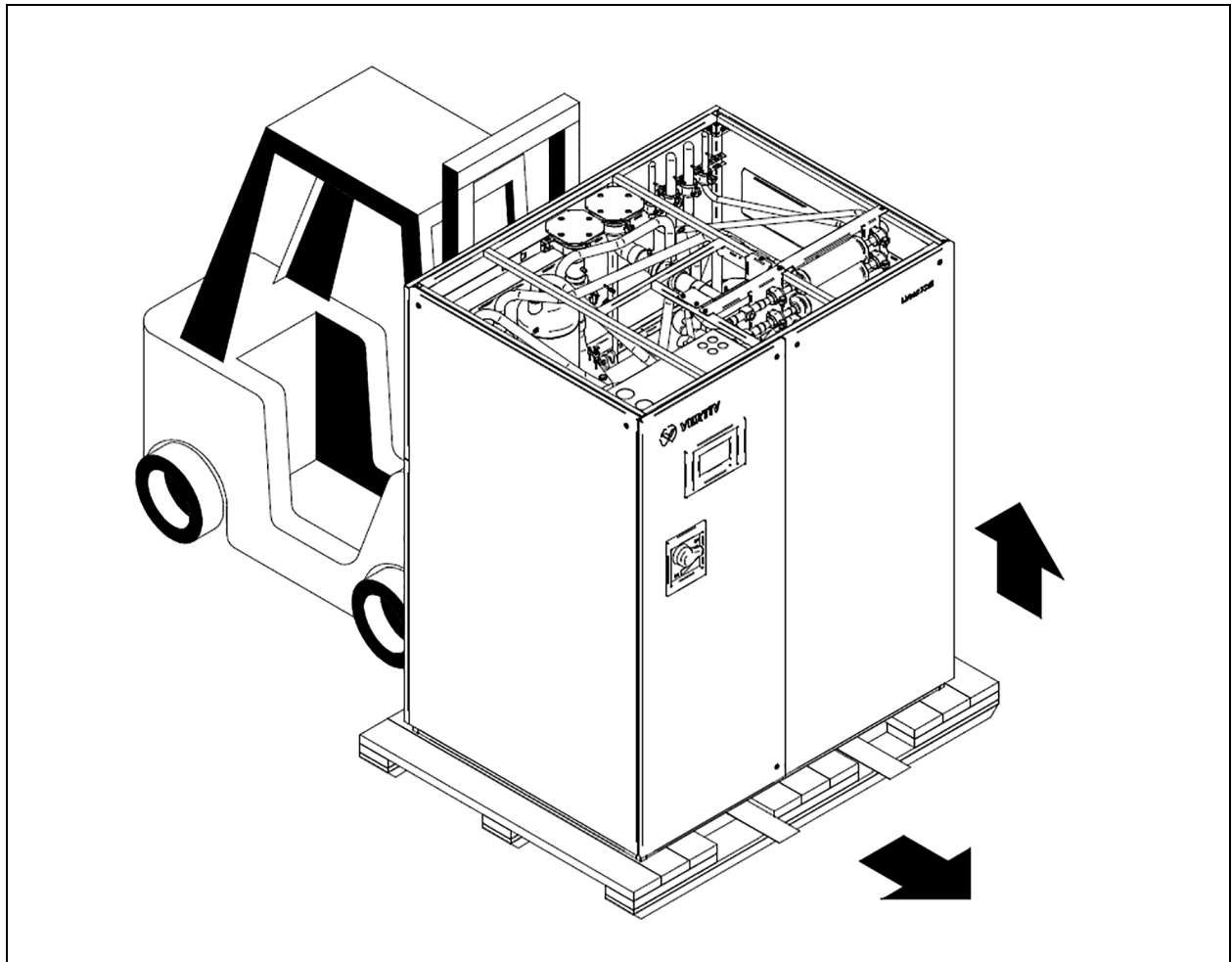
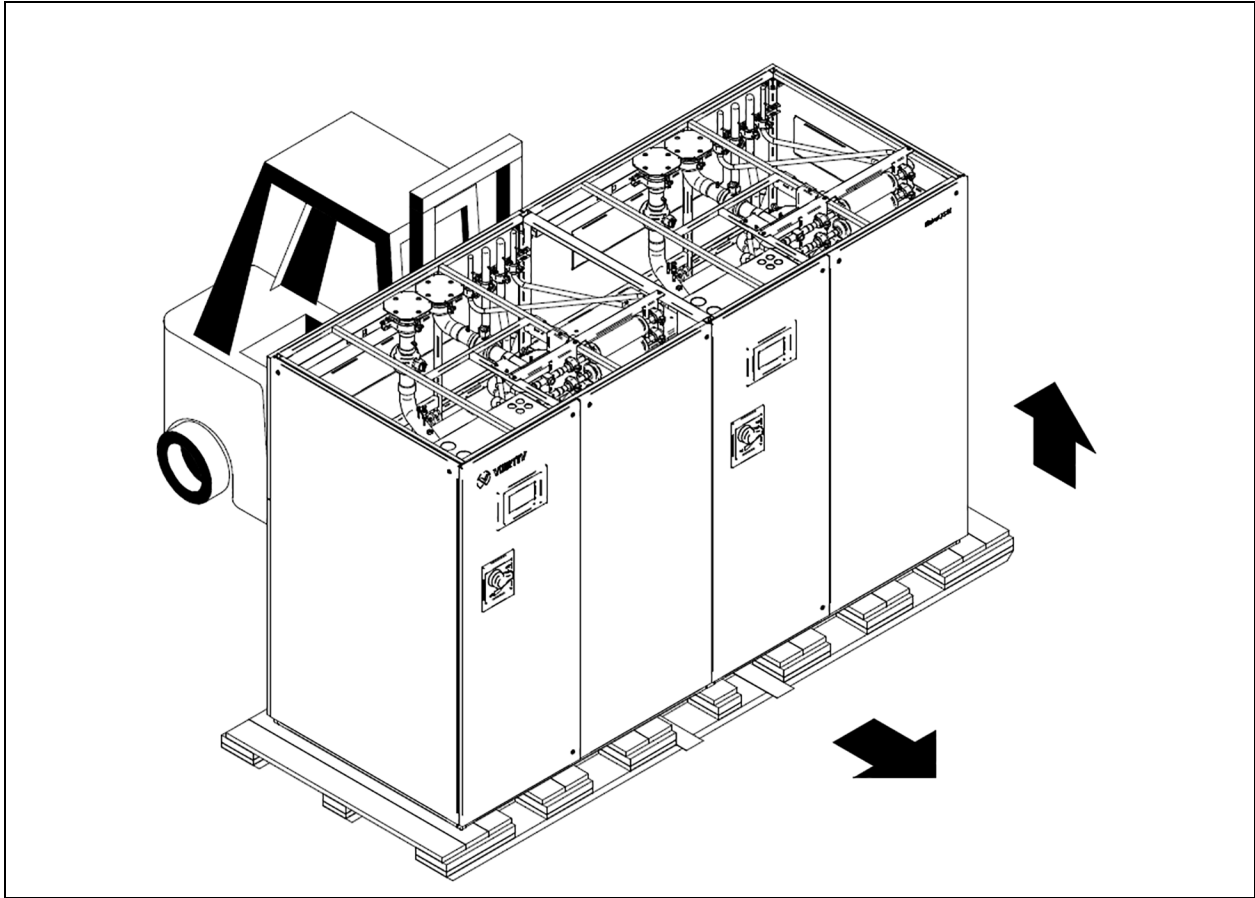


Figure 4.9 Fork Lift Option for Handling the Vertiv™ Liebert® XDM 400 Unit



4.7 Removing Unit from Skid for Handling Using Gantry

- Use recommended rigging equipment to strap around bottom frame members of unit.
- Lift unit to a height where skid is no longer supporting weight of unit.
- Remove skid from under unit.

Figure 4.10 Removing Vertiv™ Liebert® XDM 200 from Skid Gantry Option

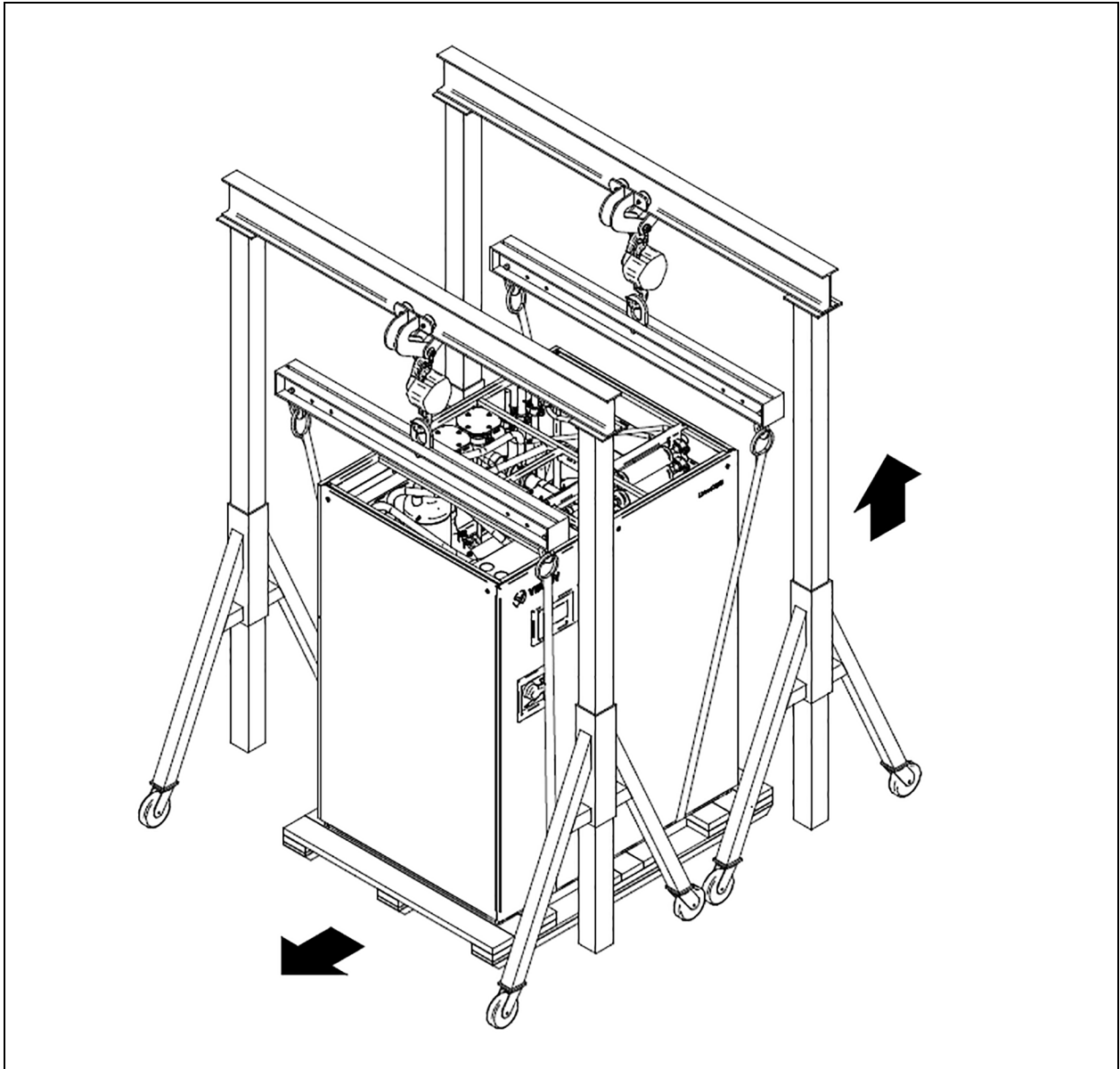
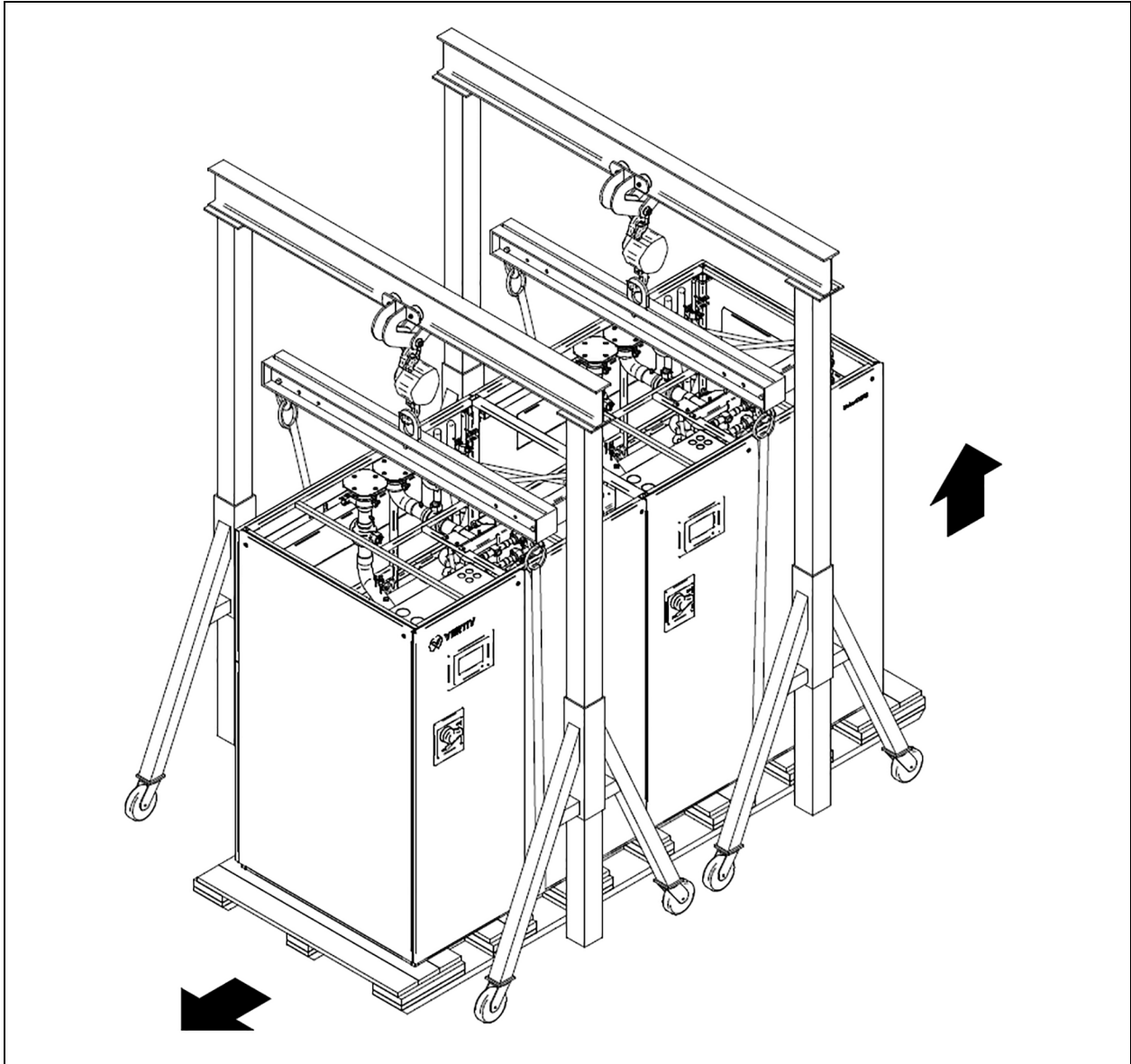


Figure 4.11 Removing Vertiv™ Liebert® XDM 400 from Skid Gantry Option



4.8 Methods of Moving Unit to Installation Location

4.8.1 Method 1: Fork Lift

Use fork lift to move unit to designated installation location.

Figure 4.12 Moving Vertiv™ Liebert® XDM 200 to Installation Location with Fork Lift

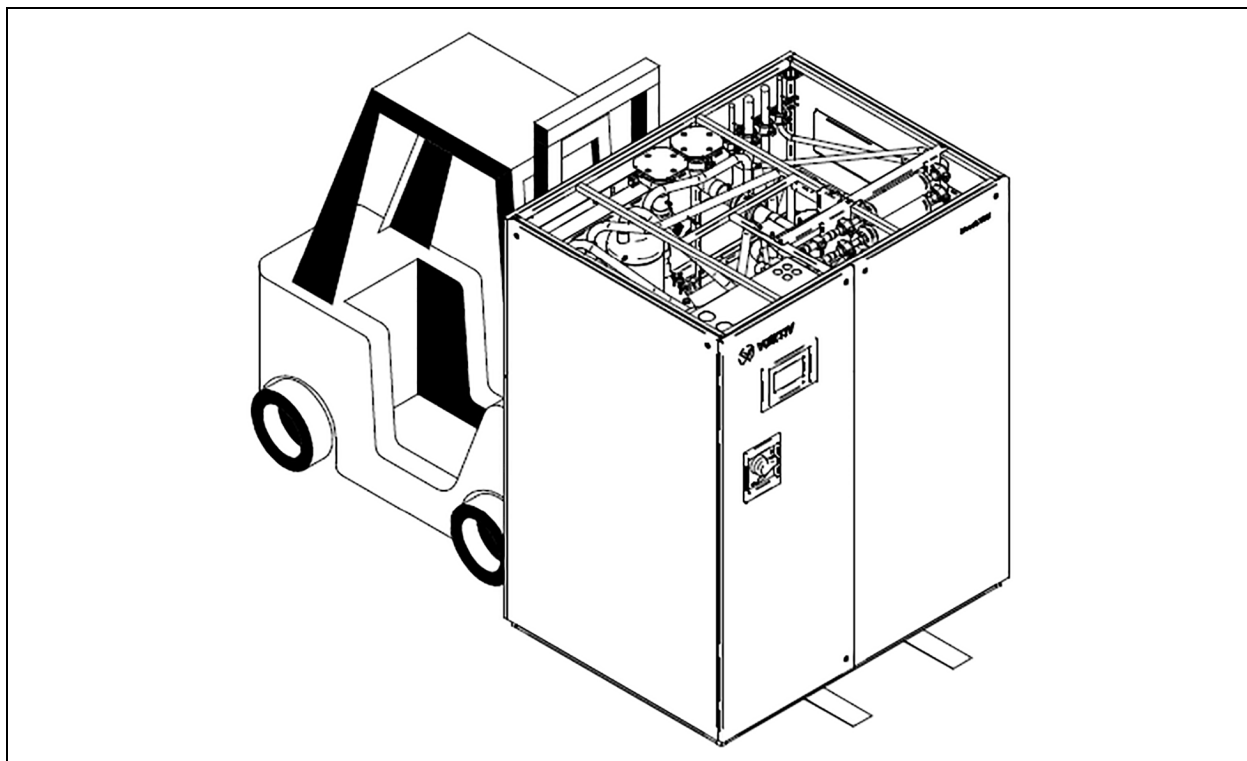
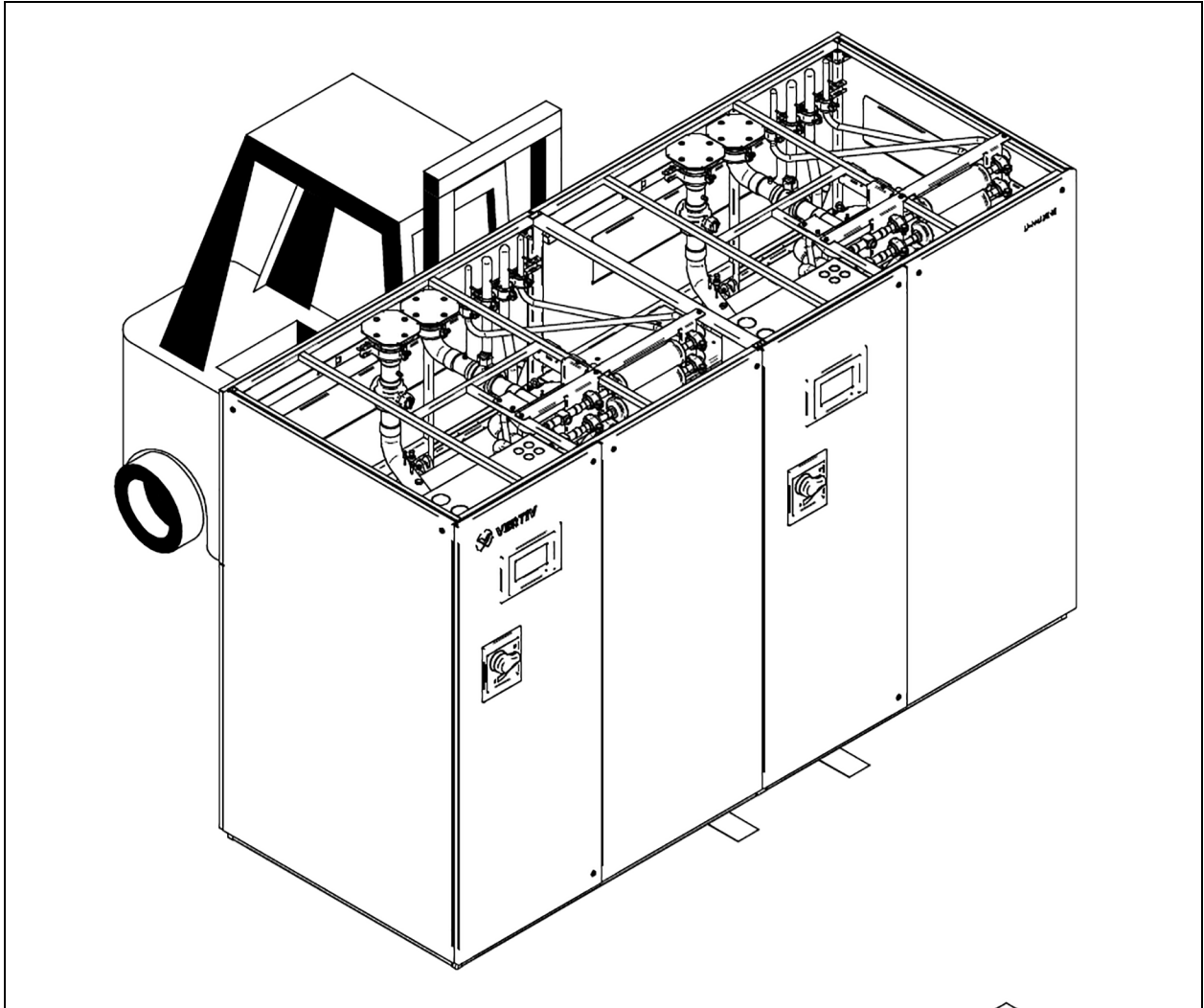


Figure 4.13 Moving Vertiv™ Liebert® XDM 400 to Installation Location with Fork Lift



4.8.2 Method 2: Gantry

Use the gantry to move unit to designed installation location.

Figure 4.14 Moving Vertiv™ Liebert® XDM 200 to Installation Location with Gantry

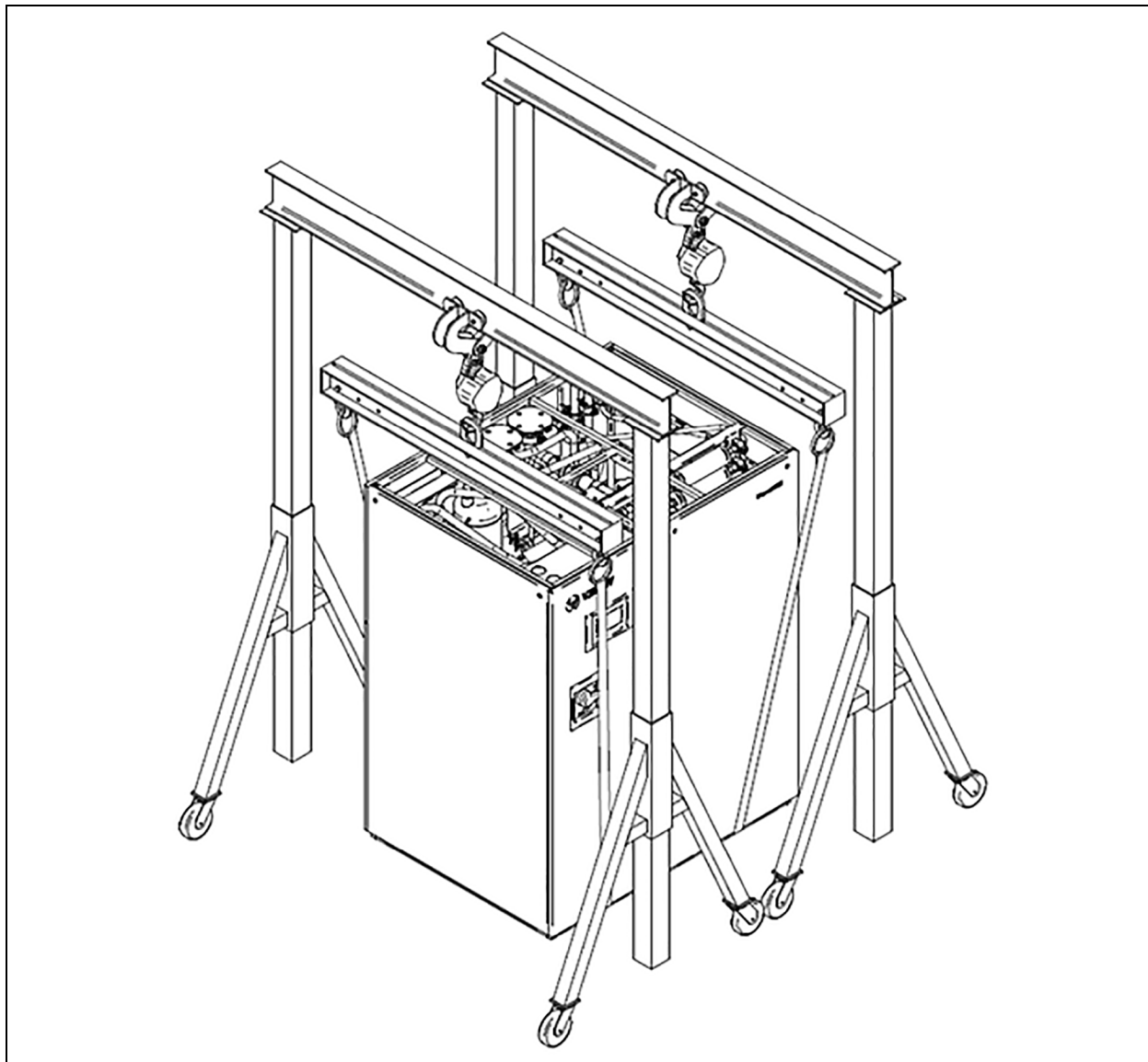
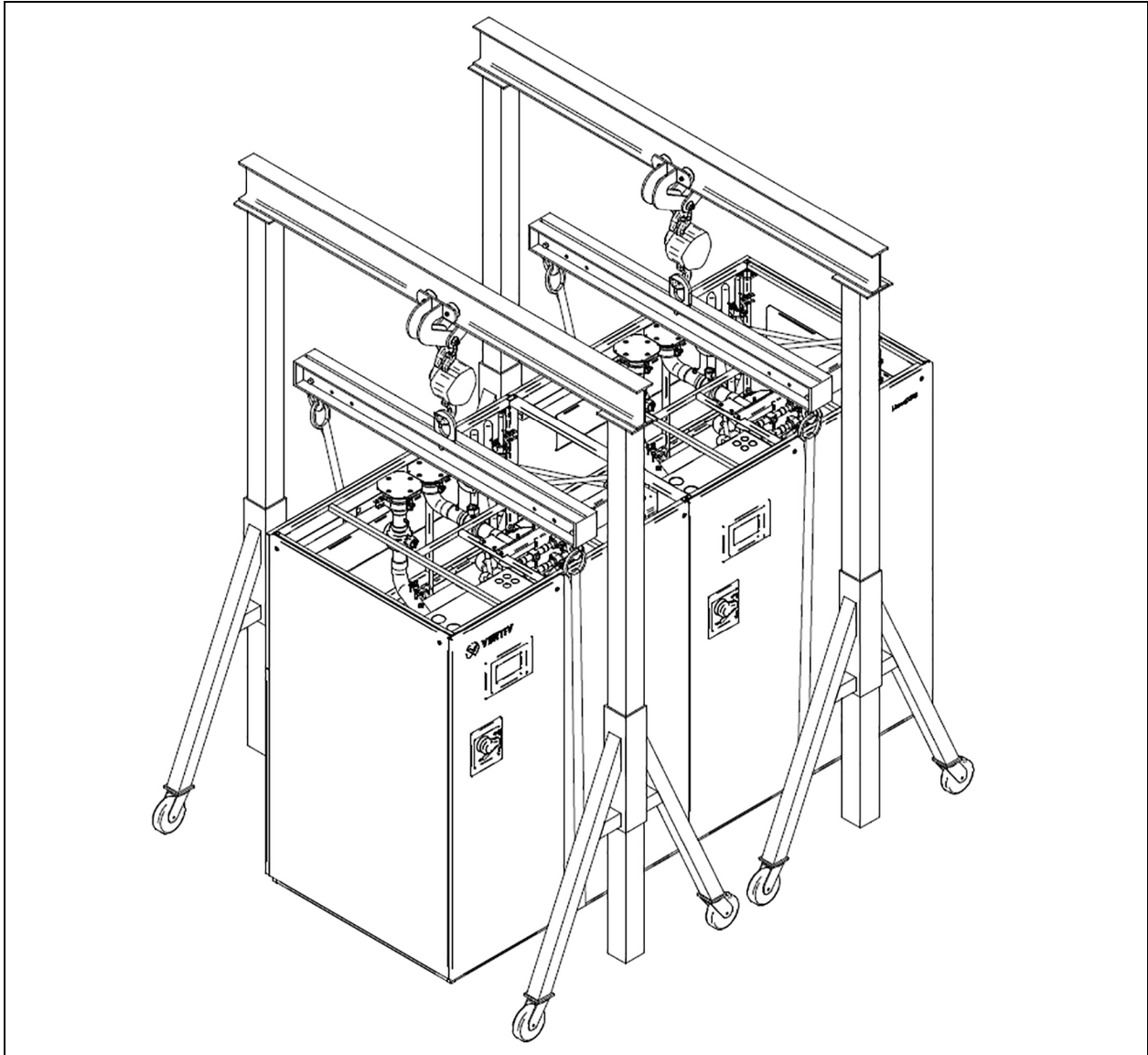


Figure 4.15 Moving Vertiv™ Liebert® XDM 400 to Installation Location with Gantry



4.8.3 Method 3: Dolly Carts

Use fork lift or gantry to lower unit onto dolly carts for movement to designated location.

Figure 4.16 Moving Vertiv™ Liebert® XDM 200 via Dolly Carts

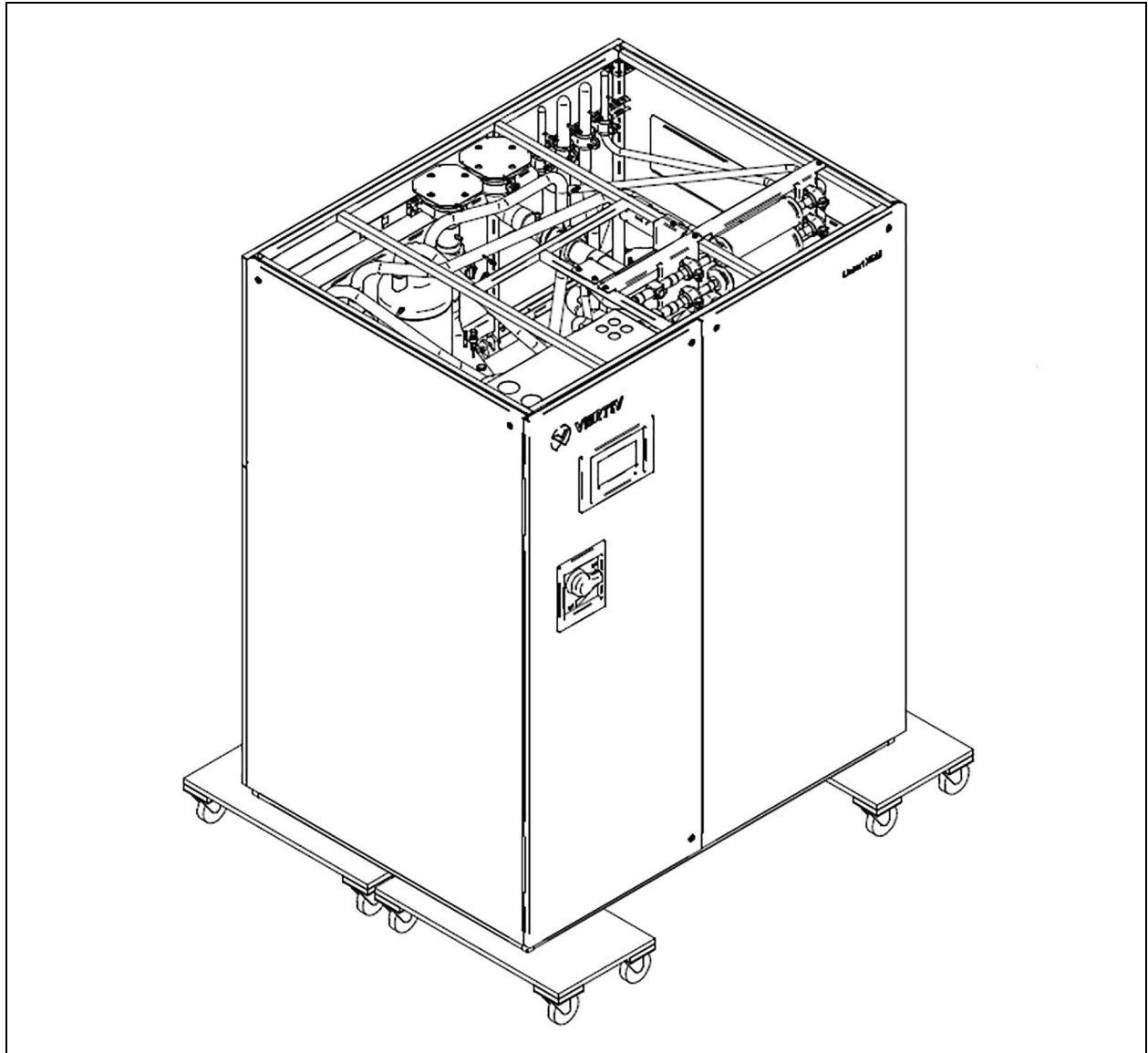
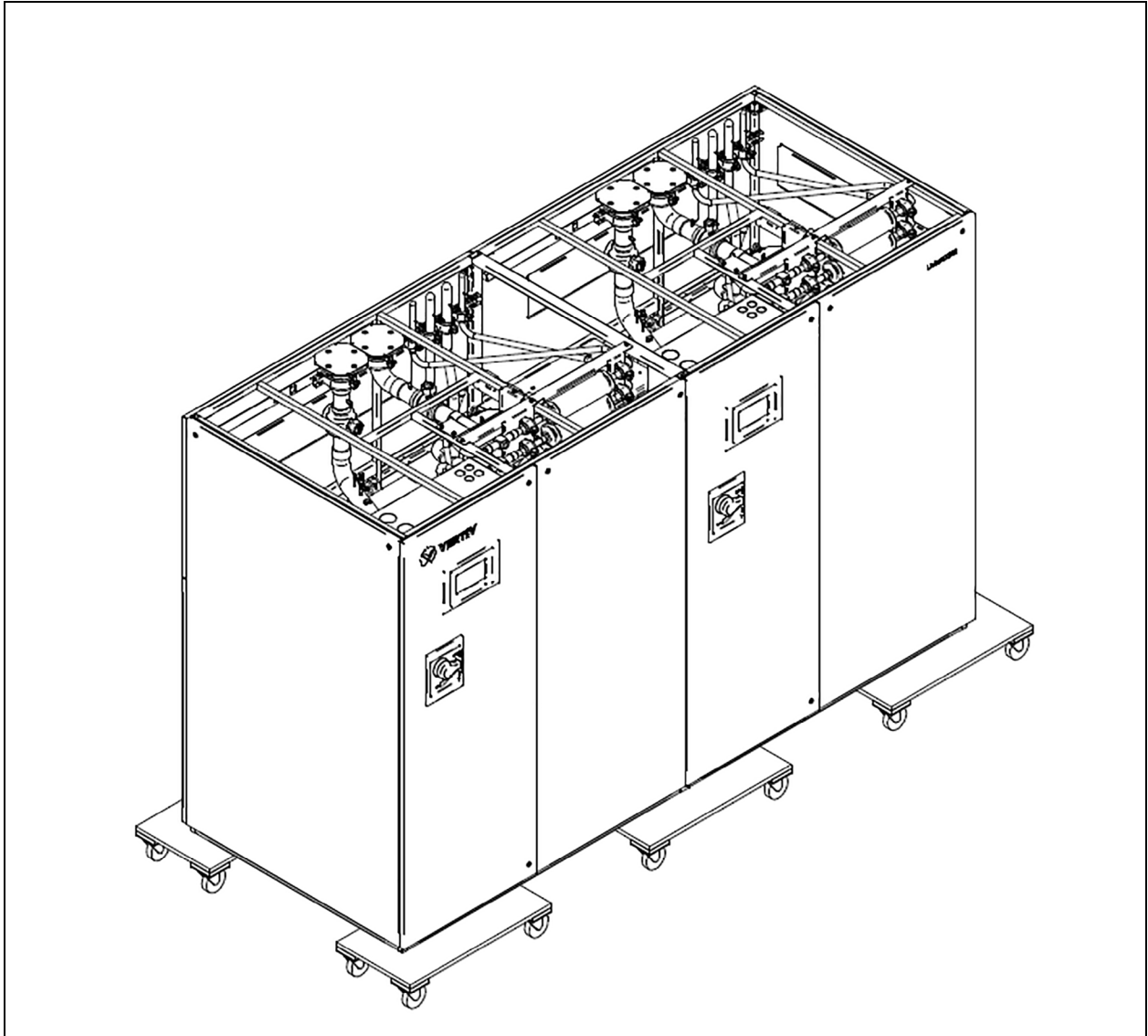


Figure 4.17 Moving Vertiv™ Liebert® XDM 400 via Dolly Carts



4.9 Placing the Unit on a Floor Stand



CAUTION: Risk of heavy unit falling into defective raised floor. Can cause injury and equipment damage. Prior to installation, all floor tiles immediately around floor stand are to be removed and inspected. Make sure tiles are not cracked, and ribs have not been cut. If free from defects, re-install. Replace with new tiles if defects are found.

Unit to be placed onto floor stand using process that will provide safest method based on site layout. Professional installers to be used when placing unit. Unit may require lift onto a floor stand if elevated flooring has not been installed. If flooring is installed, unit will be placed over floor opening containing floor stand.

This page intentionally left blank

5 Piping and Refrigerant Requirements

The main fluid connections are flange fittings with a factory installed plate. These connections may be at the top or bottom of the unit.

- Field installed piping must be installed in accordance with local codes and must be properly assembled, supported, isolated, and insulated. Avoid piping runs through noise sensitive areas, such as office walls and conference rooms.
- Refer to specific text and detailed diagrams in this manual for other unit specific piping requirements.
- All piping below the elevated floor must be arranged so that it offers the least resistance. Careful planning of the piping layout under the raised floor is required. When installing piping on the sub-floor, we recommend installing the pipes in a horizontal plane rather than stacked one above the other. Whenever possible, the pipes should be run parallel.
- Place the tubing on supporting saddles.
- Install shutoff ball valves on the inlet and outlet pipes to ease maintenance.
- Install optional thermostats and pressure gauges on the inlet and outlet pipes.
- Install water drain taps at the lowest point in the circuit.
- Locate auto air vents at tops of all risers and any intermediate system high points to aid in air removal at start-up and maintenance.

The pipe connection locations, piping general arrangement and schematics are described in the submittal documents included in [Submittal Drawings](#) on page 103.

The following tables list the relevant documents by number and title.

Table 5.1 Piping General Arrangement Drawings

Document Number	Title
DPN005067 p1	Vertiv™ Liebert® XDM Piping Schematic Liebert® XDM with Vertiv™ Liebert® MCV
DPN005067 p2	Liebert® XDM Piping Schematic Liebert® XDM Chilled Water Side
10025700	Glycol and Water Requirements

Table 5.2 Piping Connection Drawings

Document Number	Title
DPN005075	Liebert® XDM Primary Connections Top (Fluid and Refrigerant) 200kW
DPN005076	Liebert® XDM Primary Connection Locations Top (Fluid and Refrigerant) 400kW
10017481	Liebert® XDM Primary Connection Locations (Bottom Fluid and Top Refrigerant) 200kW
10017482	Liebert® XDM Primary Connection Locations (Bottom Fluid and Top Refrigerant) 400kW
Header Assembly	
DPN005227	Liebert® XDM Header 400kW
Refrigeration Piping Layout and Condenser Positioning Drawings	
DPN005138, p1	Liebert® XDM Air Cooled Piping Schematic Liebert® MCV Mounted above Liebert® XDM
DPN005138, p2	Liebert® XDM Piping Schematic Liebert® MCV and Liebert® XDM at Similar Level

Table 5.2 Piping Connection Drawings (continued)

Document Number	Title
Installation and Service Clearance	
344167	Liebert® XDM 200 Installation and Clearance Bottom Connection
344168	Liebert® XDM 400 Installation and Clearance Bottom Connection

5.1 Piping Connection Sizes

Table 5.3 below lists the copper pipe connections for the Vertiv™ Liebert® XDM.

Table 5.3 Liebert® XDM Piping Connection Sizes

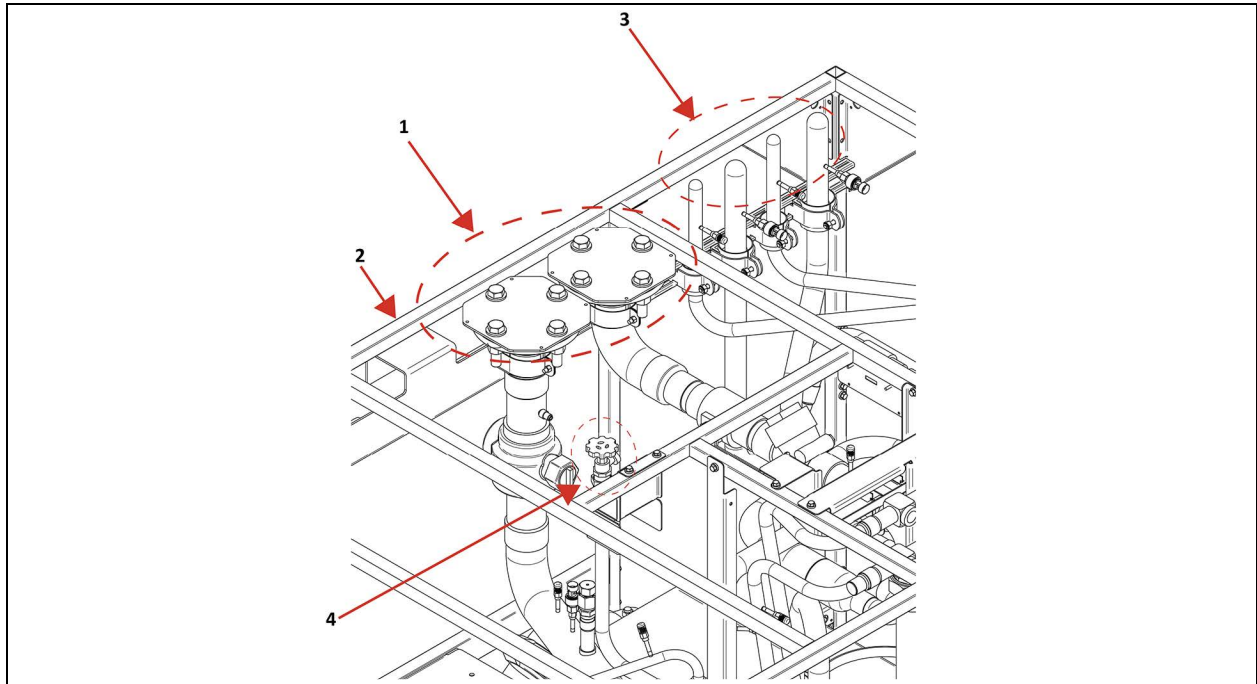
Connection	Pipe Size OD, cu. in.	Connections	Qty XDM 400	Qty XDM 200
R410A Hot Gas	1-3/8	1-3/8 in. copper OD	4	2
R410A Liquid	7/8	7/8 in. copper OD	4	2
Coolant Supply	2-5/8	2-1/2 in. ASME Class 150 flange	2	1
Coolant Return	2-5/8	2-1/2 in. ASME Class 150 flange	2	1
Fill Water Source	5/8	5/8 in. Copper OD	2	1

Refer to DPN005075 and DPN005076 in [Submittal Drawings](#) on page 103.

5.2 Fluid and Refrigerant Connection Locations

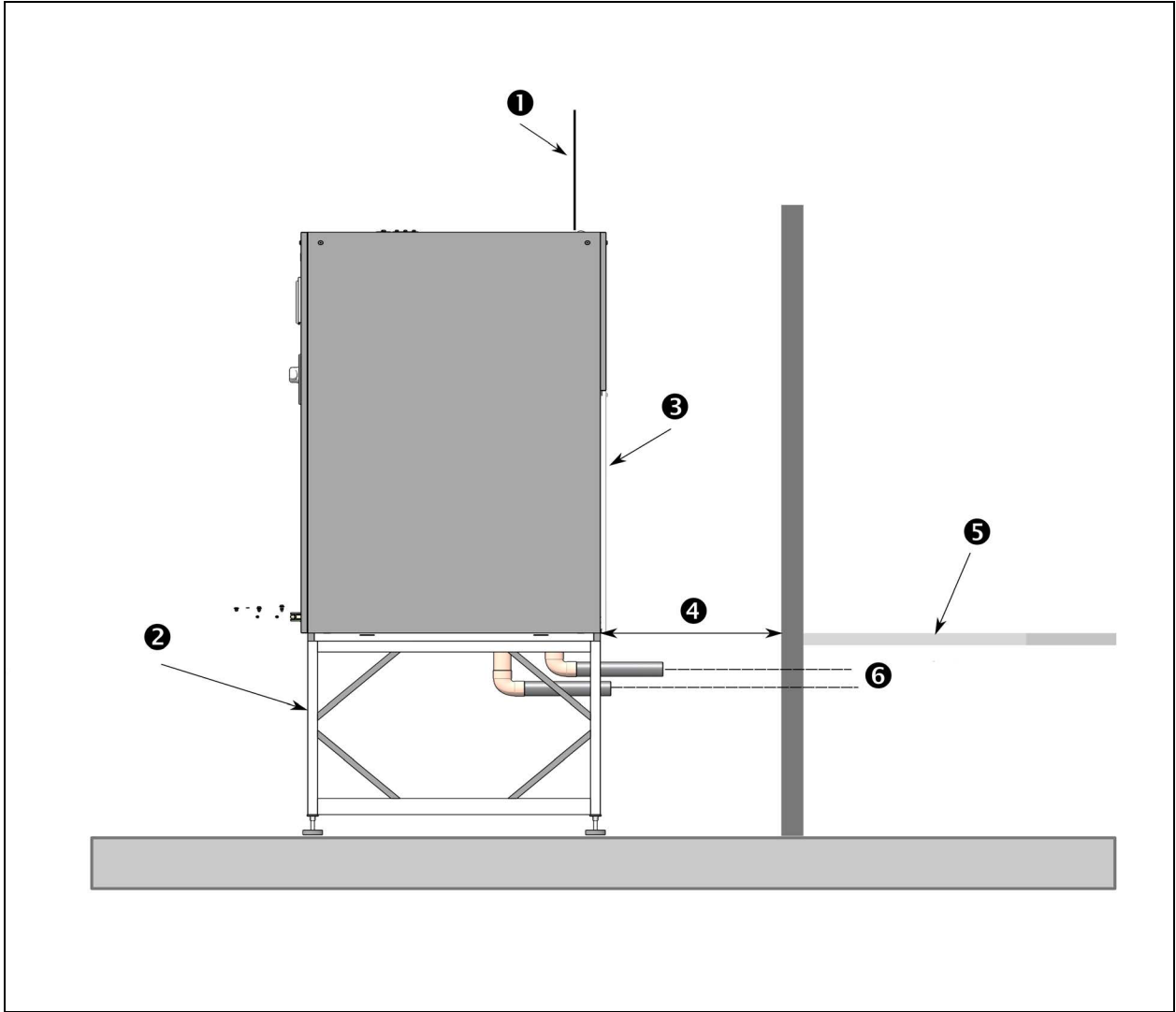
Depending on the connection location on the heat load unit, the Vertiv™ Liebert® XDM offers top and bottom supply and return connections. See **Figure 5.1** below .

Figure 5.1 Top Connection Locations



Item	Description
1	Fluid supply and return top coolant connections
2	Rear of unit
3	Supply and return refrigerant connections. (Outdoor air cooled condensers.)
4	Fill connection

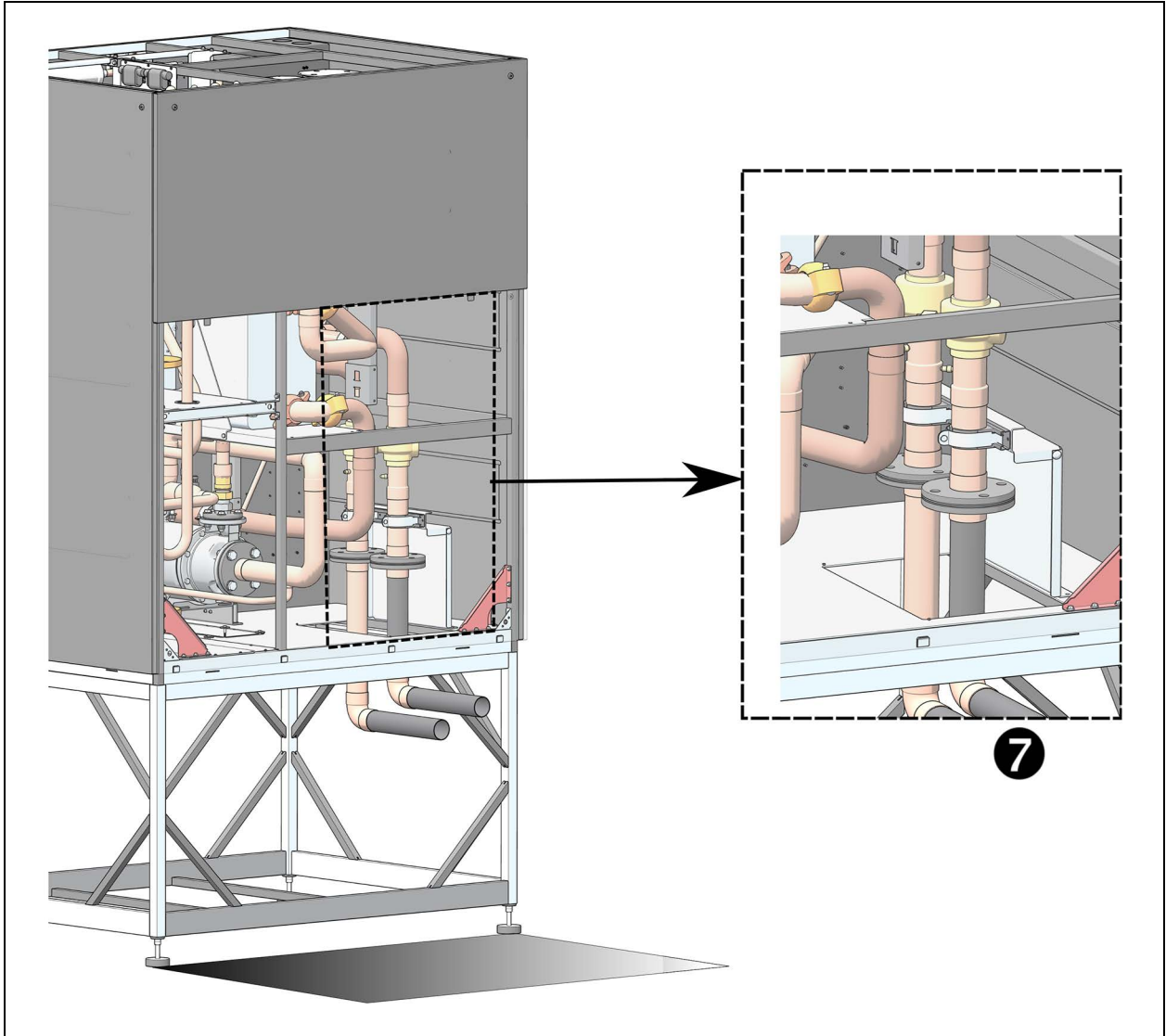
Figure 5.2 Bottom Connection with Floor Stand



Item	Description
1	Fluid supply and return top coolant connections
2	Service access under unit, will vary depending upon height of floor stand
3	Lower rear panel (removed for clarity)
4	Rear service access requirement, 36"
5	Data hall raised floor
6	Secondary circuit supply and return connections

NOTE: For installation clearance and access information, refer to Vertiv drawings 344167 and 344168 in Submittal Drawings on page 103 .

Figure 5.3 Detailed View Secondary Circuit Supply and Return Connections



Item	Description
7	Detailed view of secondary circuit supply and return connections

NOTE: For installation clearance and access information, refer to Vertiv drawings 344167 and 344168 in [Submittal Drawings](#) on page 103 .

This page intentionally left blank

6 Refrigerant Requirements

6.1 Refrigerant Piping and Charging



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



WARNING! Risk of explosive discharge of high-pressure refrigerant. Can cause serious injury or death. Building and equipment damage may also result. Neutral and service ports on the compressor service valves do not have a valve core. Front-seat the service valves and relieve pressure from the compressor before loosening a part or a component attached to the service valve. Follow local codes to properly reclaim refrigerant.



CAUTION: Risk of excessive refrigerant line pressure. Can cause equipment damage or injury resulting from tubing and component rupture. Do not close off the refrigerant line isolation valve for repairs unless a pressure relief valve is field installed in the line between the isolation valve and the check valve. The pressure-relief valve must be rated 5% to 10% higher than the system design pressure. An increase in ambient temperature can cause the pressure of the isolated refrigerant to rise and exceed the system design pressure rating (marked on the unit nameplate).

Consult local building and plumbing codes for installation requirements of additional pressure relief devices when isolation valves are field installed. Do not isolate any refrigerant circuits from over pressurization protection.

Table 6.1 System Refrigerant Pressures

Refrigerant 4-410A		
	High Side	Low Side
Design Pressure	530 psig 3,655 kPa	235 psig 1,620 kPa
High Pressure Cutout	580 psig 3999 kPa	N/A

Field installed interconnecting piping must be properly selected and installed based on local and national codes, the user manual, and the unit serial tag. Source: DPN000788.

NOTICE

Risk of oil contamination with water. Can cause equipment damage.

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

NOTICE

Units should never be operated with no refrigerant charge, a holding charge, a proper load or without additional oil as required added. Tag out system to prevent unauthorized personnel from accidentally starting equipment and damaging compressors if any of these conditions exist.

6.1.1 Refrigerant Piping Guidelines for Air Cooled Systems

- Air cooled units ship with a nitrogen holding charge. Do not vent the charge until all refrigerant piping is in place, ready for connection to the unit and condenser.
- Use copper piping with a brazing alloy with a minimum temperature of 1350°F (732°C), such as Sil-Fos. Avoid soft solders, such as 50/50 or 95/5.
- Use a flow of dry nitrogen through the piping during brazing to prevent formation of copper oxide scale inside the piping. When copper is heated in the presence of air, copper oxide forms. POE oils will dissolve these oxides from inside the copper pipes and deposit them throughout the system, clogging filter driers and affecting other system components.
- A pure dry nitrogen flow of 1-3 ft³/min (0.5-1.5 l/s) inside the pipe during brazing is sufficient to displace the air. Control the flow using a suitable measuring device.
- Ensure that the tubing surfaces to be brazed are clean and that all burrs have been removed from the ends of the tubes.
- Ensure that all loose material has been cleaned from inside the tubing before brazing.
- Protect all refrigerant line components within 18 in. (460 mm) of the brazing site by wrapping them with a wet cloth or with a suitable heat-sink compound.
- Isolate piping from building using vibration-isolating supports.
- The Vertiv™ Liebert® XDM is used with a Vertiv™ Liebert® MCV heat rejection skid without receiver tanks. For these systems, the bottom of the condenser coil cannot be more than 15 ft. (4.6 m) below the elevation of the EEV inside the indoor units. The bottom of the condenser coil must be no greater than 60 ft. (18.3 m) higher than the elevation of the EEV inside the indoor unit. Refer to DPN005138 included in the [Submittal Drawings](#) on page 103 .
- Install traps on hot gas (discharge) lines at the base of vertical risers over 5 ft. (1.5 m) and then for vertical rises over 25 ft. (7.6 m), install a trap in 20 ft (6 m) increments or evenly-divided over the vertical rise.
- Pitch horizontal hot gas piping down at a minimum rate of 1/2 in. per 10 ft. (42 mm per 10 m) so that gravity will aid in moving oil in the direction of refrigerant/oil flow.
- Consult factory if piping run exceeds 200 ft. (61 m) linear length or 300 ft. (91 m) equivalent length.
- Keep piping clean and dry, especially on units with R-410A refrigerant.
- Avoid piping runs through noise sensitive areas.
- Do not run piping directly in front of discharge air stream.

- Refrigerant oil—do not mix oil types.
- Refrigerant piping must be ASTM (American Society for Testing and Materials) Type ACR copper pipe.
- Refrigerant connections to the unit must be high-temperature brazed joints. Do not use soft soldering.
- Factory installed piping brackets must not be removed.
- Field installed piping must be installed in accordance with local codes and must be properly assembled, supported, isolated, and insulated.

Refer to ASHRAE Refrigeration Handbook for general, good-practice refrigeration piping. The indoor cooling unit has a factory installed high pressure safety switch in the high side refrigerant circuit.

NOTE: All indoor and outdoor field refrigerant piping must be insulated 1/2 in., minimum. All outdoor insulation must be UV and ozone resistant.

- Refer to [Refrigerant Line Sizes and Equivalent Lengths](#) on the next page, for recommended refrigerant piping sizes based on equivalent pipe lengths.
- Refer to [Refrigerant Charge Requirements for Air Cooled Systems](#) on the next page for the refrigerant charge requirements of the system.
- Refer to [Charging Vertiv™ Liebert® XDM Air Cooled Systems \(without receivers\)](#) on page 57 for more information.

6.1.2 Piping Layout and Condenser Positioning

The piping layout and condenser positioning is detailed in the submittal documents included in [Submittal Drawings](#) on page 103.

The following table lists the relevant documents by title and number.

Table 6.2 Refrigeration Piping Layout and Condenser Positioning Drawings

Document Number	Title
DPN005138	Vertiv™ Liebert® XDM Air Cooled Piping Schematic Vertiv™ Liebert® MCV Mounted above Liebert® XDM

6.1.3 Refrigerant Line Sizes and Equivalent Lengths

Table 6.3 Recommended Refrigerant Line Sizes, OD Copper

Model	XDM 200/400	
	Hot Gas Line, in.	Liquid Line, in.
50 ft. (15 m)	1-3/8	7/8
100 ft. (30 m)	1-3/8	1-1/8
150 ft. (45 m)	1-3/8*	1-1/8*
300 ft. (91 m)	1-3/8*	1-1/8*
450 ft. (137 m)	1-3/8*	1-1/8*

*Consult factory for Vertiv™ Liebert® XDM modules where pipe lengths exceed 300 ft. (91 m) or where oversized piping is considered, such as a Liebert® XDM that replaces existing Liebert DA250 models and/or uses existing piping.

Source: DPN000788.

NOTE: See the piping schematics for your system in [Submittal Drawings](#) on page 103 . For installations using pre-fabricated heat rejection skids, included piping must be factored into total equivalent length calculation. Please consult factory for details.

6.1.4 Refrigerant Charge Requirements for Air Cooled Systems

The following tables provide the refrigerant charge requirements for the Vertiv™ Liebert® XDM, connected piping, and condenser options.

Table 6.4 Indoor Unit Refrigerant Charge

Indoor Unit Type	Model	Circuit 1 lb. (kg)	Circuit 2 lb. (kg)
Air Cooled	Liebert® XDM 200	7.9 (3.6)	7.9 (3.6)
Air Cooled	Liebert® XDM 400 - Module A	7.9 (3.6)	7.9 (3.6)
Air Cooled	Liebert® XDM 400 - Module B	7.9 (3.6)	7.9 (3.6)

See [Compressor Oil Types for R-410A Refrigerant](#) on page 88 for recommended oil for the system.

To calculate the full system charge, use the data in this table and the data located in the following tables:

- [Approximate R-410A Refrigerant Required per Circuit for Vertiv™ Liebert® MCV Heat Rejection Skid](#) on the facing page
- **Table 6.6** on the facing page

Table 6.5 Approximate R-410A Refrigerant Required per Circuit for Vertiv™ Liebert® MCV Heat Rejection Skid

Heat Rejection Skid	System No.	Circuit No.	Charge per Circuit with or without Receivers lb (kg)
Liebert® MCV330 Single skid with (1) PRE unit	1	1	52 (24.6)
		2	
Liebert® MCV440 Single skid with (1) PRE unit	1	1	62 (28.1)
		2	
Liebert® MCV330 Dual skid with (2) PRE units	1	1	52 (24.6)
		2	
	2	1	
		2	
Liebert® MCV440 Dual skid with (2) PRE units	1	1	62 (28.1)
		2	
	2	1	
		2	

*The heat rejection skid contains:

- Liebert® MCV condensers.
- Liebert® EconoPhase (PRE) units, and all internal piping.

Liebert receivers are not used with an XDM system.

Table 6.6 Interconnecting Piping Refrigerant Charge for R-410A, lb per 100 ft (kg per 30m)

Line Size, OD (in)	Liquid Line (in/mm)	Hot Gas Line (in/mm)
7/8	19.8 (.8.8)	2.3 (1.0)
1-1/8	33.8 (15.1)	3.9 (1.7)
1-3/8	51.5 (23.0)	5.9 (2.6)
1-5/8	—	8.4 (3.7)

Source: DPN003099, Rev. 1

6.2 Additional Oil Requirements for Scroll and Digital Scroll Compressors

NOTICE

Risk of improper compressor lubrication. Can cause compressor and refrigerant system damage.

Failure to use oil types, viscosities, and quantities recommended by the compressor manufacturer may reduce compressor life and void the compressor warranty. See [Compressor Oil Types for R-410A Refrigerant](#) on page 88 for the recommended oil for the system.

- Do not mix polyolester (POE) and mineral based oils.
- Do not mix oils of different viscosities.
- Consult your Vertiv sales representative, visit <https://www.Vertiv.com/en-us/support/>, or contact the compressor manufacturer if questions arise.

See [Refrigerant Charge Requirements for Air Cooled Systems](#) on page 52 for the amount required for various system level charges.

In addition to oil added based on system charge, additional oil is required for discharge line field installed traps. Standard formed tube traps are required. See **Figure 6.1** on the facing page and **Table 6.8** on page 56.

Straight tubes and fittings used as traps require much more oil and the length of the straight tube can vary.

With the total calculated refrigerant charge for each circuit, see **Table 6.7** below for the refrigerant charge amount that was calculated and follow that line to the right to see how much additional compressor oil is required for each circuit. Count the numbers of traps in each circuit. See **Table 6.8** on page 56 for the discharge line pipe diameter. Follow the line to the right to see how much oil is needed per trap. Multiply the number of traps per circuit by the Oil volume. Add the additional compressor oil amount and the trap oil volume together. This will be the total amount of oil that will need to be added before the refrigerant is added to each circuit.

The amount of oil added by field service must be recorded on the tag marked "Oil Added Field Service Record" that is attached to each compressor. The date of oil addition must be included as well.

Table 6.7 Refrigerant System Charge, Additional Oil Per Circuit

Refrigerant System Charge Per Circuit, lb (kg)	Additional Oil Per Circuit, oz (ml)
<40 (18.1)	0
40 (18.1)	10 (300)
50 (22.7)	18 (530)
60 (27.2)	26 (770)
70 (31.8)	34 (1010)
80 (36.3)	42 (1240)
90 (40.8)	50 (1480)
100 (45.4)	58 (1720)
110 (49.9)	66 (1950)
120 (54.4)	74 (2190)

Table 6.7 Refrigerant System Charge, Additional Oil Per Circuit (continued)

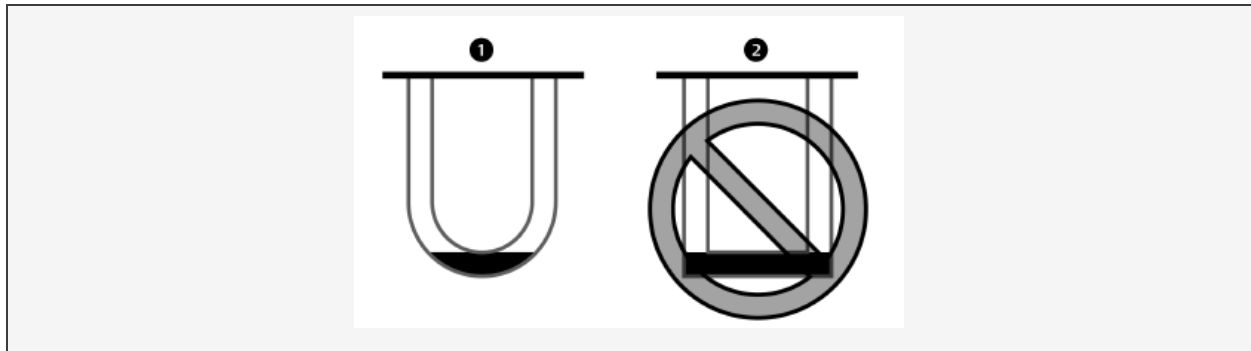
Refrigerant System Charge Per Circuit, lb (kg)	Additional Oil Per Circuit, oz (ml)
130 (59.0)	82 (2430)
140 (63.5)	90 (2660)
150 (68.0)	98 (2900)
160 (72.6)	106 (3130)
170 (77.1)	114 (3370)
180 (81.6)	122 (3610)
190 (86.2)	130 (3840)
200 (90.7)	138 (4080)

Compressor Type	Oil Type for R-410A refrigerant
Copeland Scroll and Digital Scroll	POE Oil - ISO 32 Centistokes Viscosity

NOTE: System charge: Indoor unit + condenser + refrigerant lines.
For system charges over 200 lb. (91.7kg), consult your Vertiv representative.

NOTE: Use Copeland POE Oil ULTRA 32-3MAF or other Copeland-approved oils.

Figure 6.1 Standard Formed Tube Trap Versus Straight Tubes and Fittings Trap



Item	Description
1	Standard form fitted tube trap
2	Straight tubes and fittings trap

Table 6.8 Volume of Oil in Standard Form Trap by Pipe Diameter

Pipe Diameter, in.	Oil Volume, oz (ml)
1/2	0.2
	5.9
5/8	04.
	11.8
3/4	0.6
	17.7
7/8	0.9
	26.6
1-1/8	1.8
	53.2
1-3/8	3.3
	97.6
1-5/8	5.5
	162.7
Source: DPN003950, Rev. 6	

6.3 Evacuation, Leak Testing, and Charging Air Cooled Systems

Two discharge lines and two liquid lines must be field installed between the indoor unit and outdoor condenser.

NOTE: Keep the evaporator unit and condenser closed with their factory charge of dry nitrogen while all field piping is installed. Keep the field piping clean and dry during installation. Do not allow it to stand open to the atmosphere. When all the field interconnecting piping is in place, vent the dry nitrogen charge of each evaporator unit, making its piping connection last. Follow all proper brazing procedures, including a dry nitrogen purge to maintain system cleanliness. The condenser connection pipes must be wrapped with a wet cloth to keep the pressure and temperature sensors cool during any brazing.

6.4 Evacuation and Leak Testing Air Cooled Systems

For proper leak check and evacuation, you must open all system valves and account for all check valves.

NOTE: The system includes a factory-installed check valve and an additional downstream Schrader valve with core in the compressor discharge line. Proper evacuation of the condenser side of the compressor can be accomplished only using the downstream Schrader valve. See the appropriate piping schematic for your system in [Submittal Drawings on page 103](#).

1. Starting with Circuit #1, open the service valves and place a 150 PSIG (1034 kPa) of dry nitrogen with a tracer of refrigerant. Check the system for leaks with a suitable leak detector.
2. With pressure still in Circuit #1, open the compressor service valves in Circuit #2.
 - If pressure increases in Circuit #2, the system is cross-circuited and must be re-checked for proper piping.
 - If there is no pressure increase, repeat Step # 1 on Circuit #2.

- Check pressure on fluid side of unit. If pressure has risen over starting pressure (should be 30 psig or less), the BPHE is leaking from the refrigerant to water side and should be replaced.
3. After completion of leak testing, release the test pressure (observe local code) and pull an initial deep vacuum of 500 microns on the system with a suitable pump.
 4. After four hours, check the pressure readings and if they have not changed, break vacuum with dry nitrogen. Pull a second and third vacuum to 500 microns or less. Re-check the pressure after two hours.
 5. When the three checks are complete, remove the jumper hose from the service valve fitting and the condenser. Proceed to [Charging Vertiv™ Liebert® XDM Air Cooled Systems \(without receivers\)](#) below .

6.4.1 Break Vacuum

Using a manifold charging hose equipped with a ball valve, properly connect to a tank of refrigerant, and purge the hose with refrigerant to ensure non-condensables do not enter the system. Connect the hose assembly to the liquid line Schrader port and break circuit vacuum with a portion of the calculated refrigerant pre-charge. Add enough refrigerant to bring pressure slightly above positive. Close ball valve and remove refrigerant tank.

6.5 Charging Vertiv™ Liebert® XDM Air Cooled Systems (without receivers)

NOTICE

Risk of improper refrigerant charging. Can cause equipment damage.

R-410A is a blended refrigerant and must be introduced and charged from the cylinder only as a liquid.

Care must be exercised to avoid damage to the compressor. We recommend connecting a manifold charging hose equipped with a ball valve to the liquid line Schraeder port.

NOTICE

Risk of improper operation. Can cause compressor failure.

Operating the unit with the EEV closed can cause compressor failure. A minimum of 20 psig (138 kPa) must be established and maintained for the compressor to operate. The charging function can be reset as many times as required to complete.

NOTICE

Units should never be operated with no refrigerant charge, holding charge, proper load, or without additional oil as required. Tag out system to prevent unauthorized personnel from accidentally starting equipment and damaging compressors if any of these conditions exist.

To charge the system:

1. Check the nameplate on the indoor unit for the refrigerant type to be used. Unit control configurations differ depending upon the refrigerant type.
2. Charge one unit at a time. Refer to [Checklist for Completed Installation](#) on page 79 .
3. Calculate the amount of charge for the system. See [Refrigerant Charge Requirements for Air Cooled Systems](#) on page 52 .
4. Add Additional Compressor and trap oil. See [Additional Oil Requirements for Scroll and Digital Scroll Compressors](#) on page 54 .

5. Accurately weigh in about 80% of the calculated system charge before starting the unit. Do not exceed the calculated charge by more than 0.5 lb (0.37 kg).
6. Close the Vertiv™ Liebert® MCV heat rejection skid disconnect switch.
7. Close the Liebert® XDM disconnect switch. Each circuit must be fully charged according to the following guidelines:
 - Unit must be charged with the supply water temperature within +/- 5° F (9° C) of the operating point.
 - If the operating point changes, the charge may need to be adjusted according to the new operating point.
 - The return water temperature to the unit being charged must be stable. If this is not possible due to the lack of heat load, then load banks must be used to offset the cooling load during start-up.

NOTICE

The unit must have line voltage applied to the unit at least 12 hours before compressor start-up to allow the compressor crankcase heaters time to warm the compressors and boil off any liquid refrigerant in the compressors after pre-charge.

8. In the Service menu of the Vertiv™ Liebert® iCOM™ controller, select *Diagnostics/Service > Diagnostics*.
 - a. Enable Manual Mode.

NOTE: Manual mode will time out after 60 minutes.

- b. In the Search Box type *E177* and press *Enter*.

Two parameters appear in the Parameter Directory (E177.1 and E177.2).

Press the *Gear icon* in the upper right corner.

Select *Make Writeable*.

Change E177.1 and E177.2 from 5 minutes to 2 minutes.

This will reduce the superheat setpoint from 24° F (13.3° C) to 13° F (7.2° C) degrees in two minutes.

- c. In the Pump options, set Pump to On to operate the pump during Manual Mode.
 - d. It is recommended to set the Vertiv™ Liebert® XDM pump speed manually to operate at 80 ± 5 gpm (303 ± 19 Lpm) with approximately 140kW of load to charge both circuits simultaneously, or 40 ± 5 gpm (151 ± 19 Lpm) with 70kW of load for one circuit at a time.
 - e. It is best to charge both circuits simultaneously since sub-cooling values need to be confirmed on both circuits once charging is complete. If you wish to charge one circuit at a time, **Table 6.9** on the facing page provides a target sub-cooling value. However, the target sub-cooling value for two circuits running should be verified as well once both circuits are charged.

NOTE: Adjust the load as needed to maintain the customer's desired supply fluid temperature ±5° F (9° C).

- f. In Compressor Circuit 1 options, set the Compressor Mode to Charge to operate Compressors 1A and 1B at full capacity. Turn Compressor 1A and 1B to On. The EEV will modulate to control superheat setpoint.
 - g. Reset the charge function as many times as needed to complete unit charging.

NOTE: You must establish and maintain a minimum 20 psig (138 kPa) for the compressor to operate.

9. Check the subcooling using the Schrader port on the liquid line just before the expansion valve, or at the Schraders near the inlet connections. Affix a thermocouple on the pipe next to the Schrader port you use. Superheat should be around 13° F (7.2° C) before verifying subcooling.

- After adjusting the refrigerant charge, allow the system to operate an additional 15 minutes before checking the need for further adjustment.

NOTE: A digital scroll compressor can have a clear unit sight glass on the liquid line only when operating at 100% capacity. When operating below 100% capacity, the unit sight glass may show bubbles with each 15 second unloading cycle.

Table 6.9 Target Subcooling

Approximate Load		Subcooling	
kW		°F	°C
2 circuits	200	12	6.7
1 circuit	100	14	7.8

Subcooling should be within $\pm 3^{\circ}\text{F}$ (1.7°C)

Adjust load during charging to get customer's desired supply fluid temperature.

Adjust flow rate to get customer's desired dT at the Liebert® XDM.

- Repeat step 8 to step 10 for Compressor Circuit 2.
- Run both circuits simultaneously to verify sub-cooling meets the 2-circuit value.
- Change E177.1 and E177.2 back to 5 minutes after both circuits are charged.

6.5.1 Additional Compressor Oil

Once the circuits are topped off with refrigerant, more compressor oil may need to be added to each circuit if the final charge is over 10 pounds of the calculated refrigerant charge. Record this additional oil amount on the manilla tag hanging on the compressor service valve.

This page intentionally left blank

7 Secondary Fluid Circuit Requirements

7.1 Interconnection with Cooling Modules

Copper water piping must be ASTM Type ACR copper pipe. The Vertiv™ Liebert® XDM may be connected to Vertiv™ Liebert® DCD cooling modules with prefabricated piping assembly or rigid, off-the-shelf piping. The cooling modules are connected in parallel between main return and supply pipes going to and from the Liebert® XDM.

7.2 Fluid Requirements

See 10025700 included in [Submittal Drawings](#) on page 103 to determine if water or a water/glycol mixture is best suited for your application.

7.3 Secondary Fluid Loop Piping Guidelines



CAUTION: Risk of improper piping installation, leak checking, fluid chemistry and fluid maintenance. Can cause injury. Building and equipment damage may also result. Installation and service of this equipment should be done only by qualified personnel who have been specially-trained in the installation of air-conditioning equipment and who are wearing appropriate, OSHA-approved PPE.

NOTICE

Risk of frozen pipes and corrosion from improper coolant mixture. Can cause water leaks resulting in equipment and building damage.

When the cooling unit or piping may be exposed to freezing temperatures, charge the system with the proper percentage of glycol and water for the coldest design ambient temperature. Automotive antifreeze is unacceptable and must NOT be used in any glycol fluid system. Use only HVAC glycol solution that meets the requirements of recommended industry practices. Do not use galvanized pipe.

NOTICE

Risk of piping system corrosion and freezing fluids. Can cause leaks resulting in equipment and very expensive building damage. Piping systems are at risk of freezing and premature corrosion. Fluids in these systems must contain the proper antifreeze and inhibitors to prevent freezing and premature corrosion. The water or water/glycol solution must be analyzed by a competent local water treatment specialist before start-up to establish the inhibitor and antifreeze solution requirement and at regularly scheduled intervals throughout the life of the system to determine the pattern of inhibitor depletion.

The complexity of water and water/glycol solution condition problems and the variations of required treatment programs make it extremely important to obtain the advice of a competent and experienced water treatment specialist and follow a regularly scheduled coolant fluid system maintenance program.

Water chemistry varies greatly by location, as do the required additives, called inhibitors, that reduce the corrosive effect of the fluids on the piping systems and components. The chemistry of the water used must be considered, because water from some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation. Sediment deposits prevent the formation of a protective oxide layer on the inside of the coolant system components and piping. The water/coolant fluid must be treated and circulating through the system continuously to prevent the buildup of sediment deposits and/or growth of sulfate reducing bacteria.

Proper inhibitor maintenance must be performed in order to prevent corrosion of the system. Consult glycol manufacturer for testing and maintenance of inhibitors.

Commercial ethylene glycol, when pure, is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the water from which it is prepared and may become increasingly corrosive with use if not properly inhibited.

We recommend installing a monitored fluid detection system that is wired to activate the automatic closure of field installed coolant fluid supply and return shut-off valves to reduce the amount of coolant fluid leakage and consequential equipment and building damage. The shut-off valves must be sized to close off against the maximum coolant fluid system pressure in case of a catastrophic fluid leak.

NOTICE

Risk of no flow condition. Can cause equipment damage.

Do not leave the water/coolant fluid supply circuit in a continuous no flow condition. Idle fluid allows the collection of sediment that prevents the formation of a protective oxide layer on the inside of tubes. Keep unit switched On and water/coolant fluid supply circuit system operating continuously. In multiple unit teams, allow standby units to enter the rotation automatically or schedule regular manual rotations.

NOTICE

Risk of leaking chilled water lines. Can cause equipment and building damage.

Lines and joints must be inspected regularly. Improper installation, application and service practices can result in water leakage from the unit. Water leakage can result in severe property damage and loss of critical data center equipment. Do not locate unit directly above any equipment that could sustain water damage.

Vertiv recommends installing monitored leak detection equipment for the unit and supply and return lines.

NOTICE

Risk of a catastrophic water circuit rupture. Can cause expensive building and equipment damage.

Install an overflow drain pan under the unit with a monitored leak detection system in the pan and shutoff valves in the supply and return water lines that automatically close if water is detected by the leak detection system. The shutoff valves should be spring return and must be rated for a close-off pressure that is the same as or higher than the supply water pressure. If it is not possible to install an overflow drain pan, then a monitored leak detection system should be installed in the base of the unit or under the unit to actuate the shutoff valves immediately on a leak detection signal.

The overflow drain pan should have a drain line connected to it that flows to a floor drain or maintenance sink in case of a shutoff valve or leak detection system malfunction.

- Equipment damage and personal injury can result from improper installation, leak checking, fluid chemistry, and fluid maintenance.
- Follow local piping codes and safety codes.
- During brazing, fill lines with flowing nitrogen to prevent excessive oxidation and scale formation inside the piping. Employ prevailing good refrigeration practices for piping supports, leak testing, dehydration, and charging. Failure to do so may result in damage to the system. Refer to the ASHRAE refrigeration handbook for general good practices.
- Qualified personnel must install and inspect system piping.
- Contact a local water consultant regarding water quality, corrosion protection and freeze-protection requirements.

- Manual shut off valves at the supply and return line are included internal to each Vertiv™ Liebert® XDM unit.
- Install a monitored fluid detection system that is wired to activate the automatic closure of field installed coolant fluid supply and return shut off valves to reduce the amount of coolant fluid leakage and consequential equipment and building damage. The shut off valves must be sized to close off against the maximum coolant fluid system pressure in case of a catastrophic fluid leak.
- Insulate all piping lines to prevent condensation in applications where the dew point approaches the chilled water temperature.
- A field provided wye strainer is required in the chilled water return line to the Liebert® XDM. The wye strainer protects the pump, brazed plate heat exchanger and system components from debris.

Refer to specific text and detailed diagrams in this manual for other unit specific piping requirements.

The pipe connections and field provided wye strainer are described in the [Submittal Drawings](#) on page 103.

7.3.1 Flanged Connections

Checking Flange Condition

1. Check the condition of the flange faces for scratches, dirt, and scale.
2. Check for corrosion pitting and tool marks.
3. Inspect the gasket seating surfaces.
4. Check the areas on the flange where the nuts will seat. These areas should be flat and free from pitting and excessive wear.
5. Confirm that the flange is corrosion free and undamaged.

Flange Alignment between Vertiv™ Liebert® XDM and Field Supplied Flange

1. Visually examine the flange alignment to ensure that an acceptable fit has been obtained.
2. While aligning flanges, make sure that there are no residual stresses in the joint. The use of heat correction for the alignment of flanges is strictly prohibited.
3. Flange faces should be parallel and aligned.
4. The flange bolt holes should be in line so that bolts will pass freely.

Nuts and Bolts Check

1. Visually examine the nuts, studs, and bolts before installation to ensure that they are free from defects such as corrosion and damaged threads. Nuts or bolts with damaged threads should not be used.
2. Check the length of the stud or bolt to avoid short bolting and excessive threads. Flange bolts shall be furnished in a sufficient length to allow use of bolt tensioning equipment or spades, spaces, drip rings and water valves, and the associated extra gaskets.
3. Visually examine studs and nuts after cleaning to ensure that they are free from burrs. Studs and nuts shall be cleaned using a wire brush to remove any dirt on the thread and nuts to flange connection surfaces. Lubricant shall not be used in the gasket and in the gasket seating area.
4. The bolt and nut material grades should be correctly identified before they are used.
5. Bolts and nuts can only be re-used if it is known they have not been overloaded or have not exceeded their yield point.
6. When assembling the nut on the bolt, the nut identification marking must always point outwards.

Gasket Check

1. Do not use sealing compound, grease, or other paste or adhesive on the gasket or flange faces.
2. Do not force the gasket into the seat between the mating flange faces during insertion.
 - a. Once the gasket is seated, bring the mating flanges together carefully without shaking the gasket off the seat.
 - b. Then install all studs and run up all nuts hand-tight.
3. Visually examine gaskets before installation to ensure that they are free from defects.
4. Color coding shall be maintained per the rate and type of gasket provided by the manufacturer.
5. Clean the gasket seating by using a wire brush.
6. Make sure the material is as specified. Look for any possible defects or damage in the gasket such as folds or creases.
7. Soft material gaskets should be replaced with new ones whenever an opened joint is to be closed again.
8. The full face flange gasket shall only be used once.

Flange Bolt Torque Sequence

Torque bolts and nuts in a cross-cross sequencing using a minimum of three torquing passes and the maximum bolt stress as defined below:

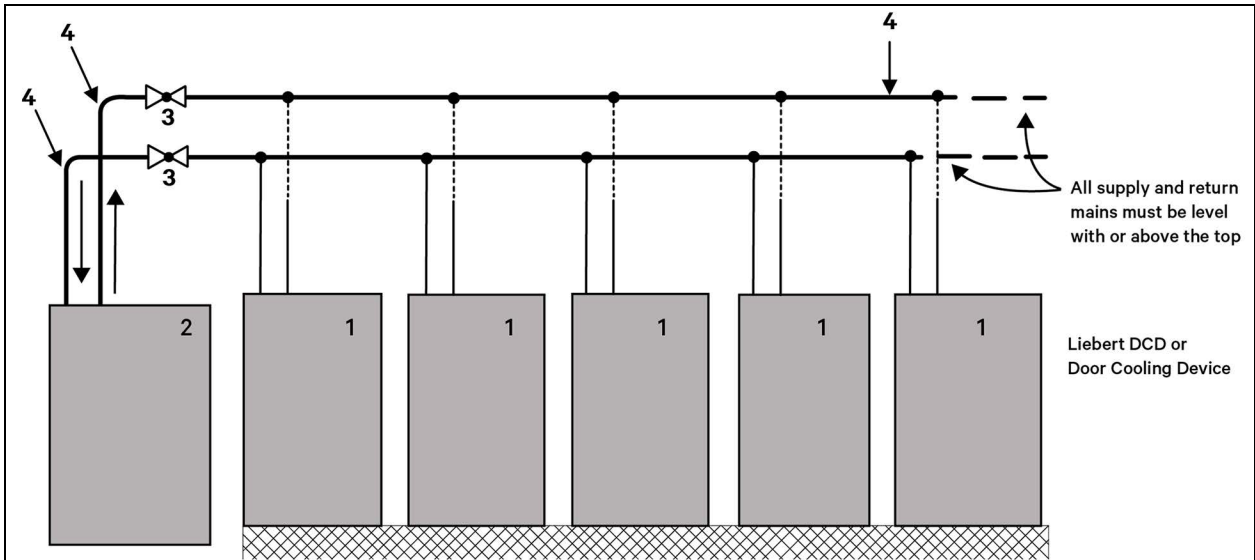
1. Pass 1: Torque to a maximum of 30% of the final torque value in accordance with the torque sequence. Check that the gasket is getting compressed uniformly.
2. Pass 2: Torque to a maximum of 60% of final torque value.
3. Pass 3: Torque to the final torque value (100%).

After the three basic torque passes are completed, repeat torquing the nuts until at least once using the final torque in a cross-cross manner until no further rotation of the nut is observed. Tighten to 1/2 turn past snug.

Field flange connection to the Vertiv™ Liebert® XDM unit must be installed accordance with local codes and best industry practice.

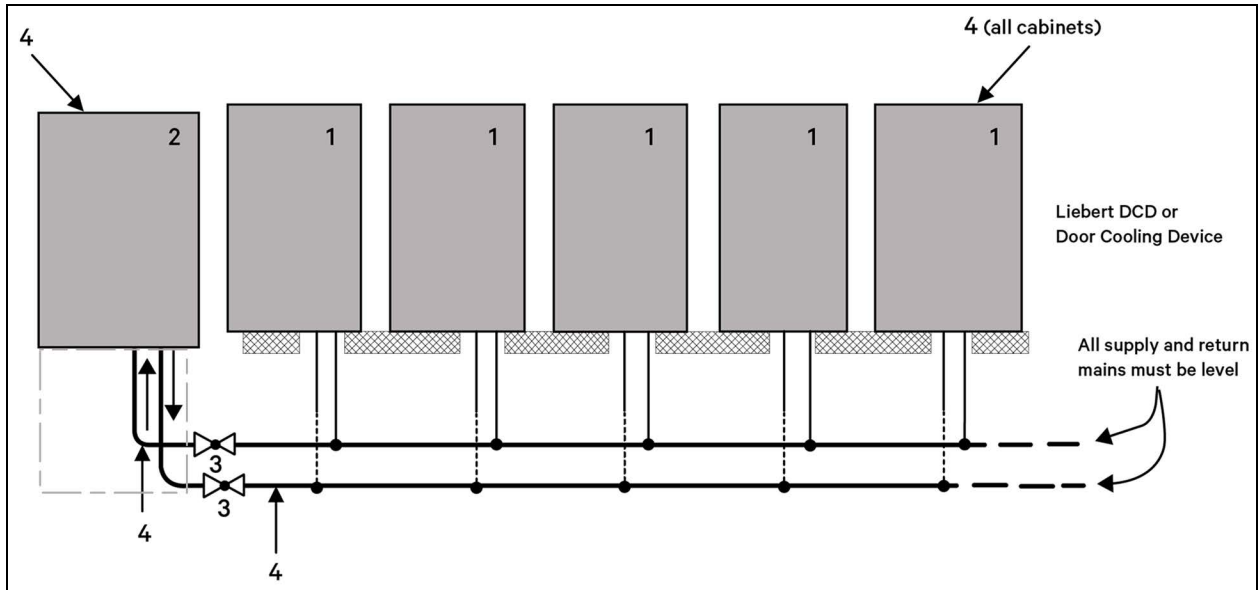
7.3.2 Secondary Fluid Top and Bottom Circuit

Figure 7.1 Vertiv™ Liebert® XDM Secondary Fluid System (Top Chilled Connections)



Item	Description
1	Heat Load
2	Liebert® XDM
3	Ball Valve
4	Air Bleeders

Figure 7.2 Liebert® XDM Secondary Fluid System Bottom Connections



Item	Description
1	Heat Load
2	Liebert® XDM with floor stand
3	Ball Valve
4	Air Bleeders

7.3.3 Recommended Secondary Fluid Pipe Sizes

Connect the main pipes between the Vertiv™ Liebert® XDM and the Vertiv™ Liebert® DCD according to site specific documentation and the configuration guide for the Liebert® DCD.

Minimize elbows and restrictions to get good fluid flow.

Table 7.1 Supply or Return Pipe Size Requirements for Liebert® XDM 200

Nominal Pipe Size in. (mm)	Maximum Total Equivalent Length ft. (m)*	Piping Material
2.5 (65)	68 (21)	Copper, PVC, or Stainless steel
3 (76)	192 (59)	Copper, PVC, or Stainless steel
4 (102)	732 (223)	Copper, PVC, or Stainless steel

* Maximum Total Equivalent Length based on 120 gpm (454 Lpm) in Sch. 80 PVC pipe and 21 ft. of head loss (6.4 m of head loss) through DCD using XDM 7.5 HP pump.

NOTE: For systems with multiple Liebert® XDM modules, larger pipe sizes may be required, per total design flow.

7.3.4 Fluid Volume for Unit and Connection Piping

The following tables provide the fluid volume requirements for the Vertiv™ Liebert® XDM and connected piping/hosing.

Table 7.2 Volume of Unit Internal Fluid Circuit

Unit Model	Fluid Volume, gal. (L)
Liebert® XDM 200	12 (45.42)
Liebert® XDM 400	24 (90.85)

7.3.5 Field Piping Connection Volumes

Field supplied, field installed piping (PVC, copper, etc.) depends on pipe diameter and length. **Table 7.3** below describes the typical fluid volumes depending on pipe diameter.

NOTE: If total fluid system volume per Liebert® XDM200 is over 95 gallons for glycol (40% or less), or 175 gallons for water, a system thermal expansion tank is required. Size per expansion tank manufacturer recommendation.

Table 7.3 Piping Fluid Volume Gallon per Foot (Liter per Meter) Reference Type L Copper

Line Size, OD, in.	Fluid Volumes	
	gal/ft	l/m
2-1/2	0.25	3.105
3	0.35	4.347
3-1/2	0.48	5.961
4	0.62	7.699

Wetted Materials List

- 304 and 316 stainless steel
- Copper piping
- Buna-N and FKM gaskets

7.3.6 Air Bleeders

Install air bleeders at each high point in the piping circuits. For under floor piping, the Vertiv™ Liebert® XDM supply pipe has the highest point and can be used to help bleed air. To do so, connect an air bleeder to the 1/4" QC thread of the Schrader valve on the pump discharge line. You will need to "bump" the pump after the system is filled with fluid to help remove the air. Also plan in an air separator or other means to easily remove air from the data center piping loop. Failure to do so will cause delays during start-up.

7.3.7 Piping Mains

Install a 30-40 mesh strainer on the chilled water supply to the Vertiv™ Liebert® XDM. The strainer is needed to prevent particles in the chilled fluid from entering the Liebert® XDM's heat exchanger

7.3.8 Secondary Fluid Flow Considerations

Secondary fluid flow should be maintained between the values of 25 gpm (minimum) and 170 gpm (maximum) per module.

Refer to individual cooling module specifications to estimate the maximum combined allowable flow for all units connected to the Vertiv™ Liebert® XDM. If the allowable combined flow rate is less than 25 gpm (5.8 m³/h) per Liebert® XDM module, adjust bypass valves (field provided) as necessary to maintain a flow above 25 gpm (5.8 m³/h) through the Liebert® XDM.

For example, the maximum allowable water flow rate for a Vertiv™ Liebert® DCD unit is 22.7 gpm (5.2 m³/h). If four of these units are connected in parallel to the Liebert® XDM, you can have a total flow over 90 gpm (20.4 m³/h).

$$22.7 \text{ gpm} \times 4 \text{ DCD units} = 90.8 \text{ gpm total flow}$$

$$5.2 \text{ m}^3/\text{h} \times 4 \text{ DCD units} = 20.9 \text{ m}^3/\text{h total flow}$$

If only one of the Liebert® DCD20 units is connected to the Liebert® XDM, you must open bypass valves (field provided) to maintain the total flow through the Liebert® XDM within the 25-170 gpm per module range.

7.4 Fluid Quality Requirements

To safeguard the maximum lifetime of chilled water system, the water used for cooling purposes must meet the VGB Cooling Water Guidelines (VGB-R 455 P). The cooling water used must be soft enough to prevent deposits, but it must not be too soft because that would lead to corrosion in the water system.

Water/glycol solutions have different requirements. As stated in the notice in [Secondary Fluid Circuit Requirements](#) on page 61 a local water treatment specialist could be consulted.

Table 7.4 below, lists the most important impurities and measures for their removal.

Table 7.4 Water Impurity

Water Impurity or Condition	Corrective Method
Particles (dp < 0.3 mm)	Filter the water.
Excessive hardness	Soften the water by ion exchange.
Moderate level of particles and hardeners	Add dispersion or stabilization agents.
Moderate level of chemical impurities	Add deadening agents and inhibitors.
Biological impurities (bacteria and algae)	Add biocides.

Table 7.5 Hydrological Data

Hydrological Data	Water Quality for XDM (Secondary Side)	Units
pH	7.5 to 9	
Sulfate ions (SO ₄ ⁻²)	<70	ppm
HCO ₃ ⁻ / SO ₄ ⁻²	>10	ppm
Total Hardness	4- 8.5	°dH
Chloride ions (Cl ⁻)	<50	ppm
Phosphate ions (PO ₄ ⁻⁴)	<2.0	ppm
Ammonia (NH ₃)	<0.5	ppm
Free Chlorine (Cl ₂)	<0.5	ppm
Iron (Fe)	<0.2	ppm
Manganese (Mn)	<0.05	ppm
Carbon Dioxide (CO ₂)	<5	ppm
Hydrogen Sulfide (H ₂ S)	<0.05	ppm
Oxygen (O ₂)	<0.1	ppm
Solids	<1500	mg/L
Elec. Conductivity	50 to 500	MicroS/cm

7.5 Filling Secondary Fluid Circuit

The piping must be filled prior to operating the pumps to avoid damage to the pump and pump seals. The pump seals are cooled and hydrodynamically lubricated by the system fluid.

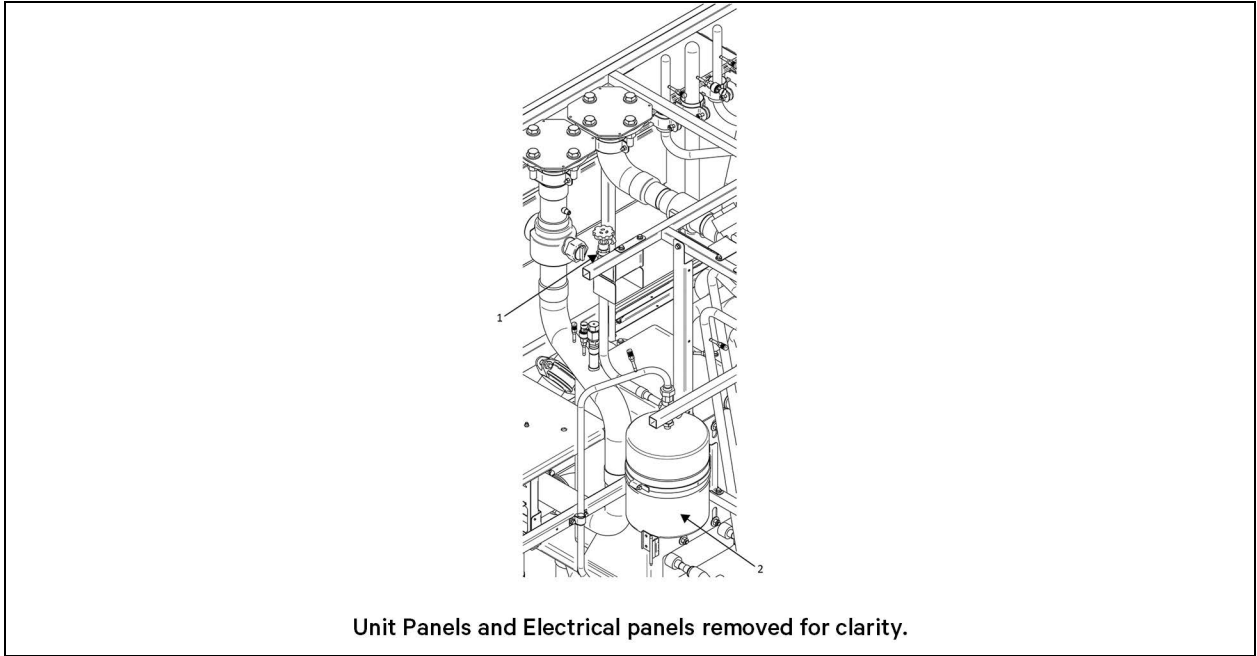
Charging and filling may be done through an expansion tank fill valve located inside of the unit. This method is acceptable if a pressurized supply line is able to remain attached during ensuing air venting. An additional fill point is the drain line connection by the pump motor.

NOTE: A fill valve supplying the expansion tank inlet is mounted at the top of the Liebert® XDM. This valve uses a hose thread connection. Fill piping may be from a city water feed, or from a transfer pump connection for applications with fluid pre-mix.

The fill valve will stop the flow of fill when the system pressure reaches the bladder pressure. The fill valve is also a check valve to prevent water from leaving the system when the fluid source is turned off. The expansion tank contains a bladder that is pre-charged to 12 psig and is ready for use without adjustment.

When filling, bleed air from all vent locations until a steady stream of fluid is observed. Vent locations are provided as 1/4" SAE flare connections at various points in the factory piping of the Vertiv™ Liebert® XDM. Vent locations should be provided at high points and long horizontal runs of the field piping as well.

Figure 7.3 Fill Valve and Vent Location



Item	Description
1	Fill valve and vent
2	Internal Expansion Tank

Test the fluid quality when filling the system. Refer to [Fluid Quality Requirements](#) on page 68.

To fill the system:

1. Locate fill connection in Liebert® XDM module. Note that each Liebert® XDM module has its own bladder tank, so on multiple Liebert® XDM systems you may fill at one or more points, according to the CW piping system design.
2. Connect the fill water source to the desired fill valve. Open high point vents where appropriate. See **Figure 7.3** above.
3. Turn on the water fill source. Allow it to run until all of the air is purged from the hose connected to the high point vents. Failure to properly purge the air will result in pump cavitation and premature pump failure.

NOTE: Liebert® XDM Controls will cause the unit to stop operation if enough air remains in the piping. This will show up as a "Loss of Flow" warning.

4. Close air vents when purged or return auto air-vents to specified position (open/closed) according to field piping design. Allow water fill pressures to stabilize. The unit fill volume is listed in [Volume of Unit Internal Fluid Circuit](#) on page 67.
5. With the unit in manual mode, turn pump(s) on for a few seconds at a time initially, resting for a minute or so between cycles, to get trapped air to move to the high points. Add additional fluids while pump is running as needed to get a stagnant pressure of 20 psig.

NOTE: Do not leave final stagnant pressure over 30 psig to avoid potential damage to bladder tank. System pressure can be checked using tire gauge on air port of expansion tank, located on the bottom side of the tank, if needed.

6. Check the return fluid pressure data point. Pump must be able to run at 100% speed with inlet pressure no lower than 4 psi. Return fluid pressure can be checked from the Liebert® iCOM™ screen. Refer to the Vertiv™ Liebert® XDM and Vertiv™ Liebert® iCOM™ User Manuals.

It may be necessary to repeat the fill steps after the pump(s) have run to remove trapped air from the system.

NOTE: Manual mode will time out after 30 minutes.

7.5.1 Leak Check before Commission and Operation

NOTICE

Risk of leaking fluid. Can cause equipment damage and serious building damage. Check the cooling fluid system for leaks before commissioning. Check the fluid pipe connection to the heat exchanger and inspect the mechanical condition of the cooling fluid circuit and connections thoroughly.

To check for leaks:

1. Confirm that the flow directions of field installed components are correct.
2. Confirm that all isolating valves are open.
3. The fluid system in the Vertiv™ Liebert® XDM is factory checked for leaks and may be shipped with an inert gas holding charge. At installation, check all fluid circuits for leaks.
4. Repair any leaks.

NOTE: We recommend isolating the unit with field installed shut off valves during leak checking of field installed piping. When the units are included in a leak test, use of fluid for pressure testing is recommended. When pressurized gas is used for leak testing the unit, the maximum recommended pressure is 30 psig (207 kPa) and tightness of the unit would be verified by pressure decay over time (<2 psig/hour [13.8 kPa/hour]) or sensing a tracer gas with suitable instrumentation. Dry seals in fluid valves and pumps may not hold a high gas pressure.

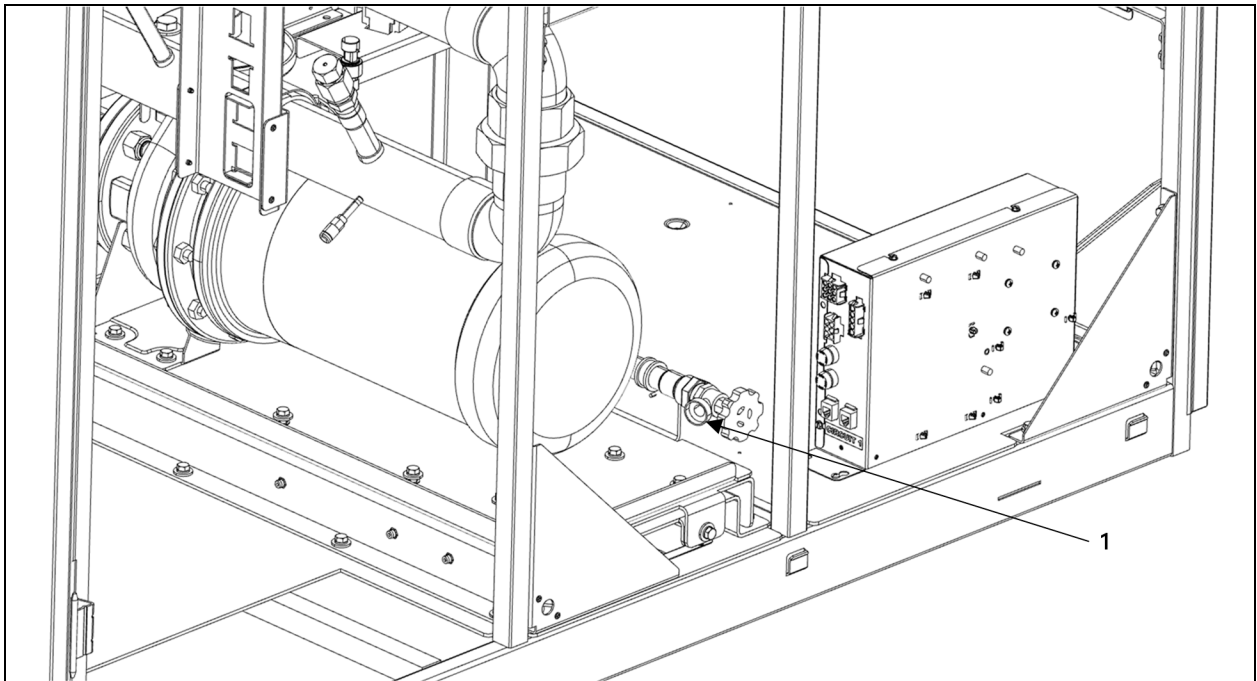
This page intentionally left blank

8 Draining Secondary Fluid Circuit

Vertiv recommends storing decommissioned units in spaces with temperatures that are above freezing in order to prevent any remaining water from freezing in the unit.

Before moving the Vertiv™ Liebert® XDM, drain fluid from the system through a drain port at the lowest point of the system. If you do not wish to drain fluid from the system loop, close the isolation valve to the Liebert® XDM unit. Additionally, drain water from the pump via the drain port located at the bottom of the pump housing.

Figure 8.1 Fluid Drain Valve Location



Item	Description
1	Drain connection

This page intentionally left blank

9 Electrical Connections



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power supply disconnect switches, verify with a voltmeter that power is Off, and wear appropriate, OSHA approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC, and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included, and check the nameplate to be sure the voltage matches available utility power. The Vertiv™ Liebert® iCOM™ controller does not isolate power from the unit, even in the Unit Off mode. Some internal components require and receive power even during the Unit Off mode of the Liebert® iCOM™ controller. The factory supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



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



WARNING! Risk of short circuits and electric shock. Can cause serious injury or death. Building and equipment damage can result from cut insulation or damaged wires. Can cause overheated wiring, smoke, fire, activation of fire suppression systems and EMS personnel, and loss of power to fans. Verify that all wiring connections are tight and that all wiring is contained within the junction box prior to closing and securing the cover.

Insert CSA-certified or UL-listed bushings into holes and/or knockouts used to route wiring through metal panels to protect the wire insulation from contact with sheet metal edges.



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

NOTICE

Risk of improper power-supply connection. Can cause equipment damage and loss of warranty coverage.

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

See transformer label for primary tap connections. Installer will need to change transformer primary taps if applied unit voltage is other than pre-wired tap voltage.

NOTICE

Risk of improper electrical connection of three-phase input power. Can cause backward pump rotation and unit damage. Service technicians should use a gauge set on the system during the initial start up to verify that the three-phase power is connected properly. Three-phase power must be connected to the unit line voltage terminals in the proper sequence so that the pump rotates in the proper direction. Incoming power must be properly phased to prevent pump from running backward. We recommend checking the unit's phasing with proper instrumentation to ensure that the power connections were made correctly. We also recommend verifying discharge and suction pressures during start up to ensure that the pumps are running in the correct direction.

Before proceeding with the electrical connections, ensure that:

- All electrical components are undamaged.
- All terminal screws are tight.
- The supply voltage and frequency are as indicated on the unit.

NOTE: The serial tag on the 600mm (24 in.) unit is on the inside of the display panel.

9.1 Power Supply Cable Connection Guidelines

- Connect the cable to the line inlet terminal board.
- Use the appropriate cable size for the current draw, supply voltage, and installation type.
- Protect the supply using a backup fuse or circuit breaker.
- Do not fit the supply cable in the raceways inside the unit's electric board—600 mm (24 inch) units.
- Use only multi-polar cables with sheath (CEI20-22).

9.2 Wiring Connection Guidelines

- Remote On/Off connections must be provided by the installer.
- The General Alarm terminals allow remote alarm signaling.

In case of short circuit, check the affected switch for sticking and replace it, if necessary.

9.3 Electrical Field Connections

The electrical connections are described in the submittal documents included in the .

The following table lists the relevant documents by number and title.

Table 9.1 Electrical Field Connection Drawings

Document Number	Title
DPN005144	Vertiv™ Liebert® XDM Electrical Field Connections Liebert® XDM Models
DPN005140	Liebert® XDM CANbus and Interlock Connections Vertiv™ Liebert® MCV + Vertiv™ Liebert® EconoPhase + Base Assembly
DPN005241	Liebert® XDM Electrical Data

This page intentionally left blank

10 Checklist for Completed Installation

NOTE: Risk of unintended pump start. Can cause equipment damage.

Do not install the ship loose fuses until the system is fully charged with fluid. Operating pumps without a full fluid charge can result in equipment damage.

10.1 Start the Vertiv™ Liebert® XDM

To start the Liebert® XDM:

1. Open all valves in the water circuit according to the instruction label attached to the valve. Verify valves are located properly and that any electric valves are operating as required. (Refer to [Filling Secondary Fluid Circuit](#) on page 69 for fluid filling and air venting instructions.)
2. Close the main switch to apply power to the unit.

NOTE: The default setting for the Vertiv™ Liebert® iCOM™ control is for standalone operation. The standalone mode lets you turn on the unit by rotating the main switch on the electrical panel. The yellow LED on the Liebert® iCOM™ display panel lights after the unit is turned on because electrical power is present.

3. Check the supply voltage on all phases.
4. Check to ensure that there are no water leaks.
5. Start the unit through the home menu on the display. Tap the three bars in the upper left of the display, then “Turn unit on”.
6. Check the amp draw on all components. (See [Electrical Connections](#) on page 75.)

10.2 Checks to Perform after Start-up

Once the system is operating under load, check the various components as follows:

1. Verify that the compressors are operating properly.
2. Ensure that the supply fluid temperature and flow are being controlled.
3. Record the following on the warranty inspection form:
 - a. Compressor and pump voltages and current draws.
 - b. All fluid temperatures.
 - c. Fluid entering and leaving pressure
4. Check the strainers and clean if necessary.
5. Check the water filters and replace if necessary. Required due to possible debris in field piping.
6. Check pressure across pump for proper head.

10.3 Electrical Installation Checks

1. Check that supply voltages and phase matches equipment nameplate.
2. Check that power wiring connections completed to the disconnect switch, evaporator unit, and heat rejection equipment.
3. Check that power line circuit breakers or fuses have proper ratings for equipment installed.
4. Check that control wiring connections are completed between indoor evaporator and heat rejection equipment.
5. Ensure that all internal and external high and low voltage wiring connections are tight.

6. Confirm that unit is properly grounded to an earth ground.
7. Confirm that electrical service conforms to national and local codes.
8. Check compressors for proper rotation.

10.4 Vertiv™ Liebert® DX Piping Installation Checks

1. Check that piping is completed to the refrigerant loop.
2. Confirm that piping has been leak checked.
3. Check that additional oil has been added for system charges over 40 pounds (18.1kg) per circuit. See [Additional Oil Requirements for Scroll and Digital Scroll Compressors](#) on page 54 .
4. Check that piping is properly sized, sloped, and trapped as shown in the piping schematics.
5. Check piping inside and outside of equipment for proper support and adequate spacing to prevent rub through.
6. Ensure that factory clamps have been installed.
7. Confirm that the drain line is connected, not obstructed, and pitched per local code.

10.5 Vertiv™ Liebert® Secondary Circuit Piping Installation Checks

1. Check that piping is completed.
2. Confirm that piping has been leak checked.
3. Check that piping is properly sized, sloped as shown in the piping schematics.
4. Check that air bleeders are installed at the high point in the piping circuits.

For under floor piping, the Vertiv™ Liebert® XDM supply pipe has the highest point and can be used to help bleed air. Also install air bleeders in the under floor piping circuit to vent trapped air from long horizontal runs.

For overhead piping, install Liebert® XDM supply pipe at the highest point in the field piping and in long horizontal runs.

5. Confirm that the supply line is connected, not obstructed, and pitched to the top of the unit to assist in air venting.
6. Check piping inside and outside of equipment for proper support and adequate spacing to prevent rub through.
7. Confirm that the drain line is connected, not obstructed, and pitched per local code as needed.
8. Verify water detection is properly installed around all units (recommended).

11 Troubleshooting



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

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

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



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

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

Table 11.1 below lists possible issues, probable causes, and corrective steps.

Table 11.1 Unit Diagnostics

Symptom	Possible Cause	Check or Remedy
Pump will not energize	No main power	Check L1, L2, and L3 for rated voltage.
	Loose electrical connections	Tighten connections.
	Blown fuse	Check fuses to pumps.
	Incorrect phase wiring	Check wiring phase.
Pump will not start or run	Pump Shutdown Alarms	Check alarm history on unit for PUMP OP W/NO FLOW or XD FLOW BLOCKED events. Check system for closed valves or blockages preventing pump flow.
	VFD error	Check alarm history on unit for PUMP INVRTR FAIL.
	No enable signal	Check 1MPR relay closure and connections.
	No control signal	Check 0-10 VDC Analog signal from P51 connections at VFD.

Table 11.1 Unit Diagnostics (continued)

Symptom	Possible Cause	Check or Remedy
Pump noisy	Air in the system	Purge air from high point vent on the top of unit.
	Cavitation due to vapor in pump	Check for adequate charge in system, see Filling Secondary Fluid Circuit on page 69 .
	Worn motor bearings	Replace pump.
	Pump is rotating in reverse	Check wiring phase
Pump suddenly stops	Loss of power	When power is restored, the Liebert® XDM Liquid to Air Cooled Chiller automatically restarts.
	Clogged strainer or impeller	Clean out the debris.
Pipe rattle	Loose pipe connections	Check pipe connections.
Return water temperature high	Low fluid flow	Check alarm history for related alarms.
		Clean strainer. Check pressure drop of hose set and connected load. Check flow meter.
	Room temperature too high	Reduce room temperature.
Economizer Pump/compressor will not energize	No main power.	Check L1, L2, and L3 for rated voltage.
	Loose electrical connections.	Tighten connections.
	Incorrect phase wiring.	See Electrical Installation Checks on page 79 .
Local display is not operational, but unit operates	Local display cable disconnected	Connected cable.
	Local display cable damaged.	Replace cable.
	Local display configuration is lost.	Contact Vertiv Technical Support.
Local display is not operational and unit does not operate	Unit electrical supply is off	Restore electrical supply.
	Unit main switch is off.	Switch the unit on.
	Control board supply issues.	Contact Vertiv Technical Support.
	Control board issues.	Contact Vertiv Technical Support.
Liebert® XDM not making capacity.	Air in the system.	Check for adequate charge in system. See Filling Secondary Fluid Circuit on page 69
	Incorrect refrigerant charge.	Check charge per conditions referenced in Table 6.9 on page 59 .
Supply water temperature high.	Dewpoint margin controlling water setpoint.	Check if the dewpoint in the room is lower than the desired water temperature.
	Cooling system not running.	Check alarm history for related alarms.
		Compressors off due to cycling at low pressure. Compressors off due to high discharge pressure.

12 Initial Start-up Checks and Commissioning Procedure for Warranty Inspection



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power supply disconnect switches, verify with a voltmeter that power is Off, and wear appropriate, OSHA approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC, and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included, and check the nameplate to be sure the voltage matches available utility power. The Vertiv™ Liebert® iCOM™ controller does not isolate power from the unit, even in the Unit Off mode. Some internal components require and receive power even during the Unit Off mode of the Liebert® iCOM™ controller. The factory supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



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

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



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

NOTICE

Risk of improper electrical connection of three phase input power. Can cause backward compressor rotation and unit damage. Service technicians should use a gauge set on the system during the initial start-up to verify that the three phase power is connected properly. Three phase power must be connected to the unit line voltage terminals in the proper sequence so that the compressors rotate in the proper direction. Incoming power must be properly phased to prevent compressors from running backward. We recommend checking the unit's phasing with proper instrumentation to ensure that power connections were made correctly. We also recommend verifying discharge and suction pressures during start-up to ensure that the compressors are running in the correct direction.

- Confirm that all items in the [Checklist for Completed Installation](#) on page 79 have been done.
- Locate the Vertiv™ Liebert® XDM Warranty Inspection Check Sheet in the unit's electrical panel.
- Complete the Liebert® XDM Warranty Inspection Check Sheet during start-up.

- Forward the completed Liebert® XDM Warranty Inspection Check Sheet to your local sales office. ***This information must be completed and forwarded to validate warranty.***
- Contact your local sales representative or technical support if you have any questions or problems during unit start-up and commissioning. Visit <https://www.Vertiv.com/en-us/support/> or call 1-800-543-2778.

13 Maintenance

13.1 Safety Instructions

All maintenance operations must strictly observe national, state, and local accident prevention regulations, especially the regulations concerning electrical systems, refrigerators, and manufacturing resources.

Air conditioning equipment maintenance may be performed only by authorized properly trained and qualified personnel.

To keep all warranties valid, the maintenance must adhere to the manufacturer's regulations.



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power supply disconnect switches, verify with a voltmeter that power is Off, and wear appropriate, OSHA approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC, and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included, and check the nameplate to be sure the voltage matches available utility power. The Vertiv™ Liebert® iCOM™ controller does not isolate power from the unit, even in the Unit Off mode. Some internal components require and receive power even during the Unit Off mode of the Liebert® iCOM™ controller. The factory supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



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

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



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

NOTICE

Risk of improper maintenance. Can cause equipment damage.

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

Ignoring safety instructions is dangerous. Soiled parts cause a loss of performance and, for switch or control devices, can lead to the breakdown of the unit performance and operation.

13.2 Maintenance Schedule

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

All tasks and time periods listed here are the manufacturers' regulations and must be documented in an inspection report.

Table 13.1 Maintenance Schedule

Component		Maintenance Period			
		Monthly By User	Every 3 Months	Every 6 Months	Annually
General	Check and clean strainer.			X	
Compressor	Check oil levels			X	
	Check for oils leaks			X	
	Check compressor mounts			X	
	Verify that cap tubes are not rubbing			X	
	Check/re-torque wire connections			X	
	Check compressor operations			X	
	Check crankcase heater fuses			X	
	Check for refrigerant leaks			X	
Electrical/Electronics	Check condition of contacts.			X	
	Check electrical connections.				X
	Check operation of controller.			X	
	Check unit operation sequence.			X	
	Check all sensors for proper readings			X	
Pumps	Check for irregular noise from the pumps.		X		
	Check for leaks of the pump casing and seals.	X			
	Check motor mounts for tightness.				X

13.3 Fluid and Piping Maintenance

Maintaining the system fluid quality is required throughout the life of the system. Fluid and piping system maintenance schedules must be established and performed. A coolant fluid maintenance program must be established that will evaluate fluid chemistry and apply necessary treatment. The complexity of water condition problems and the variations of required treatment programs make it extremely important to obtain the advice of a competent and experienced water treatment specialist and follow a regularly scheduled coolant fluid system maintenance program.

Perform periodic inspections of the heat exchanger and coolant fluid piping system for leaks and visible damage.

13.4 Spare Parts

Only original spare parts made by Vertiv must be used. Using third-party material will invalidate the warranty. When seeking technical assistance, always refer to the component list supplied with the equipment, and specify the model number, serial number and, if available, the part number.

NOTE: When replacing a faulty component, follow the relevant manufacturer instructions.

NOTE: When the spare parts must be brazed, be careful not to damage the internal parts (gaskets, seals, O-rings, etc.).

13.5 Compressor Oil

NOTICE

Risk of improper compressor lubrication. Can cause compressor and refrigerant system damage.

Failure to use oil types, viscosities and quantities recommended by the compressor manufacturer may reduce compressor life and void the compressor warranty.

- Do not mix polyolester (POE) and mineral-based oils.
- Do not mix oils of different viscosities.
- Consult Vertiv technical support or the compressor manufacturer if questions arise.

Table 13.2 Compressor Oil Types for R-410A Refrigerant

Compressor Type	Oil Type
Copeland Scroll and Digital Scroll	POE Oil - ISO 32 Centistoke Viscosity ¹
1. Use Copeland POE Oil ULTRA 32-3MAF or other Copeland-approved oils.	
Source: DPN003950. Rev. 6	

NOTE: See , for additional oil based on the system's refrigerant charge.

13.6 Compressor Electrical Failure (Motor Burnout)

If a burnout has occurred, a full system clean out is required. If not cleaned, compressor and system problems will continue.

Consult the factory for compressor maintenance. Do not attempt to remove the compressor without first contacting Vertiv™ support at 1-800-543-2778.

13.6.1 Replacing a Compressor with Electrical Failure (Motor Burnout)



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

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

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



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



WARNING! Risk of over pressurization of the refrigeration system. Can cause explosive discharge of high pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate. For systems requiring EU CE compliance (50 Hz), the system installer must provide and install a pressure relief valve in the high side refrigerant circuit that is rated same as the refrigerant high side “Max Allowable Pressure” rating that is marked on the unit serial tag. Do not install a shutoff valve between the compressor and the field installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU “Notified Body.”



WARNING! Risk of explosive discharge of high-pressure refrigerant. Can cause serious injury or death. Building and equipment damage may also result. Neutral and service ports on the compressor service valves do not have a valve core. Front-seat the service valves and relieve pressure from the compressor before loosening a part or a component attached to the service valve. Follow local codes to properly reclaim refrigerant.

NOTE: Release of refrigerant to the atmosphere is harmful to the environment. Refrigerant must be recycled or discarded in accordance with federal, state, and local regulations.

1. Attach suction and discharge gauges to access fittings.
2. Front-seat service valves to isolate the compressor. Recover refrigerant using an approved recovery procedure and equipment. Use a filter drier when charging the system with recovered refrigerant.
3. Remove marked pressure transducer and discharge pressure switch. Disconnect all electrical connections.
4. Detach service valves from compressor.

5. Remove failed compressor.
6. Follow compressor manufacturer's suggested clean-out procedures.
7. Install replacement compressor and make all connections. Replace gaskets or seals on service valves. Replace unloading solenoid.
8. Evacuate, charge and operate per the appropriate procedure per local codes:

NOTICE

Risk of improper component re-installation. Can cause equipment damage.

Identify and mark location of suction pressure transducer and discharge pressure switch. These devices look similar and they must be reinstalled in their original location.

13.6.2 Compressor Mechanical Failure

If mechanical failure of the compressor has occurred, only the compressor needs replaced. A full system clean out is not required.

13.6.3 Replacing a Compressor with Mechanical Failure



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

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

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



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



WARNING! Risk of over-pressurization of the refrigeration system. Can cause explosive discharge of high pressure refrigerant, loss of refrigerant, environmental pollution, equipment damage, injury, or death. This unit contains fluids and gases under high pressure. Use extreme caution when charging the refrigerant system. Do not pressurize the system higher than the design pressure marked on the unit's nameplate. For systems requiring EU CE compliance (50 Hz), the system installer must provide and install a pressure relief valve in the high side refrigerant circuit that is rated same as the refrigerant high side "Max Allowable Pressure" rating that is marked on the unit serial tag. Do not install a shutoff valve between the compressor and the field installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU "Notified Body."



WARNING! Risk of explosive discharge of high-pressure refrigerant. Can cause serious injury or death. Building and equipment damage may also result. Neutral and service ports on the compressor service valves do not have a valve core. Front-seat the service valves and relieve pressure from the compressor before loosening a part or a component attached to the service valve. Follow local codes to properly reclaim refrigerant.

NOTE: Release of refrigerant to the atmosphere is harmful to the environment. Refrigerant must be recycled or discarded in accordance with federal, state, and local regulations.

1. Front seat service valves to isolate the compressor. Recover refrigerant using an approved recovery procedure and equipment
2. Remove failed compressor.
3. Keep the replacement compressor sealed until installation is complete to the point that the system isolation valves are ready to be engaged. Keep exposure of the POE oil in compressor to atmosphere to a minimum.
4. Install replacement compressor, replace gaskets or seals on service valves, and make all connections. Replace unloading solenoid if equipped.
5. Once the compressor is completely installed, keep isolation valves closed to the system and open to compressor. Add dry nitrogen to compressor and check all connections for leaks. With no leaks confirmed, evacuate the isolated compressor prior to introducing to the rest of the system.
6. When evacuating the isolated compressor volume, pull a vacuum of 500 microns with no decay above 1000 microns within 20 minutes.
Once evacuation requirements of compressor are met, open the valves to open the compressor to the system.
7. Check compressor and system operation. Make any necessary adjustments for proper equipment operation.

13.7 Flow Sensor



WARNING! Arc flash and electric shock hazard. Open all local and remote electric power supply disconnect switches, verify with a voltmeter that power is Off, and wear appropriate, OSHA approved personal protective equipment (PPE) per NFPA 70E before working within the electric control enclosure. Failure to comply can cause serious injury or death. Customer must provide earth ground to unit, per NEC, CEC, and local codes, as applicable. Before proceeding with installation, read all instructions, verify that all the parts are included, and check the nameplate to be sure the voltage matches available utility power. The Vertiv™ Liebert® iCOM™ controller does not isolate power from the unit, even in the Unit Off mode. Some internal components require and receive power even during the Unit Off mode of the Liebert® iCOM™ controller. The factory supplied, optional disconnect switch is inside the unit. The line side of this switch contains live high voltage. The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch. Refer to unit electrical schematic. Follow all local codes.



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

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



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

Fluid flow is sensed and reported to the unit control by an ultrasonic flow sensor. The sensor is clamped to the unit piping without penetrating the pipe or obstructing the flow.

To replace the flow sensor:

1. Shut off all power to the unit by opening the main disconnect switch on the electrical panel on the front of the Vertiv™ Liebert® XDM.
2. Open the display door and the high voltage deadfront.
3. Remove the front panel by turning the quarter turn latches located in the top two corners of the panel, and lifting it up off the tabs in the base.
4. Disconnect the flow sensor cable.
5. Unscrew the two sensor mounting screws and remove the sensor.
6. Attach the new flow sensor to the mounting bracket with the two screws. Tighten screws evenly to ensure even pressure on the rubber backing of the flow meter.

NOTE: Do not adjust the flow sensor location once the rubber backing has made contact with the pipe. The rubber may tear, causing the flow sensor to not work properly.

7. Attach the sensor cable to the new flow sensor.
8. Replace the electric panel deadfront and restore power to the unit.
9. Program the flow sensor parameters using the instructions provided with the sensor. (See **Figure 13.1** on the next page.)
10. Shut off all power to the unit by opening the main disconnect switch on the electrical panel on the front of the Vertiv™ Liebert® XDM.
11. Slide the front panel over the tabs at the base, and hold in place by turning the quarter turn latches located in the top two corners of the panel.
12. Close the high voltage deadfront and display door, fastening it in place with the quarter turn latches.
13. Restore power to the unit and close the display door.

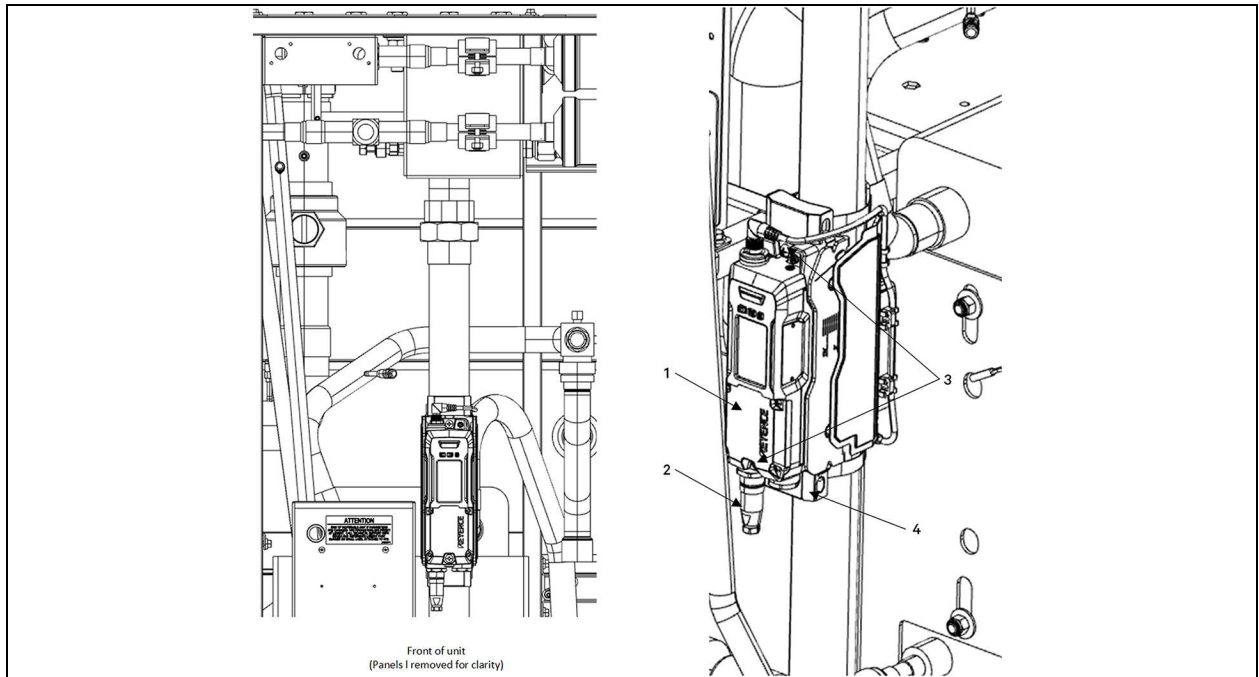
Table 13.3 Parameter Settings

Parameter Setting	Value
Analog output lower limit (A-LOF)	0 gpm
Analog output upper limit (A-HIF)	202 gpm

Table 13.4 Initial Parameter Settings

CH2	ANLG
GAL	ON
PIPE	2

Figure 13.1 Flow Sensor



Item	Description
1	Flow sensor
2	Cable connection
3	Mounting screws
4	Mounting bracket

14 Preventive Maintenance Checklist

Inspection Date		Job Name	
Indoor Unit Model #		Indoor Unit Serial Number #	
Condenser Model #		Condenser Serial #	
Room Temperature/Humidity	° %	Ambient Temperature	°

Not all units will have all components. To determine your unit's configuration, compare the [Indoor Unit Model #](#) above and the information in the Components and Nomenclature section.

Good maintenance practices are essential to minimizing operation cost and maximizing product life. Read and follow all applicable maintenance checks listed below. At a minimum, these checks should be performed semi-annually. However, maintenance intervals may need to be more frequent based on site specific conditions. Review the unit user manual for further information on unit operation. We recommend the use of trained and authorized service personnel, extended service contracts, and factory certified replacement parts. Contact your local sales representative for more details.

Check all that apply:

Electrical Panel

- Check the fuses.
- Check the contactors for pitting.
- Check/re-torque the wire connections.

Controls

- Check all sensors for proper readings.
- Check/verify the control operation (sequence).
- Check/test the change over device(s) (if equipped).
- Check/test the water detection devices(s) (if equipped).
- Check/re-torque the wire connections.

Refrigeration Piping

- Check the refrigerant lines (clamps secure, no rubbing, no leaks).
- Check for moisture.
- Check for restriction temperature drop across filter drier.

Compressor Section

- Check the oil level.
- Check for oil leaks.
- Check the compressor mounts (springs/bushings).
- Verify that the cap tubes are not rubbing.
- Check/re-torque the wire connections (inside the compressor box).
- Check the compressor operation (vibration/noise).
- Check the crank case heater fuses (operation).
- Check for refrigerant leaks.

- Suction pressure Circuit #1 ----- Circuit #2 -----
- Discharge pressure Circuit #1 ----- Circuit #2 -----
- Superheat Circuit #1 ----- Circuit #2 -----
- Low pressure switch cut out Circuit #1 ----- Circuit #2 -----
- Low pressure cut in Circuit #1 ----- Circuit #2 -----
- High pressure cut out Circuit #1 ----- Circuit #2 -----
- Amp draw

Circuit #1A	L1	L2	L3
Circuit #1B	L1	L2	L3
Circuit #2A	L1	L2	L3
Circuit #2B	L1	L2	L3

Pump

- Check for pump motor bearing noise.
- Verify that pump suction pressure is above 10 psi.

Suction:						
----------	--	--	--	--	--	--

- Pump amp draw

#1	L1	L2	L3
#2	L1	L2	L3

- Verify pump change over (if multiple pumps).

Other

- Verify that the expansion tank air pressure is above 10 psi.
- Verify that proper water maintenance is being performed.
- Check for water leaks.
- Compare the pump to nameplate amps.
- Check for restriction temperature drop across the filter drier.
- Check/test the water detection device(s), if equipped.

Pump Customer Fluid Loop

- For optional main and bypass water filters, check pressure drop. If necessary, replace filter. Customer to provide BMS monitoring for filter replacement.
- Check strainer to determine if it needs to be cleaned.
- Check for leaks at all connections.

Vertiv™ Liebert® MC or Vertiv™ Liebert® MCV Condenser

- Make sure that the coil is clean of debris (clean coil if required).
- Verify that the fans are free of debris.
- Ensure that the fans are securely mounted.
- Confirm that the motor bearings are in good condition.
- Check all refrigerant lines for vibration isolation. Support as necessary.
- Check for refrigerant leaks.
- Check the surge protection device (if installed) status-indicator lights.
- Check/Re-torque the wire connections.
- Check the contactors for pitting (replace if pitted).
- Verify the operation sequence/set points.
- Charge verification:
 - a. Outdoor ambient temperature.
 - b. Subcooling
 - c. Indoor unit return air temperature

Motor amp draw

#1	L1		L2		L3	
#2	L1		L2		L3	
#3	L1		L2		L3	
#4	L1		L2		L3	
#5	L1		L2		L3	
#6	L1		L2		L3	
#7	L1		L2		L3	
#8	L1		L2		L3	
#9	L1		L2		L3	
#10	L1		L2		L3	
#11	L1		L2		L3	
#12	L1		L2		L3	
#13	L1		L2		L3	
#14	L1		L2		L3	
#15	L1		L2		L3	
#16	L1		L2		L3	

Vertiv™ Liebert® EconoPhase Pumped Refrigerant Economizer

- Check for refrigerant leaks.
- Check/re-torque the wire connections.
- Check the contactors for pitting (replace if pitted).
- Verify the pump speed control operation.
- Check the pump mounting.

This page intentionally left blank

Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Thermal Management Products

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Liebert® AC and DC Power Products

1-800-543-2378

A.2 Locations

United States

Vertiv Headquarters

505 N. Cleveland Ave.

Westerville, OH 43082, USA

Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road

Wanchai, Hong Kong

This page intentionally left blank

Appendix B: Submittal Drawings

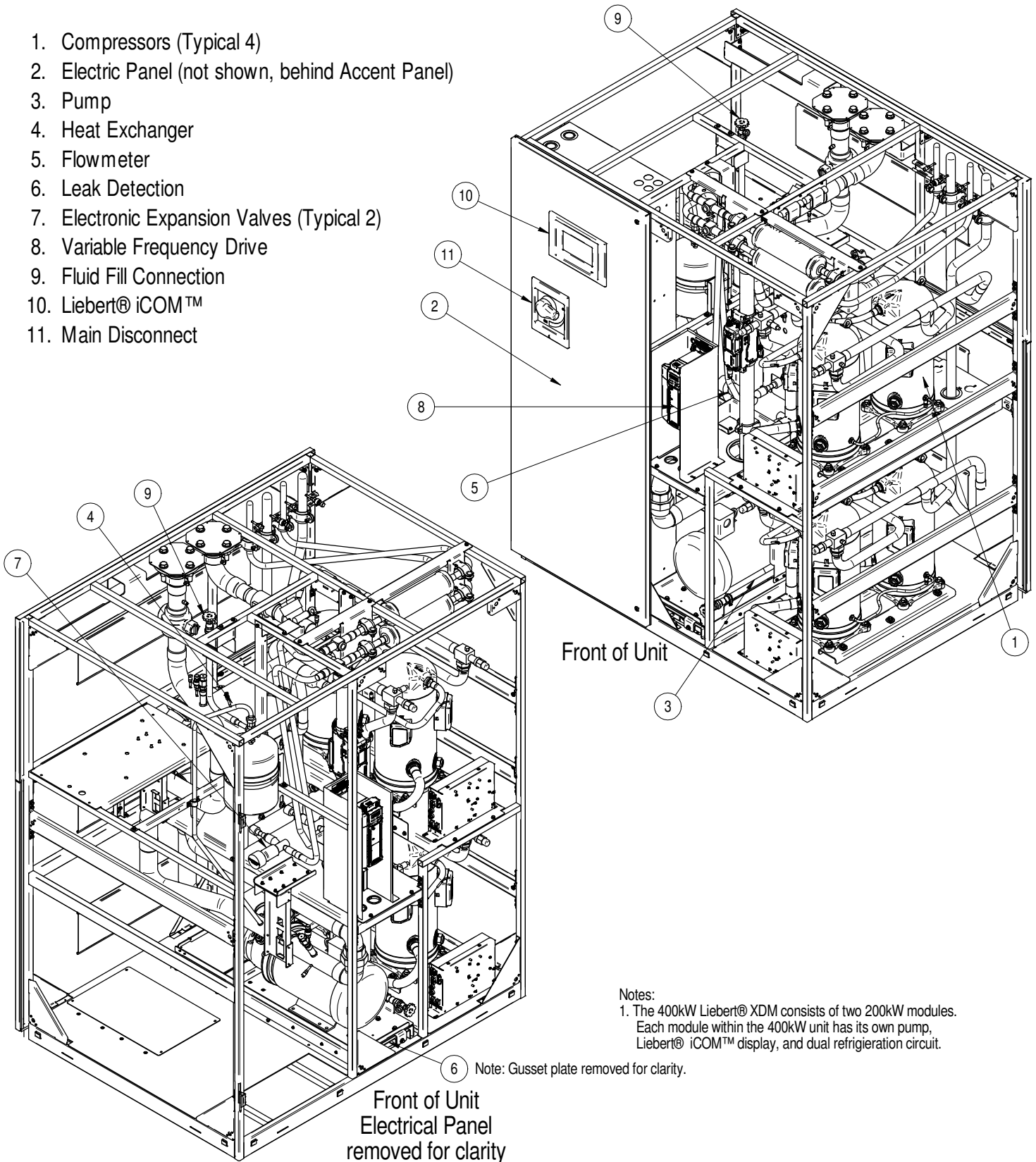
Table B.1 Submittal Drawings Contents

Document Number	Title
Component Locations	
DPN005063	Liebert® XDM Component Location Diagram
Planning Dimensions XDM	
DPN005228	Liebert® XDM Standard Features
DPN005230	Liebert® XDM Optional Features
DPN005062	Liebert® XDM Cabinet Dimensional Data 200kW
DPN005066	Liebert® XDM Cabinet Dimensional Data 400kW
Planning Dimensions Floor Stand	
DPN005214	Liebert® XDM Floor Stand Dimensional Data 200kW
DPN005226	Liebert® XDM Floor Stand Dimensional Data 400kW
Piping General Arrangement	
DPN005067 p1	Liebert® XDM Piping Schematic Liebert® XDM with Liebert® MCV
DPN005067 p2	Liebert® XDM Piping Schematic Liebert® XDM Chilled Water Side
10025700	Glycol and Water Requirements
Piping Connection Drawings	
DPN005075	Liebert® XDM Primary Connection Locations Top (Fluid and Refrigerant) 200kW
DPN005076	Liebert® XDM Primary Connection Locations Top (Fluid and Refrigerant) 400kW
10017481	Liebert® XDM Primary Connection Locations (Bottom Fluid and Top Refrigerant) 200kW
10017482	Liebert® XDM Primary Connection Locations (Bottom Fluid and Top Refrigerant) 400kW
Header Assembly	
DPN005227	Liebert® XDM Header Assembly 400kW
Refrigeration Piping Layout and Condenser Positioning Drawings	
DPN005138, p1	Liebert® XDM Air Cooled Piping Schematic Liebert® MCV Mounted above Liebert® XDM
DPN005138, p2	Liebert® XDM Piping Schematic Liebert® MCV and Liebert® XDM at Similar Level
Installation and Service Clearance	
344167	Liebert® XDM Installation and Clearance Data 200kW
344168	Liebert® XDM Installation and Clearance Data 400kW
Electrical Field Connections	
DPN005144	Liebert® XDM Electrical Field Connections Liebert® XDM Models
DPN005140	Liebert® XDM CANbus and Interlock Connections Liebert® MCV + Liebert® EconoPhase + Base Assembly
DPN005241	Liebert® XDM Electrical Data

This page intentionally left blank

COMPONENT LOCATION DIAGRAM

1. Compressors (Typical 4)
2. Electric Panel (not shown, behind Accent Panel)
3. Pump
4. Heat Exchanger
5. Flowmeter
6. Leak Detection
7. Electronic Expansion Valves (Typical 2)
8. Variable Frequency Drive
9. Fluid Fill Connection
10. Liebert® iCOM™
11. Main Disconnect



Notes:

1. The 400kW Liebert® XDM consists of two 200kW modules. Each module within the 400kW unit has its own pump, Liebert® iCOM™ display, and dual refrigeration circuit.



LIEBERT® XDM

STANDARD FEATURES

HEAT EXCHANGER - Brazed plate design with interwoven circuiting constructed of stainless steel plates, copper brazed.

PUMP The unit is equipped with one stainless steel pump and dedicated speed controllers. The pump speed shall be variable and automatically regulated by the Liebert® iCOM™. Flow is monitored by the flowmeter.

TANDEM COMPRESSORS - Scroll with a suction gas cooled motor, vibration isolators, thermal overloads, manual reset high-pressure switch and pump down low-pressure switch.

CABINET AND FRAME - the exterior steel panels are custom powder coated to protect against corrosion. A hinged control access panel opens to a second front panel, which is a protected enclosure for all high voltage components. Frame is constructed of 14 gauge heli-arc welded tubular steel and painted using an auto-deposition coating system

FLOW MONITOR - The unit is equipped with an ultrasonic flow transmitter for the control and monitoring of the system fluid flow.

STANDARD SYSTEM PRESSURE RATING - 100 psig (689 kPa).

Liebert® iCOM™ UNIT-LEVEL CONTROLLER – Liebert® XDM is controlled by the Liebert® iCOM™ Control System. A 7-inch, high definition, capacitive, color touchscreen presents system information and allows parameters to be viewed and adjusted. The controls shall be menu driven and shall display user menus for active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in percentage of each function, date and time), total run hours, various sensors, display setup and service contacts. It features a 3-level password protection system. Unit-to-Unit communication capability with other Liebert® XDM units is included as standard.

BASE-COMMS FOR BMS CONNECTIVITY- The Liebert® iCOM™ controller provides one Ethernet Port and one RS-485 Port dedicated for BMS connectivity. Provides ground fault isolated RS-485 Modbus, BACnet IP & Modbus IP network connectivity to Building Management Systems for unit monitoring and management. Also, provides ground fault isolated 10/100 baseT Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP v1/v2c/v3 for Network Management Systems, HTTP for web page viewing, SMTP for e-mail, and SMS for mobile messaging. The Liebert® iCOM™ controller can support dual IP on one network and one 485 protocol simultaneously.

UNIT FACTORY INSTALLED DISCONNECT SWITCH AND MAIN FUSES - Type of disconnect switch available –“Locking”. The “Locking Type” consists of a fused disconnect switch operational from the outside of the unit. Access to the high voltage electric panel compartment can be obtained only with the switch in the “off” position. Fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on.

65,000 AMP SHORT CIRCUIT CURRENT RATING (SCCR) The 60Hz electrical panel provides 65kA SCCR.

REMOTE SHUTDOWN TERMINAL The remote shutdown terminal shall provide the customer with a location to remotely shut down the unit, complying with the National Fire Code.

COMMON ALARM CONTACT The common alarm contacts shall provide the customer with a set of normally open contacts for remote indication of unit alarms.



LIEBERT® XDM

OPTIONAL FEATURES

REVERSING STARTER AND CAPACITIVE BUFFER – The unit shall include reversing starter with ATS (automatic transfer switch) control. In the event of a loss of primary power, the unit will automatically switch over to a secondary power source. The unit shall be equipped with a Capacitive Buffer to provide the Liebert® iCOM™ with a minimum of 3 minutes of ride-through power. The Capacitive Buffer shall provide power to the Liebert® iCOM™ control with embedded Unity functionality for continuous connectivity to Building Management System/Building Automation Systems (where applicable).

POWER MONITORING - The unit shall be equipped with factory-programmed/installed power meters to monitor power characteristics for either individual component or total unit. These meters allow the user to monitor meter connection status, input under voltage, input RMS voltage leg-to-leg and leg-to ground, input current for each phase, energy consumption in kilowatt hours and instantaneous power in watts. In multi-unit applications, a phase loss protection routine shall place a unit into standby mode in the event that phase loss is detected.

RS-485 EXPANSION CARD – Provides ground fault isolated connection to a Liebert® SiteLink-E for monitoring and management. Compatible with Liebert® SiteScan™ Web 4.0 or newer version.

LOW VOLTAGE TERMINAL PACKAGE -

TWO (2) ADDITIONAL REMOTE SHUTDOWN TERMINALS provide the customer with a total of three locations to remotely shut down the unit.

TWO (2) EXTRA COMMON ALARM CONTACTS provide the customer with a total of three sets of normally open contacts for remote indication of unit alarms.

MAIN PUMP ENABLED CONTACT - The main pump enabled contact provides the unit with one normally open set of contacts to indicate that the main pump is enabled.

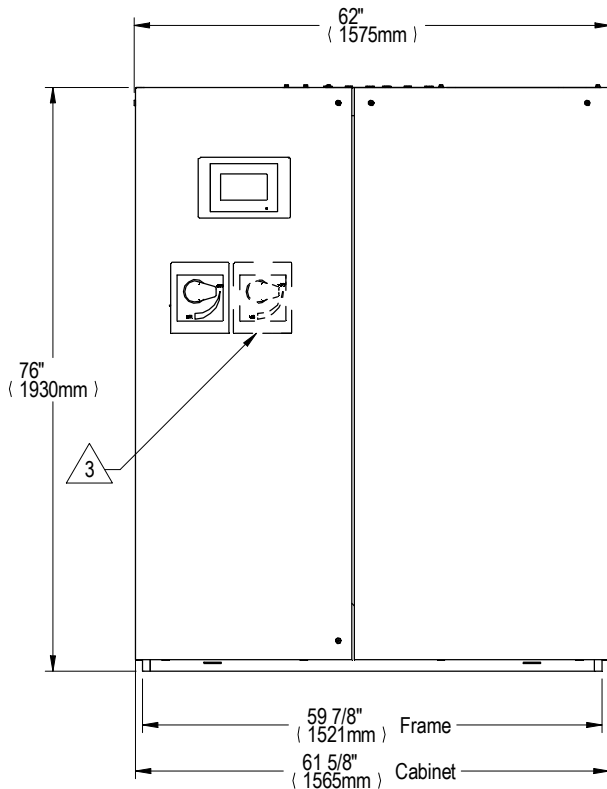
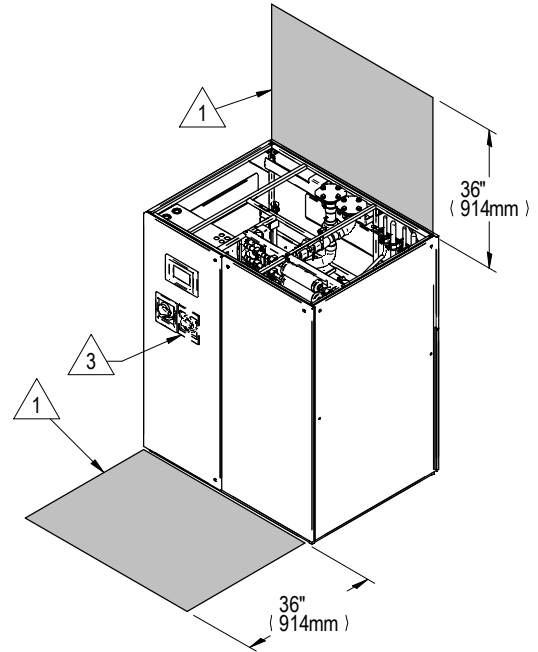
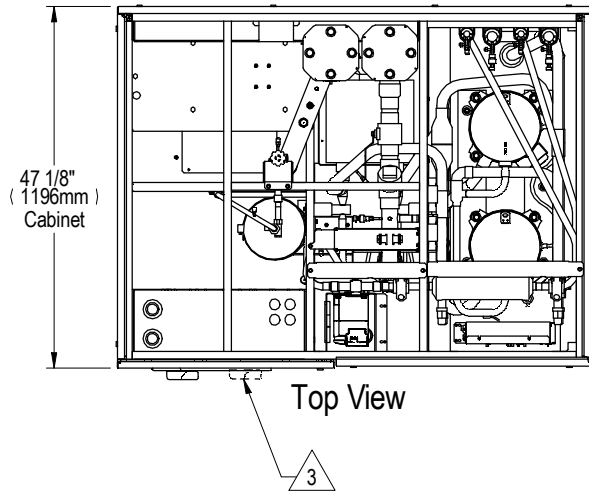
LIQUI-TECT™ OPTIONAL SHUTDOWN – One pair of dry contacts for the Liqui-Tect™ sensor signal will provide optional unit shutdown. (Liqui-Tect™ sensor is not included).

REMOTE TEMPERATURE AND HUMIDITY SENSORS - Are provided in a vented case for mounting in the room to be conditioned. Includes 30 ft. (9m), 60 ft. (18m), 90 ft. (27m), 120 ft. (36m), or 150 ft. (45m) of cable supplied for connecting sensors to unit.

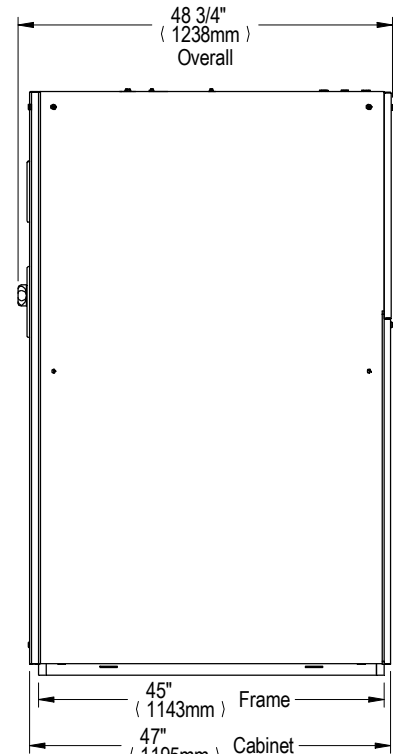
LT410 LIQUI-TECT™ POINT LEAK-DETECTION SENSOR (Factory Wired and secured in the pump drip pan) - The water sensor is a hermetically sealed solid-state device with no moving parts. When the sensor detects the presence of moisture, the alarm system is activated.

LIQUI-TECT™ SENSOR (Field Installed) - The water sensor is a hermetically sealed solid-state device with no moving parts. When the sensor detects the presence of moisture, the alarm system is activated.

CABINET DIMENSIONAL DATA
200kW



Front View

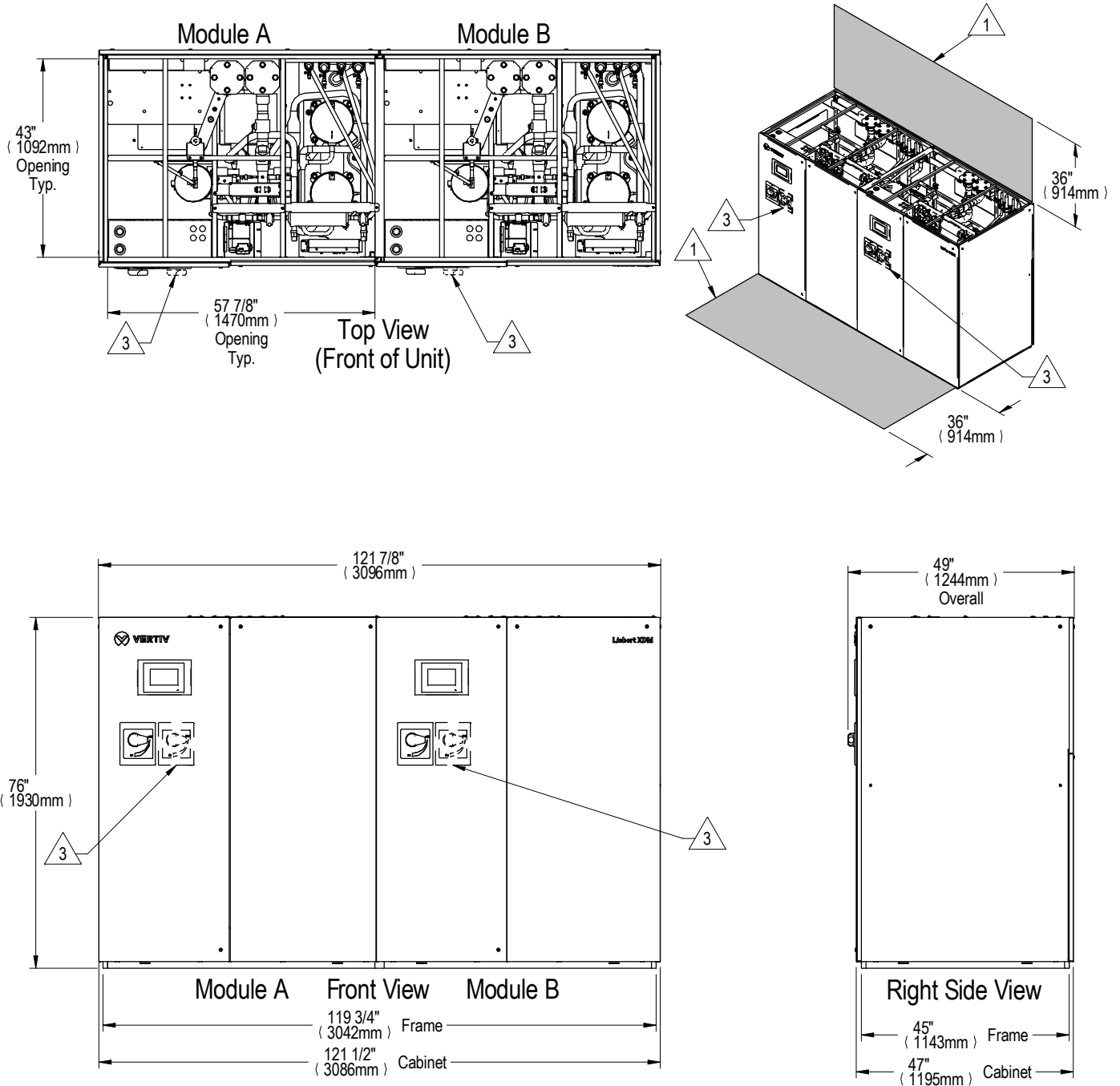


Right Side View

Notes:

1. Shaded areas indicate recommended minimum clearance for Vertical and Front Service and Component access.
2. Cabinet dimensional data is typical for Top and Bottom connection units.
3. Factory supplied optional secondary disconnect switch location.

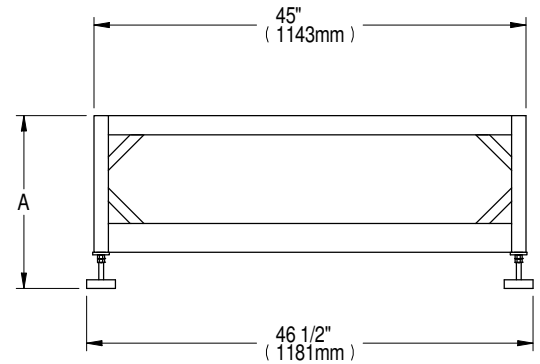
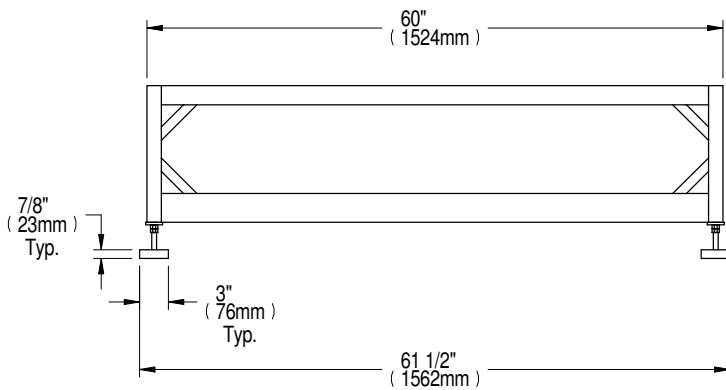
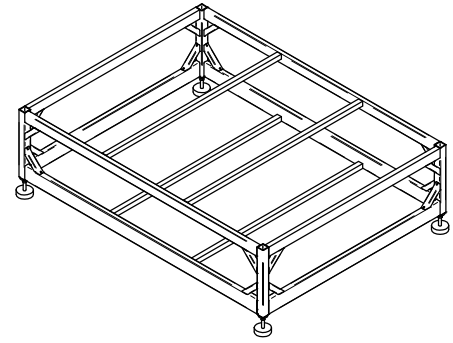
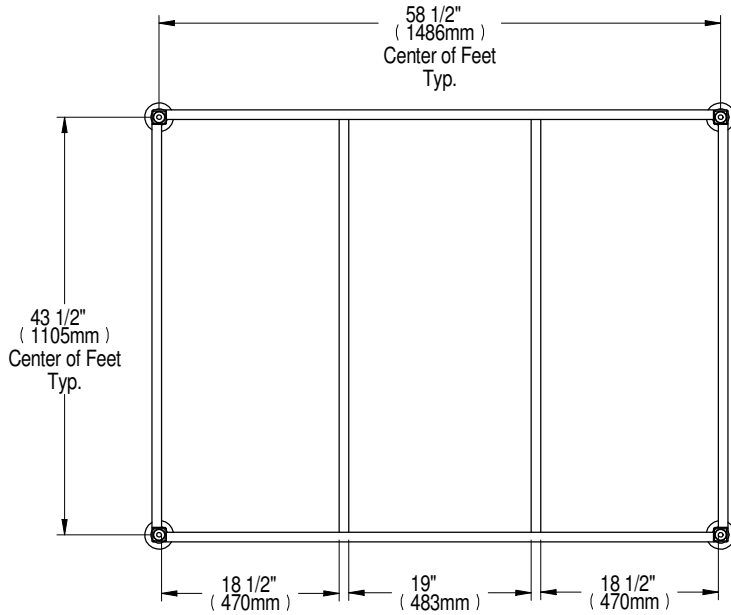
CABINET DIMENSIONAL DATA 400kW



Notes:


1. Shaded areas indicate recommended minimum clearance for Vertical, and Front Service and Component access.
2. Cabinet dimensional data is typical for Top and Bottom connection units.
3. Factory supplied optional secondary disconnect switch locations.

FLOORSTAND DIMENSIONAL DATA
200kW

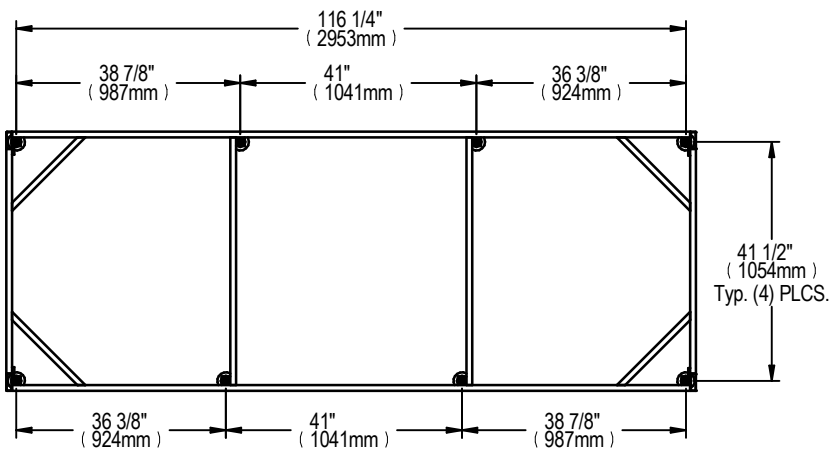
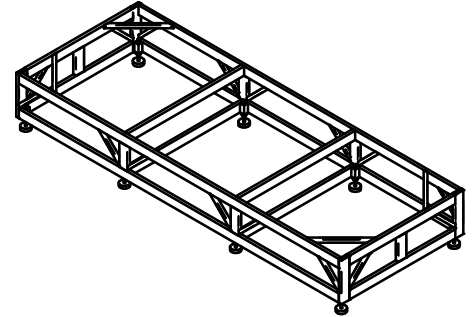


Notes:

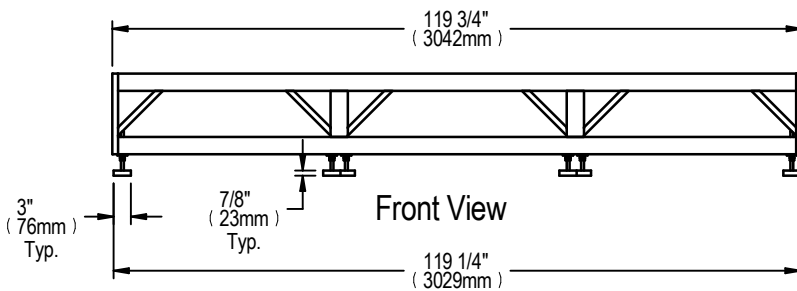
- Leveling feet are provided with $\pm 1\text{-}1/2\text{'}$ (38mm) adjustment from nominal height A.

Height in (mm)	
A	
18	(457)
24	(610)
30	(762)
36	(914)
42	(1067)
48	(1219)

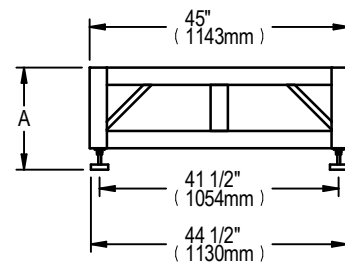
FLOORSTAND DIMENSIONAL DATA
400kW




Top View
(All dimensions to center of feet)



Front View

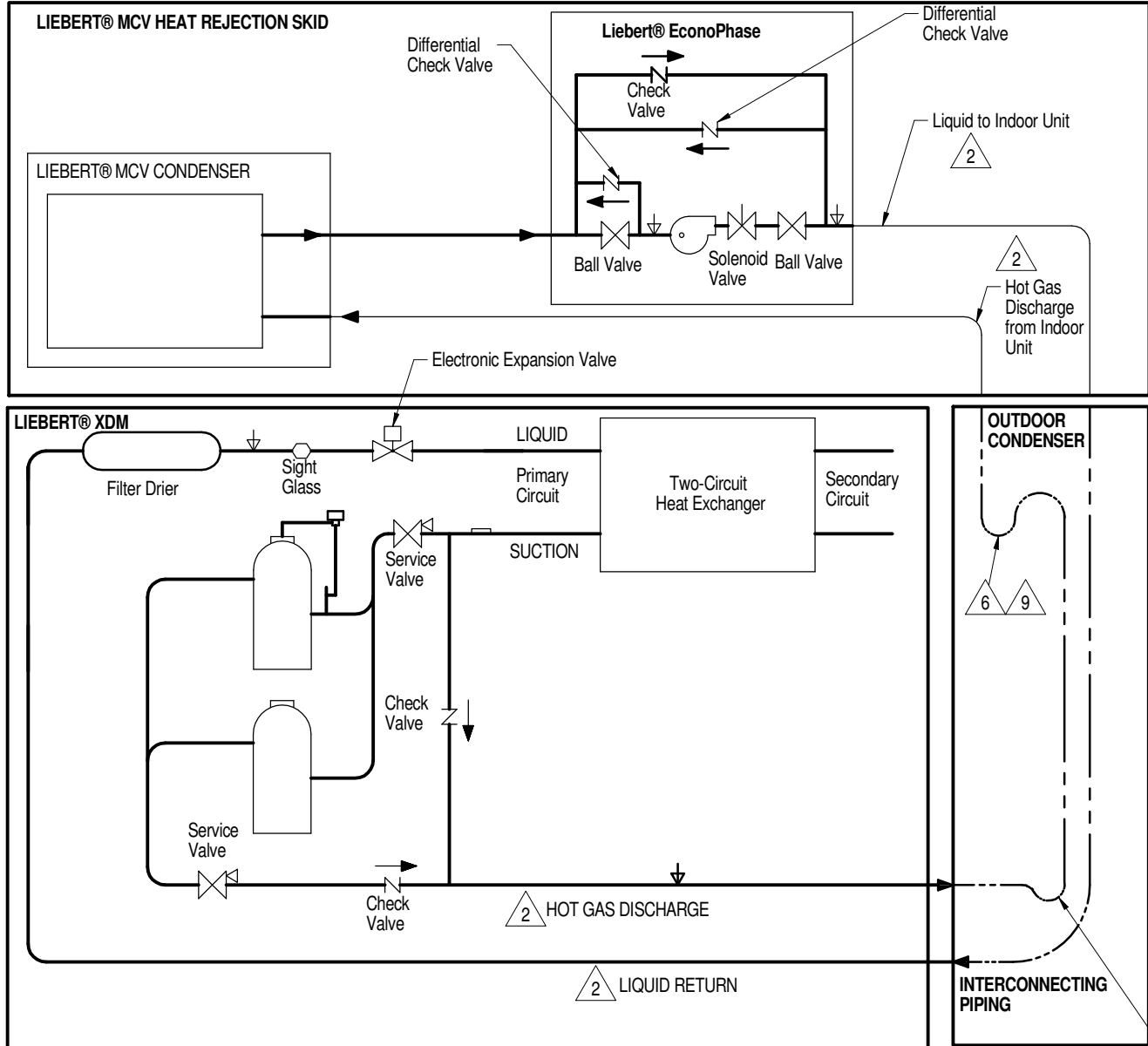




Height in. (mm)
A 
18 (457)
24 (610)
30 (762)
36 (914)
42 (1067)
48 (1219)

Notes

1. Leveling feet are provided with $\pm 1\text{-}1/2"$ (38mm) adjustment from nominal height "A".

PIPING SCHEMATIC
LIEBERT® XDM with LIEBERT® MCV

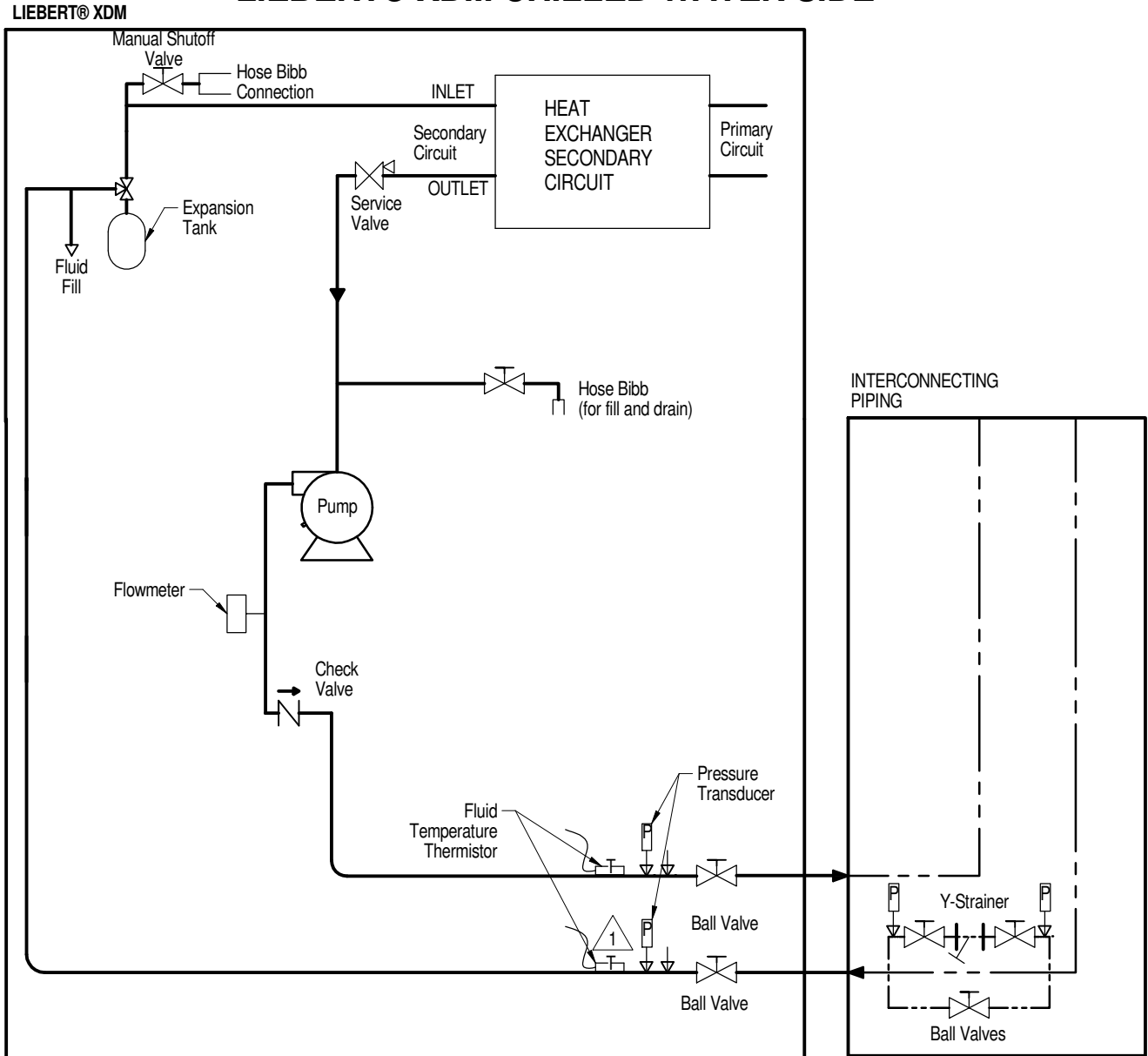


FACTORY REFRIGERANT PIPING  SERVICE/SCHRADER (ACCESS) CONNECTION, NO VALVE CORE.
 FIELD PIPING  SERVICE/SCHRADER (ACCESS) CONNECTION, WITH VALVE CORE.

Notes:

1. Two refrigeration circuits provided. Single refrigeration circuit shown for clarity.
2. Circuit 1 must be maintained between indoor unit, condenser and Liebert® EconoPhase unit. Circuit 2 must be maintained between indoor unit, condenser and EconoPhase unit.
3. Schematic representation shown. Do not use for specific connection locations.
4. The bottom of the condenser coil must be less than 60' (18.3m) above and cannot be more than 15 ft (4.6m) below the elevation of the EEVs inside the indoor unit.
5. All indoor and outdoor field refrigerant piping must be insulated, 1/2" minimum thickness. All outdoor insulation must be UV and ozone resistant.
6. Components are not supplied by Liebert but are required for proper circuit operation and maintenance.
7. Traps must be installed and horizontal lines pitched to ensure proper oil return and to reduce liquid flood back to compressor. Pitch horizontal gas piping at a minimum of 1/2" per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
8. Do not isolate any refrigeration circuits from over pressurization protection.
9. For rises over 25ft. (7.6m), trap every 20ft. (6m) or evenly divided

PIPING SCHEMATIC
LIEBERT® XDM CHILLED WATER SIDE



————— FACTORY WATER PIPING
 - - - - - FIELD PIPING
 - - - - - OPTIONAL PIPING

▽ SERVICE/SCHRADER (ACCESS) CONNECTION, NO VALVE CORE.
 ▽ SERVICE/SCHRADER (ACCESS) CONNECTION, WITH VALVE CORE.

Notes:

1. Supply and Return connections in Liebert® XDM having temperature sensor, pressure transducer, schrader air vent, and ball valve.
2. Field to install strainer in field secondary (XDM) return line to Cooling Modules. Vertiv recommends a bypass piping arrangement to allow for cleaning the strainer without disrupting unit operation. Also pressure taps across the strainer to check pressure drop. Three full port ball valves, pressure taps and piping are supplied by the field. The maximum distance of this assembly is 10 feet from the Liebert® XDM Unit.



LIEBERT® XDM

SECONDARY LOOP GLYCOL AND WATER REQUIREMENTS BRAZED PLATE HEAT EXCHANGER

For applications when the outdoor winter design temperature is below -18°F (-27°C), use a percentage of glycol per the appropriate table below or contact your Vertiv Sales Representative and Application Engineer. The percent glycol solution values listed below in Tables 1 and 2 are for reference and are based on burst protection of the Brazen Plate Heat Exchanger (BPHE) at various outdoor winter design temperatures. This outdoor winter design temperature should be the coldest expected temperature to ensure continued operation of The Liebert® XDM product. The recommended percent values listed below are based on the Dowfrost HD (Propylene Glycol) and Dowtherm SR-1 (Ethylene Glycol) chart. If the coldest outdoor temperature does not drop below -18°F (-27°C), water is an acceptable fluid in the Liebert® Secondary Loop. If the Secondary Loop is using a coolant other than water, contact your Vertiv Sales Representative and Application Engineer.

Table 1: Propylene Glycol Values

Winter Outdoor Design Temperature °F (°C)	Secondary Side	
	Recommended % PG by Volume	Recommended % PG by Mass
Down to 15 (-9)	20	21
Down to 5 (-15)	25	26
Down to -15 (-26)	30	31
Down to -30 (-34)	35	36



LIEBERT® XDM

GLYCOL AND WATER REQUIREMENTS BRAZED PLATE HEAT EXCHANGER

Table 2: Ethylene Glycol Values

Winter Outside Design Temperature °F (°C)	Secondary Side	
	Recommended % PG by Volume	Recommended % PG by Mass
Down to 15 (-9)	20	22
Down to 5 (-15)	25	27
Down to -10 (-23)	30	33
Down to -30 (-34)	35	38

There are two (2) basic types of additives:

- Corrosion Inhibitors
- Environmental Stabilizers

The Corrosion Inhibitors function by forming a surface barrier that protects metals from attack. Environmental Stabilizers, while not Corrosion Inhibitors in the strictest sense, decrease corrosion by stabilizing or favorably altering the overall environment. An alkaline buffer, such as borax, is a simple example of an environmental stabilizer because its prime purpose is to maintain an alkaline condition (pH above 7).

NOTICE:

Water chemistry varies greatly by location, as do the required additives that reduce the corrosion effect of the fluids on the piping system and components. The chemistry of the water used must be considered, because water from some sources may contain corrosive elements that reduce the effectiveness of the inhibited formulation. Sediment deposits prevent the formation of a protective oxide layer on the inside of the coolant system components and piping. The water/coolant fluid must be treated and circulating through the system continuously to prevent the buildup of sediment deposits and, or growth of sulfate reducing bacteria. The complexity of water/glycol solution condition problems and the variations of required treatment programs make it extremely important to obtain the advice of a competent and experienced water treatment specialist and follow a regularly scheduled coolant fluid system maintenance program. The water or water/glycol solution must be analyzed before start up to establish the inhibitor and antifreeze solution requirement and at regularly scheduled intervals throughout the life of the system to determine the pattern of inhibitor depletion.

Proper inhibitor maintenance must be performed in order to prevent corrosion of the system. Consult glycol manufacturer for testing and maintenance of inhibitors. Commercial ethylene glycol, when pure, is generally less corrosive to the common metals of construction than water itself. It will, however, assume the corrosivity of the water from which it is prepared and may become increasingly corrosive with use if not properly inhibited.

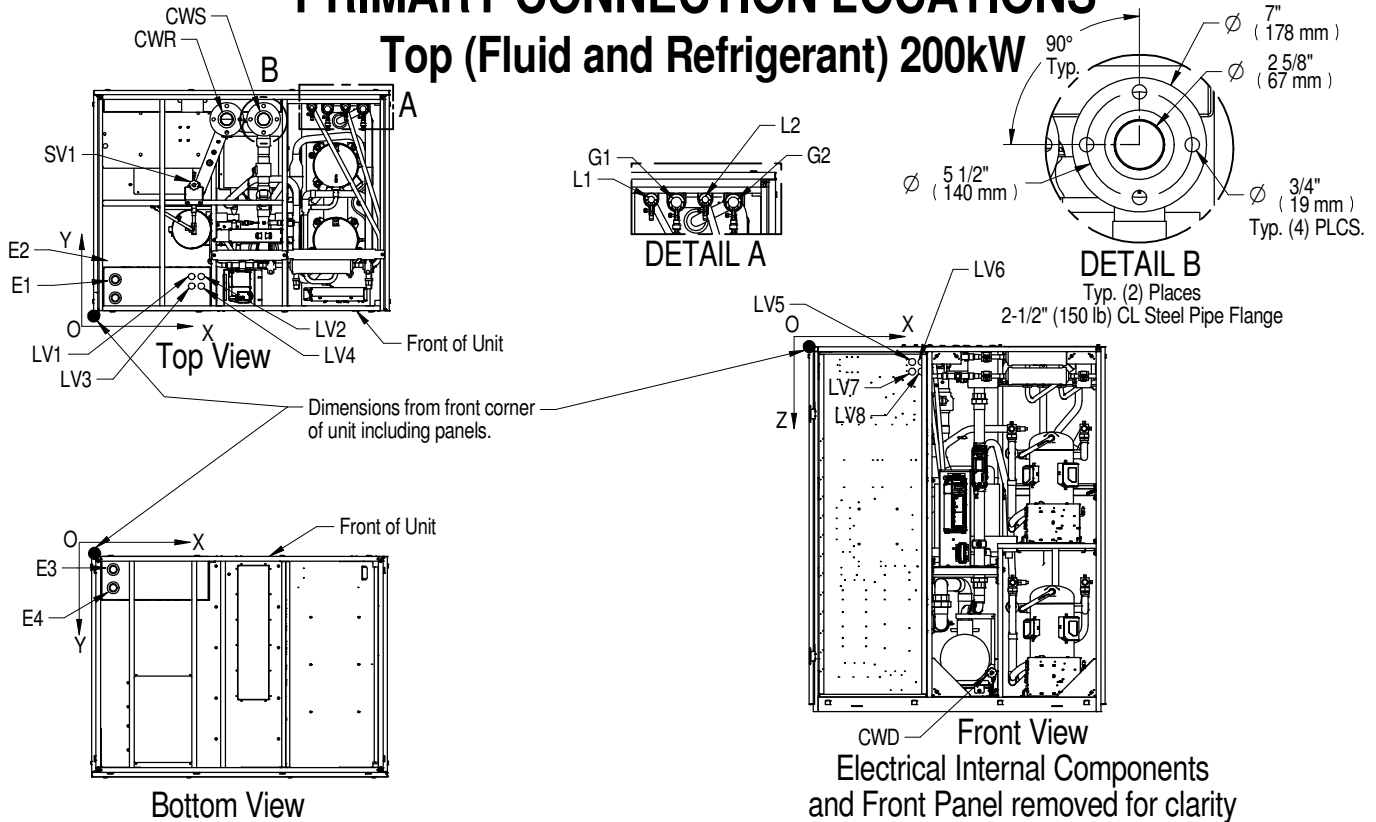
Remove any dirt, oil, or metal filings that may contaminate the cooling system piping to prevent contamination of the fresh glycol solution and fouling of the system. Flush the system thoroughly using a mild cleaning solution or high quality water and then completely drain before charging with glycol.

Cleaning a new system is just as important as cleaning an old one. New systems can be coated with oil or a protective film. Dirt and scale are also common. Any residual contaminants could adversely affect the heat-transfer stability and performance of your system. In most cases, special cleaners are needed to remove scale, rust, and hydrocarbon foulants from pipes, manifolds, and passages.

For more information on cleaners and degreasers, contact your Vertiv® representative. Follow the manufacturer's instructions when using these products.

PRIMARY CONNECTION LOCATIONS

Top (Fluid and Refrigerant) 200kW



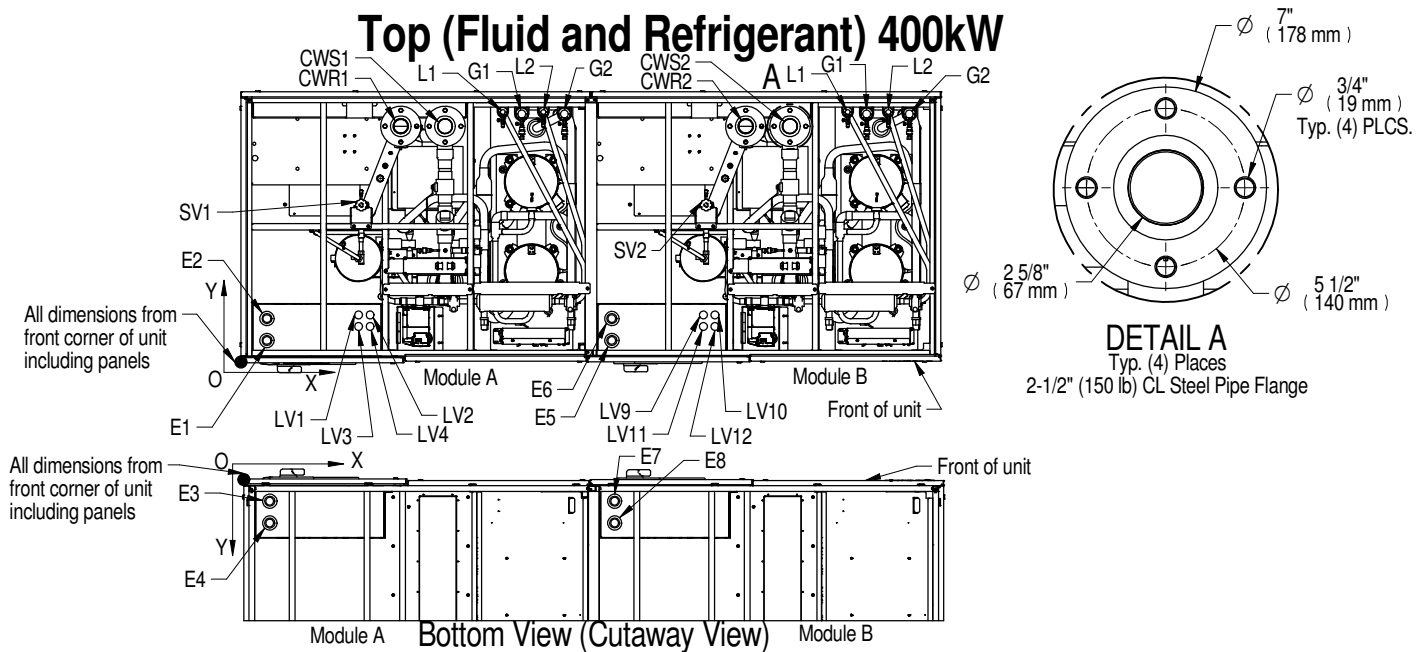
POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	Z in. (mm)	Connection Size Opening
L1	Liquid Line System 1 Refrigerant Connection	45-1/2 (1155)	43-1/4 (1099)	N/A	7/8" O.D. Cu
L2	Liquid Line System 2 Refrigerant Connection	52-1/2 (1333)			1-3/8" O.D. Cu
G1	Hot Gas Discharge 1 Refrigerant Connection	48-3/4 (1238)	43 (1091)	N/A	3/4" GHT
G2	Hot Gas Discharge 2 Refrigerant Connection	56 (1426)			
CWD	Customer Secondary Circuit Drain Connection (Hose Bibb)	38 (966)	N/A	68 (1726)	3/4" GHT
CWR	2-Way Chilled Water Return from Heat Load	27-3/4 (705)	41 (1043)	N/A	2-1/2" (150 lb) Steel Pipe Flange
CWS	2-Way Chilled Water Supply to Heat Load	35-3/8 (900)			
E1, E3, E2, E4	High Voltage Electrical Connections (E1, E2 = Top, E3, E4 = Bottom)	4-1/2 (115)	3-7/8 (98)	N/A	Concentric knockouts 1-3/8", 1-3/4", 2-1/2"
			7-5/8 (195)		
LV1	Electrical Connection (Low Volt, Top)	20-3/8 (519)	8-1/4 (211)	N/A	1-3/8"
LV2		22-3/8 (569)			
LV3		20-3/8 (519)			
LV4		22-3/8 (569)			
LV5	Electrical Connection (Low Volt Optional, Upper Front)	21-1/2 (545)	N/A	3-1/8 (81)	1-1/2"
LV6		23-3/8 (595)			
LV7		21-1/2 (545)			
LV8		23-3/8 (595)			
SV1	Customer Secondary Circuit Drain Connection (Hose Bibb)	20-7/8 (530)	27-3/8 (695)	N/A	3/4" GHT

Notes:

- Drawing not to scale. Tolerance on all piping dimensions is $\pm 1/2"$ (13mm).
- Field drain line a minimum of $1/8"$ (3.2mm) per foot (305mm). Select appropriate drain system materials. The drain line must comply with all local codes.

PRIMARY CONNECTION LOCATIONS

Top (Fluid and Refrigerant) 400kW

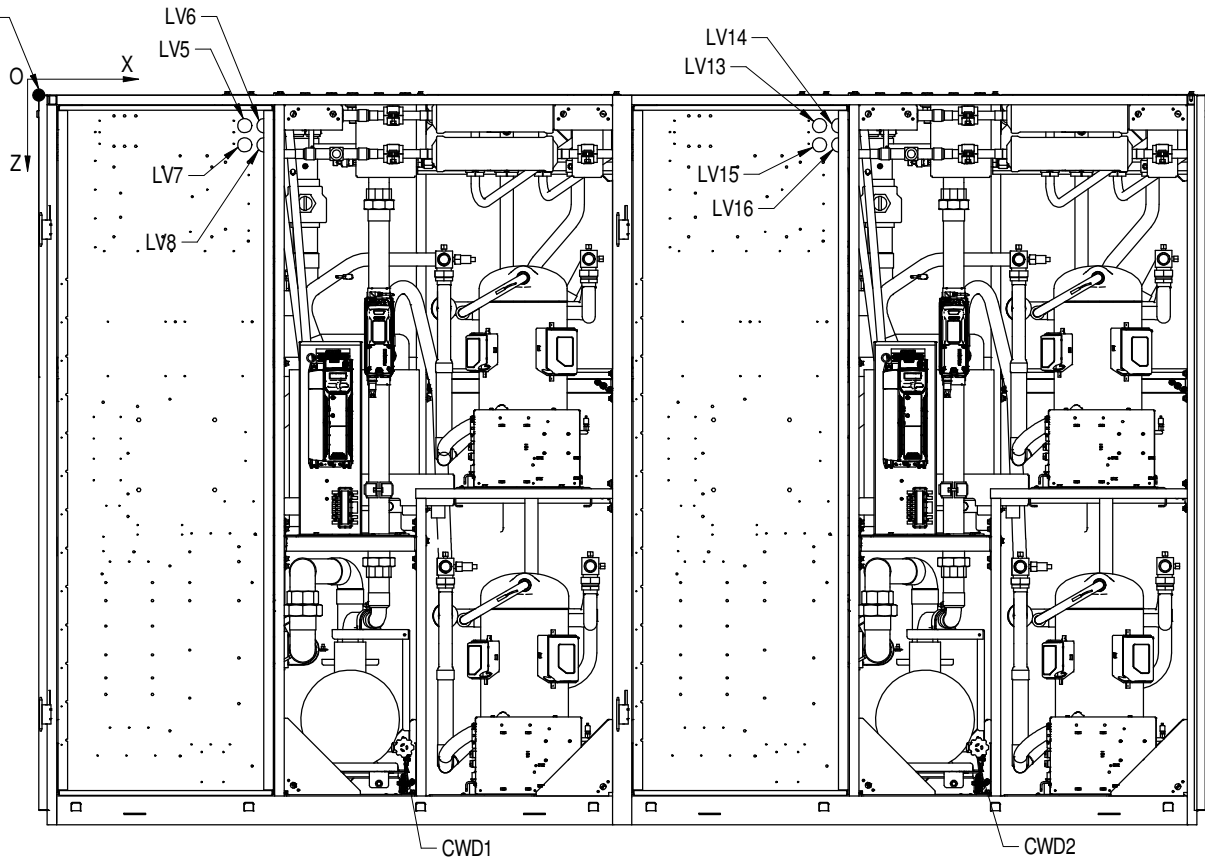


Module	POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	Connection Size Opening
A	L1	Liquid Line System 1 Refrigerant Connection	45-1/2 (1155)	43-1/4 (1098)	7/8" O.D. Cu
	L2	Liquid Line System 2 Refrigerant Connection	52-1/2 (1333)		
	G1	Hot Gas Discharge 1 Refrigerant Connection	48-3/4 (1238)	42-7/8 (1090)	1-3/8" O.D. Cu
	G2	Hot Gas Discharge 2 Refrigerant Connection	56-1/8 (1426)		
	CWR1	2-Way Chilled Water Return from Heat Load	27-3/4 (705)	41 (1043)	2-1/2" (150lb) Steel Pipe Flange
	CWS1	2-Way Chilled Water Supply to Heat Load	35-3/8 (900)		
	E1, E3, E2, E4	High Voltage Electrical Connections (E1, E2 = Top, E3, E4 = Bottom)	4-1/2 (115)	3-7/8 (98)	Concentric knockouts 1-3/8", 1-3/4", 2-1/2"
				7-5/8 (195)	
	LV1, LV2, LV3, LV4	Electrical Connection (Low Volt Top)	20-3/8 (519)	8-1/4 (211)	1-3/8"
			22-3/8 (569)		
	20-3/8 (519)		6-1/4 (160)		
	22-3/8 (569)				
SV1	Customer Secondary Circuit Fill Connection (Hose Bibb)	20-7/8 (530)	27-3/8 (695)	3/4" GHT	
B	L1	Liquid Line System 1 Refrigerant Connection	105-3/8 (2676)	43-1/4 (1098)	7/8" O.D. Cu
	L2	Liquid Line System 2 Refrigerant Connection	112-3/8 (2859)		
	G1	Hot Gas Discharge 1 Refrigerant Connection	108-5/8 (2759)	42-7/8 (1090)	1-3/8" O.D. Cu
	G2	Hot Gas Discharge 2 Refrigerant Connection	116 (2947)		
	CWR2	2-Way Chilled Water Return from Heat load	87-5/8 (2226)	41 (1043)	2-1/2" (150lb) Steel Pipe Flange
	CWS2	2-Way Chilled Water Supply to Heat Load	95-1/4 (2421)		
	E5, E7, E6, E8	High Voltage Electrical Connections (E5, E6 = Top, E7, E8 = Bottom)	64-3/8 (1635)	3-7/8 (98)	Concentric knockouts 1-3/8", 1-3/4", 2-1/2"
				7-5/8 (195)	
	LV9, LV10, LV11, LV12	Electrical Connection (Low Volt Top)	80-1/4 (2039)	8-1/4 (211)	1-3/8"
			82-1/4 (2090)		
	80-1/4 (2039)		6-1/4 (160)		
	82-1/4 (2090)				
SV2	Customer Secondary Circuit Fill Connection (Hose Bibb)	80-3/4 (2051)	27-3/8 (695)	3/4" GHT	

Notes:
 1. Drawing not to scale. Tolerance on all piping dimensions is ±1/2" (13mm).
 2. Field drain line a minimum of 1/8" (3.2mm) per foot (305mm). Select appropriate drain system materials. The drain line must comply with all local codes.

PRIMARY CONNECTION LOCATIONS
Top (Fluid and Refrigerant) 400kW

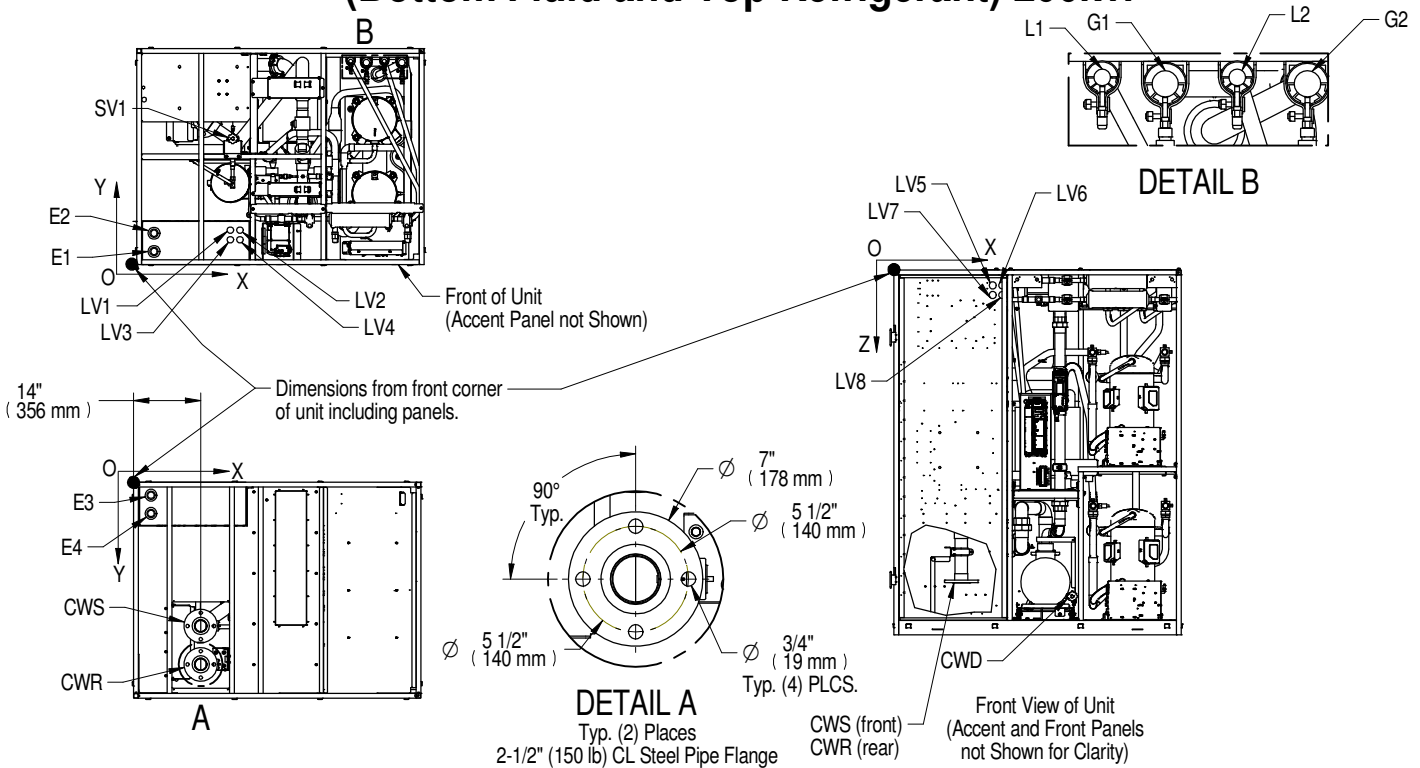
All dimensions from front corner of unit including panels



Module A Front View Module B
 Electrical Internal Components
 and Front Panel removed for clarity

Module	POINT	DESCRIPTION	X in. (mm)	Z in. (mm)	Connection Size Opening
A	LV5	Electrical Connection (Low Volt Upper Front)	21-1/2 (545)	3-1/8 (81)	1-1/2"
	LV6		23-1/2 (596)		
	LV7		21-1/2 (545)	5-1/8 (132)	
	LV8		23-1/2 (596)		
CWD1	Customer Secondary Circuit Fill Connection (Hose Bibb)	38 ((966)	68 (1726)	3/4" GHT	
B	LV13	Electrical Connection (Low Volt Upper Front)	81-3/8 (2066)	3-1/8 (81)	1-1/2"
	LV14		83-3/8 (2116)		
	LV15		81-3/8 (2066)	5-1/8 (132)	
	LV16		83-3/8 (2116)		
	CWD2		Customer Secondary Circuit Fill Connection (Hose Bibb)	97-7/8 (2487)	

PRIMARY CONNECTION LOCATIONS (Bottom Fluid and Top Refrigerant) 200kW

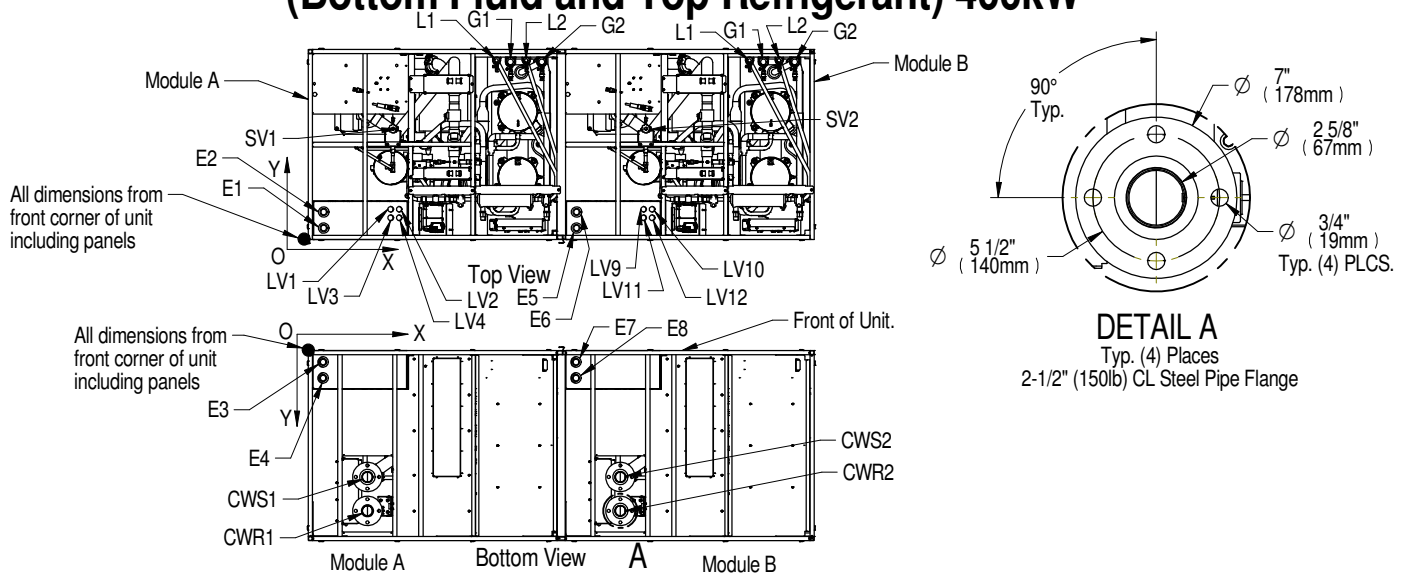


POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	Z in. (mm)	Connection Size Opening
L1	Liquid Line System 1 Refrigerant Connection	45-1/2 (1155)	43-1/4 (1098)	N/A	7/8" O.D. Cu
L2	Liquid Line System 2 Refrigerant Connection	52-1/2 (1333)			1-3/8" O.D. Cu
G1	Hot Gas Discharge 1 Refrigerant Connection	48-3/4 (1238)	42-7/8 (1090)	N/A	1-3/8" O.D. Cu
G2	Hot Gas Discharge 2 Refrigerant Connection	56 (1426)			
CWD	Customer Secondary Circuit Drain Connection (Hose Bibb)	38 (966)	N/A	68 (1726)	3/4" GHT
CWR	2-Way Chilled Water Return from Heat Load	14-7/8 (378)	39-1/8 (993)	65-1/8 (1654)	2-1/2" (150 lb) Steel Pipe Flange
CWS	2-Way Chilled Water Supply to Heat Load		31-1/8 (790)		
E1, E3, E2, E4	High Voltage Electrical Connections (E1 & E2 = Top, E3 & E4 = Bottom)	4-1/2 (115)	3-7/8 (98)	N/A	Concentric knockouts 1-3/8", 1-3/4", 2-1/2"
			7-5/8 (195)		
LV1	Electrical Connection (Low Volt, Top)	20-3/8 (519)	8-1/4 (211)	N/A	1-3/8"
LV2		22-3/8 (569)			
LV3		20-3/8 (519)			
LV4		22-3/8 (569)			
LV5	Electrical Connection (Low Volt Optional, Upper Front)	21-1/2 (545)	N/A	3-1/8 (81)	1-1/2"
LV6		23-3/8 (595)			
LV7		21-1/2 (545)			
LV8		23-3/8 (595)			
SV1	Customer Secondary Fill Connection (Hose Bibb for fill)	20-7/8 (530)	27-3/8 (695)	N/A	3/4" GHT

Notes:

- Drawing not to scale. Tolerance on all piping dimensions is $\pm 1/2"$ (13mm).
- Field drain line a minimum of 1/8" (3.2mm) per foot (305mm). Select appropriate drain system materials. The drain line must comply with all local codes.

PRIMARY CONNECTION LOCATIONS (Bottom Fluid and Top Refrigerant) 400kW



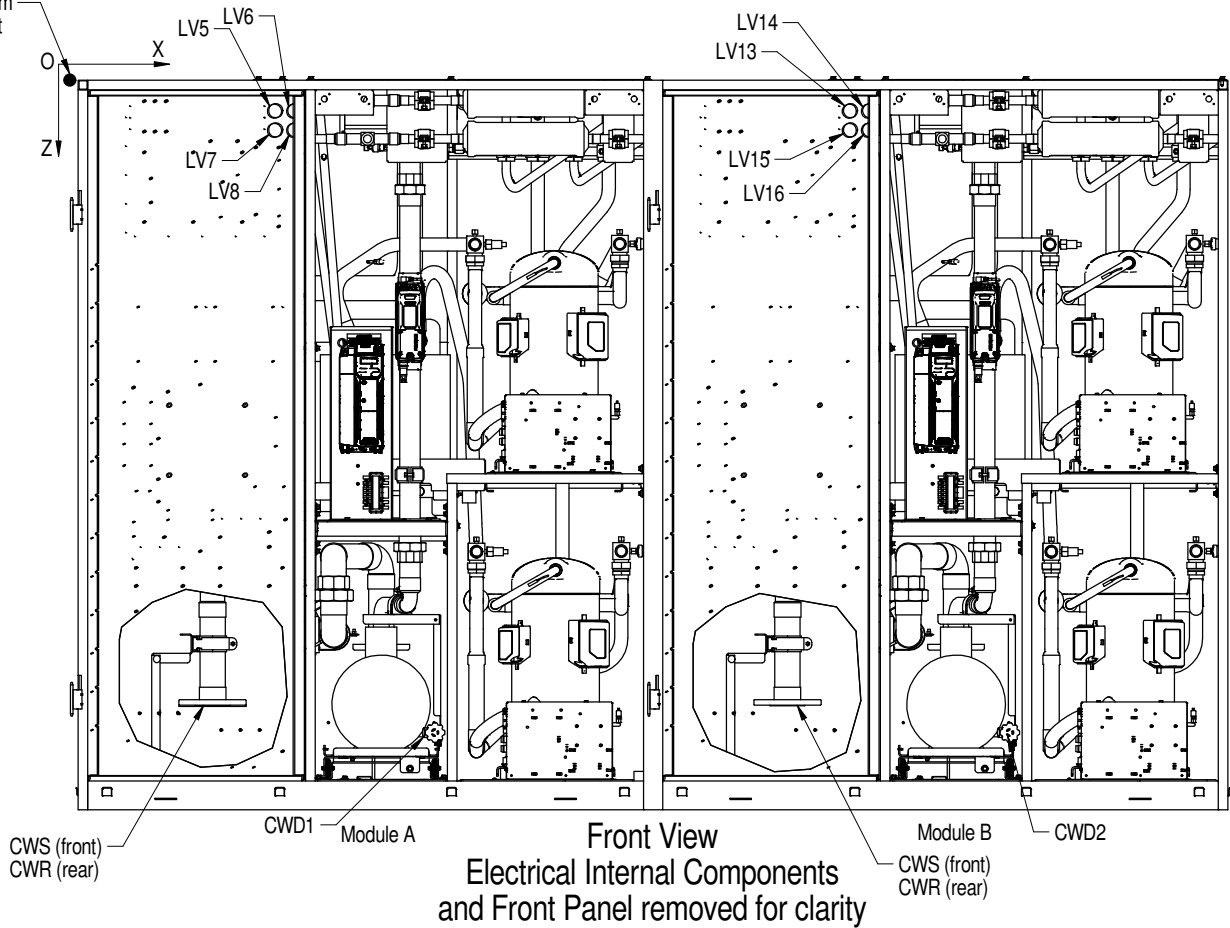
Module	POINT	DESCRIPTION	X in. (mm)	Y in. (mm)	Connection Size Opening
A	L1	Liquid Line System 1 Refrigerant Connection	45-1/2 (1155)	43-1/4 (1098)	7/8" O.D. Cu
	L2	Liquid Line System 2 Refrigerant Connection	52-1/2 (1333)		
	G1	Hot Gas Discharge 1 Refrigerant Connection	48-3/4 (1238)	42-7/8 (1090)	1-3/8" O.D. Cu
	G2	Hot Gas Discharge 2 Refrigerant Connection	56-1/8 (1426)		
	CWR1	2-Way Chilled Water Return from Heat Load	15 (381)	39-1/8 (993)	2-1/2" (150 lb) Steel Pipe Flange
	CWS1	2-Way Chilled Water Supply to Heat Load		31-1/8 (790)	
	E1, E3, E2, E4	High Voltage Electrical Connections (E1 & E2 = Top, E3 & E4 = Bottom)	4-1/2 (115)	3-7/8 (98)	Concentric knockouts 1-3/8", 1-3/4", 2-1/2"
				7-5/8 (195)	
	LV1	Electrical Connection (Low Volt Top)	20-3/8 (519)	8-1/4 (211)	1-3/8"
	LV2		22-3/8 (569)		
LV3	20-3/8 (519)		6-1/4 (160)		
LV4	22-3/8 (569)				
SV1	Customer Secondary Circuit Drain Connection (Hose Bibb)	20-7/8 (530)	27-3/8 (695)	3/4" GHT	
B	L1	Liquid Line System 1 Refrigerant Connection	105-3/8 (2759)	43-1/4 (1098)	7/8" O.D. Cu
	L2	Liquid Line System 2 Refrigerant Connection	112-3/8 (2859)		
	G1	Hot Gas Discharge 1 Refrigerant Connection	108-5/8 (2676)	42-7/8 (1090)	1-3/8" O.D. Cu
	G2	Hot Gas Discharge 2 Refrigerant Connection	116 (2947)		
	CWR2	2-Way Chilled Water Return from Heat load	74-3/4 (1899)	39-1/8 (993)	2-1/2" (150 lb) Steel Pipe Flange
	CWS2	2-Way Chilled Water Supply to Heat Load		31-1/8 (790)	
	E5, E7, E6, E8	High Voltage Electrical Connections (E5, E6 = Top, E7, E8 = Bottom)	64-3/8 (1635)	3-7/8 (98)	Concentric knockouts 1-3/8", 1-3/4", 2-1/2"
				7-5/8 (195)	
	LV9	Electrical Connection (Low Volt Top)	80-1/4 (2039)	8-1/4 (211)	1-3/8"
	LV10		82-1/4 (2090)		
LV11	80-1/4 (2039)		6-1/4 (160)		
LV12	82-1/4 (2090)				
SV2	Customer Secondary Circuit Drain Connection (Hose Bibb)	80-3/4 (2051)	27-3/8 (695)	3/4" GHT	

Notes:

1. Drawing not to scale. Tolerance on all piping dimensions is $\pm 1/2"$ (13mm).
2. Field drain line a minimum of $1/8"$ (3.2mm) per foot (305mm). Select appropriate drain system materials. The drain line must comply with all local codes.

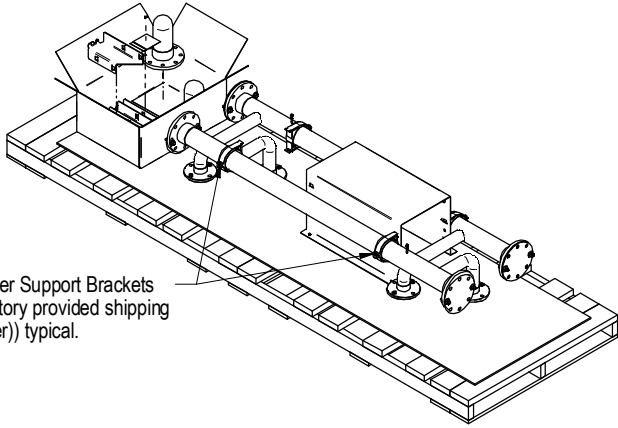
**PRIMARY CONNECTION LOCATIONS
(Bottom Fluid and Top Refrigerant) 400kW**

All dimensions from front corner of unit including panels

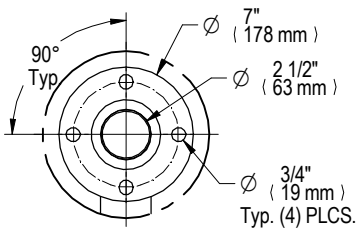
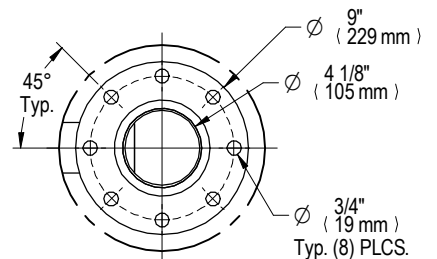
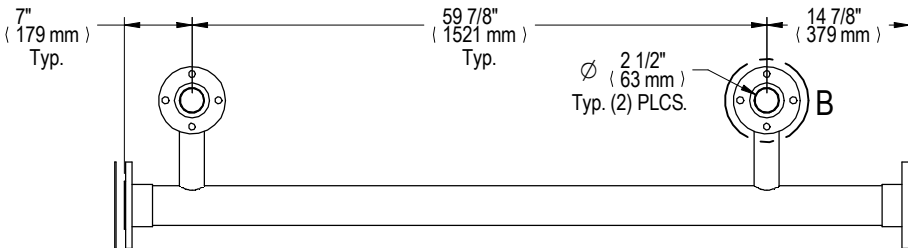
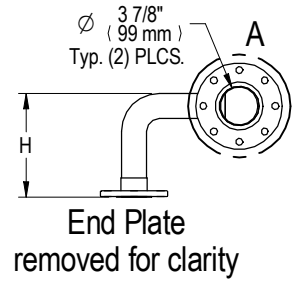
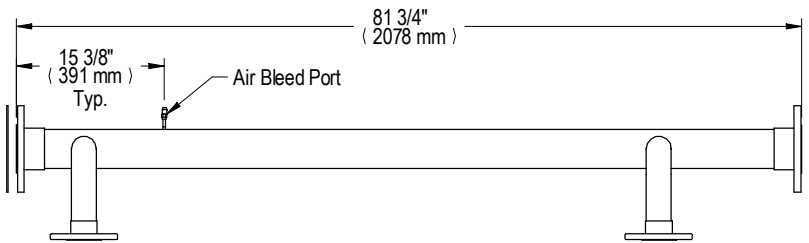
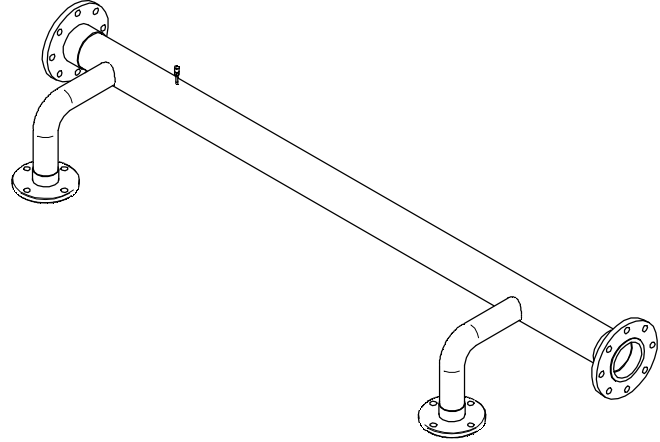


Module	POINT	DESCRIPTION	X in. (mm)	Z in. (mm)	Connection Size Opening
A	LV5	Electrical Connection (Low Volt Upper Front)	21-1/2 (545)	3-1/8 (81)	1-1/2"
	LV6		23-1/2 (596)		
	LV7		21-1/2 (545)	5-1/8 (132)	
	LV8		23-1/2 (596)		
	CWD1	Customer Secondary Circuit Drain Connection (Hose Bibb)	38 (966)	68 (1726)	3/4" GHT
CWR1	2-Way Chilled Water Return from Heat load	14-7/8 (377)	65-1/8 (1654)	2-1/2" (150 lb) Steel Pipe Flange	
CWS1	2-Way Chilled Water Supply to Heat Load				
B	LV13	Electrical Connection (Low Volt Upper Front)	81-3/8 (2066)	3-1/8 (81)	1-1/2"
	LV14		83-3/8 (2116)		
	LV15		81-3/8 (2066)	5-1/8 (132)	
	LV16		83-3/8 (2116)		
	CWD2	Customer Secondary Circuit Drain Connection (Hose Bibb)	97-7/8 (2487)	68 (1726)	3/4" GHT
	CWR2	2-Way Chilled Water Return from Heat load	74-3/4 (1899)	65-1/8 (1654)	2-1/2" (150 lb) Steel Pipe Flange
	CWS2	2-Way Chilled Water Supply to Heat Load			

**HEADER ASSEMBLY
400kW**



Factory provided Header Support Brackets and Clamps (reuse factory provided shipping clamps (two per Header)) typical.



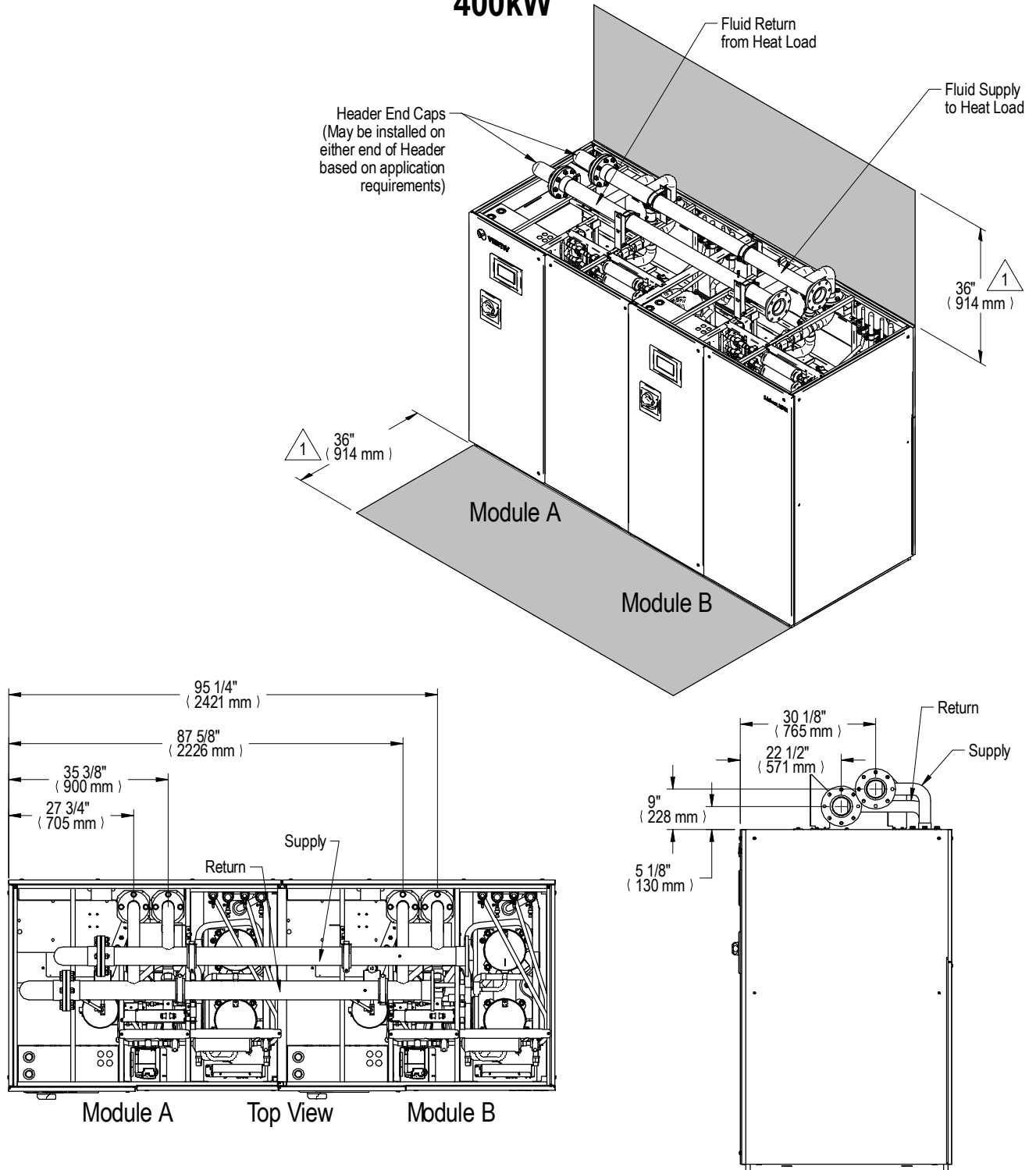
DETAIL B
Typ. (4) Places
2-1/2" (150lb)
Steel Pipe Flange
Connect to Liebert® XDM Unit

Header Assembly is shipped with one (1) Header end plate attached to Header at each end. End plates are not required during installation process. Gaskets and Caps are supplied in the ship loose box for field installation.

DETAIL A
Typ. (4) Places
4" (150lb)
Steel Pipe Flange
Connection to
Customer Heat Load

Header	Height "H" in. (mm)
Supply	10-3/4 (274)
Return	7 (177)

HEADER ASSEMBLY 400kW



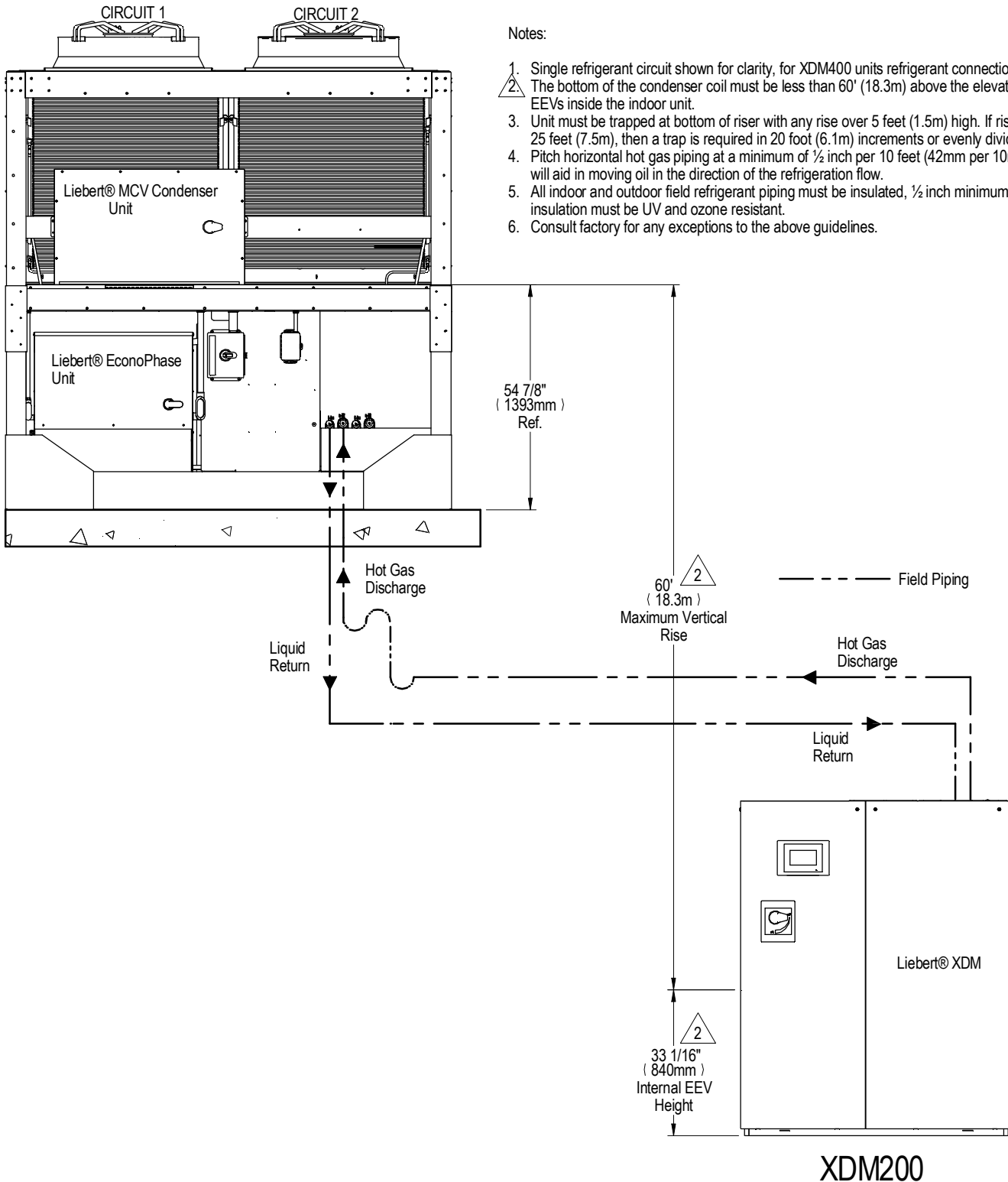
Notes:

1. Shaded areas indicate recommended minimum clearance for Vertical, and Front Service and Component access.

Right Side
View

AIR COOLED PIPING SCHEMATIC

LIEBERT® MCV WITHOUT RECEIVER MOUNTED ABOVE LIEBERT® XDM

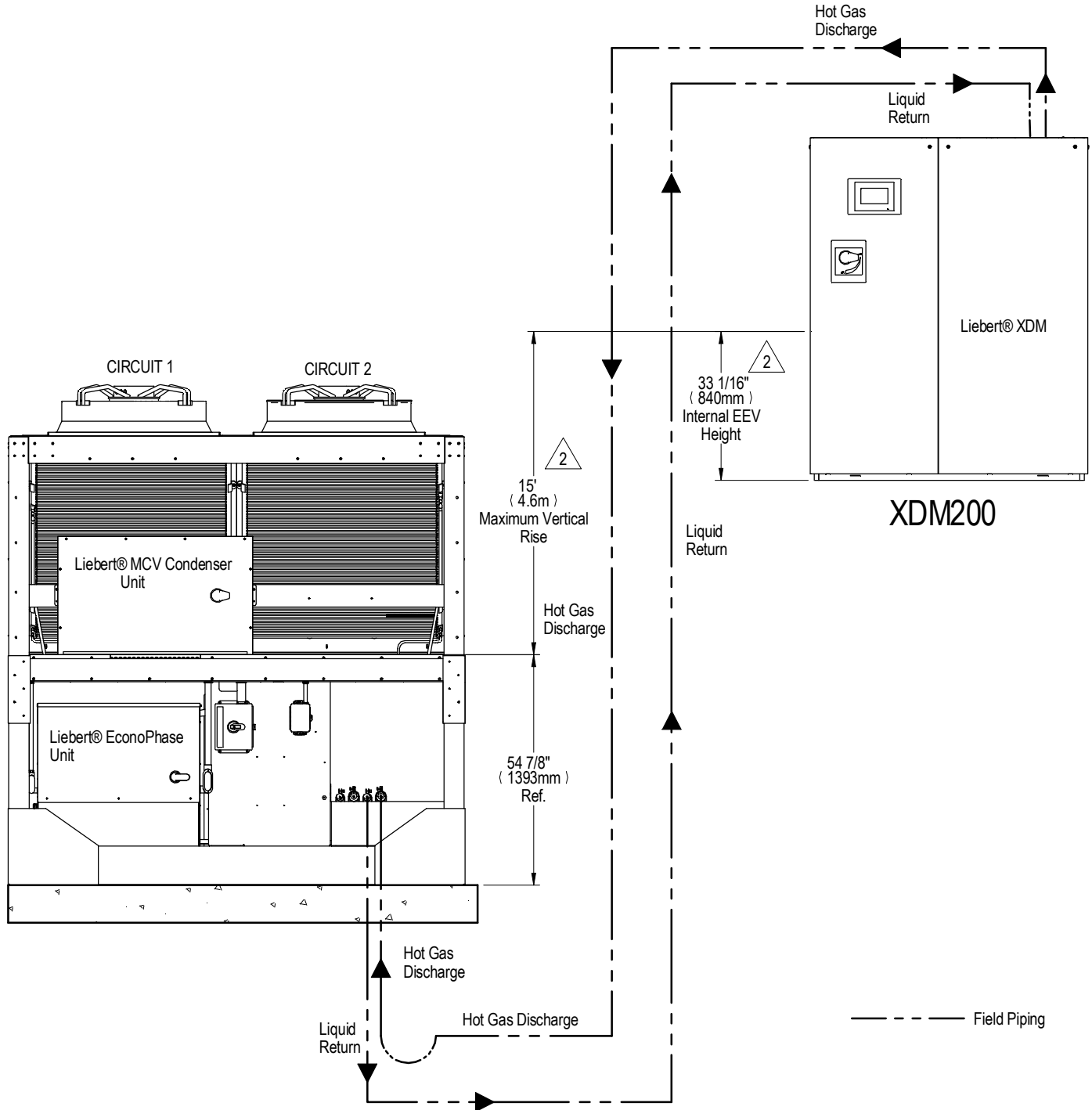


Notes:

1. Single refrigerant circuit shown for clarity, for XDM400 units refrigerant connections are typical.
2. The bottom of the condenser coil must be less than 60' (18.3m) above the elevation of the EEVs inside the indoor unit.
3. Unit must be trapped at bottom of riser with any rise over 5 feet (1.5m) high. If rise exceeds 25 feet (7.5m), then a trap is required in 20 foot (6.1m) increments or evenly divided.
4. Pitch horizontal hot gas piping at a minimum of 1/2 inch per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
5. All indoor and outdoor field refrigerant piping must be insulated, 1/2 inch minimum. All outdoor insulation must be UV and ozone resistant.
6. Consult factory for any exceptions to the above guidelines.

AIR COOLED PIPING SCHEMATIC

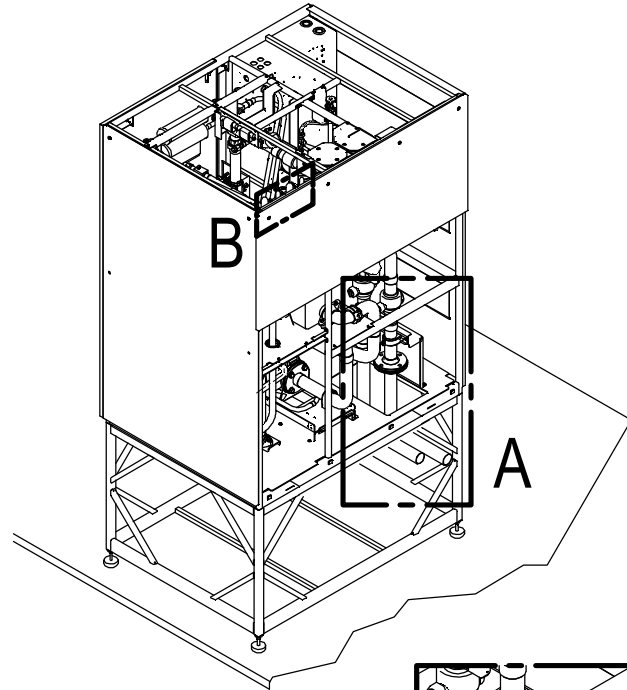
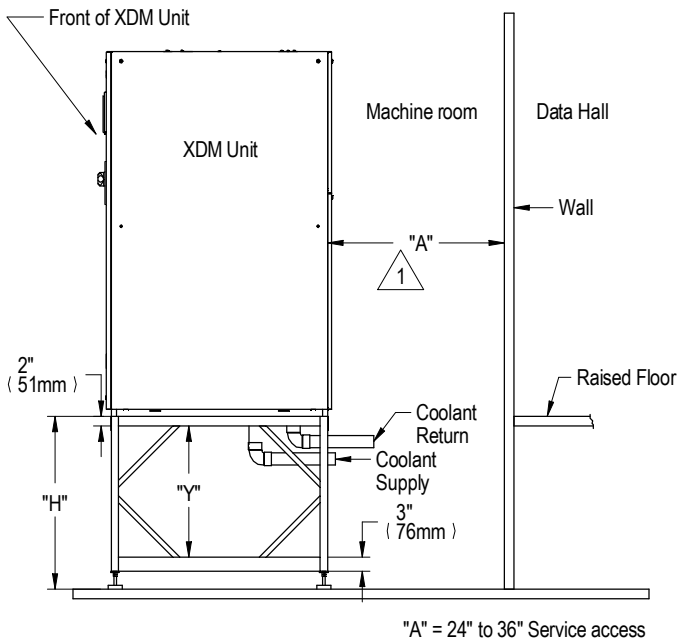
LIEBERT® MCV WITHOUT RECEIVER MOUNTED BELOW LIEBERT® XDM



Notes:

1. Single refrigerant circuit shown for clarity, for XDM400 units refrigerant connections are typical.
2. The bottom of the condenser coil cannot be more than 15' (4.6m) below the elevation of the EEVs inside the indoor unit.
3. Unit must be trapped at bottom of riser with any rise over 5 feet (1.5m) high. If rise exceeds 25 feet (7.5m), then a trap is required in 20 foot (6.1m) increments or evenly divided.
4. Pitch horizontal hot gas piping at a minimum of 1/2 inch per 10 feet (42mm per 10m) so that gravity will aid in moving oil in the direction of the refrigeration flow.
5. All indoor and outdoor field refrigerant piping must be insulated, 1/2 inch minimum. All outdoor insulation must be UV and ozone resistant.
6. Consult factory for any exceptions to the above guidelines.

**INSTALLATION AND SERVICE CLEARANCE DATA
200kW**

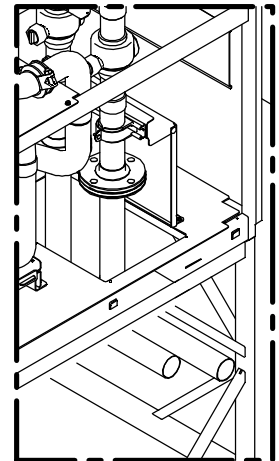


Wall not shown for clarity

Height in. (mm)	
H	Y
18 (457)	9 (229)
24 (610)	15 (381)
30 (762)	21 (533)
36 (914)	27 (686)
42 (1067)	33 (838)
48 (1219)	39 (991)



DETAIL B
REFRIGERANT CONNECTIONS



DETAIL A

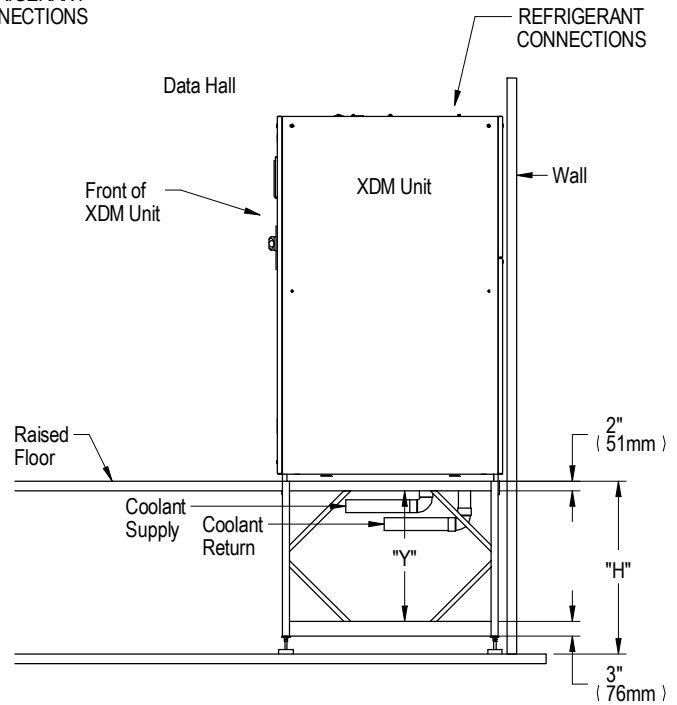
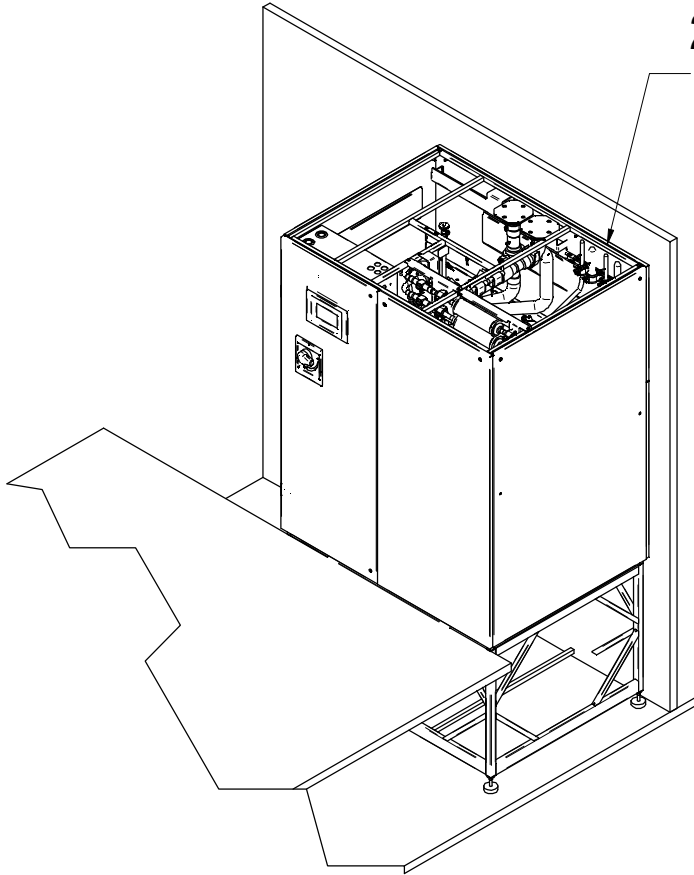
Notes:

1. Rear Service access requirement between "A" 24" (610 mm) to 36" (915mm).
2. "Y" = Vertical clearance between top and bottom floorstand tubing frame members.

INSTALLATION AND SERVICE CLEARANCE DATA

200kW

REFRIGERANT CONNECTIONS

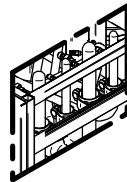
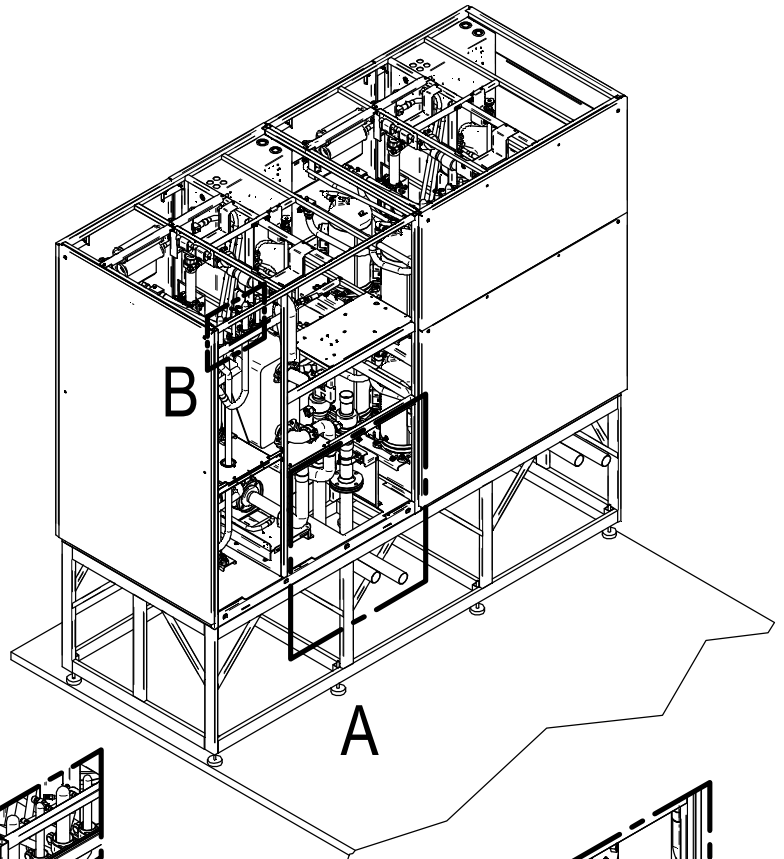
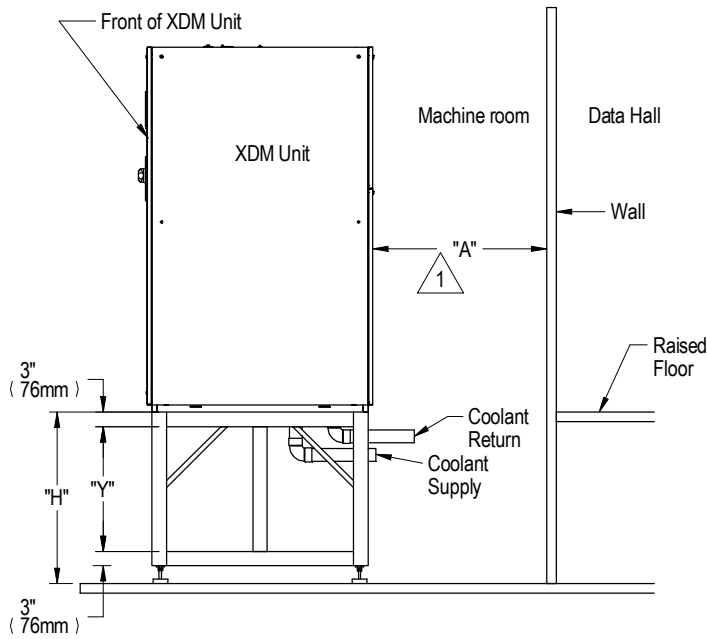


Height in. (mm)	
H	Y
18 (457)	9 (229)
24 (610)	15 (381)
30 (762)	21 (533)
36 (914)	27 (686)
42 (1067)	33 (838)
48 (1219)	39 (991)

Notes:

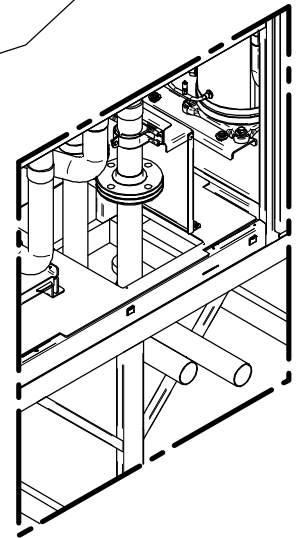
1. Rear Service access is not required..
2. "Y" = Vertical clearance between top and bottom floorstand tubing frame members.

**INSTALLATION AND SERVICE CLEARANCE DATA
400kW**



DETAIL B

TYPICAL
REFRIGERANT CONNECTIONS



DETAIL A

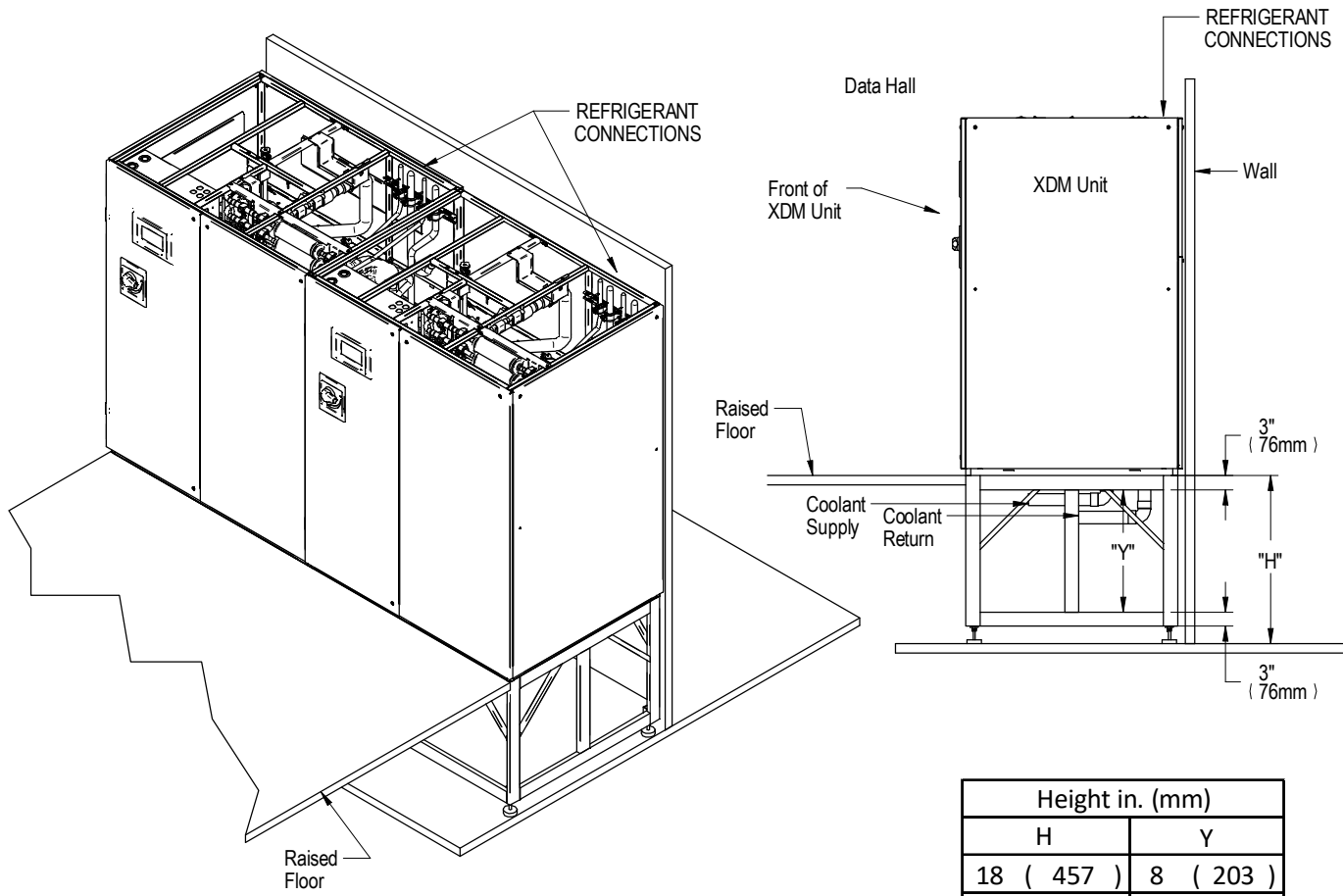
TYPICAL BOTTOM
WATER CONNECTIONS

Height in. (mm)	
H	Y
18 (457)	8 (203)
24 (610)	14 (356)
30 (762)	20 (508)
36 (914)	26 (660)
42 (1067)	32 (813)
48 (1219)	38 (965)

Notes:

1. Rear Service access requirement between "A" 24" (610 mm) to 36" (915mm).
2. "Y" = Vertical clearance between top and bottom floorstand tubing frame members.

INSTALLATION AND SERVICE CLEARANCE DATA
400kW



Height in. (mm)	
H	Y
18 (457)	8 (203)
24 (610)	14 (356)
30 (762)	20 (508)
36 (914)	26 (660)
42 (1067)	32 (813)
48 (1219)	38 (965)

Notes:

1. Rear Service access is not required..
2. "Y" = Vertical clearance between top and bottom floorstand tubing frame members.

ELECTRICAL FIELD CONNECTIONS

LIEBERT® XDM MODELS

STANDARD ELECTRICAL CONNECTIONS

- 1) High voltage entrance - Located in bottom and top of box (XDM200 quantity 4), (XDM400 quantity 8).
- 2) Low voltage entrance – Located in bottom and top of box (XDM200 quantity 4), (XDM400 quantity 8).
- 3) Three phase electrical service - Terminals are on top of disconnect switch. Three phase service not provided by Liebert.
- 4) Earth ground - Terminal for field supplied earth grounding wire and component ground terminal strip. Earth grounding required for Liebert units.
- 5) Unit factory installed disconnect switch and Main Fuses – Access to the high voltage electric panel compartment can be obtained only with the switch in the “off” position. Fused disconnects are provided with a defeater button that allows access to the electrical panel when power is on.
- 6) Remote unit shutdown - Replace existing jumper between terminals 37 & 38 with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 7) Customer alarm inputs - Terminals for field supplied, normally open contacts, having a minimum 75VA, 24VAC rating, between terminals 24 & 50, 51, 55, 56. Use field supplied Class 1 wiring. Terminal availability varies by unit options.
- 8) Common alarm - On any alarm, normally open dry contact is closed across terminals 75 & 76 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 9) Heat rejection interlock - On any call for compressor operation, normally open dry contact is closed across terminals 70 & 71 & 230 to heat rejection equipment. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 10) Unit-to-Unit – Plug 64 is reserved for U2U communication
- 11) Site and BMS – Plug 74 and terminal block 3 are reserved for Site and BMS connections. Plug 74 is an eight pin RJ45 for a Cat 5 cable. Terminal block 3 is a two position screw terminal block for use with twisted pair wires.

ELECTRICAL FIELD CONNECTIONS

LIEBERT® XDM MODELS

CANbus ELECTRICAL CONNECTIONS

- 12) CANbus Connector – Terminal block with terminals 49-1 (CAN-H) and 49-3 (CAN-L) + SH (shield connection). The terminals are used to connect the CANBus communication cable (provided by others) from the indoor unit to the Liebert® MCV Condenser skid
- 13) CANbus Cable – CANbus cable provided by others to connect to the outdoor condenser and optional PRE unit. No special considerations are required when the total external cable connection between the indoor unit and outdoor unit(s) is less than 450FT (137M). For total external cable connections greater than 450FT (137M). For external cable connections greater than 450FT (137M), but less than 800FT (243M) a CANbus isolator is required (Contact Factory).

Cable must have the following specifications:

- Braided shield or foil shield with drain wire
- Shield must be wired to ground at indoor unit
- 22-18AWG stranded tinned copper
- Twisted pair (minimum 4 twists per foot)
- Low Capacitance (15pF/FT or less)
- Must be rated to meet local codes and conditions
- EXAMPLES BELDEN 89207 (PLENUM RATED), OR ALPHA WIRE 6454 CATEGORY 5, 5E, OR HIGHER
- Do not run in same conduit, raceway, or chase as high voltage wiring.
- For CANbus network lengths greater than 450FT (137M) call Factory.

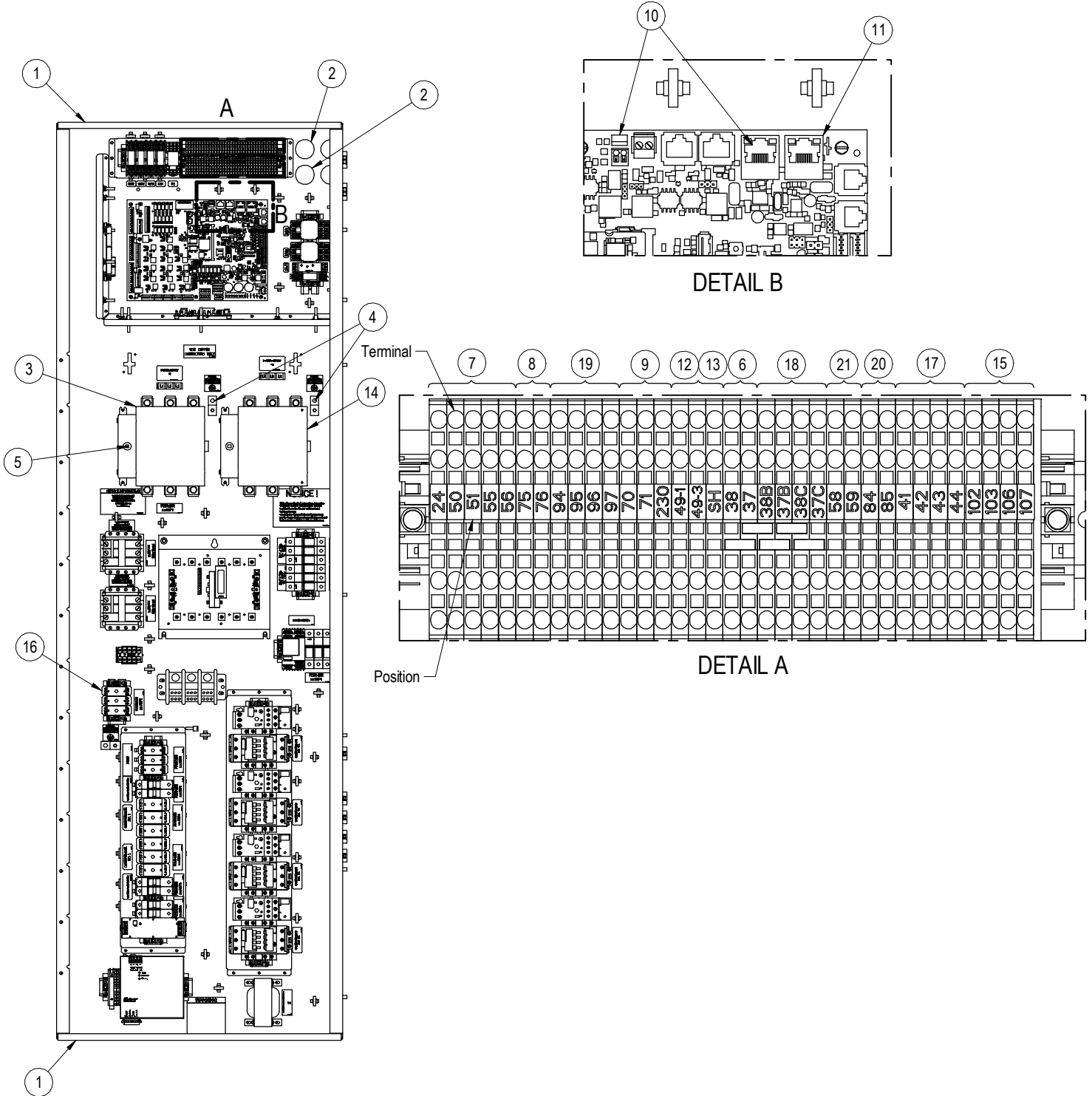
OPTIONAL ELECTRICAL CONNECTIONS

- 14) Secondary Disconnect Switch and Earth Ground – Fuses are included in the 65KAIC SCCR fused disconnect switch models.
- 15) Reverse Starter contacts - Normally open dry contact is closed across terminals 102 & 103 for power supply 1 and 106 & 107 for power supply 2 to indicate the active power feed. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 16) Heat Rejection Power Connection- Terminals are on bottom of fuse block. Use field supplied wiring per local codes for connection to Heat Rejection unit.
- 17) Analog inputs- Terminals 41, 42, 43, and 44 are user configurable for 0-10V, 0-5V, or 4-20MA.

OPTIONAL LOW VOLTAGE TERMINAL PACKAGE CONNECTIONS

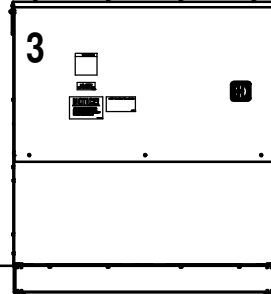
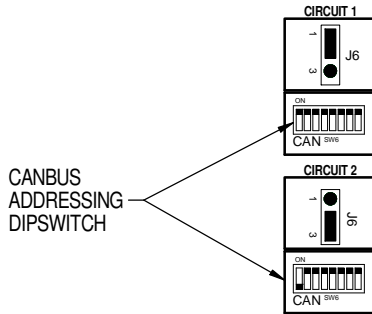
- 18) Remote unit shutdown - Two additional contact pairs available for unit shutdown (labeled as 37B & 38B, 37C & 38C). Replace jumpers with field supplied normally closed switch having a minimum 75VA, 24VAC rating. Use field supplied Class 1 wiring.
- 19) Common alarm - On any alarm, two additional normally open dry contacts are closed across terminals 94 & 95 and 96 & 97 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 20) Pump enabled contact - On VFD enable, normally open dry contact is closed across terminals 84 & 85 for remote indication. 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.
- 21) Liebert® LiquiTect™ shutdown and dry contact – On Liebert® LiquiTect™ activation, normally open dry contact is closed across terminals 58 & 59 for remote indication (Liebert® LiquiTect™ sensor ordered separately). 1 AMP, 24VAC max load. Use Class 1 field supplied wiring.

ELECTRICAL FIELD CONNECTIONS LIEBERT® XDM MODELS



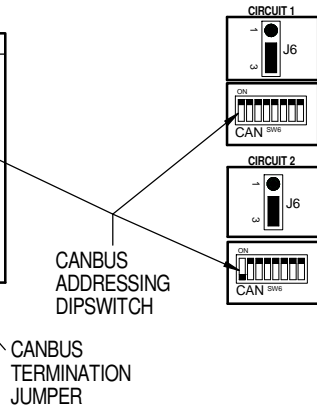
CANbus & INTERLOCK CONNECTIONS LIEBERT® MCV + LIEBERT® ECONOPHASE + BASE ASSEMBLY

ECONOPHASE CONTROL BOARDS (FACTORY SET)



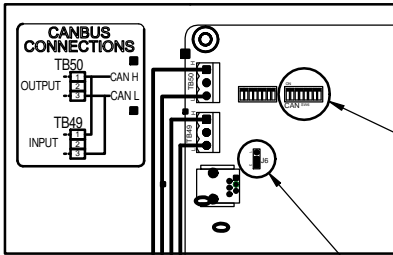
LIEBERT® ECONOPHASE UNIT

CONDENSER CONTROL BOARDS (FACTORY SET)



CANBUS COMMUNICATION CABLE

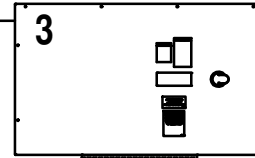
LIEBERT® MCV CONDENSER



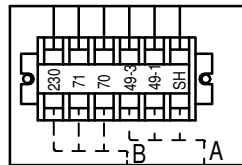
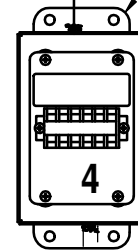
DETAIL 3
JUMPER AND DIPSWITCH LOCATION

CANBUS TERMINATION JUMPER

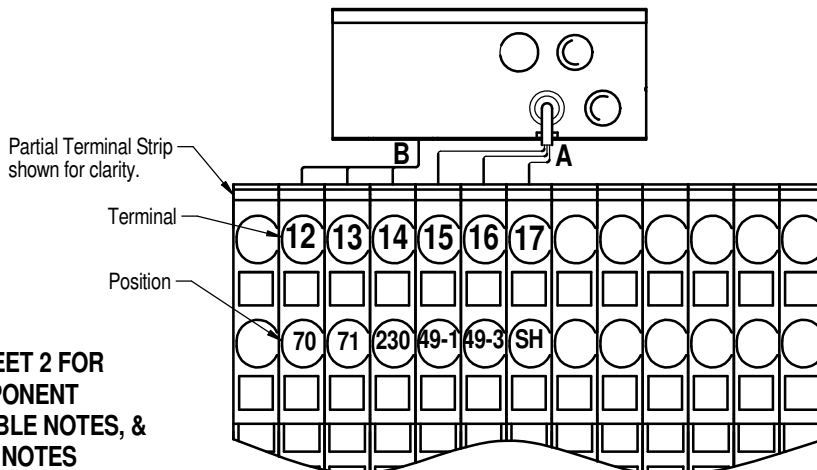
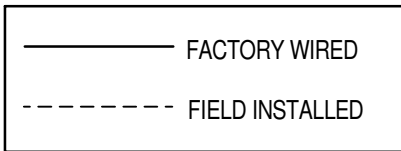
NOTE:
ONE Liebert® XDM system shown for simplicity.



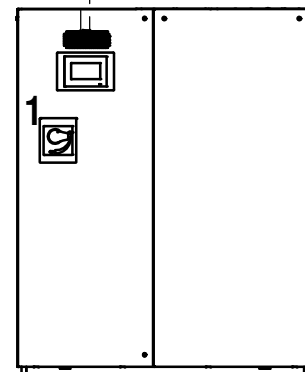
LOW VOLTAGE JUNCTION BOX



DETAIL 4 LOW VOLTAGE JUNCTION BOX



DETAIL 1 CANBUS CABLE CONNECTION (A)



INDOOR LIEBERT® XDM UNIT

SEE SHEET 2 FOR
COMPONENT
NOTES, CABLE NOTES, &
WIRE NOTES



LIEBERT® XDM

CANbus & INTERLOCK CONNECTIONS

LIEBERT® MCV + LIEBERT® ECONOPHASE + BASE ASSEMBLY

COMPONENT NOTES:

1. COMPONENT APPEARANCE, ORIENTATION, AND POSITION MAY VARY BETWEEN PRODUCT LINES. TERMINAL NAMES REMAIN CONSTANT.
2. ALL CIRCUITS TO THESE CONNECTION POINTS REMAIN CONSTANT.

CAN & CABLE NOTES (A):

1. CABLE MUST HAVE THE FOLLOWING SPECIFICATIONS:
 - BRAIDED SHIELD OR FOIL SHIELD WITH DRAIN WIRE
 - SHIELD MUST BE WIRED TO GROUND AT INDOOR UNIT
 - 22-18AWG STRANDED TINNED COPPER
 - TWISTED PAIR (MINIMUM 4 TWISTS PER FOOT)
 - LOW CAPACITANCE (15pF/FT OR LESS)
 - MUST BE RATED TO MEET LOCAL CODES AND CONDITIONS.
 - EXAMPLES BELDEN 89207 (PLENUM RATED), OR ALPHA WIRE 6454 CATEGORY 5, 5E, OR HIGHER.
2. DO NOT RUN IN SAME CONDUIT, RACEWAY, OR CHASE AS HIGH VOLTAGE WIRING.
3. FOR CANBUS NETWORK LENGTHS GREATER THAN 450FT(137M), CONTACT LIEBERT FACTORY.

INTERLOCK WIRE NOTES (B):

1. FIELD SUPPLIED WIRE
 - 3 CONDUCTOR 18AWG OR GREATER
 - RATED 600V
2. RUN FIELD SUPPLIED WIRES BETWEEN THE INDOOR UNIT AND THE LOW VOLTAGE JUNCTION BOX.



LIEBERT® XDM

ELECTRICAL DATA

Single Disconnect		
Unit Voltage Rating		XDM200
460V/60Hz 7.5HP	FLA	91.8
	WSA	97.0
	OPD	110
460V/60Hz 5.0HP	FLA	88.7
	WSA	93.9
	OPD	110

FLA = Full Load Amps; WSA = Wire Size Amps; OPD = Maximum Overcurrent Protection Device
 Note: The XDM400 consists of two separate XDM200 electrical feeds.

Dual Disconnect (Rev Starter, Cap Buffer, and Cond Sub-feed)			
Unit Voltage Rating		XDM200 + MCV330 + PRE	XDM200 + MCV440 + PRE
460V/60Hz 7.5HP	FLA	108.6	114.2
	WSA	113.8	119.4
	OPD	125	125
460V/60Hz 5.0HP	FLA	105.5	111.1
	WSA	110.7	116.3
	OPD	125	125

FLA = Full Load Amps; WSA = Wire Size Amps; OPD = Maximum Overcurrent Protection Device
 Note: The XDM400 consists of two separate XDM200 electrical feeds.

Connect with Vertiv on Social Media



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



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



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



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



Vertiv.com | Vertiv Headquarters, 505 N. Cleveland Ave., Westerville, OH 43082, USA

© 2023 Vertiv Group Corp. All rights reserved. Vertiv™ and the Vertiv logo are trademarks or registered trademarks of Vertiv Group Corp. All other names and logos referred to are trade names, trademarks or registered trademarks of their respective owners. While every precaution has been taken to ensure accuracy and completeness here, Vertiv Group Corp. assumes no responsibility, and disclaims all liability, for damages resulting from use of this information or for any errors or omissions.

SL-70597_REVD_07-23