

Precision Cooling
For Business-Critical Continuity™

Liebert® XDH™
User Manual - 50 & 60Hz



GENERAL SAFETY GUIDELINES



WARNING

Risk of top-heavy unit falling over. Can cause death or injury.

Improper handling can cause equipment damage, injury, or death. Read all of the following instructions before attempting to move, lift, remove packaging from the unit, or preparing unit for installation.



WARNING

Risk of explosive discharge. Can cause death or injury.

This unit contains fluids and/or gases under high pressure. Relieve system pressure before cutting into or disconnecting piping or piping components.



WARNING

Risk of high-speed moving parts. Can cause death or injury.

Disconnect all local and remote electric power supplies before working in the unit.



WARNING

Risk of electric shock. Can cause death or injury.

Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the unit before working within.



CAUTION

Risk of overhead interference. Can damage unit or structure.

The unit may be too tall to fit through a doorway while on the skid. Measure the unit and doorway heights and refer to the installation plans before moving the unit to verify clearances.



CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare unit for installation.



CAUTION

Risk of improper operation and overpressurization. Can result in injury or property damage. Only qualified personnel trained in HVAC installation or service should install or service this equipment.

Read all installation, operating and safety instructions before proceeding.

Fluorinated Greenhouse Gas Requirements—European Union

Stationary air conditioning, refrigeration, heat pump equipments and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R134a, R410A, must comply with the F-Gas Regulation: (EC) No. 842/2006 (F-gas). The regulation prohibits, among other actions, venting fluorinated greenhouse gases to the atmosphere.

The F-Gas Regulation also requires operators to use all measures that are technically feasible and do not entail disproportionate cost to prevent leakage of these gases, to test for leakage regularly and to recover f-gas during equipment service and maintenance and before disposing of equipment.

Refer to the full regulation for additional details.

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1.0 LIEBERT XDH COMPONENT LOCATIONS AND MODEL NUMBER NOMENCLATURE

Figure 1 Liebert XDH component locations

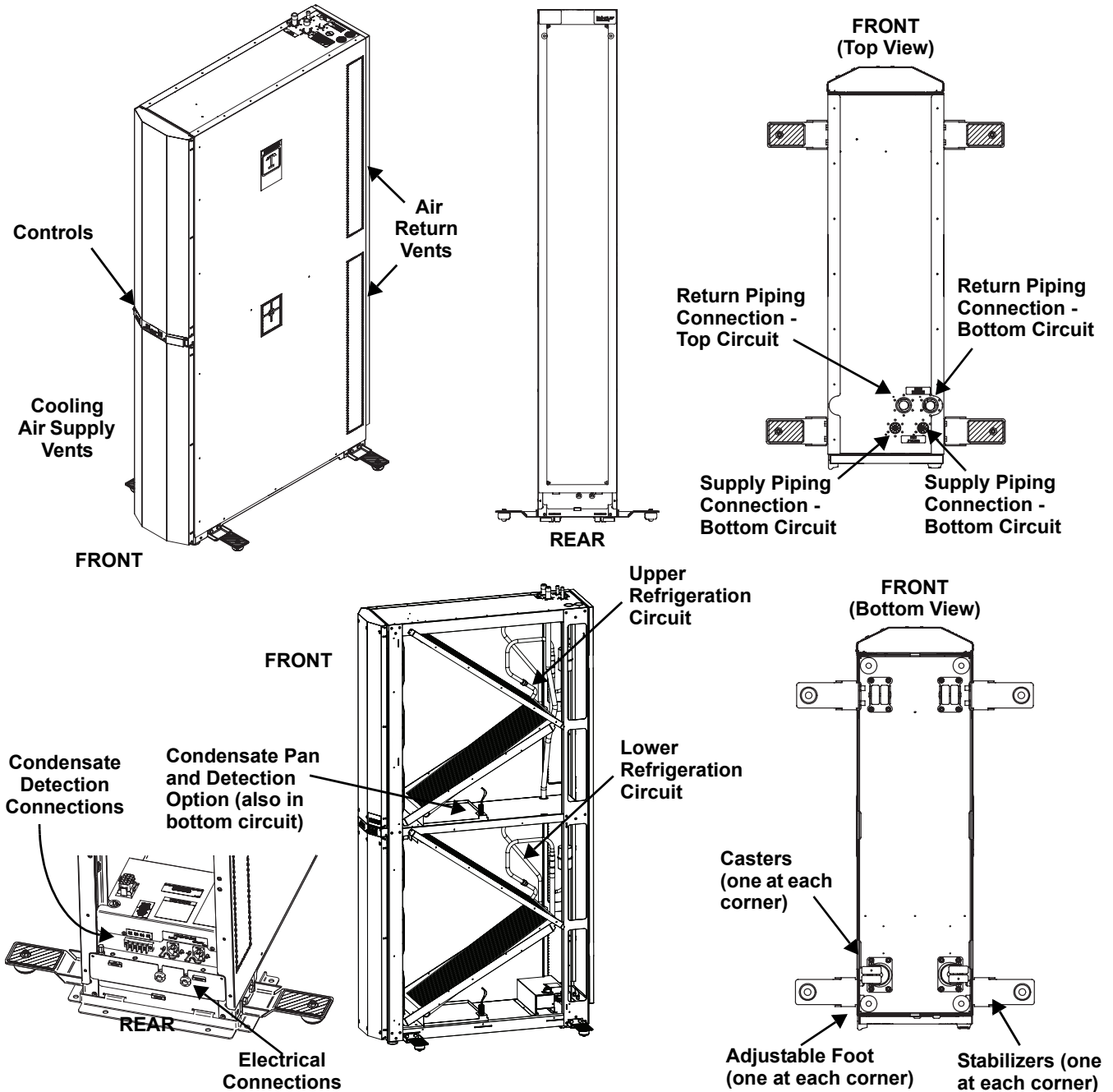
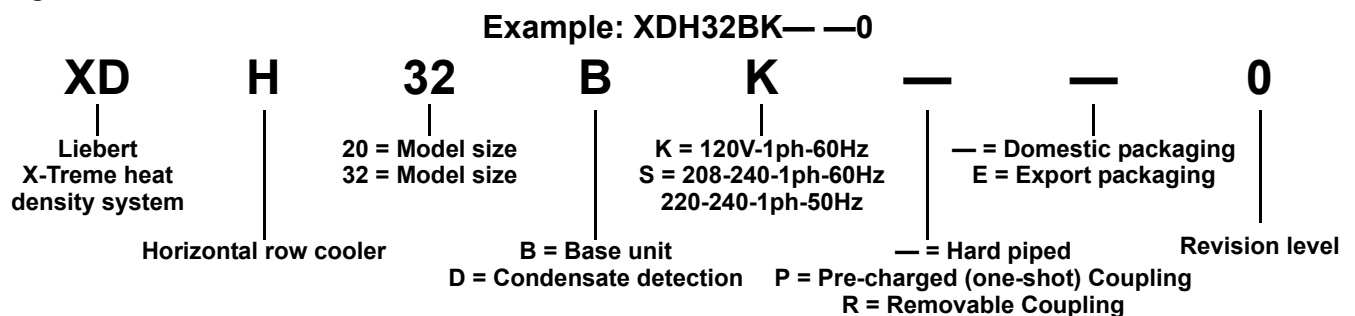


Figure 2 Liebert XDH model number nomenclature



2.0 INTRODUCTION

2.1 Product Description

The Liebert XDH cooling module is designed to be placed within a row of server enclosures in a hot-aisle-cold-aisle arrangement. The Liebert XDH, available in a half-rack-width unit, is intended for use with a Liebert XD pumped refrigerant cooling system, supplied by either a Liebert XDP or Liebert XDC.

Warmer air from the enclosures is drawn in through the rear of the Liebert XDH, cooled and blown into the cold aisle in a diffuse pattern. The cooling air is then drawn into the enclosures to cool the equipment.

The Liebert XDH has dual refrigeration circuits, one in the upper half of the unit and the other in the lower half. This permits increasing and decreasing cooling levels in response to server room conditions. The dual refrigeration circuits permits interlaced connection of two Liebert XD refrigerant sources to enhance system reliability.

Controls on the front of the Liebert XDH permit independent operation of the two banks of fans. Dual power connections ensure continued fan operation if one of two electrical sources fails.

The Liebert XDH is intended for use in low-humidity environments and does not need a drain connection. A condensate pan under each refrigeration unit collects the small amount of moisture expected in the server room. An optional, factory-installed condensate detection system is available. The Liebert XDH is available with uni-directional or bi-directional air diffusers.

2.2 References

This document must be used together with site specific documentation and documentation for other parts of the system.

2.3 Pre-Installation Checks

- Verify that the Liebert XDH voltage matches the available utility power. The serial tag with this information is accessible by opening the Liebert XDH's rear door. The tag is on a shelf near the Liebert XDH's midline.
- Check the received materials to be sure all required assemblies and parts have been received. If you discover any external damage, report it to the shipping company and your local Liebert representative.

2.4 Parts Included With the Liebert XDH

- User manual (this document)
- Liebert XDH module
- Power cords
- Shipping/floor mounting brackets
- Tie-down bracket assembly
- Diffusers (top and bottom)

2.5 Installation Considerations

The Liebert XDH is designed for placement within a row of computer cabinets in the data center in a hot-aisle-cold-aisle arrangement. The Liebert XDH is 12" (305mm) wide, so it takes up little space. For installation arrangement, see **4.2 - Installing the Liebert XDH Within the Enclosure Row**. Be sure to follow all applicable codes.

Determine whether the Liebert XDH includes the condensate detection option (factory-installed). This option will require separate low voltage connections to a monitoring unit. A front panel alarm and indicator alert the user to condensation inside the unit. To minimize the possibility of condensation, insulate all piping between the Liebert XDH and the Liebert XDP or Liebert XDC.

If the Liebert XDH is installed at the end of a row, Liebert recommends using uni-directional air diffusers to direct cooling air into the cold aisle, toward the equipment racks. If the Liebert XDH is installed between racks within a row, Liebert recommends using bi-directional air diffusers, directing the cooling air toward the equipment racks on either side of the Liebert XDH.

Table 1 Application limits

Input Voltage		Range of Return Air Conditions to Unit	
Minimum	Maximum	Dry Bulb Temperature	Relative Humidity
-10%	+10%	60° to 100°F (16° to 38°C)	20% to 80%

2.5.1 Room Preparation

The room should be well-insulated and must have a sealed vapor barrier. The vapor barrier in the ceiling and walls can be a polyethylene film. Paint on concrete walls and floors should contain either rubber or plastic.



NOTE

The vapor barrier is the single most important requirement for maintaining environmental control in the conditioned space.

Outside or fresh air should be kept to a minimum when temperature and humidity must be tightly controlled. Outside air adds to the cooling, heating, dehumidifying and humidifying loads of the site. Doors should be properly sealed to minimize leaks and should not contain ventilation grilles.

3.0 GENERAL PRODUCT INFORMATION

3.1 Product/System Description

The Liebert XDH is designed for placement within a row of computer cabinets in the data center in a hot-aisle-cold-aisle arrangement to maximize the Liebert XDH's cooling: The unit takes in hot air through the rear from the hot aisle, cools the air by air-to-fluid heat exchangers and discharges the air through the front of the unit into the cold aisle.

Chilled R-134a refrigerant is provided to the Liebert XDH by a Liebert XD Pumping unit (Liebert XDP) or by a Liebert XD Chiller (Liebert XDC). The Liebert XDH may be installed in a Liebert XD piping system that includes other Liebert XD cooling modules, such as the Liebert XDO, Liebert XDV or Liebert XD CoolFrame.

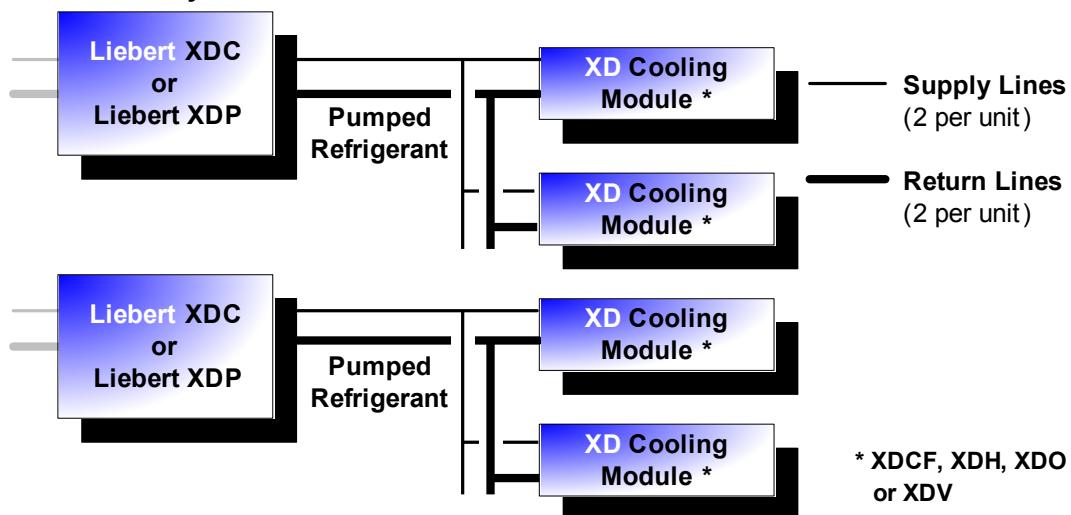
Replaceable front panels on the Liebert XDH may be customized to match the appearance of various computer manufacturer's equipment, allowing the Liebert XDH to blend in with adjacent server equipment and enclosures. Air diffusers are available to direct cooling air for more efficient cooling, depending on the Liebert XDH's positioning in a row or at the end of a row.

The Liebert XDH is not expected to produce any condensation because of its location, usually in the data center. A condensate pan is provided as a precaution. It does not have a drain fitting or other means of being emptied.

A Liebert Liqui-TECT moisture detection device and a contact-closure output are available as an option. These options detect condensation in the Liebert XDH's catch pan and connect to a monitoring or alarm system. A front panel alarm and indicator alert the user to condensation inside the unit.

The complete cooling system consists of Liebert XDH modules, Liebert XDP or Liebert XDC pumped refrigerant distribution units, power and signal cabling and interconnecting piping, see **Figure 3** below.

Figure 3 Liebert XDH hydraulic schematic



3.2 Checking and Unpacking

When the Liebert XDH is delivered, inspect all items for either visible or concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Liebert or to your sales representative. If you later find any concealed damage, report it to the shipping company and your local Liebert representative.

Check to be sure all required assemblies and parts have been received.

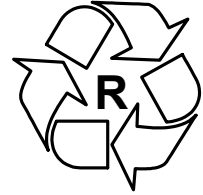
The Liebert XDH is shipped in protective packaging and secured to a pallet (see **Figure 5**). Do not remove these protective items from the Liebert XDH before it is at the installation location. When unpacking and handling the Liebert XDH, exercise extra care to prevent damage.

3.3 Equipment Inspection

Upon arrival of the unit, and before unpacking, verify that the labeled equipment matches the Bill of Lading. Inspect all items for visible and concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Liebert Corporation or to your sales representative.

3.3.1 Recyclable Packaging

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



WARNING

Risk of top-heavy unit falling over. Can cause death, injury and equipment damage.

Read all of the following instructions before attempting to move, lift, remove packaging from the unit, or preparing unit for installation.



CAUTION

Risk of overhead interference. Can damage unit or structure.

The unit may be too tall to fit through a doorway while on the skid. Measure the unit and doorway heights and refer to the installation plans before moving the unit to verify clearances.



CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare unit for installation.



CAUTION

Risk of damage from forklift. Can cause exterior and/or underside damage.

Keep tines of the forklift level and at a height suitable to fit below the skid.

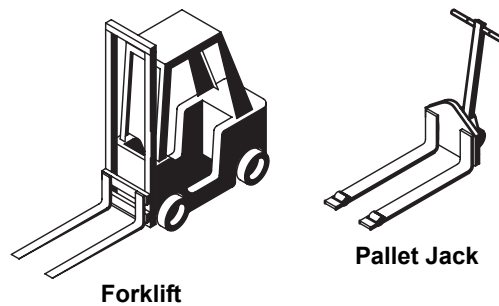


CAUTION

Risk of hazardous environments. Can cause unit damage.

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

Figure 4 Recommended unit handling equipment



3.3.2 Unit Handling

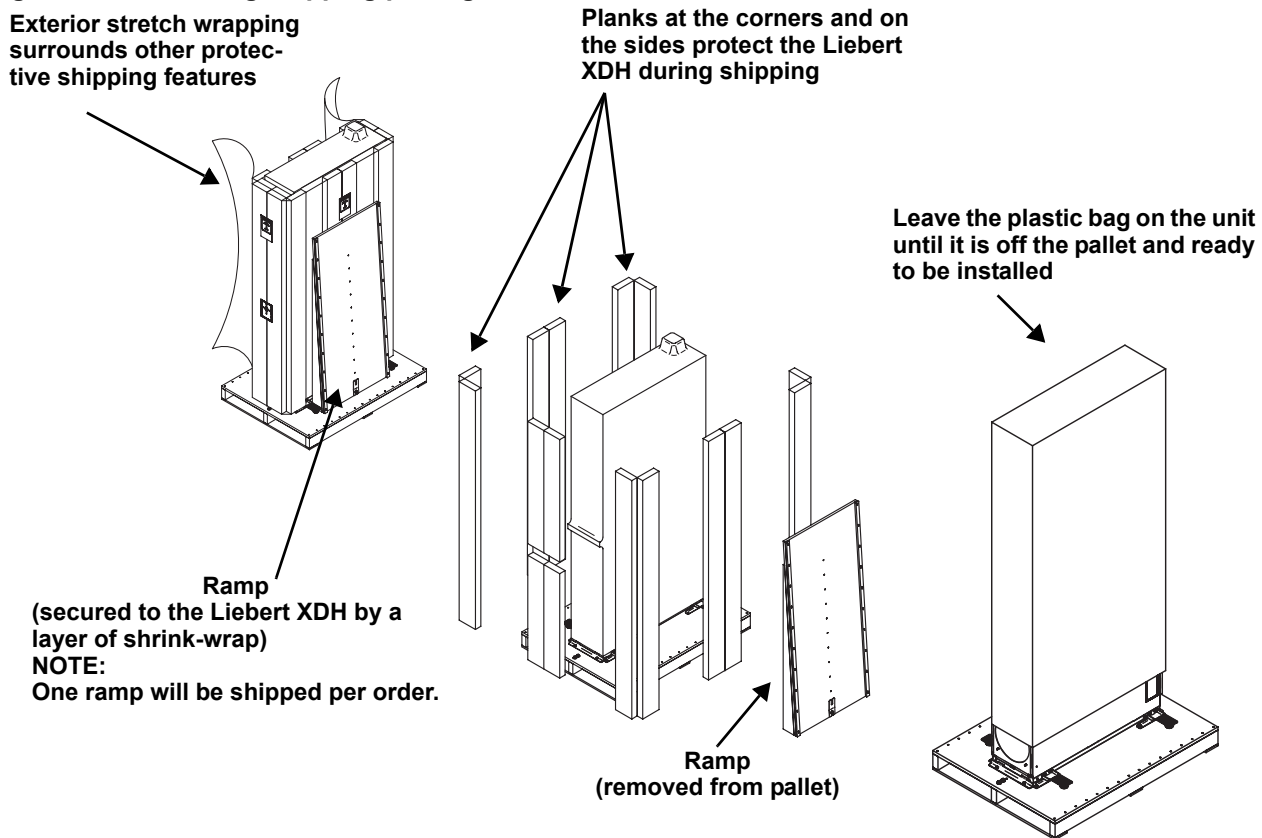
If possible, transport the unit using a forklift or pallet jack.

- If using a forklift or pallet jack, ensure that the fork tine length is suitable to safely move the packaged unit.
- Liebert recommends keeping the unit in the protective packaging until it has been moved to the installation site.
- When handling and unpacking the unit, exercise great care to prevent damage.
- Do not lift the unit any higher than 6" (152mm) while moving it. If it must be lifted higher than 6" (152mm), exercise great care and keep all personnel who are not helping move the unit at least 20' (5m) away from the unit.
- The Liebert XDH ships with four outrigger-style wheels to permit rolling it into position. Liebert recommends using a forklift or pallet jack to move the Liebert XDH as near as practical to its installation site before removing it from the shipping pallet.

3.3.3 Unpacking the Unit

1. Remove the exterior stretch-wrap packaging from around the unit, exposing the protective corner and side packaging planks.
2. Remove the ramp, corner and side packaging planks from the unit, exposing the bag over the unit. Remove the bag when ready to install the Liebert XDH.

Figure 5 Removing shipping package



3.3.4 Taking the Unit off the Pallet



WARNING

Risk of unsecured unit rolling off pallet. Can cause equipment damage, injury or death.

The Liebert XDH is on casters. Ensure that the unit/skid is located on a flat surface before loosening the hardware securing the Liebert XDH to its shipping pallet.

The Liebert XDH ships with four outrigger-style wheels to permit rolling it into position for installation. Liebert recommends using a forklift or pallet jack to move the Liebert XDH as near as practical to its installation site before removing it from the shipping pallet.

1. Locate the ramp that was shipped with the Liebert XDH (see **Figure 5**).
2. Loosen the hex screw on the ramp and remove the metal bracket (see **Figure 6**).
3. Rotate the metal bracket 180 degrees and insert the shortest slot of the metal bracket under the hex screw head and tighten the hex screw.
4. Loosen the two hex screws on the skid.
5. Align the ramp and the metal bracket with the skid. Ensure that the ramp is in contact with the skid (see **Figure 7**).
6. Insert the opposite end of the metal bracket under the hex screws on the skid. (see **Figure 7**)
7. Tighten the hex screws on the skid.
8. Remove the six hex screws from each of the two tie-down brackets, one located on either end of the Liebert XDH. (see **Figure 7**).
9. Remove the two tie-down brackets.
10. At least two properly trained personnel may roll the Liebert XDH down the ramp and off the pallet onto a flat surface.

Figure 6 Prepare ramp to remove the Liebert XDH from shipping pallet

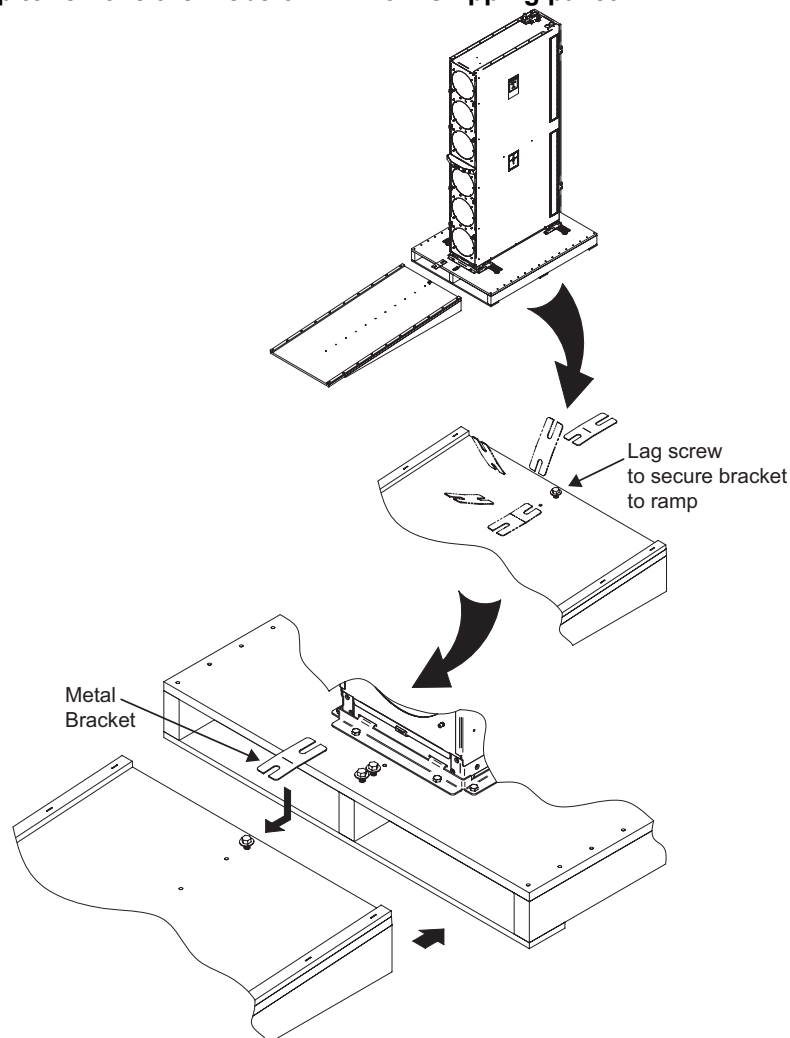
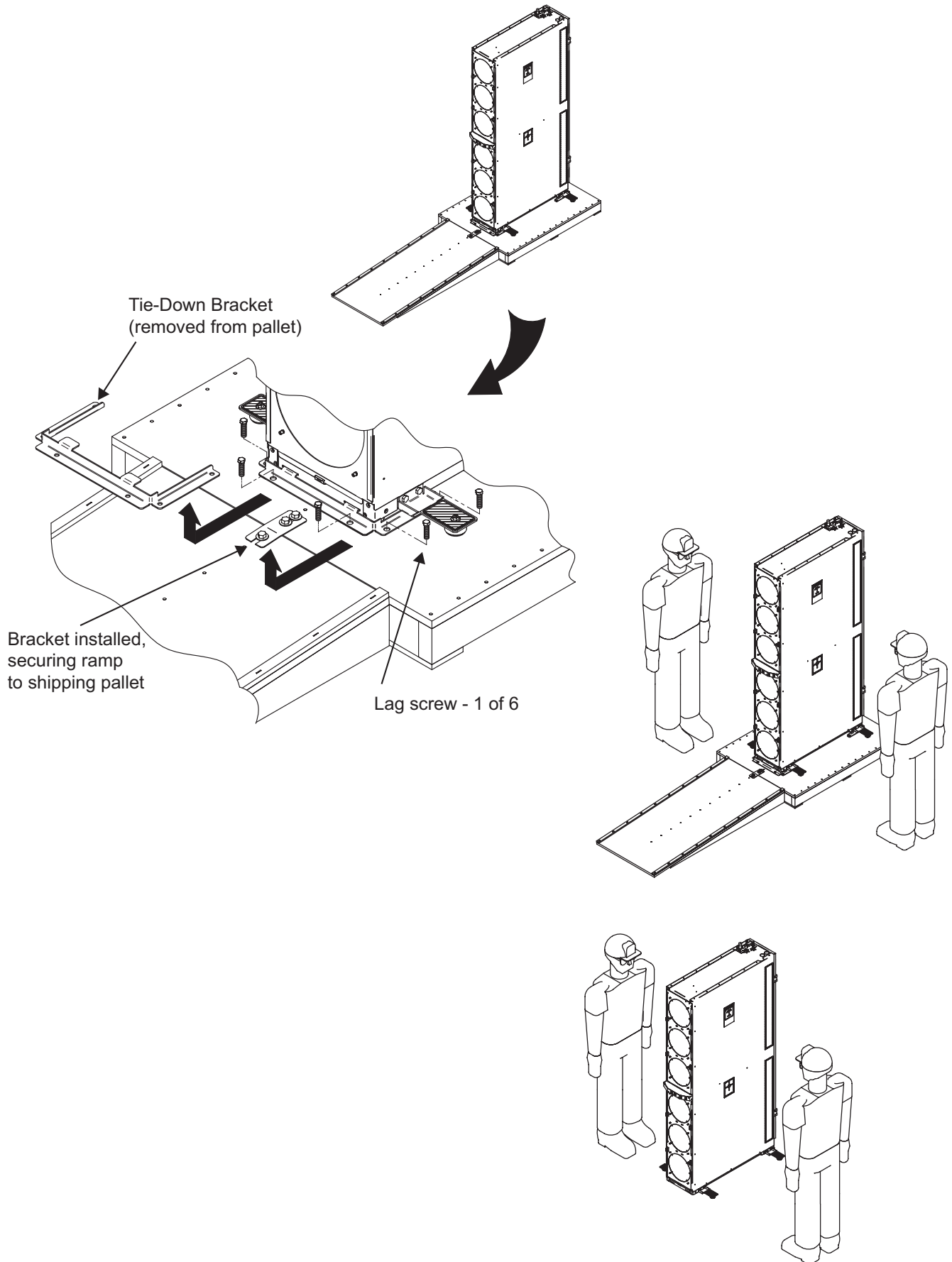


Figure 7 Attaching ramp, removing the Liebert XDH from pallet



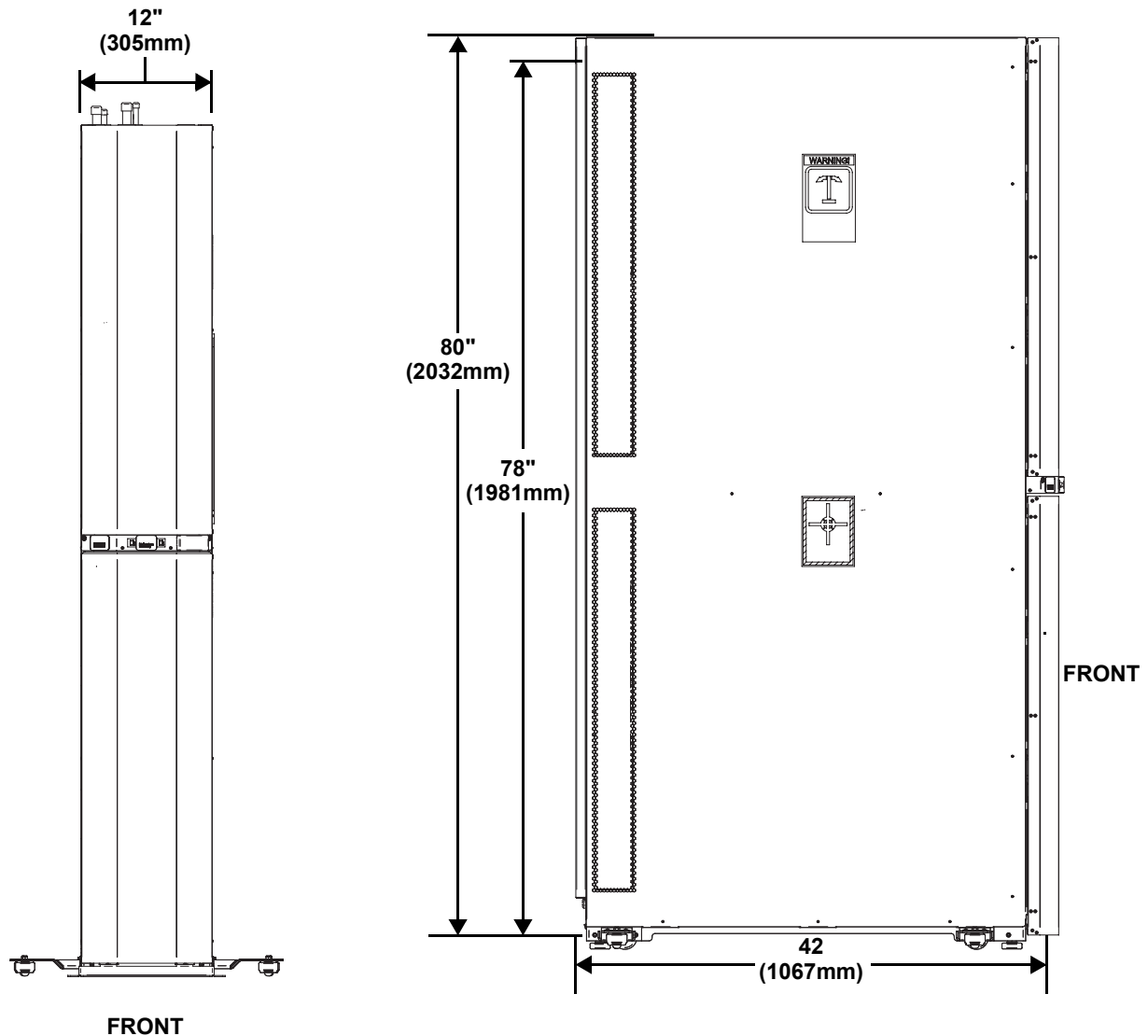
4.0 MECHANICAL CONSIDERATIONS

4.1 Determining Placement in the Conditioned Space

The Liebert XDH units should be placed among the cabinets that generate the greatest amount of heat. If heat loads are dispersed evenly throughout the room, the Liebert XDH modules may be spread out accordingly.

The Liebert XDH is engineered to fit among computer enclosure cabinets. **Figure 8**, below, illustrates the unit's dimensions.

Figure 8 Liebert XDH dimensions



4.2 Installing the Liebert XDH Within the Enclosure Row

Built-in casters allow rolling the Liebert XDH into position for installation. Stabilizers reduce the likelihood of the unit tipping over. These stabilizers must be removed before the unit is positioned in the row. Adjustable leveling feet prevent it from moving after positioning.

Once positioned, the Liebert XDH must be secured either to the floor with the included shipping brackets or to an adjacent cabinet. An adjustable bracket (Liebert P/N 187642G1) for attaching the Liebert XDH to an adjacent cabinet is included with each unit.

4.2.1 Airflow Direction

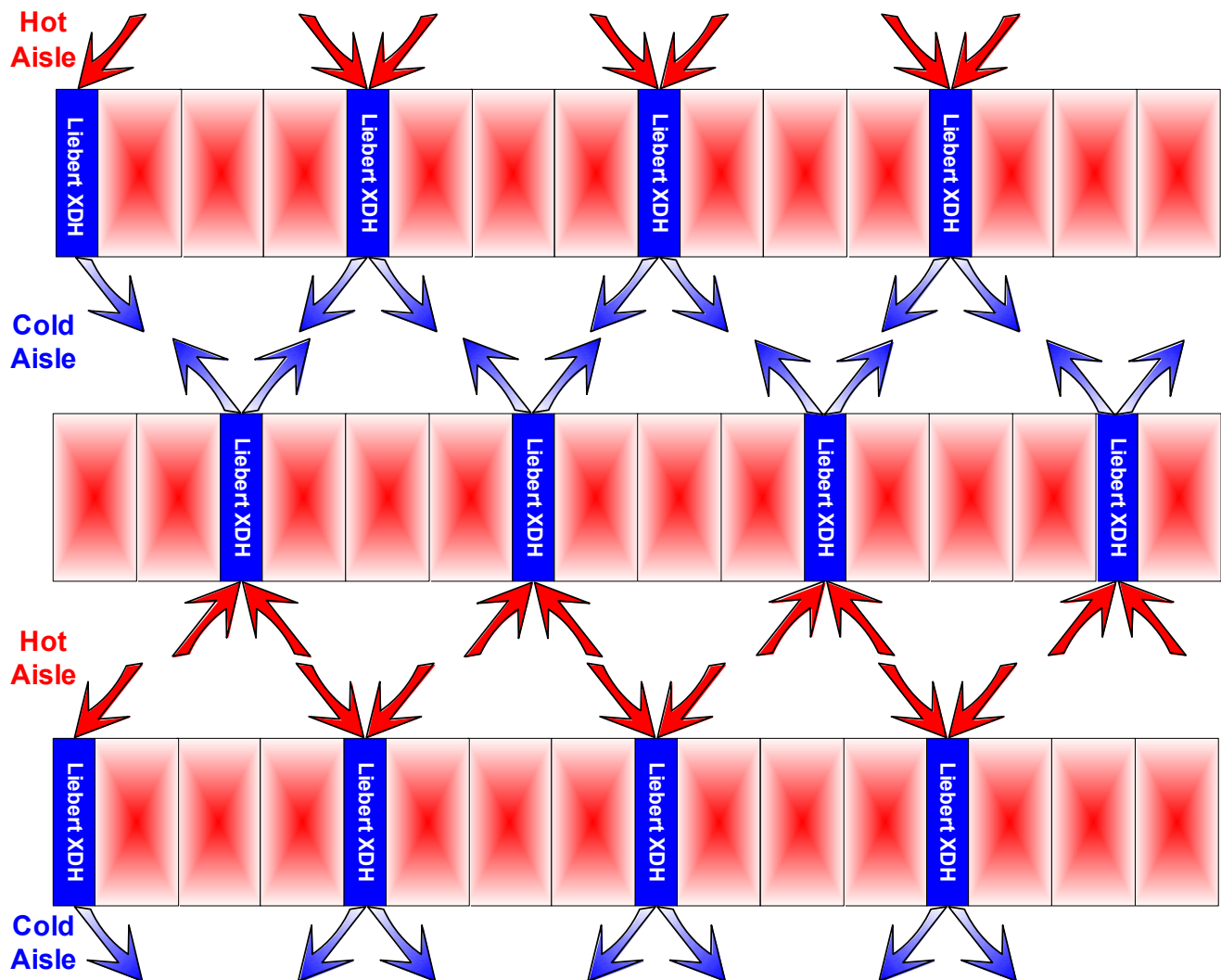
If the Liebert XDH is installed at the end of a row, Liebert recommends using uni-directional air diffusers. The uni-directional diffusers are designed to blow cooling air to the left; the diffusers can be used for right air discharge by removing them from the Liebert XDH, turning them 180 degrees, then reattaching them to the Liebert XDH.

If the Liebert XDH is installed between racks, Liebert recommends using bi-directional air diffusers. These diffusers blow air right and left, as well as to the front.

Two diffusers were shipped with the Liebert XDH. If uni-directional diffusers were ordered, the diffuser with the part number 186458 is designed for installation on the upper half of the Liebert XDH. The other diffuser, for use on the lower half of the Liebert XDH, has the part number 186459. When installed in these positions, the diffusers will direct the airflow to the left.

If directing the airflow in the opposite direction would improve cooling, the diffusers may be switched. See **Install Air Diffusers for Best Airflow Direction on page 11**.

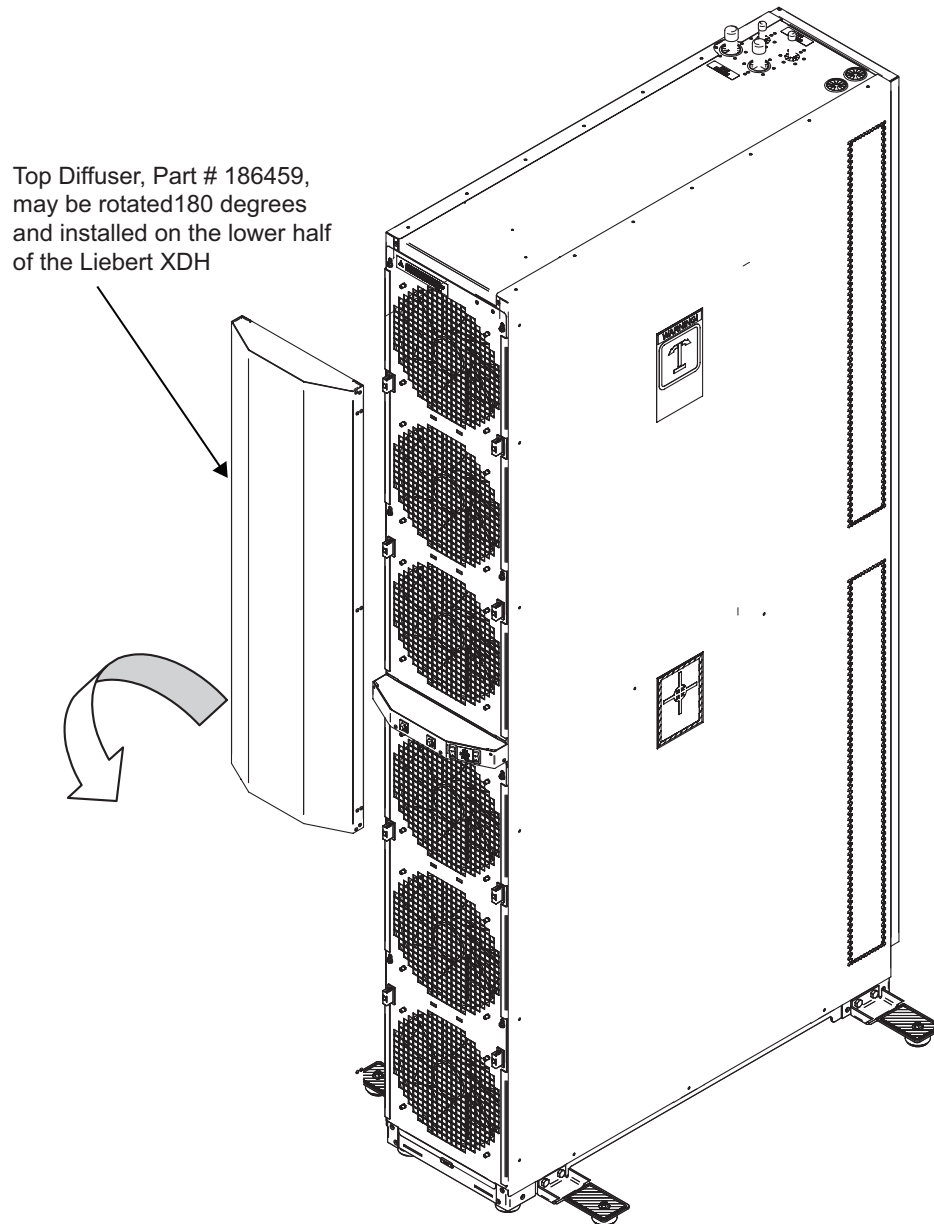
Figure 9 Liebert XDH placement in enclosure row



Install Air Diffusers for Best Airflow Direction

1. Remove the top diffuser, Part # 186458, from its packaging.
2. Check the top diffuser's fittings and insertion holes on the Liebert XDH to determine how the diffuser should be installed—the diffuser may be attached only one way on the top half of the Liebert XDH.
3. Rotate the diffuser 180 degrees and press it against the lower half of the Liebert XDH until it snaps into the fittings (see **Figure 10**).
The vanes in the diffuser now point in the opposite direction.
4. Repeat **Steps 1** through **3** to install the bottom diffuser, Part # 186459, on the upper half of the Liebert XDH.

Figure 10 Change airflow direction



5.0 PIPING

5.1 European Union Fluorinated Greenhouse Gas Requirements

Stationary air conditioning, refrigeration, heat pump equipments and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R134a, R410A, must comply with the F-Gas Regulation: (EC) No. 842/2006 (F-gas). The regulation prohibits, among other actions, venting fluorinated greenhouse gases to the atmosphere.

The F-Gas Regulation requires operators to use all measures that are technically feasible and do not entail disproportionate cost to prevent leakage of these gases, to test for leakage regularly and to recover f-gas before disposing of equipment, as well as during service and maintenance.

Refer to the full regulation for additional details.

5.2 System Connection Configuration

If possible, connect the Liebert XDH's upper and lower refrigeration circuits to Liebert XDPs or Liebert XDCs in an interlaced configuration (see **Figure 11**). Interlacing the connection piping will keep one of the Liebert XDH's circuits operating should one of the Liebert XDP or Liebert XDC units fail.

However, in a system with just one Liebert XDP or Liebert XDC, connect Liebert XDH modules in a non-interlaced configuration (see **Figure 12**).

Figure 11 Typical Liebert XDH piping—interlaced connections

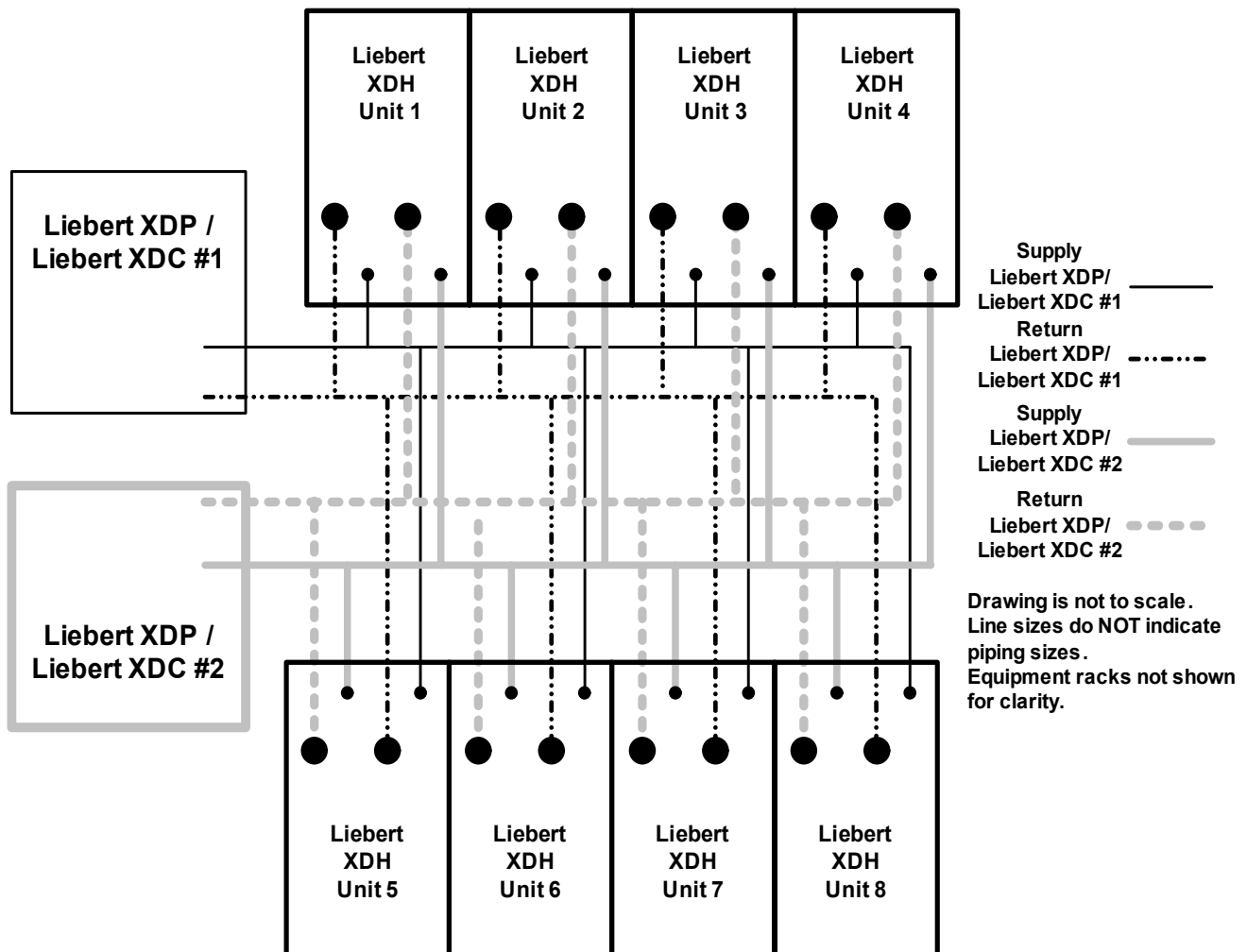


Figure 12 Typical Liebert XDH piping—non-interlaced connection

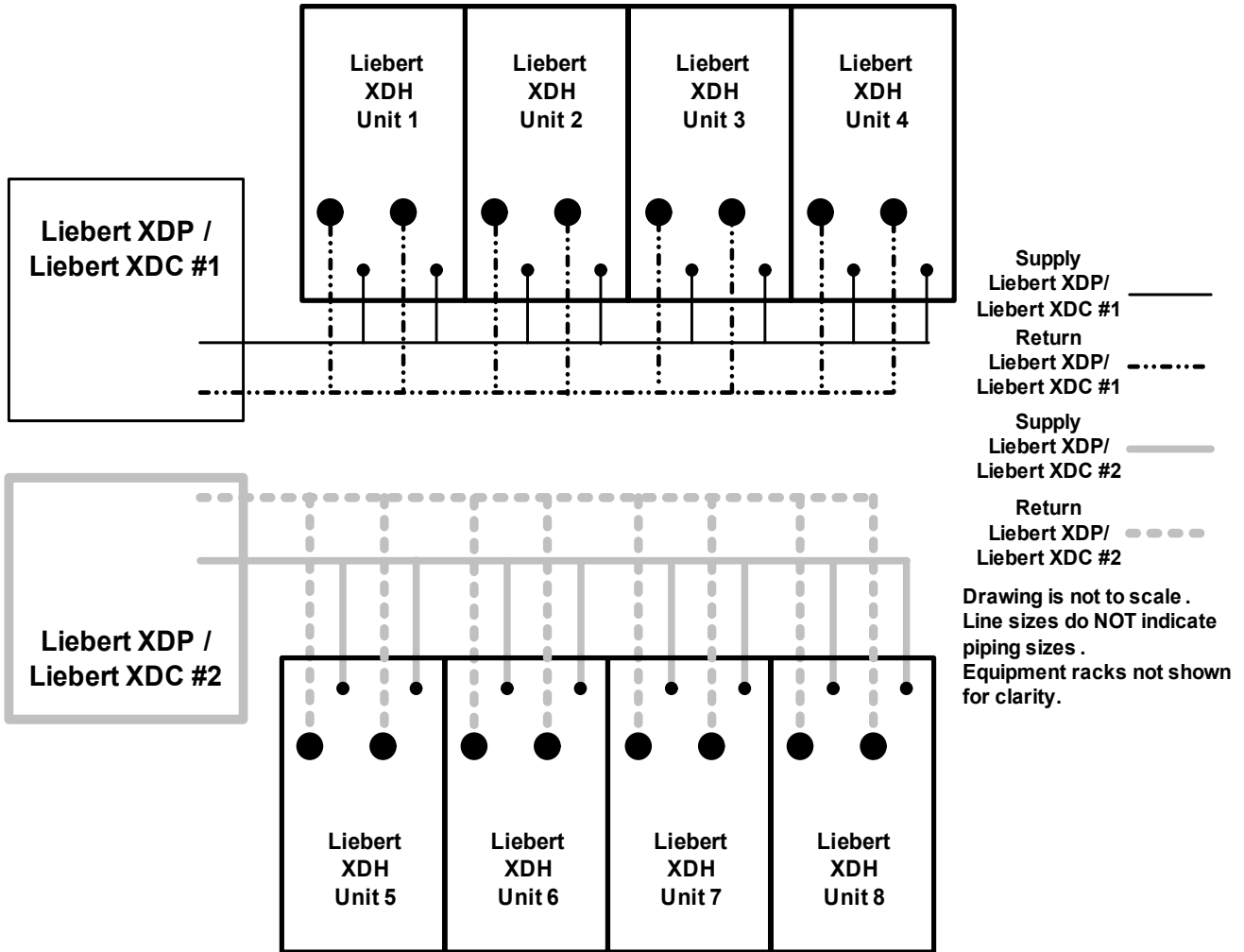


Figure 13 Direct system configuration—hydraulic system schematic

Direct Liebert XD System Configuration
 Pumping and control are performed by Liebert XDC.

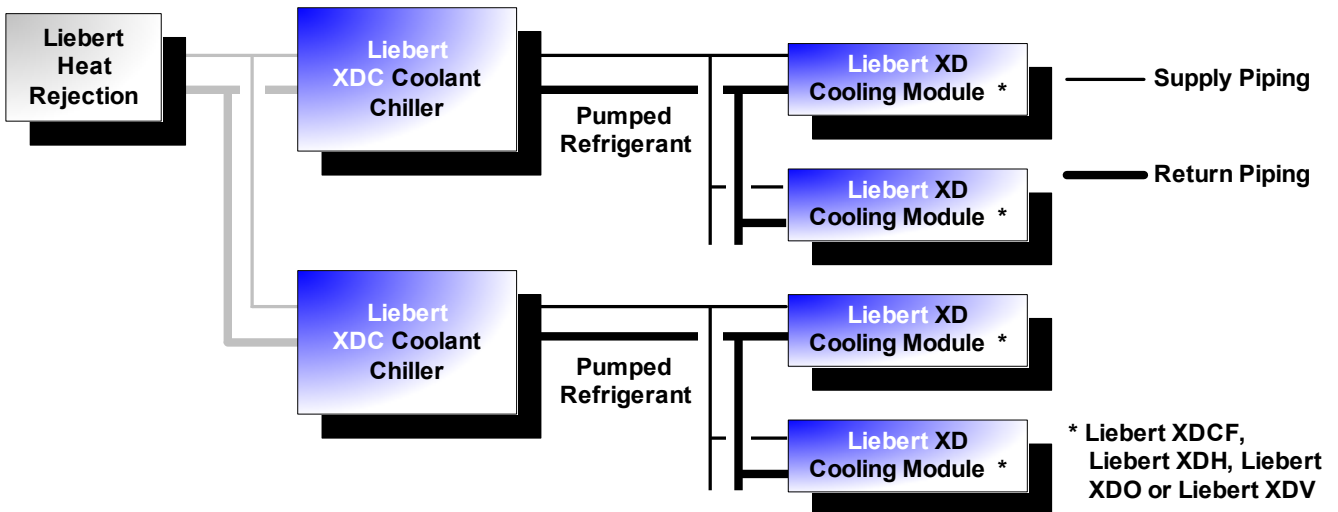
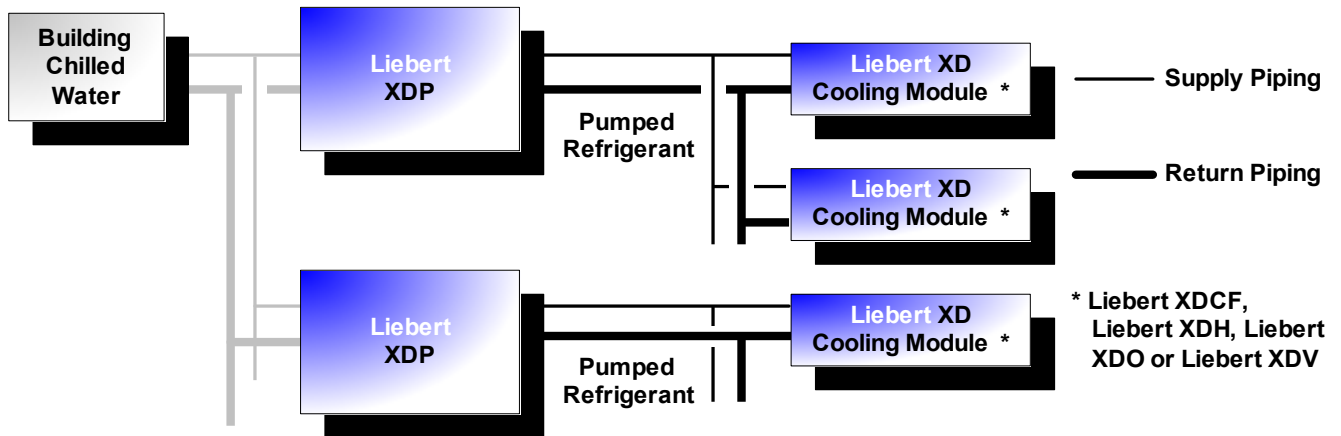


Figure 14 Indirect system configuration—hydraulic system schematic

**Indirect XD
System Configuration**

Liebert XDPs pump refrigerant to cooling modules, isolate the refrigerant circuit from the building's chilled water supply with an internal heat exchanger and maintain refrigerant above the dew point.



5.3 Connection Methods and Points

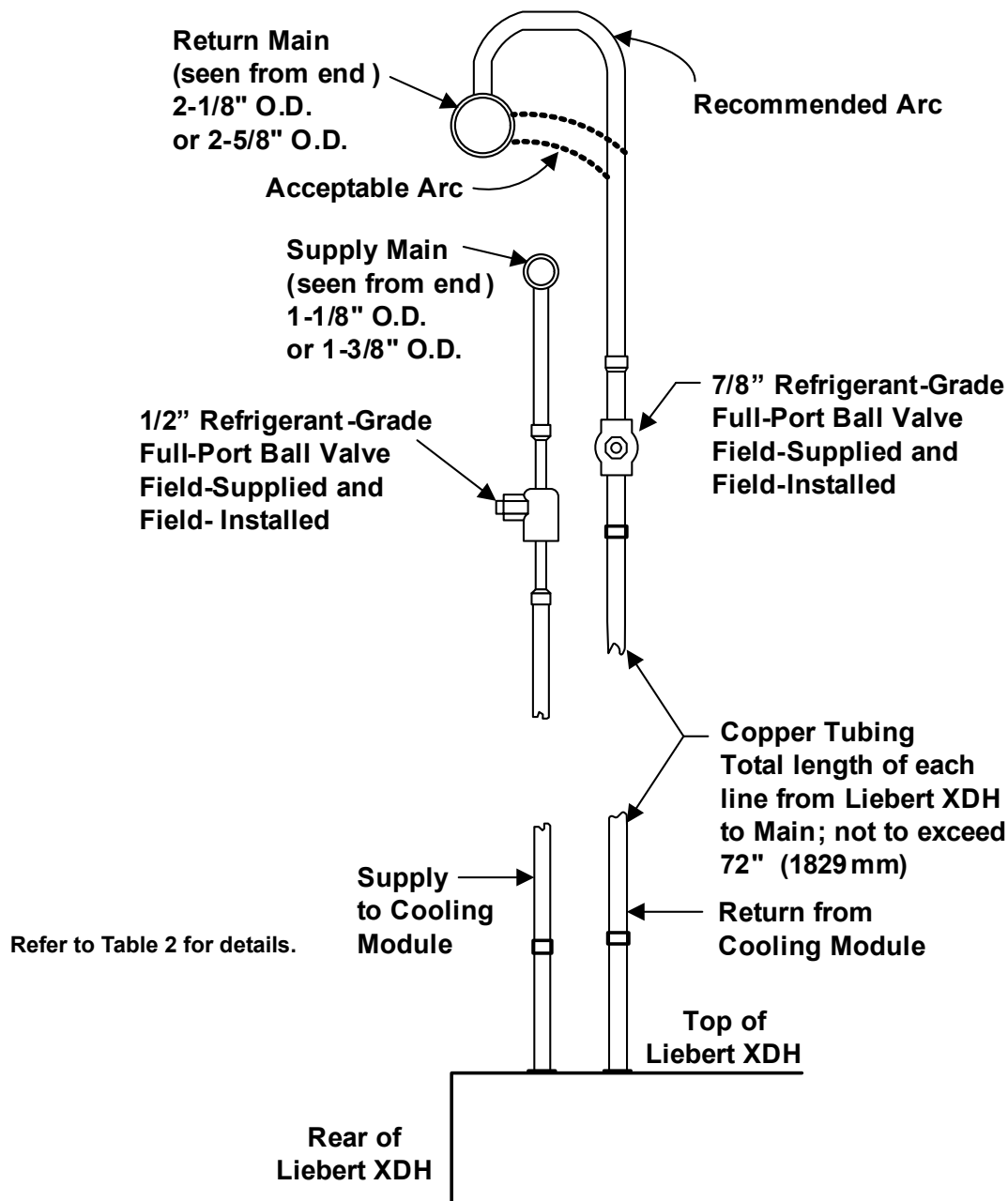
Refer to site specific drawings for general locations of the piping connections. For Liebert XDH connection locations, refer also to **Figure 16**.

The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

Supply piping connection is 1/2" OD copper pipe, and return piping connection is 7/8" OD copper. Both supply and return fittings may be supplied with optional one-shot connections. These fittings contain pressurized R-134a refrigerant inside the Liebert XDH.

The Liebert XDH has supply and return piping access on the top of each module.

Figure 15 Hard pipe connection diagram



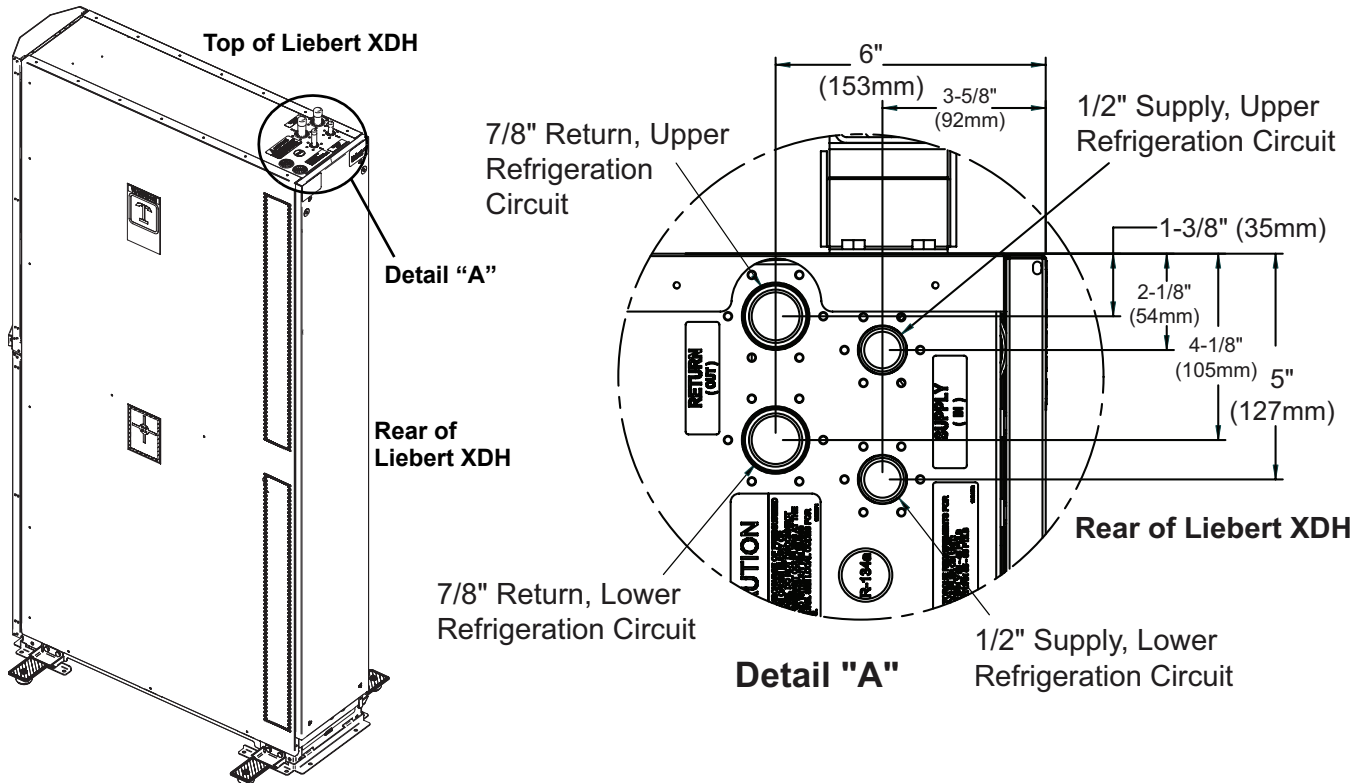
5.4 Piping Considerations—Hard-Piped Connections

Refrigerant enters and exits the Liebert XDH through connections on the top of the unit (see **Figure 16**).

The supply piping for each refrigeration circuit is 1/2" OD copper pipe. The return piping for each circuit is 7/8" OD copper. Each Liebert XDH has two supply connections and two return connections, one for each refrigeration circuit.

The Liebert XDH units that are intended for hard-piping connections will have copper caps soldered in place and a holding charge of nitrogen.

Figure 16 Supply and return—hard-piping connections



5.4.1 Venting the Holding Charge and Connecting to Mains

After the piping for the supply and return mains has been installed, the Liebert XDH units may be connected. The Liebert XDH is shipped with a low-pressure holding charge (about 30 psi) of nitrogen to prevent oxidation and moisture. Holding charges must be vented from the upper refrigeration circuit and from the lower refrigeration circuit.

To vent the holding charge:

1. Find the four Schrader valves that retain the nitrogen holding charge in the Liebert XDH. The valves are inside the rear door, one on each supply line and one on each return line. Three are near the top of the Liebert XDH; one Schrader valve is in the bottom half of the Liebert XDH.
2. Vent the holding charge in the upper refrigeration circuit by depressing the pin in a Schrader valve on either the supply or return line for that circuit. (The upper circuit's lines are on the left side of the unit.)
3. Replace and secure the cap on the Schrader valve that was opened.
4. Vent the holding charge in the lower refrigeration circuit by depressing the pin in a Schrader valve on either the supply or return line for that circuit. (The lower circuit's lines are on the right side of the unit.)
5. Replace and secure the cap on the Schrader valve that was opened.
6. Use a torch to unsweat the caps on unit's piping connections.
7. Pipe the Liebert XDH's supply and return connections to the mains. See **5.4.2 - Brazing Preparations** for precautions about connecting the Liebert XDH to the piping mains.

5.4.2 Brazing Preparations

After the holding charge has been vented, a torch can be used to remove the caps over the ends of the supply and return lines.

The assembly and connection means used for piping in the Liebert XD system are similar to those used for conventional refrigeration systems. All piping should be installed with high-temperature brazed joints. Soft soldering is not recommended.

During brazing, the lines must be filled with flowing dry nitrogen to prevent excessive oxidation and scale formation inside the piping. Prevailing good refrigeration practices must be employed for piping supports, leak testing, dehydration and charging. Failure to use good system practices may result in damage to the system. Refer to the ASHRAE refrigeration handbook for general good-practice refrigeration.

5.5 Connection Methods for Hard Pipe

The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

5.6 Recommended Piping Size

Connect the main pipes between the Liebert XDH branch piping and the Liebert XDP or Liebert XDC according to **Table 2**. Elbows and restrictions must be minimized to ensure good fluid flow.

Please see **Table 2** below for recommended pipe sizes and **Figure 3** for piping segment locations.

Table 2 Branch piping sizes for pumped refrigerant loop

Pipe Function	Size / Equivalent Pipe Length
From Liebert XDH supply to supply line of Liebert XDP/Liebert XDC	1/2" OD (0.430" ID) for lengths up to 10 feet (3m)
	7/8" OD(0.545" ID) for lengths over 10 feet but less than 25 feet (3-7.6m)
From Liebert XDH return to return line of Liebert XDP/Liebert XDC	7/8" OD(0.545" ID) for lengths up to 10 feet (3m)
	1-1/8" OD(1.025" ID) for lengths over 10 but less than 25 feet (3-7.6m)



NOTE

To minimize the amount of pumped refrigerant required, do NOT oversize the piping.

5.6.1 Connecting Methods—One-Shot Connections



CAUTION

Risk of sudden refrigerant discharge. Can cause loss of charge and minor injury.

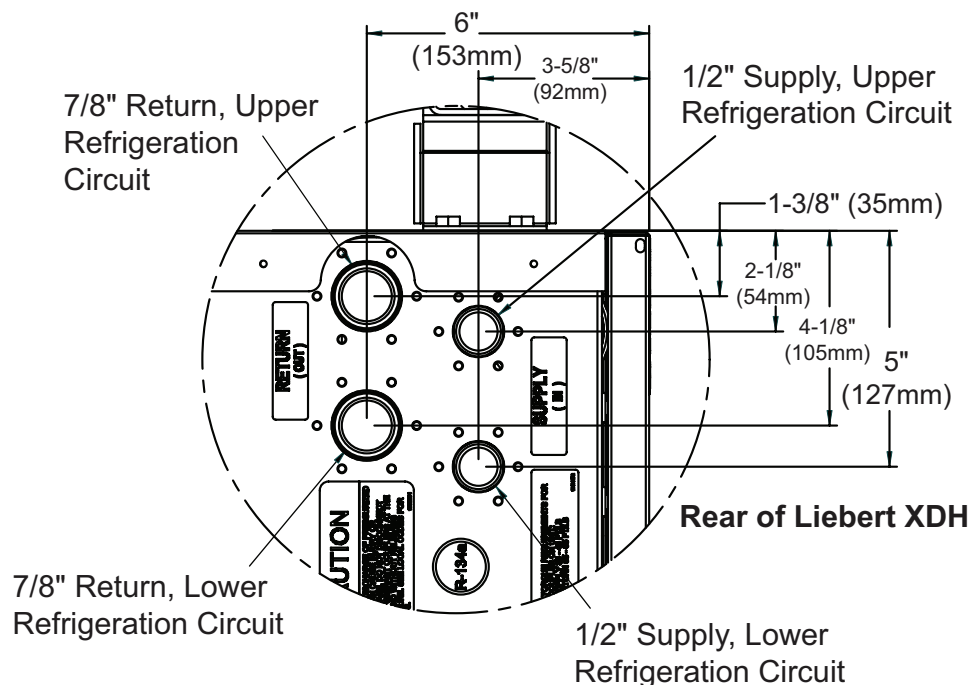
If the optional precharged option is chosen, the Liebert XDH is shipped with a full charge of R-134a refrigerant under pressure. Do not remove the pipe caps or plugs before the unit is ready for connection to Liebert XD Piping.

Supply and return fittings on the precharged Liebert XDH units are one-shot connections. Do not disconnect one-shot connections after they have been connected. Disconnection will release pressurized R-134a refrigerant from the Liebert XDH.

The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

Both supply and return fittings may be supplied with optional, one-shot connections. These fittings contain pressurized R-134a refrigerant inside the Liebert XDH.

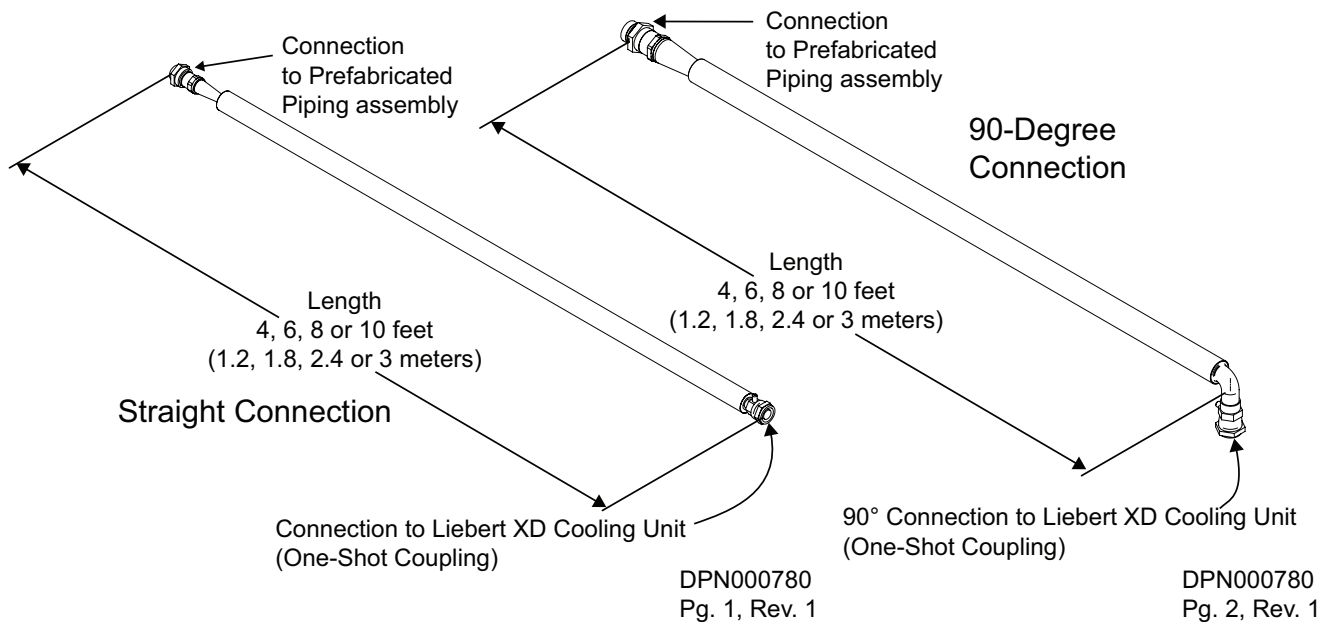
Figure 17 Piping location and connecting sizes for pre-charged units



5.7 Field Installation of Liebert XD Flex Pipe Kit on the Liebert XDH

Liebert XD Flex Pipe kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8, 2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefab piping assembly is a threaded coupler. For data on acquiring the correct kit for your installation, see Table 4.

Figure 18 Liebert XD Flex Pipe dimensions—straight and 90-degree connections



5.8 Connecting Liebert XD Flex Pipes to Liebert XDH Modules



CAUTION

Risk of high pressure refrigerant discharge. May cause injury and air pollution.

Do not disconnect one-shot refrigerant connections after they have been connected.

Disconnection will release pressurized R-134a refrigerant from the Liebert XDH.

1. Remove the caps on the supply and return lines on the top of the Liebert XDH.
2. Lubricate the threads, diaphragm and O-ring with one or two drops of mineral oil.
3. Connect the line-set coupling finger-tight.
4. Make sure the Schrader valve is properly oriented; refer to the label on the top of the Liebert XDH.
5. Hold the backup hex nut with a wrench while tightening the swivel nut.
6. Tighten the swivel nut on the female coupling until it is seated or a definite resistance is felt.
7. Once a definite bottoming resistance is felt (as in metal to metal), place a mark lengthwise from the swivel nut to the backup hex and tighten the swivel nut on the female coupling an additional 1/4 turn.
8. Tighten the supply fittings to 35-45 ft/lb (47-61 Nm).
9. Tighten the return fittings to 55-65 ft/lb (74-88 Nm).
10. Mark the female and male coupler with for future reference.

5.8.1 Header System

The Liebert XDH module system with optional flexible piping requires use of the Liebert XD prefabricated piping assembly. The prefabricated piping is compatible with the Liebert XD Flex Pipe required to attach to the Liebert XDH modules. For the details on piping connection locations, see **Figure 16**.

For additional information, refer to the Liebert X-treme Density System Design Manual, SL-16655.

5.9 Connecting a Liebert XDH with Liebert XD Flex Pipe to an Operational Liebert XD System



NOTE

Before connecting the Liebert XDH with Liebert XD Flex Pipe to the prefabricated piping mains, check the entire system for leaks.

Check the holding charge in the Liebert XDH to ensure that the unit has no leaks.

Read all instructions before beginning installation.

Tools Required

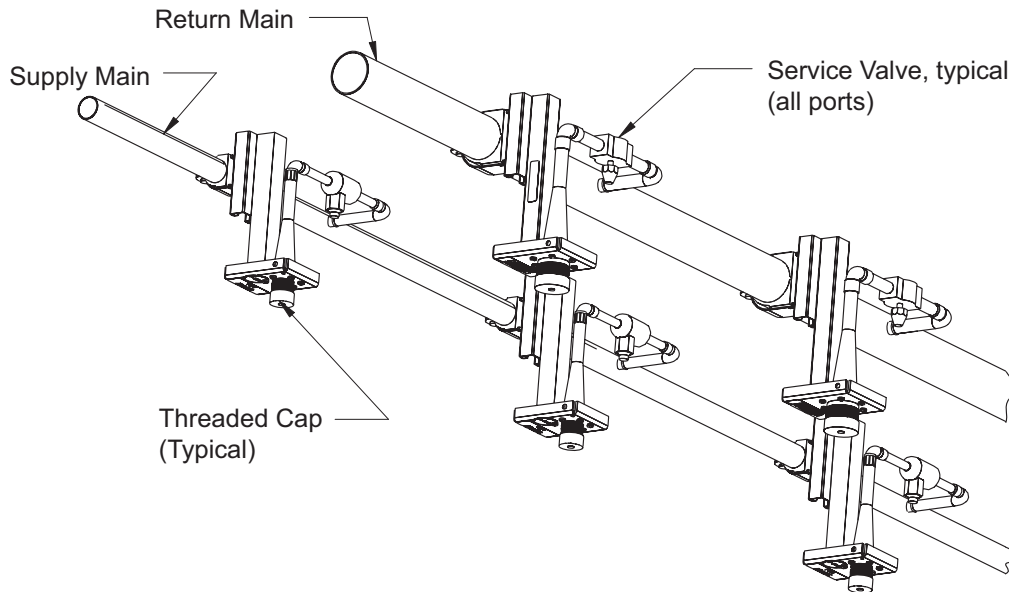
- Two adjustable wrenches, with a maximum adjustment size of 2-1/2 inches
- Screwdriver, Phillips or blade type



NOTE

This operation requires two people.

1. Determine the port location of the supply and return piping overhead
2. Make sure the service valve for each port is closed
3. Remove cap for only the required ports. Do not remove caps from the unused ports.
4. Once **Step 3** has been completed, remove the pipe plugs that are supplied on the Liebert XD Flex Pipe.
5. Use system refrigerant to lubricate the face of the male coupling half, including the poppet valve face and the stainless steel delta ring.

Figure 19 Liebert XD prefabricated piping assembly

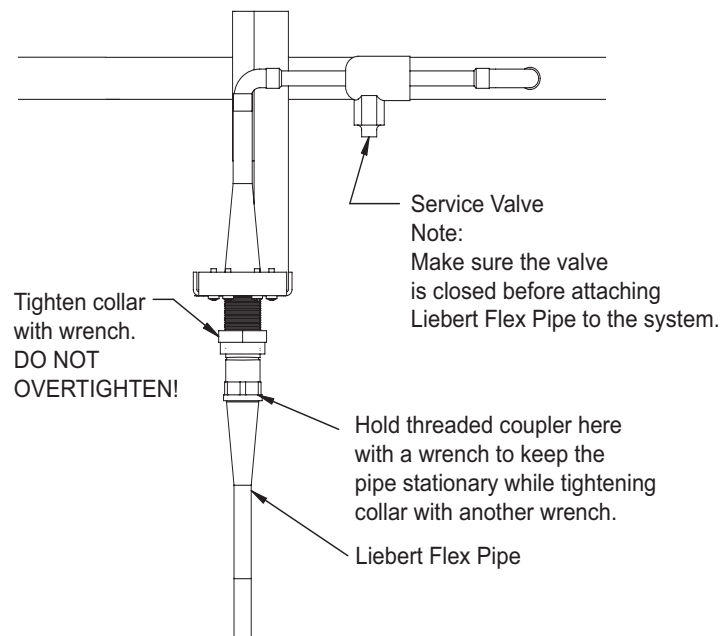
6. Thread the return couplers together. The return couplers are the larger of the couplers.
7. Use one of the adjustable wrenches to hold the fixed side of the female coupler on the Liebert XDH stationary. With the other adjustable wrench, tighten the collar onto the coupler. Tighten these only until the force required to tighten abruptly increases. See **Figure 20**.

NOTICE

Do not overtighten the couplers. Overtightening of couplers will damage the couplers.

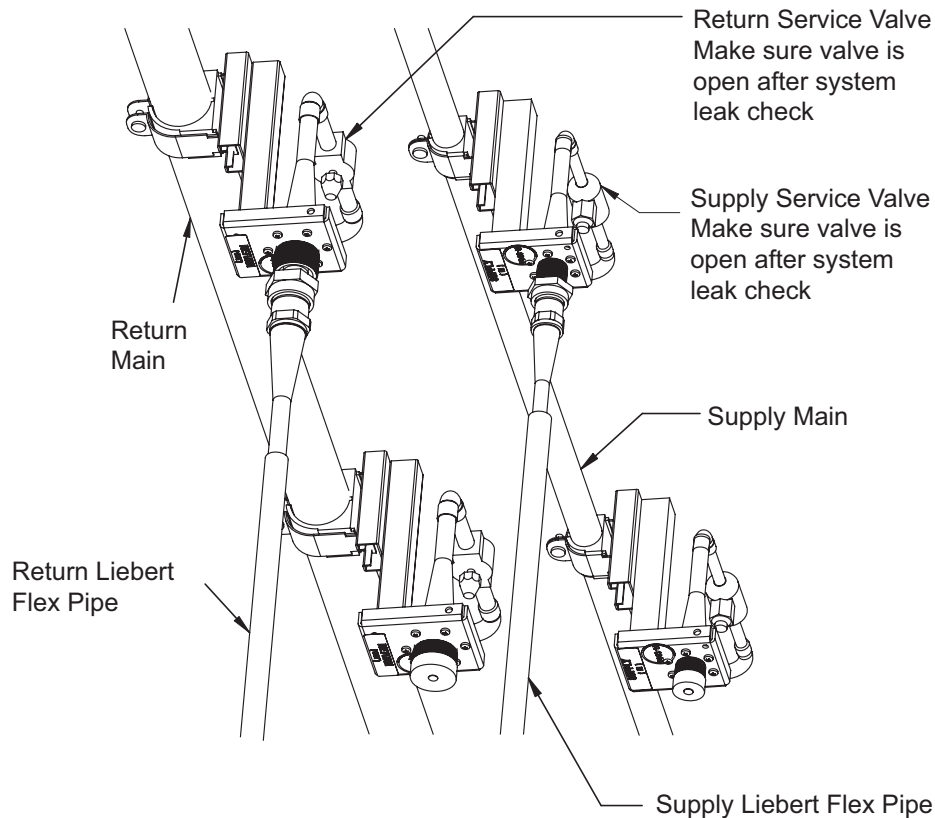
Figure 20 Detail view of Liebert XD Flex Pipe and prefabricated piping port

**Supply Side Torque Range for
1/2" coupler is 22.1 to 25.8 lb/ft (30-35Nm)**
**Return Side Torque Range for
1" coupler is 59 to 62.7 lb/ft (80-85Nm)**



8. Repeat **Steps 6** and **7** for the smaller couplers (supply line).
9. Once the supply and return connections are completed, open the return service valves, then open the supply service valves.

Figure 21 Liebert XD system with prefabricated piping assembly and Liebert XD Flex Pipe



5.10 Disconnecting a Liebert XDH With Liebert XD Flex Pipe From a Liebert XD System



CAUTION

Risk of sudden discharge of pressurized refrigerant. Can cause equipment damage or injury. Do not disconnect threaded refrigerant couplers at the unit cabinet end without relieving system pressure. Reclaim any refrigerant during removal of unit from system.

NOTICE

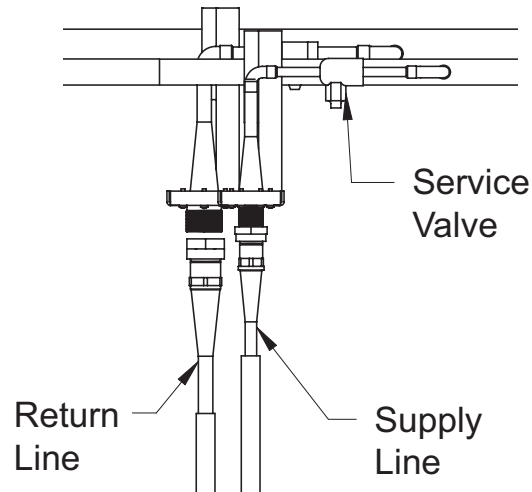
Before uninstalling a Liebert XDH with Liebert Flex Pipe from the prefabricated piping mains: Close the supply service valve, wait approximately two minutes, then close the return service valve.

Read all instructions before beginning.

Tools Required

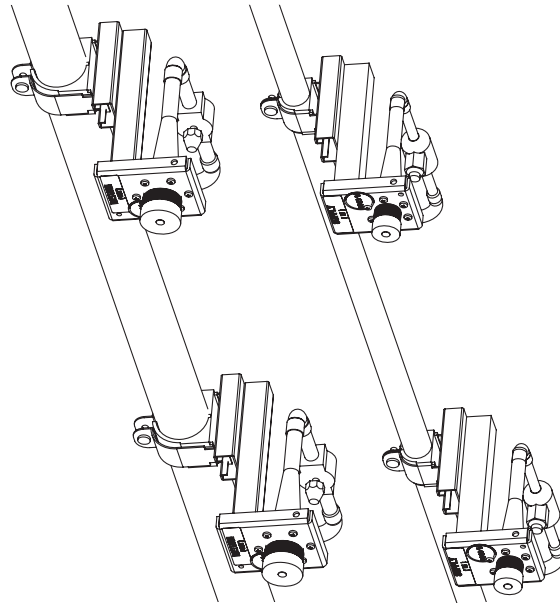
- Two adjustable wrenches, maximum adjustment size of 2-1/2 inches
 - Phillips head #2 screwdriver
1. Close the service valves in the supply line to the Liebert XDH (smaller couplers).
 2. Close the service valves in the return lines to the Liebert XDH (larger couplers).
 3. Locate and have ready the caps and plugs for both ends of the supply and return couplers.
 4. Loosen the female supply couplers from the male supply couplers (smaller couplers). This requires two adjustable wrenches. Refer to **Figure 20**.
 5. The Liebert XDH side of the female couplers must be held stationary while the collars on the couplers are being loosened. Refer to **Figure 20**.
 6. Disconnect the couplers.

Figure 22 Profile view of the Liebert XD system



7. Place the protective dust cap and plug back onto both ends of the couplers on the Liebert XDH and the port pipe.

Figure 23 Piping mains without Liebert XDH and Liebert XD Flex Pipe



8. Repeat **Steps 5** through **7** for the return couplers (larger couplers).
9. Carefully lay the Liebert XD Flex Pipe aside.



CAUTION

Risk of tubing kinks. Can cause permanent damage to the Liebert XD Flex Pipes.
Do not fold or bend Liebert XD Flex Pipe.

5.11 Insulation

To minimize the possibility of condensation, insulate all piping between the Liebert XDH and the Liebert XDP or Liebert XDC.

6.0 ELECTRICAL

The unit must be installed in accordance with national wiring regulations. Refer to the unit's serial tag for electrical requirements. Refer to **Table 3** for details.

WARNING

Risk of electric shock. Can cause death or injury.

Disconnect both electric power cords before working within the unit.

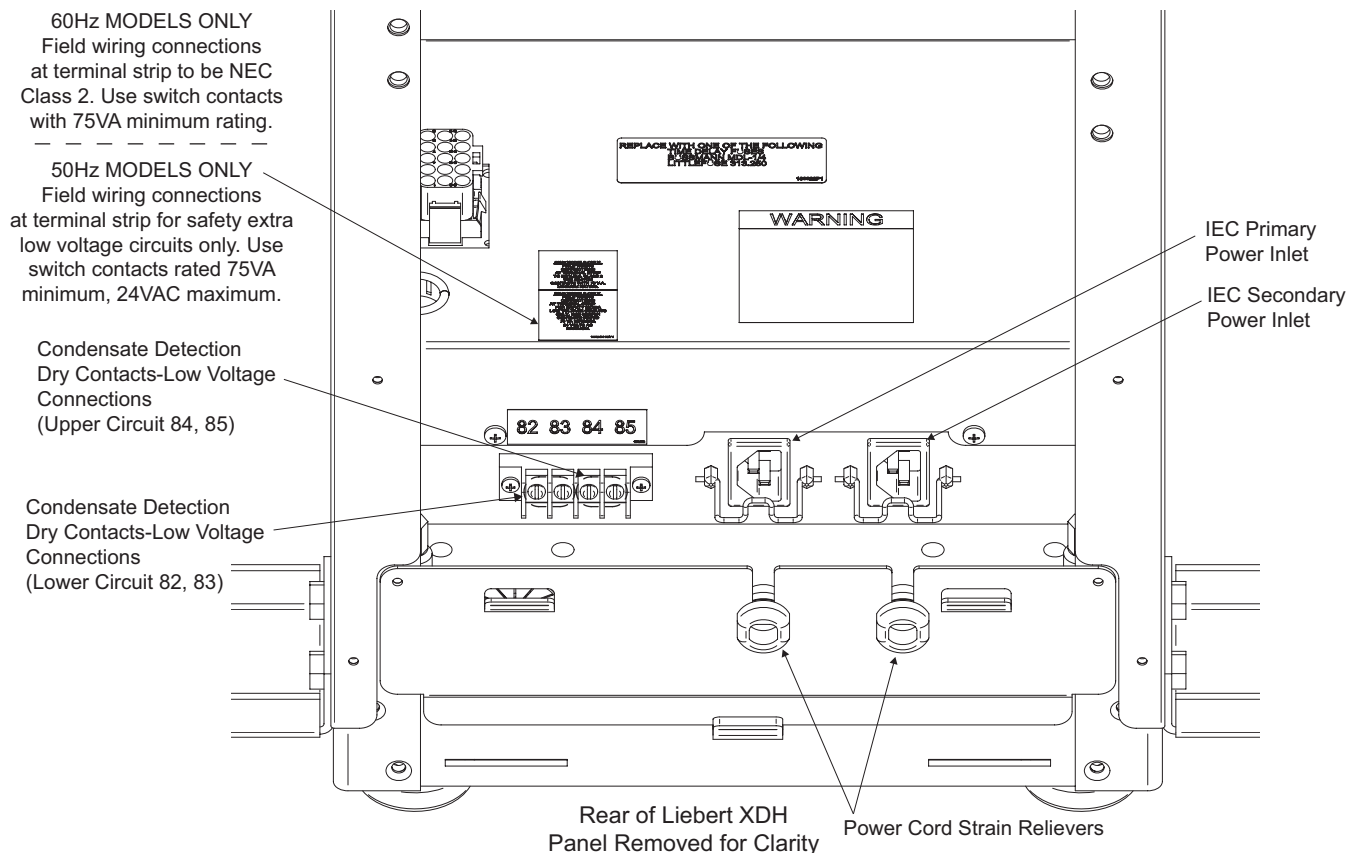
6.1 Connecting High Voltage Wiring

The Liebert XDH requires single-phase power for normal operation. The unit ships with two power cords, each 10 feet (3m) long with NEMA 5-15 plugs, which connect to common, three-prong outlets (see **Figure 24**).

The XDH will function properly with only one power cord. The second power cord permits connection to a separate power source to increase reliability—If one power source fails, the cord connected to the remaining, live power source will power both banks of fans.

To attach the power cords, clip the plastic hangers attaching the cords to the Liebert XDH. Press the appropriate end of each cord onto the electrical inlet. Attach the strain-relievers onto the power cords and press the assemblies into the cable exit slots.

Figure 24 Liebert XDH electrical connections



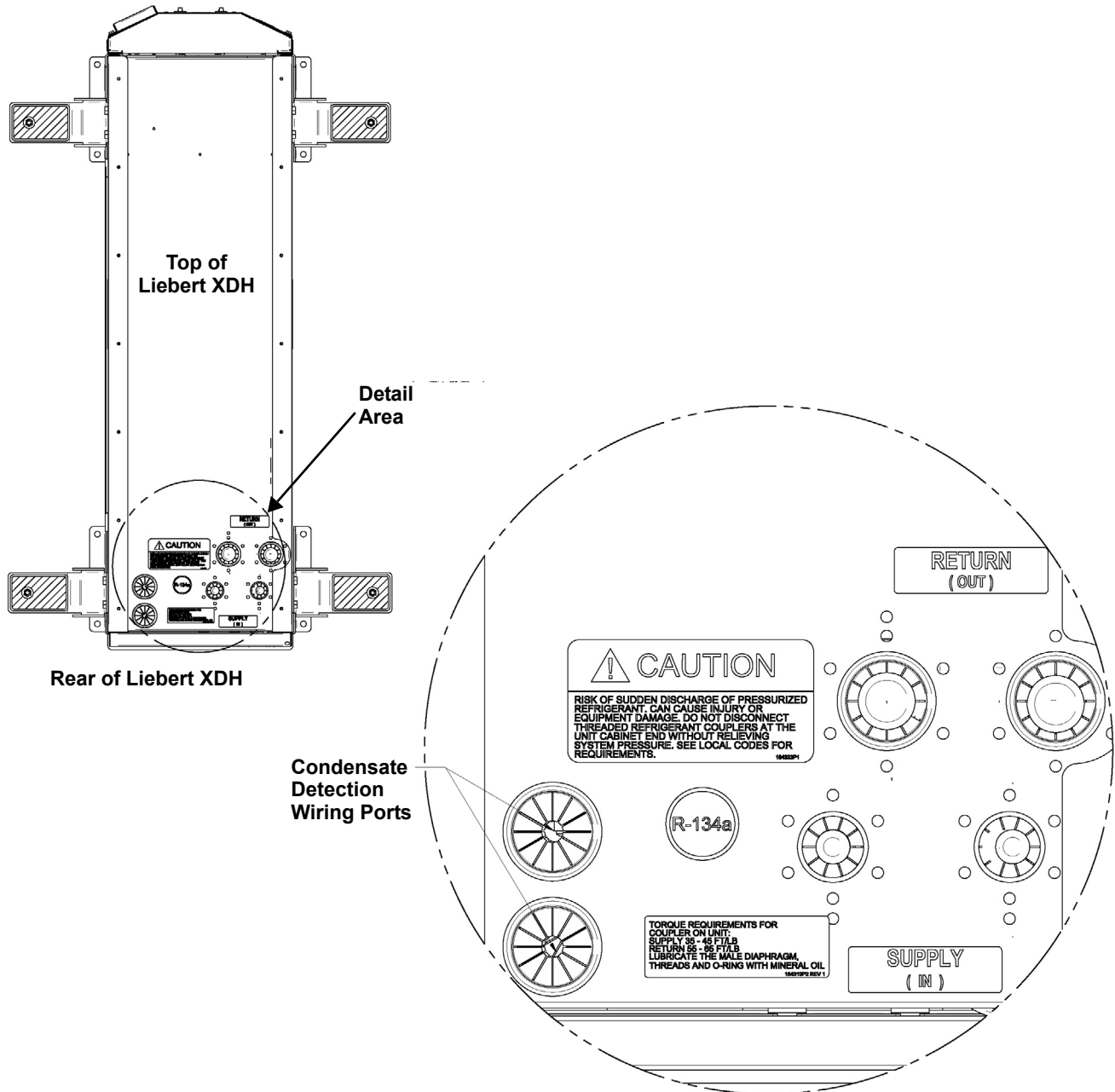
6.2 Connecting Low Voltage Wiring—Optional

Low voltage connections to the Liebert XDH are available only on units with the optional condensate detection feature. The low voltage connections are on the left side of the cabinet, in the rear, near the power connections (see **Figure 24**). These dry contacts can to be connected to a monitoring unit, such as Liebert’s SiteScan[®]. For location of the entry points for the condensate detection wiring, see **Figure 25**

For units equipped with condensate detection, make low voltage connections according to site-specific drawings.

The Liebert Liqui-tec[™] condensate detection unit is available only as a factory-installed option.

Figure 25 Condensate wiring entry points



7.0 INSTALLATION CHECKLIST AND SYSTEM FILL FOR STARTUP

7.1 Checklist for Proper Installation

- 1. The Liebert XDH module is properly mounted.
- 2. Power cords connected to electrical supply.
- 3. For Liebert XDH units with coupler option: Flex piping connections to prefabricated header assembly are secure and according to specifications.
- 4. For Liebert XDH units with coupler option: Check for holding charge of R-134a.
- 5. Low voltage wiring to optional condensate detection on the Liebert XDH.
- 6. Piping from Liebert XDP to Liebert XDH, with isolation valves piped to each Liebert XDH.
- 7. Piping insulated.
- 8. Start the Liebert XDH to ensure proper operation (see **8.1 - Start the Liebert XDH**).
- 9. Shut down the Liebert XDH.

7.2 Charging with Refrigerant and Starting the Liebert XD System

The Liebert XD System must be completely installed before it is charged with refrigerant. After installation is complete, refer to the Liebert XDP or Liebert XDC user manual for instructions on charging the Liebert XDH with refrigerant and starting the system. The complete Liebert XD system includes all Liebert XDH, XDO and XDV units, a Liebert XDC **or** Liebert XDP unit and any other connected equipment.

8.0 OPERATION

The Liebert XDH's controls are on the front of the unit at the Liebert XDH's midline for easy access. Each switch controls the operation of one bank of three fans (see **Figure 26**). The separate switches permit the use of only one bank of fans at a time, reducing the airflow if the Liebert XDH's full cooling capacity is not needed.

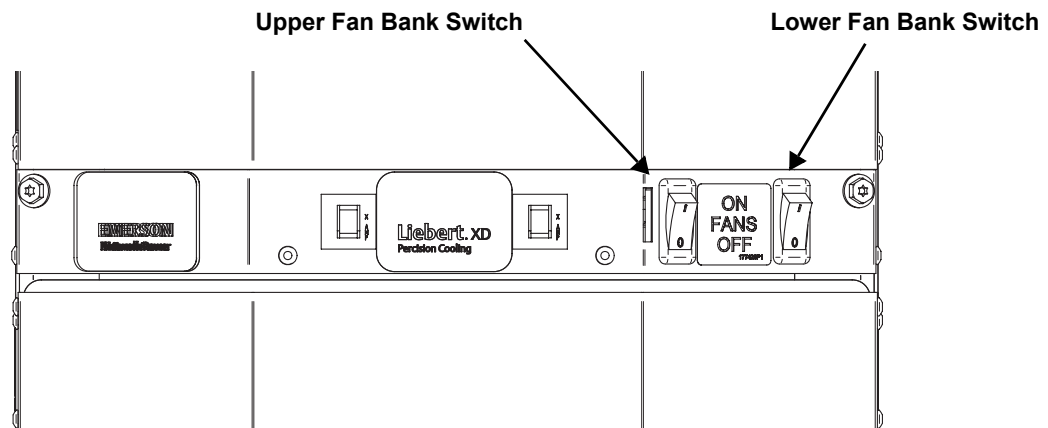


NOTE

At least one of the Liebert XDH's banks of fans must be turned on before either the Liebert XDP or Liebert XDC is switched on.

At least one of the Liebert XDH's banks of fans must be operating at all times that the Liebert XDP or Liebert XDC is operating. Operating either the Liebert XDP or the Liebert XDC without at least one of the Liebert XDH's banks of fans rotating may cause a system malfunction.

Figure 26 Fan switches



8.1 Start the Liebert XDH

The Liebert XDH's fans must be on before starting the Liebert XDP or Liebert XDC that will supply refrigerant to the Liebert XDHs.

To start the Liebert XDH, press either of the rocker switches to turn on one or both of the Liebert XDH's banks of fans. Pressing the left switch starts the fans in the upper half of the Liebert XDH; the right switch, the lower fans.

The refrigerant sources, either Liebert XDP or Liebert XDC, must be started separately.

9.0 MAINTENANCE

Minimal maintenance is required to keep the Liebert XDH operating at optimal levels. The unit should be cleaned and checked for damage and worn parts. Suggested maintenance includes:

- Cooling fins—Clean any dust and debris from the cooling fins, taking care not to bend them
- Circulating fans—Clean any dust from the fans.

9.1 Internal Access



WARNING

Risk of electric shock. Can cause injury or death.

System contains hazardous electrical voltage. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH before working within.

- Turn off the two fan switches on the front of the Liebert XDH (see **Figure 26**).

The conditions required for sensitive electronic equipment should preclude the accumulation of appreciable amounts of dust in the Liebert XDH. Most of that small amount should be found on the coils, which are accessible by opening the rear door of the unit. The fans, on the front may be cleaned by removing the front grilles, which are secured with snap-on connections.

The rear door and the fan tray on the front of the Liebert XDH are easily removed for maintenance. (A wiring diagram is provided on the center shelf.)

9.2 Fluorinated Greenhouse Gas Requirements

Stationary air conditioning, refrigeration, heat pump equipments and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R134a, R410A, must comply with the F-Gas Regulation: (EC) No. 842/2006 (F-gas). The regulation prohibits, among other actions, venting fluorinated greenhouse gases to the atmosphere.

The F-Gas Regulation requires operators to use all measures that are technically feasible and do not entail disproportionate cost to prevent leakage of these gases, to test for leakage regularly and to recover f-gas during equipment service and maintenance and before disposing of equipment.

Refer to the full regulation for additional details.

9.3 Remove Fan Tray



WARNING

Risk of electric shock. Can cause injury or death.

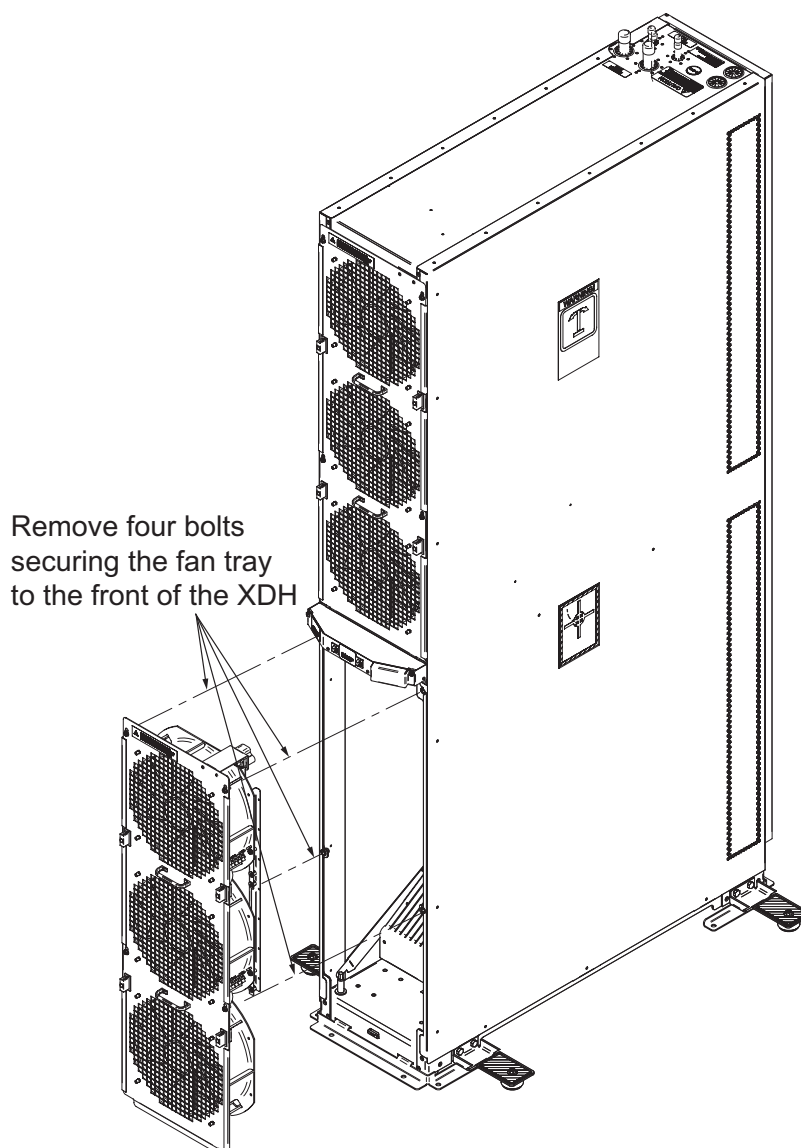
System contains hazardous electrical voltage. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH before working within.

- Turn off the two fan switches on the front of the Liebert XDH (see **Figure 26**).

1. Ensure that all electrical power to the Liebert XDH has been shut off before beginning to remove the fan tray.
2. Remove four bolts on the Liebert XDH fan tray (see **Figure 27**).
3. Lift the tray out of the unit to install the new tray.

Reverse the steps above to install a new fan tray. Be certain to align the connectors, including the electricity connector, when installing the new fan tray.

Figure 27 Remove fan tray



10.0 SPECIFICATIONS

Table 3 Liebert XDH specifications

Models	XDH20DKP-0 XDH20DK--0 XDH20BKP-0 XDH20BK--0 XDH20DKPE0 XDH20DK-E0 XDH20BKPE0 XDH20BK-E0 (60Hz)	XDH32DKP-0 XDH32DK--0 XDH32BKP-0 XDH32BK--0 XDH32DKPE0 XDH32DK-E0 XDH32BKPE0 XDH32BK-E0 (60Hz)	XDH20DSP-0 XDH20DS--0 XDH20BSP-0 XDH20BS--0 XDH20DSPE0 XDH20DS-E0 XDH20BSPE0 XDH20BS-E0 (50/60Hz)	XDH32DSP-0 XDH32DS--0 XDH32BSP-0 XDH32BS--0 XDH32DSPE0 XDH32DS-E0 XDH32BSPE0 XDH32BS-E0 (50/60Hz)
Cooling Capacity	XDH20, 60Hz Nominal (98°F [37°C] EAT): 22kW/6.3 Tons XDH20, 60Hz Maximum(105°F [40°C] EAT): 25.5kW/7.3 Tons XDH20, 50Hz Nominal (98°F [37°C] EAT): 19kW / 5.4 Tons XDH20, 50Hz Maximum(116°F [47°C] EAT): 25.5kW/7.3 Tons XDH32, 60Hz Nominal (98°F [37°C] EAT): 30kW/8.5 Tons XDH32, 60Hz Maximum(105°F [40°C] EAT): 34.5kW/7.3 Tons XDH32, 50Hz Nominal (98°F [37°C] EAT): 27kW / 7.7 Tons XDH32, 50Hz Maximum(108°F [42°C] EAT): 34.5kW/7.3 Tons			
Conditions	Capacity rating is @ 55°F (13°C) Entering Fluid Temperature and 50°F (10°C) or lower dew point			
Electrical Requirements				
Input	120V-1ph-60Hz		220-240V-1ph-50Hz, CE / 208-240V-1ph-60Hz, CSA	
Input Power Connections	Two IEC320-C14 power inlets and two IEC power cords with NEMA 5-15P connectors		Two IEC320-C14 power inlets and two IEC power cords with IEC320-C14 receptacles	
Full Load Amps	5	10	2.5	5
Power Consumption, Nominal, Watts	600	1200	575	1150
Dimensions, inches (mm)				
Height—Unit Only	78 (1981)			
Height—Including Pipe Connections	80 (2032)			
Width	12 (305)			
Depth	42 (1067)			
Weight, lb (kg)				
Unit Only	233 (106)	246 (112)	233 (106)	246 (112)
Shipping Weight	317 (144)	330 (150)	317 (144)	330 (150)
Number of Fans	6			
Airflow, Nominal, ft³/min (m³/hr)	2500 (4248)	4000 (6796)	2428 (4125)	3850 (6541)
Audible Noise, Sound Power	81 dBA	86 dBA	81 dBA	86 dBA
Pipe Connections				
Refrigerant Supply	1/2" OD, Cu (optional 1/2" threaded one-shot coupling on the unit)			
Refrigerant Return	7/8" OD, Cu (optional 7/8" threaded one-shot coupling on the unit)			
Serviceable Parts	Fans and electrical components			
Cabinet Exterior Finish	Black, matte finish, heat-fused powder coat			
Options	Condensate Sensing (factory-installed) Dry contact outgoing signal (24VAC - 1A maximum)			
	One-shot style flex pipe connections			
	Uni-directional or bi-directional air diffusers			
Agency				
Approvals	CSA 60Hz		CE 50Hz, CSA 50/60Hz	

Table 4 Liebert XD Flex Pipe assemblies, supply and return

Description	Liebert P/N Straight Connection Assembly	Liebert P/N 90-Degree Connection Assembly	Length ft (m)	Minimum Bend Radius inches (mm)	
				Supply	Return
Liebert XD Flex Pipe Kit	186566G1	186565G1	6 (1.8)	7 (178)	9 (229)
	186566G2	186565G2	10 (3.0)		
	186566G3	186565G3	8 (2.5)		
	186566G4	186565G4	4 (1.2)		

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