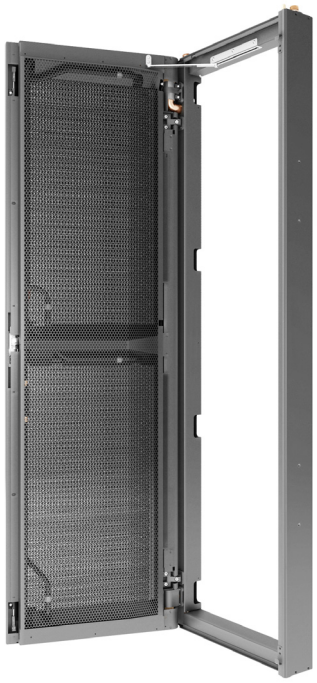
Precision Cooling
For *Business-Critical Continuity™*

Liebert® XDR™

User Manual



EMERSON
Network Power

IMPORTANT SAFETY GUIDELINES

SAVE THESE INSTRUCTIONS

WARNING

Risk of top-heavy module falling over. Can cause equipment damage, personal injury or death.

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

WARNING

Risk of explosive discharge of high-pressure refrigerant. Can cause personal injury or death.

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

WARNING

Risk of piping and component rupture. May cause equipment damage, personal injury or death.

Closing service valves may isolate liquid refrigerant, causing high pressure and rupture of piping. Do not close valves without following recommended procedures for repair, maintenance and replacement of components. Install pressure relief valves in field piping that may become isolated by service valves.

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 module for installation.

CAUTION

Risk of improper operation and overpressurization. Can cause in personal injury or property damage.

Only personnel properly trained and qualified in HVAC installation or service should install or service this equipment.

Read all installation, operating and safety instructions before proceeding.

NOTICE

Risk of overhead interference. Can cause module or structural damage.

The module may be too tall to fit through a doorway while on the skid. Measure the module and doorway heights and verify clearances by referring to the installation plans and other site-specific drawings and documents before moving the module.

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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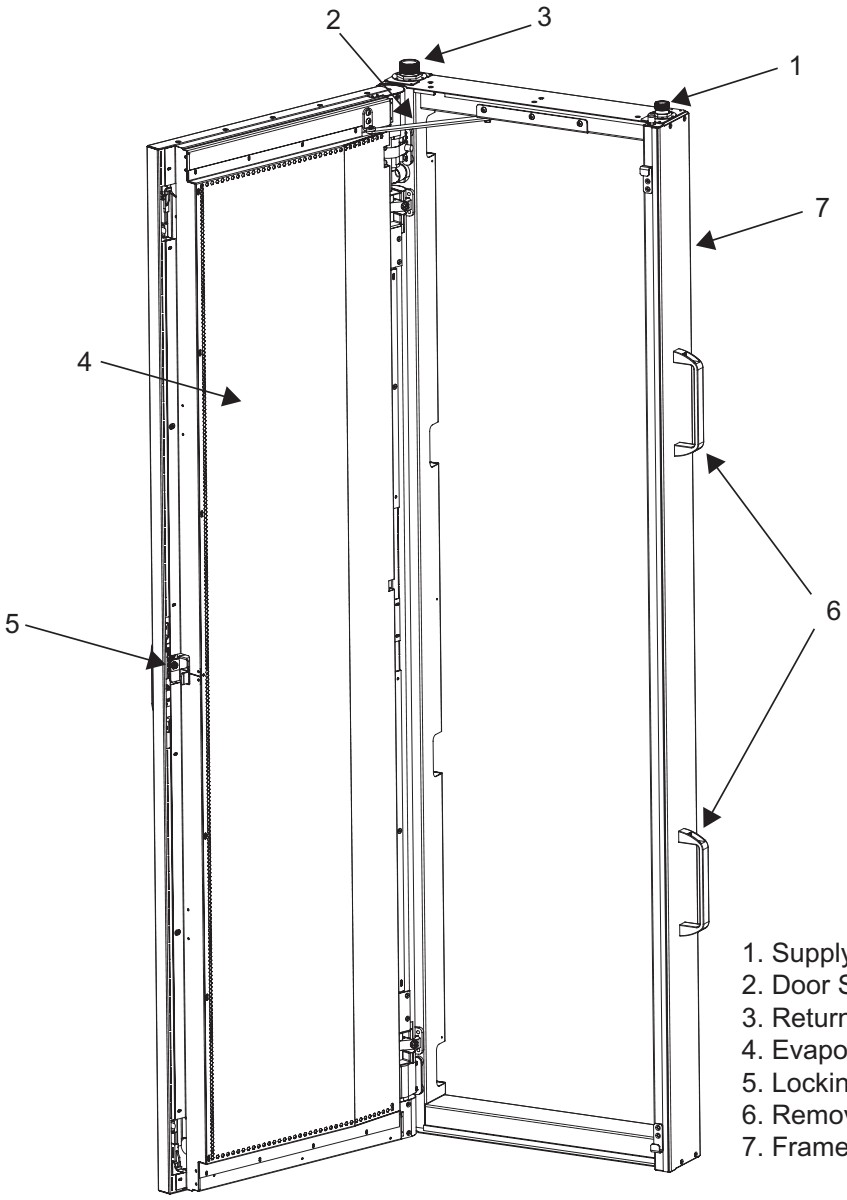
1.0 COMPONENT LOCATIONS AND MODEL NUMBER NOMENCLATURE

Figure 1 Liebert XDR component locations



1. Supply Line
2. Door Safety Catch
3. Return Line
4. Evaporator Coils
5. Locking Door Latch
6. Removable Installation Handles
7. Frame

Figure 2 Liebert XDR model number nomenclature

Example: XDR20B1R — *

XD	R	20	B	1	R	—	*
Liebert X-treme heat density system	Rear Cooling Module	20 = Model Size	B = Basic Module	1 = Standard	- = Hard-Piping P = Pre-Charged One-Shot Coupling R = Removable Coupling	- = Domestic Packaging E = Export Packaging	Revision level

2.0 INTRODUCTION

2.1 References

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

2.2 Pre-Installation Checks

- 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 Emerson representative.

2.3 Packing List

- User manual (this document)
- Liebert XDR module

2.4 Installation Considerations

The Liebert XDR is designed for attachment to the rear of computer cabinets in the data center. See **4.0 - Mechanical Considerations** for details.

2.4.1 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 XDR is a cooling system for high-density heat loads that mounts on the rear of a 24" x 42U rack (for other sizes consult the factory) and maintains access to the back of the server rack. Room air is drawn in through the front of the rack and picks up heat from the servers. The coil captures that heat, cooling the air, which is expelled through the rear of the rack.

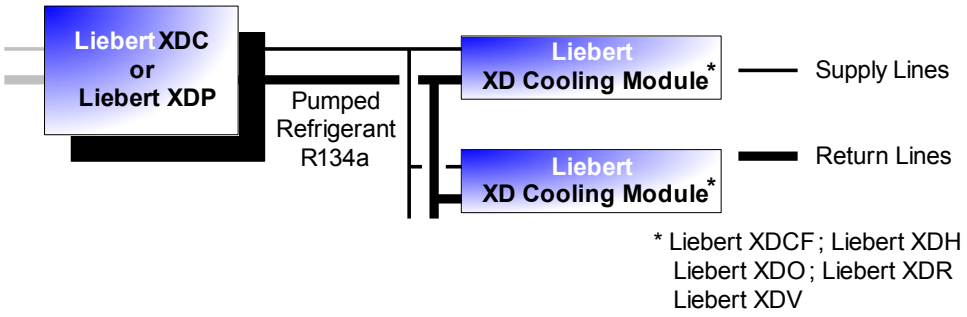
The Liebert XDR relies on the rack equipment's fans to move air across the micro-channel coil. Captured heat is carried away through pumped R-134a refrigerant supplied by either a Liebert XDP™ or Liebert XDC™.

The complete cooling system may include other Liebert XD cooling modules, such as the Liebert XDO™, Liebert XDV™, Liebert XDH™, Liebert XDA™ or Liebert XDCF™ (see **Figure 3**) and Liebert XD Flex Piping.

The Liebert XDR 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.

Four handles to ease carrying the Liebert XDR are attached at the factory. These should be removed after the module is attached to the rear of the enclosure. Leaving the handles attached would require space between the racks. The handles should be retained for use if the Liebert XDR is removed from the enclosure.

Figure 3 Generic piping layout



3.2 Checking and Unpacking

Upon arrival of the module and before unpacking it, verify that the labeled equipment matches the bill of lading.

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 Emerson or to your sales representative. If you later find any concealed damage, report it to both the shipping company and your local Emerson representative.

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

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

3.2.1 Recyclable Packaging

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

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 module for installation.

NOTICE

Risk of improper storage. Can cause module damage.

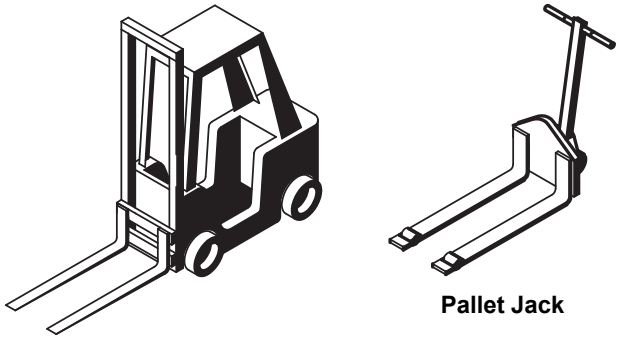
Keep the module indoors and protected from dampness, freezing temperatures and contact damage.

NOTICE

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.

Figure 4 Recommended module handling equipment



Forklift

Pallet Jack

3.2.2 Module Handling

WARNING

Risk of 130-pound (59 kg) module falling. Can cause equipment damage, personal injury or death.

Do not leave a Liebert XDR standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert XDR must be supported at all times or laid flat on protective material until it is installed.

Two properly trained and qualified people are required to move the module.

When unpacking and handling the module, exercise extra care to prevent damage.

Use a forklift or pallet jack to move the Liebert XDR. If multiple Liebert XDR modules are delivered, they will be shipped on a pallet with up to four modules. A pallet jack will be required to move these modules to the installation location.

- If using a forklift or pallet jack, ensure that the fork tine length is suitable to safely move the packaged module.
- Keep the module in the protective packaging until it has been moved to the installation site.
- When handling and unpacking the module, exercise great care to prevent damage.
- Do not lift the module 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 module at least 20 feet (5m) away from the module.
- Do not use module piping to lift or move the Liebert XDR.

3.2.3 Unpacking the Module

WARNING

Risk of 130-pound (59 kg) module falling. Can cause equipment damage, personal injury or death.

Do not leave a Liebert XDR standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert XDR must be supported at all times or laid flat on protective material until it is installed.

Two properly trained and qualified people are required to move the module.

Do not unpack the Liebert XDR before moving it to the installation location. Once at the installation point:

1. Cut the banding and place all packaged modules on the floor for unpacking.
2. Unbend all metal tabs as shown in **Figure 5**.
   Use any of these tools to unbend the tabs: flat-blade screwdriver, claw hammer, pliers or crowbar.
3. Remove the top cover from the package.
4. Remove the center top brace.
5. Remove and set aside the hardware and key package.
6. Remove side panels from package.
7. Remove top protective foam from the package.

Figure 5 Removing packaging

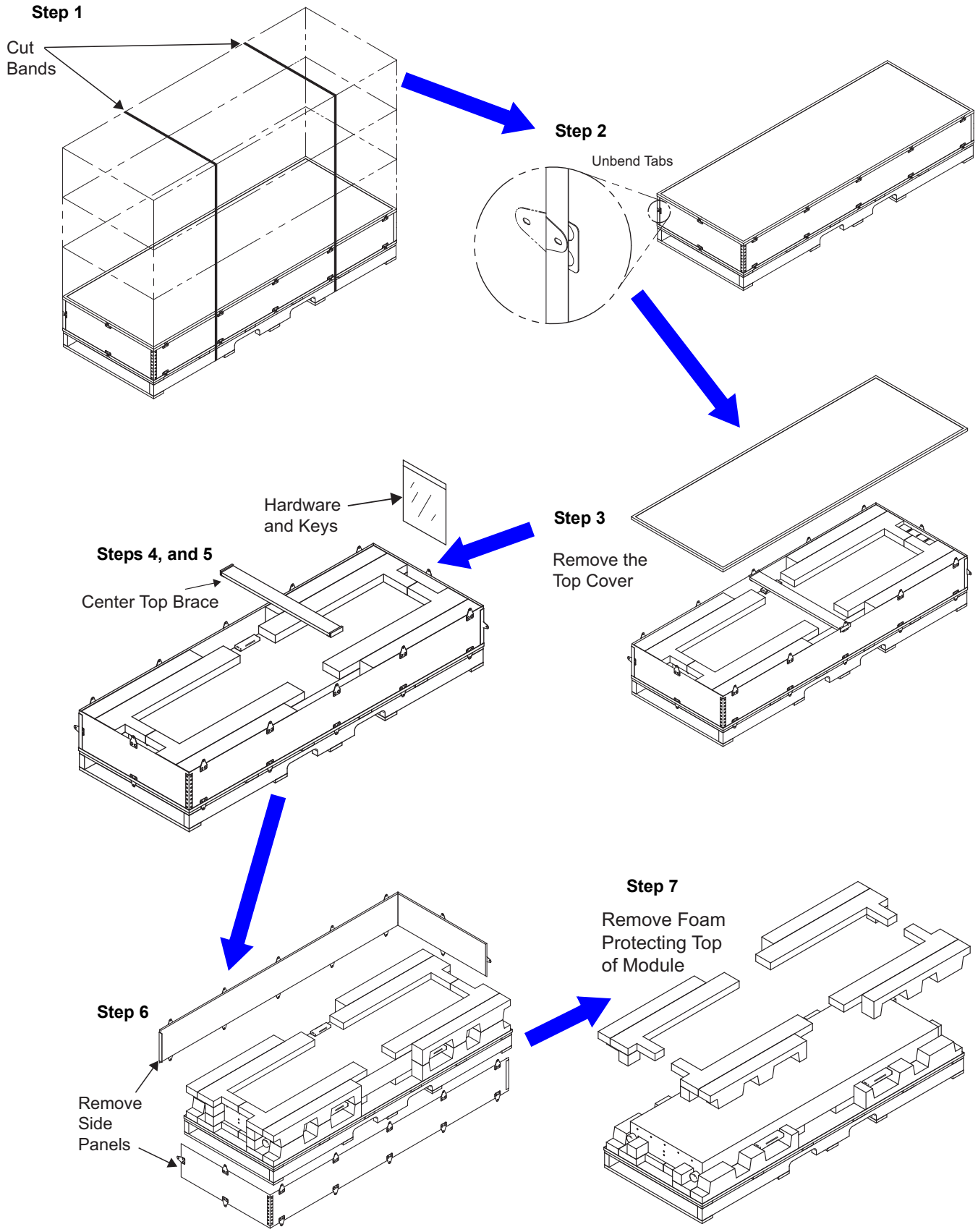
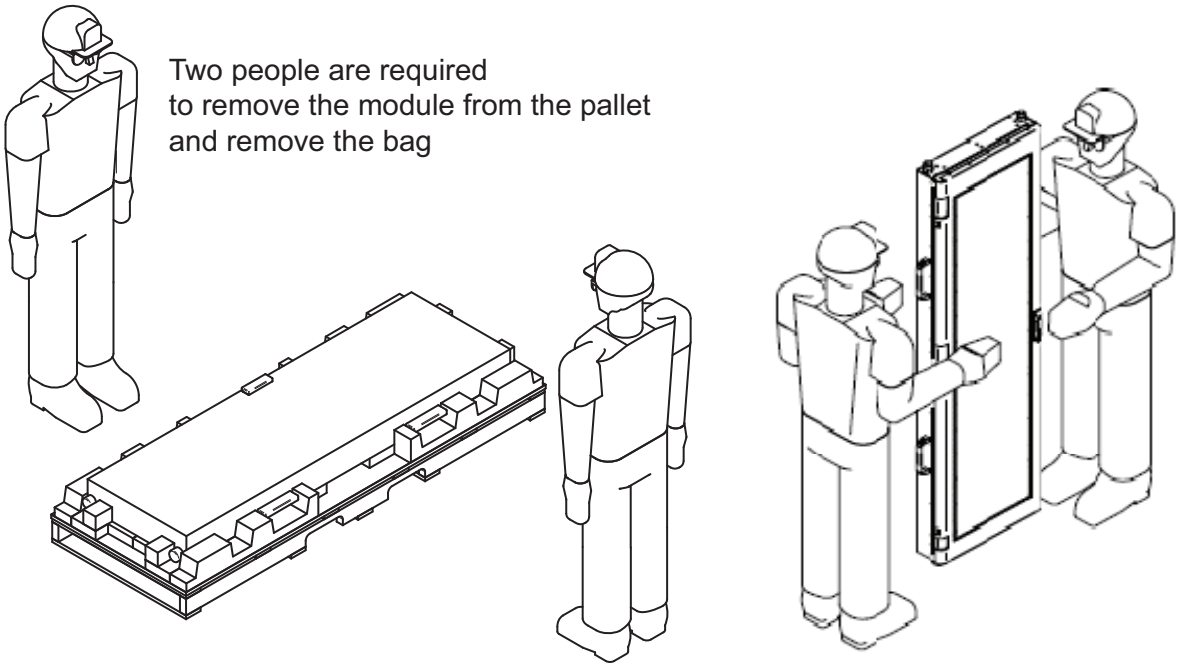


Figure 6 Remove Liebert XDR from pallet



WARNING

Risk of 130-pound (59 kg) module falling. Can cause equipment damage, personal injury or death.

Do not leave a Liebert XDR standing unattended on its side or its end without adequate support to prevent it from falling over. The Liebert XDR must be supported at all times or laid flat on protective material until it is installed.

Two properly trained and qualified people are required to move the module.

3.2.4 Removing the Liebert XDR from the Pallet

1. Unfold the module bag to expose the Liebert XDR.
2. Compare the serial tag information on the Liebert XDR to the bill of lading information. If the information does not match the product specified, contact your local sales representative.
3. At least two properly trained and qualified personnel may lift the Liebert XDR off the pallet using the four handles and stand it upright, supporting the module to keep it from falling.
4. If the Liebert XDR will not be installed immediately, lay a piece of protective material the length of the module on a flat surface and lay the Liebert XDR on it.

4.0 MECHANICAL CONSIDERATIONS

4.1 Liebert XDR Dimensions

The Liebert XDR is engineered to fit on the rear of a rack enclosure measuring approximately 24" x 42U. Consult the factory for other sizes. **Figures 7**, **8** and **9** illustrate the module's dimensions and the location of pipes. **Figure 11** shows the attachment positions of each module.

Figure 7 Overall dimensions with hard-piped connections

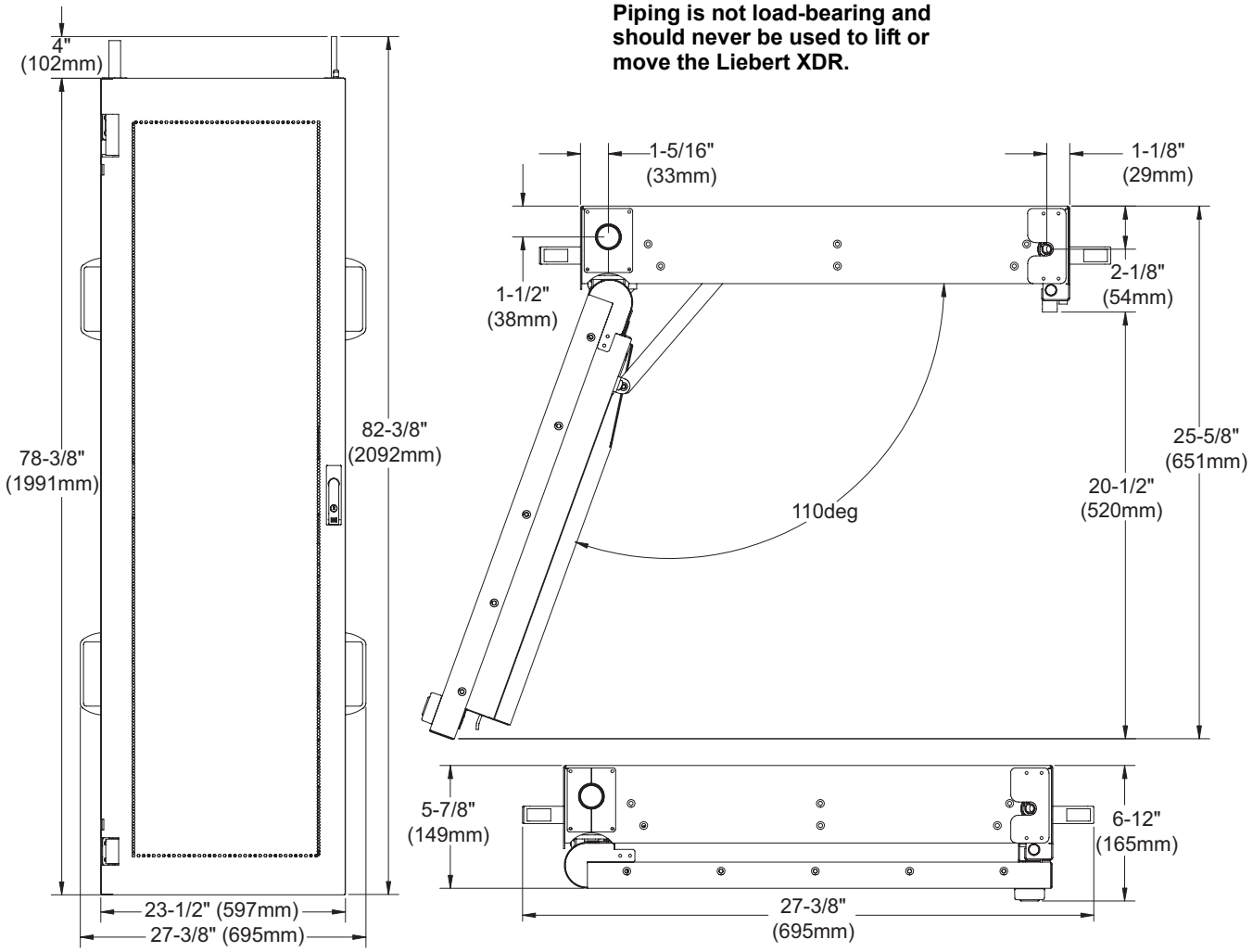


Figure 8 Overall dimensions with one-shot coupling (pre-charged)

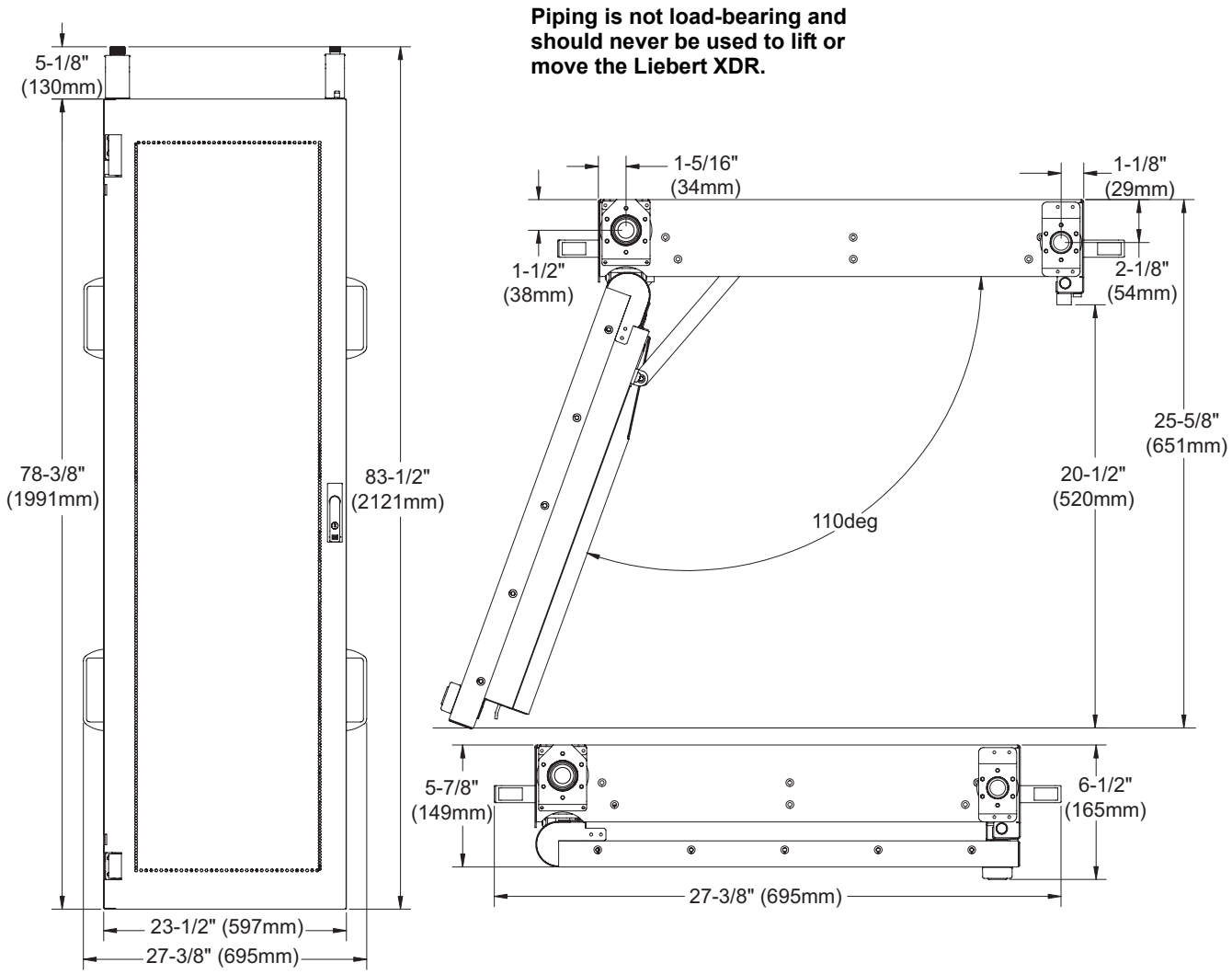
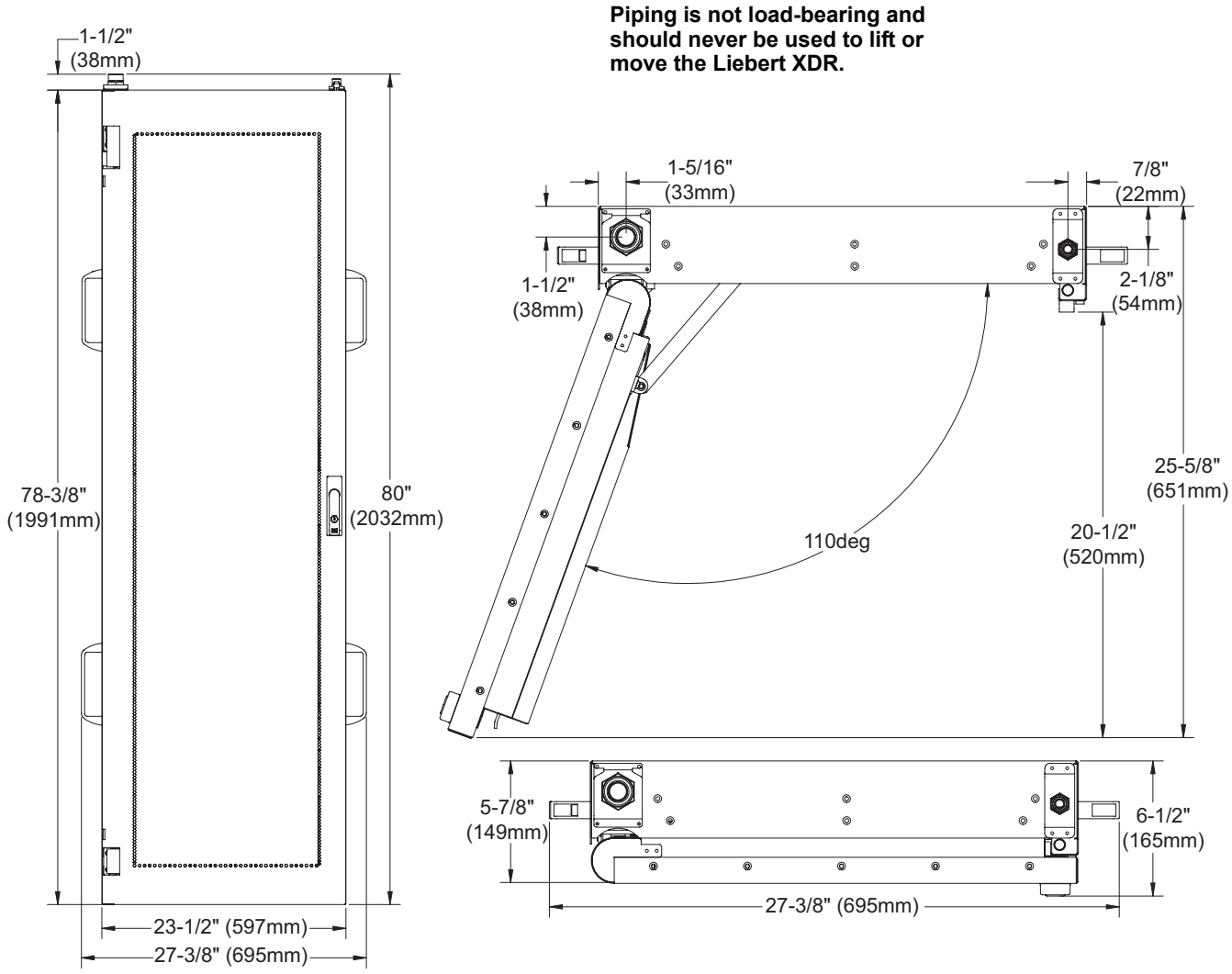


Figure 9 Overall dimensions with removable coupling



4.2 Determining Placement in the Conditioned Space

Refer to site-specific drawings for exact placement. Efficient cooling of the rack equipment depends on proper placement of equipment, proper use of blanking plates in any voids in the rack, and good cable management.

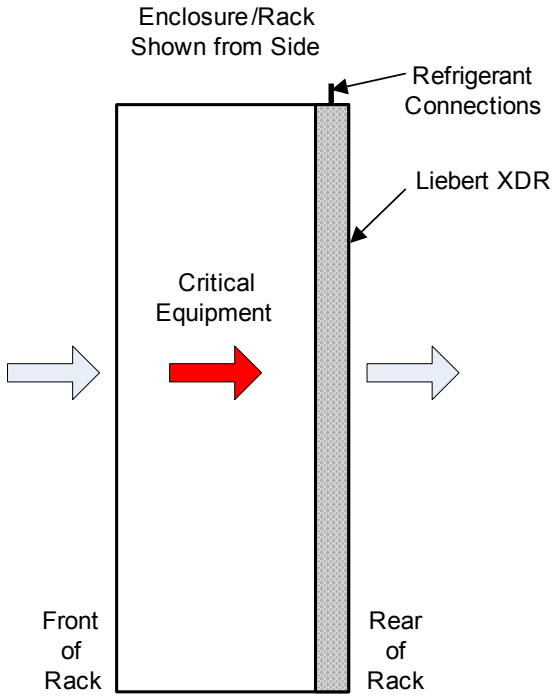
The Liebert XDR is engineered to fit the rear of computer enclosure cabinets. **Figures 7**, **8** and **9** illustrate the module's dimensions and the location of pipes.

Ensure that there is 25.6" (649mm) clearance in the rear to allow the door to open fully.

4.3 Airflow

The server fans draw air into the equipment enclosure. After heated the air, the server fans force the air across the Liebert XDR's two coils. The Liebert XDR has a low air-side pressure drop (similar to a rack with perforated doors). The server fans within the rack create sufficient airflow to move the air.

Figure 10 Generic airflow diagram



NOTE

Air bypass and recirculation can severely reduce the cooling effectiveness of the Liebert XDR. Blanking plates must be installed in any voids in the rack to prevent air bypass and air recirculation. Contact the factory for further information. Refer to the user manual supplied with the rack the Liebert XDR is mounted on.

Efficient cooling of rack equipment depends on proper use of blanking plates in any voids in the rack and good cable management. Keep the Liebert XDR's coils clear of any obstructions that may block the airflow.

Each of the Liebert XDR's coils removes approximately half the load. For even cooling in partially filled racks, servers should be evenly spaced and blanking plates should be installed on unused rack spaces to prevent recirculation of heated air.

5.0 INSTALLATION

5.1 Installing the Rack-Mounting Kit onto the Rack

The Liebert XDR module mounts on the rear of the rack using a mounting kit. The mounting kit secures the Liebert XDR's frame to the rack. Two rails are attached to the rear of the rack with M6 x 12 bolts. The number of bolts can vary depending on the rack.

Before beginning to attach the rack-mounting brackets to the rack, remove the rear door from the rack. Refer to the rack's installation manual for details.

1. Insert and screw in the M6 x 12mm bolts that shipped with the Rack Connecting Bracket.
2. Tighten the bolts with a 10mm wrench.

5.2 Mounting the Liebert XDR on the Rack-Mounting Kit

WARNING

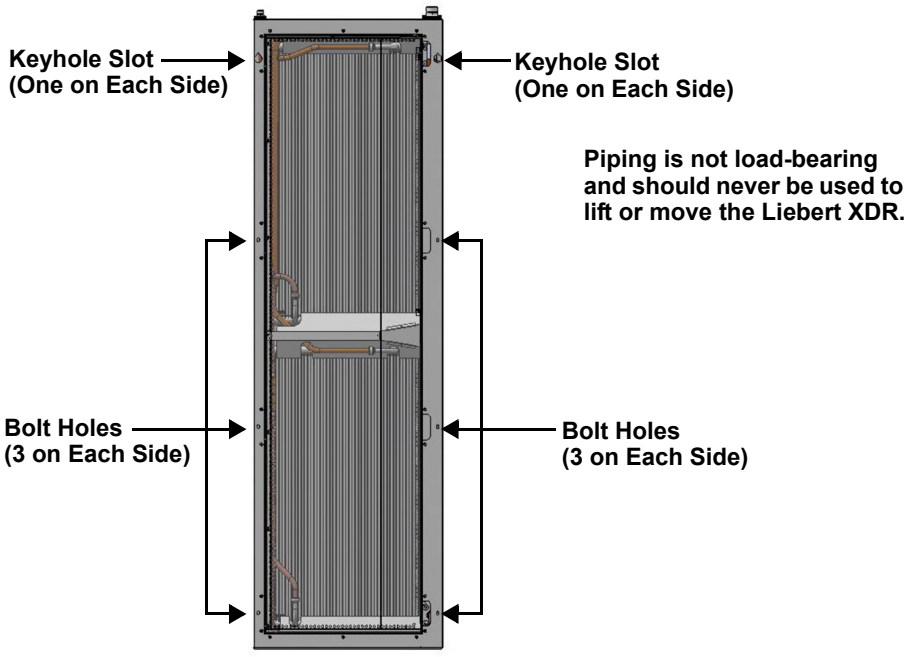
Risk of 130-pound (59 kg) module falling or causing cabinet to tip over. Can cause equipment damage, personal injury or death.

- Read all instructions before beginning.
- Use caution when installing the Liebert XDR on an equipment cabinet, particularly a cabinet with little equipment installed. Lack of weight in the cabinet could cause it to tip while the Liebert XDR is being installed.
- Two properly trained and qualified people are required to handle the Liebert XDR.
- Do not move a cabinet with a Liebert XDR installed on it.

The rack-mounting brackets must be mounted on the rack before the Liebert XDR can be installed.

1. Thread one of the provided M6x12 bolts into the top threaded hole of each rail attached to the rack.
2. Use fingers or a 10mm wrench to tighten the bolts, leaving a 1/8" (3-4mm) gap between the bolt heads and the rail. This gap is necessary to allow the door to fit over the bolts and hang safely on the rack.
3. With another person, lift the Liebert XDR by the handles on the sides, match the two keyhole slots near the top of the Liebert XDR frame to the bolts and hang the Liebert XDR on the rack.
4. Thread the remaining bolts through the holes in the frame and into the mounting rails.
5. Tighten all of the bolts snugly with a 10mm wrench.

Figure 11 Liebert XDR mounting locations



5.3 Door Safety Catch

The door safety catch prevents the door from opening beyond 110°. When the door is fully open, the safety catch will hold door in place. To release the door, push up on the door catch and close the door.

6.0 PIPING

Refer to site-specific drawings for general locations of the piping connections. The drawings should specify where the piping connects to the Liebert XDR.

6.1 European Union Fluorinated Greenhouse Gas Requirements

Stationary air conditioning, refrigeration, heat pump equipment and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R-134a, 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.

6.2 System Connection Configuration

If possible, connect the Liebert XDR modules to Liebert XDPs or Liebert XDCs in an interlaced configuration (see **Figure 12**). In an interlaced configuration, half the cooling modules in an aisle are connected to one Liebert XDP or Liebert XDC and the other half in that aisle are connected to another Liebert XDP or Liebert XDC. Interlacing the connection piping will keep half the Liebert XDR modules operating and maintain cooling in the conditioned space should one of the Liebert XDP or Liebert XDC units fail.

However, if this is not possible, connect the Liebert XDR modules in a non-interlaced configuration (see **Figure 13**).

Figure 12 Typical Liebert XDR piping—interlaced connections

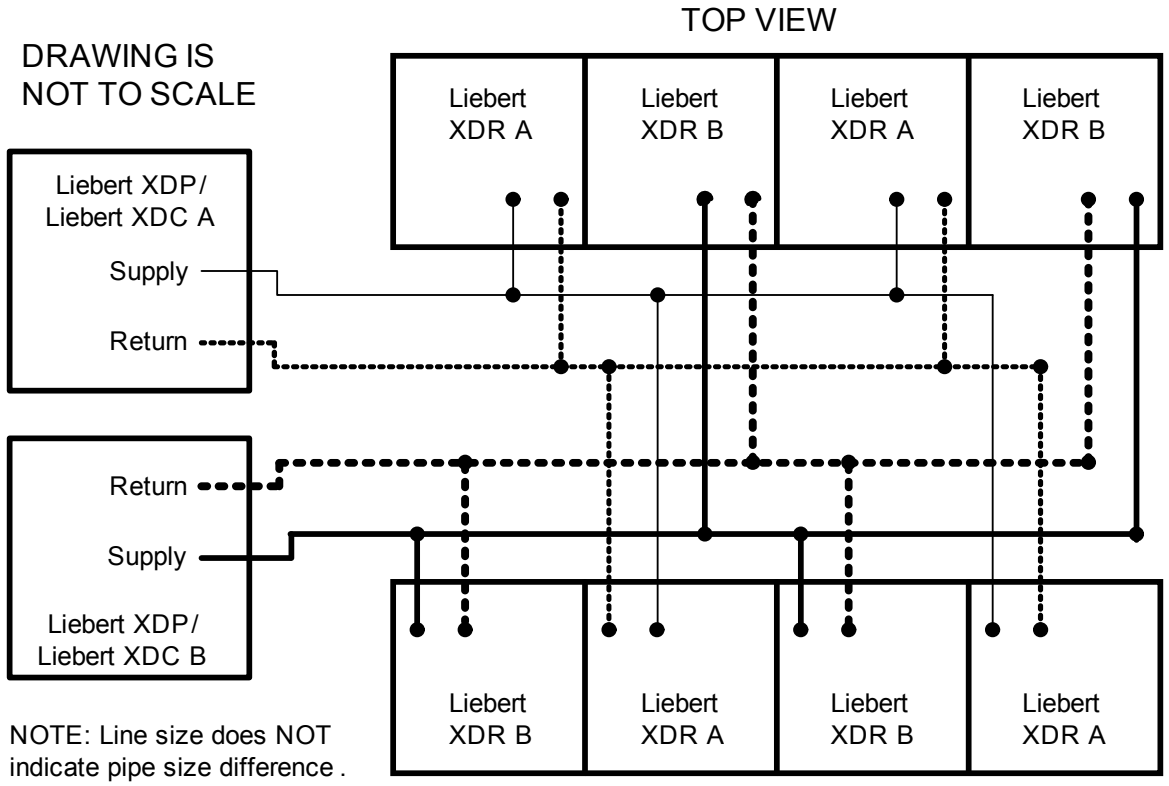
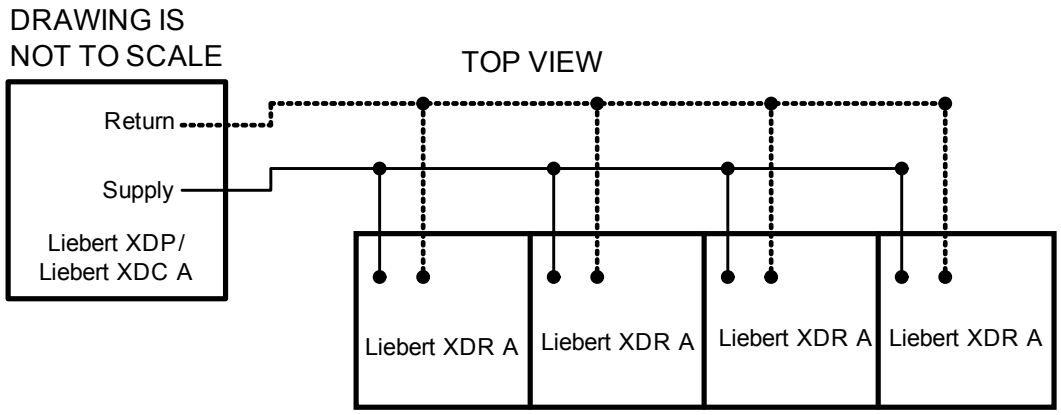


Figure 13 Typical Liebert XDR piping—non-interlaced connection



6.3 Connection Methods and Points

Refer to site specific drawings for general locations of the piping connections. For Liebert XDR connection locations, refer also to **Figures 14**, **17** and **21**.

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. All piping must be ASTM Type ACR copper.

The Liebert XDR has supply and return piping access on the top of each module. Supply piping connection is 1/2" OD copper pipe, and return piping connection is 7/8" OD copper. The hard-piped Liebert XDR has a low-pressure nitrogen holding charge.

Both supply and return couplings may be supplied with optional one-shot couplings. These couplings contain pressurized R-134a refrigerant inside the Liebert XDR.

For Liebert XDRs with removable couplings, the supply piping connection is 1/2" OD and the return piping connection is 7/8" OD. Both the Liebert XDR and the Liebert XD Flex Pipe with removable couplings have a low-pressure nitrogen holding charge.

6.4 Insulation

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

6.5 Venting the Holding Charge for Hard-Piped or Removable Liebert XD Flex Pipe Couplings

The Liebert XDR in either hard-piped configuration or with removable couplings is shipped with a low-pressure holding charge (about 30 psi) of nitrogen to prevent oxidation and moisture. This must be vented from the refrigeration circuit before removing the copper cap.

NOTE
This procedure is for modules with hard-piped or removable couplings ONLY. Do not vent a pre-charged Liebert XDR or pre-charged Liebert XD Flex Piping.

To vent the holding charge:

1. Find the Schrader valve that retains the nitrogen holding charge in the Liebert XDR. The valve is inside the rear door, on the supply line (see **Figure 14** for hard-piped connections and **Figure 22** for removable couplings).
2. Vent the holding charge in the circuit by depressing the pin in the Schrader valve on the supply line.
3. Replace and secure the cap on the Schrader valve that was opened.

6.5.1 Brazing Preparations

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.

After the holding charge has been vented and before brazing, wrap a wet rag around the copper connections before removing the caps to prevent internal component damage. A torch can be used to remove the caps over the ends of the supply and return lines.

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.

6.5.2 Recommended Piping Size

Connect the main pipes between the Liebert XDR branch piping and the Liebert XDP or Liebert XDC according to **Table 1**. Elbows and restrictions must be minimized to ensure good fluid flow.

See **Table 1** below for recommended pipe sizes and **Figure 3** for piping segment locations.

Table 1 Branch piping sizes for pumped refrigerant loop

Pipe Function	Size / Equivalent Pipe Length
From Liebert XDR 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 XDR 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.

See **Figure 14** for piping recommendations for hard-piping between the Liebert XDR and the header system.

6.6 Hard-Piped Connection Sizes

The supply piping for the refrigeration circuit is 1/2" OD copper pipe. The return piping for the circuit is 7/8" OD copper.

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

Figure 14 Piping location and connection sizes—modules with hard-piped connections

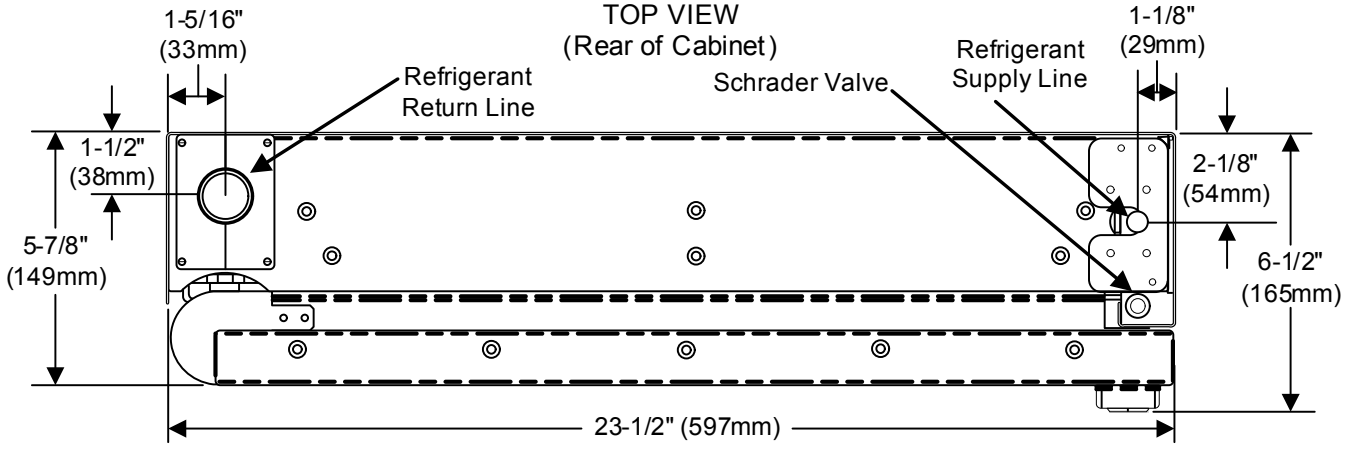
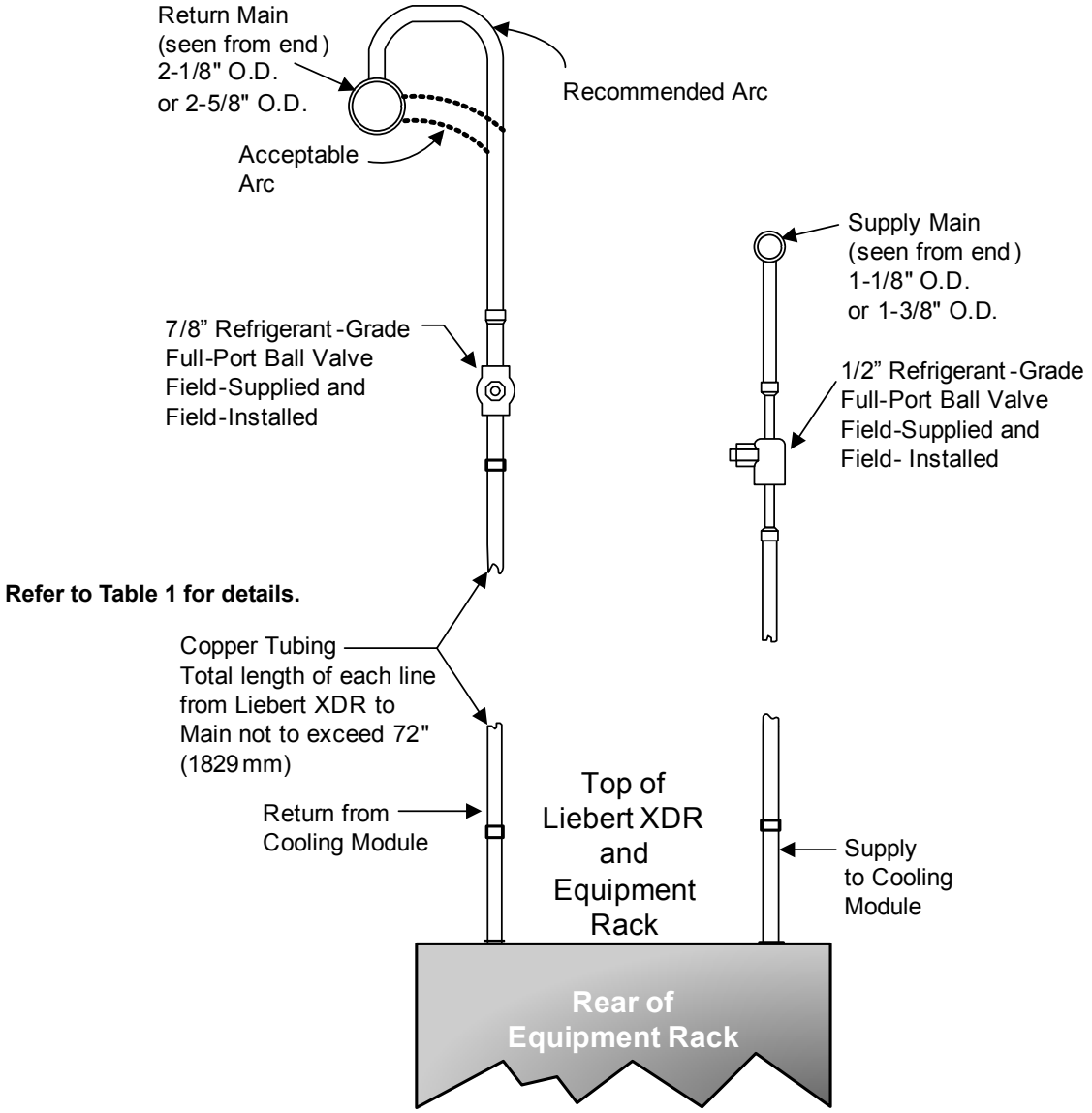


Figure 15 Hard pipe connection diagram



6.6.1 Leak-Checking and Evacuation

Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.

6.6.2 Header System

The Liebert XDR 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 XDR modules. For the details on piping connection locations, see **Figure 14**.

For additional information, refer to the Liebert X-treme Density System Design Manual, SL-16655, available at the Liebert Web site: **www.liebert.com**

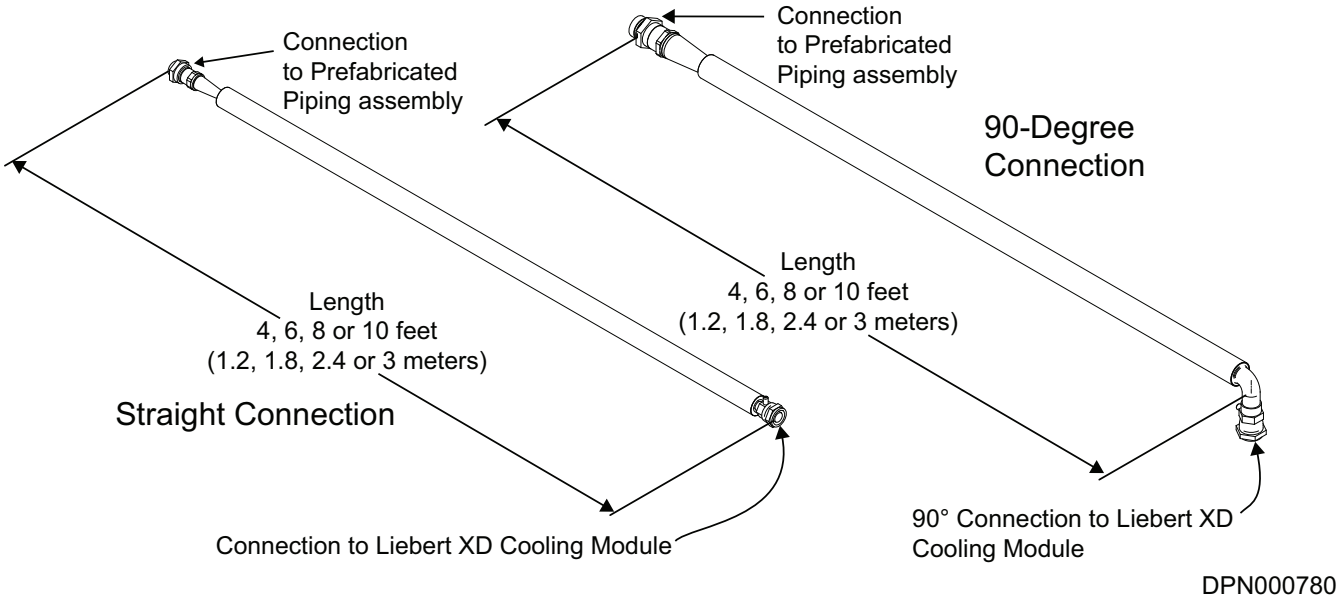
6.7 Field Installation of Liebert XD Flex Pipe Kit on Liebert XDR

If you are not performing a service installation or a field-retrofit, skip this section and proceed with the instructions in **6.7.2 - Connect a Liebert XDR with One-Shot Couplings to Liebert XD Flex Pipe**.

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 module end may be straight or 90 degrees with one-shot or removable couplings. Connection to the prefab piping assembly is a threaded coupling. For data on acquiring the correct kit for your installation, see **Table 8**.

The Liebert XD Flex Pipe should be connected to the Liebert XD module then to the header system to ease installation and prevent twisting the flex pipe.

Figure 16 Liebert XD Flex Pipe dimensions—straight and 90-degree connections



6.7.1 Connecting Methods—One-Shot Couplings for Pre-Charged Refrigerant Option

CAUTION

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

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

Supply and return fittings on the pre-charged Liebert XDR modules are one-shot couplings. Do not disconnect one-shot couplings after they have been connected. Disconnection will release pressurized R-134a refrigerant from the Liebert XDR.

Liebert XDRs with the pre-charged option are equipped with one-shot couplings on the supply and return fittings. These contain a charge of R-134a refrigerant under pressure within the module. This charge must not be vented.

Do not remove the pipe caps or plugs before the module is ready for connection to Liebert XD Piping. Do not disconnect one-shot Liebert XD Flex Pipes after they have been connected.

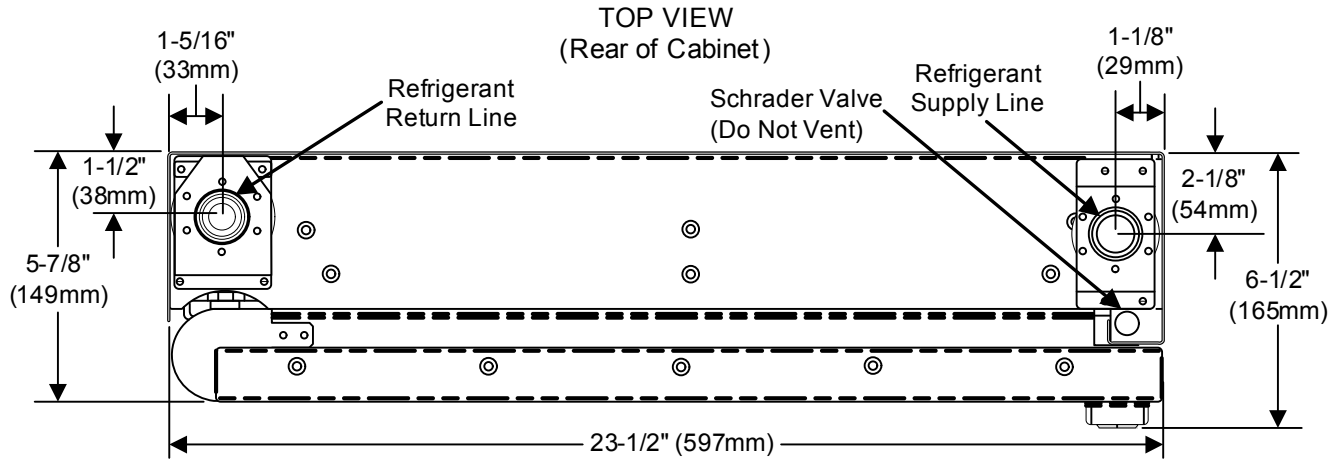
The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

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

If the module includes the optional, factory-installed, one-shot style couplings, proceed with **6.7.2 - Connect a Liebert XDR with One-Shot Couplings to Liebert XD Flex Pipe** and see **Figure 17**.

If the module does not include Liebert Flex Pipes, refer to **6.5 - Venting the Holding Charge for Hard-Piped or Removable Liebert XD Flex Pipe Couplings**.

Figure 17 Piping location and connection sizes—modules with pre-charged modules



6.7.2 Connect a Liebert XDR with One-Shot Couplings to Liebert XD Flex Pipe

NOTICE

Risk of improper reuse of Liebert XD Flex Pipes with one-shot couplings. Can cause refrigerant leaks.

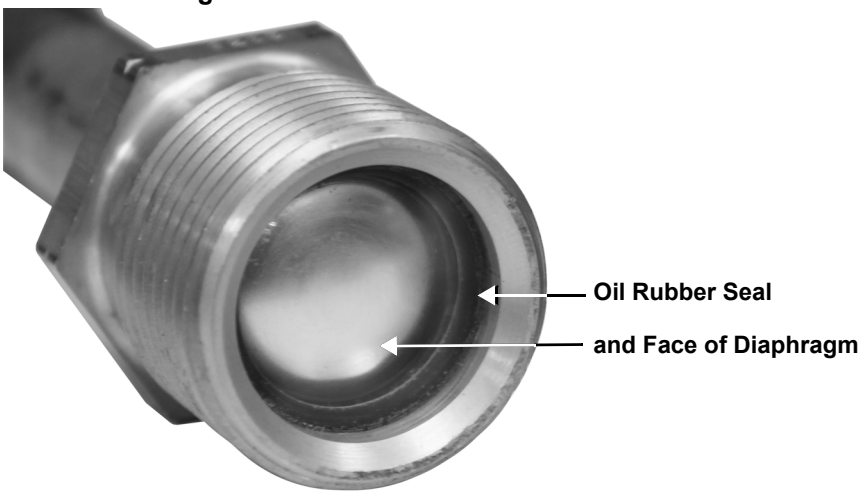
Liebert XD Flex Pipes with one-shot couplings must not be removed from the Liebert XDR unless they are being replaced with Liebert XD Flex Pipes with one-shot couplings. Do not reuse Liebert XD Flex Pipes with one-shot couplings. Reuse may result in refrigerant leaks.

Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2 inches
- One torque wrench, half-inch drive (see **Table 2** for sizes)
- Refrigerant oil

1. Check the Liebert XD Flex Pipe for proper length.
2. Remove the protector cap and plug from the connections and carefully wipe the couplings and threaded surfaces clean.
3. Use a small applicator brush saturated with refrigerant oil to lubricate the entire surface of the diaphragm and the O-ring. Refer to **Figure 18**.

Figure 18 Male coupling on Liebert XD cooling module



If refrigerant oil is not used, an alternate lubricant for this application is a refrigerant-compatible silicone grease product, such as Dow Corning DC200/60,000 cst.

4. Thread the coupling halves together by hand to ensure that the threads mate properly. Ensure that the Schrader valve is oriented so that it is accessible for service.

Figure 19 Female one-shot coupling Liebert Flex Pipe: Schrader valve location

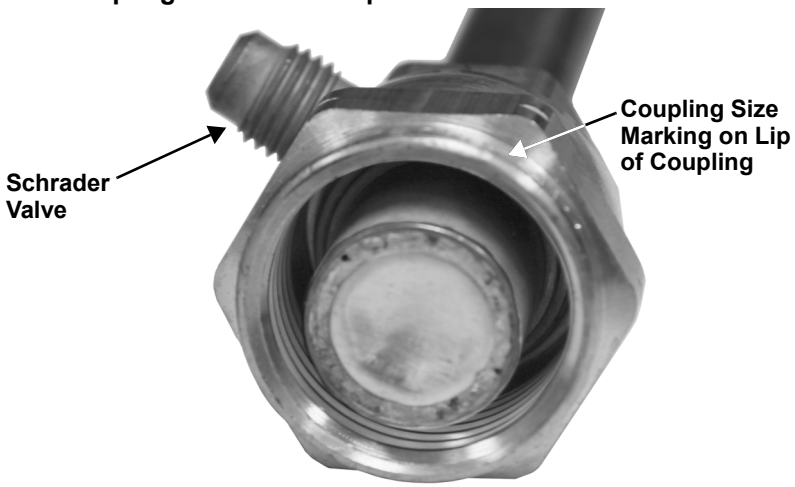
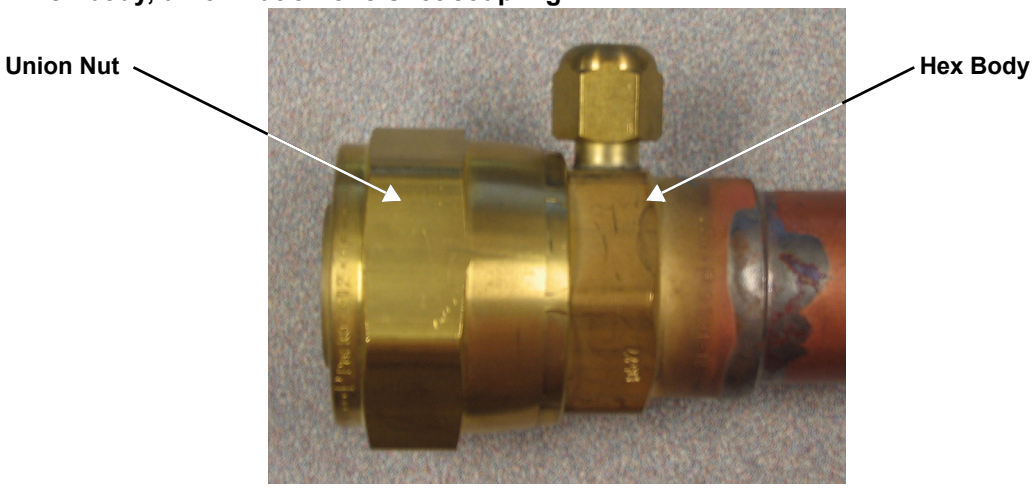


Figure 20 Hex body, union nut on one-shot coupling



NOTICE

Risk of improper tightening. Can cause equipment damage.

It is imperative that the brass body on the Liebert XD Flex Pipe coupling does not rotate while the union nut is being tightened. If the brass body rotates, it may damage the Liebert XD Flex Pipe.

5. Hold the brass body of the Liebert XD Flex Pipe with a wrench so that it does not rotate and use the torque wrench to tighten the union nut to the proper value shown in **Table 2**.

Table 2 Torque and wrench size for connecting Liebert XDR with one-shot couplings to Liebert XD Flex Pipe

Coupling Size	Wrench Sizes, in. (mm)	Torque, Union Nut Only, ft-lb (Nm)
	Union Nut	
#10 (Supply)	1-5/16 (34)	35-45 (13.5-6.2)
#12 (Return)	1-3/8 (35)	50-60 (67.8-88.1)

If a torque wrench is not available, continue with the steps below.

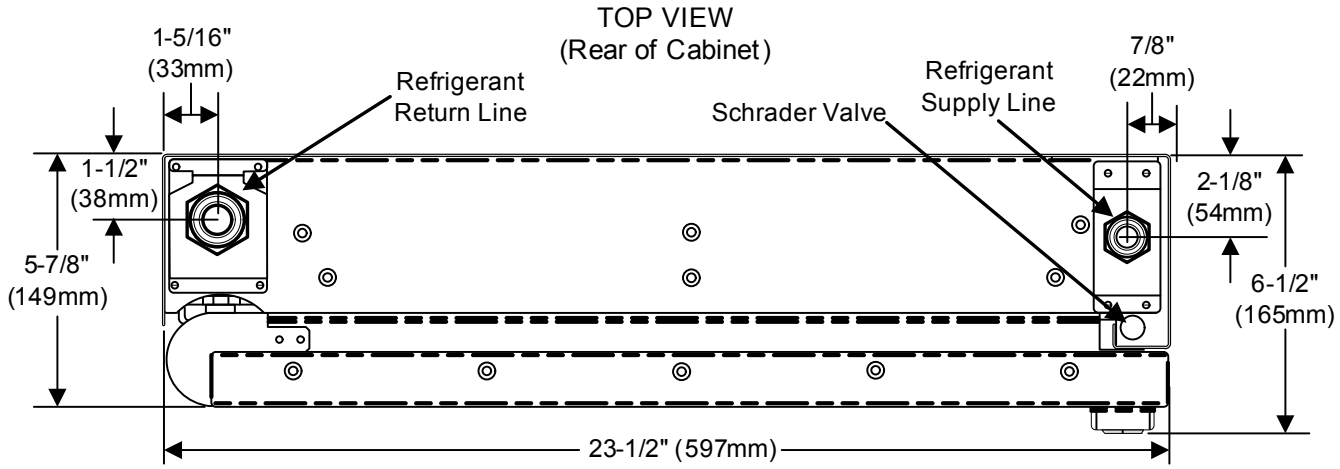
6. Tighten the union nut on the Liebert XD Flex Pipe to the coupling on the module with the proper-sized wrench until a definite resistance is felt, metal-to-metal contact.
7. Use a marker or pen to draw a line lengthwise across the module coupling to the Liebert XD Flex Pipe. The line should parallel the Liebert XD Flex Pipe.
8. Tighten the nuts an additional one (1) wrench flat (60°), judging the amount by the mark drawn in **Step 7**.

6.7.3 Connection Methods—Removable Couplings

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, removable couplings.

Figure 21 Piping location and connection sizes—modules with removable couplings



6.7.4 Connect Liebert XD Flex Pipe with Removable Coupling to a Liebert XD Cooling Module

Tools Required

- One adjustable wrench with a maximum adjustment size of 2 inches
- One torque wrench, half-inch drive (see **Table 3** for sizes)

1. Check the Liebert XD Flex Pipe for proper length.
2. Remove the protector plugs from the Liebert XD Flex Pipe.
3. Remove the protector cap from the couplings on the module.
4. Wipe the fittings and threaded surfaces clean of particles and other foreign substances.
5. Verify the O-ring is in place on the module coupling.
   Should additional O-rings be required, refer to **Table 4**.
6. Place the Liebert Flex Pipe assembly so that the flat face of the flange on the Liebert XD Flex Pipe coupling comes into contact with the O-ring on the module coupling.
7. Thread the coupling halves together by hand to ensure that the threads mate properly.

If a torque wrench is not available, continue with the steps below.

Table 3 Torque and wrench sizes for connecting Liebert Flex Pipe to the Liebert XDR with removable couplings

Coupling Size, in.	Wrench Size, in. (mm)	Torque, Union Nut Only, ft-lb (Nm)
	Union Nut	
1/2 (Supply)	15/16 (24)	40 (55)
1 (Return)	1-5/8 (41)	110 (150)

8. Hold the Liebert XD Flex Pipe so that is does not rotate and use the torque wrench to tighten the union nut to the proper value shown in **Table 3**.
9. Tighten the union nut on the Liebert XD Flex Pipe to the coupling on the module with the adjustable wrench until a definite resistance is felt.
10. Use a marker or pen to draw a line lengthwise across the module coupling to the Liebert XD Flex Pipe. The line should parallel the Liebert XD Flex Pipe.
11. Tighten the nuts an additional quarter-turn, judging the amount by the mark drawn in **Step 10**.

Figure 22 Removable couplings

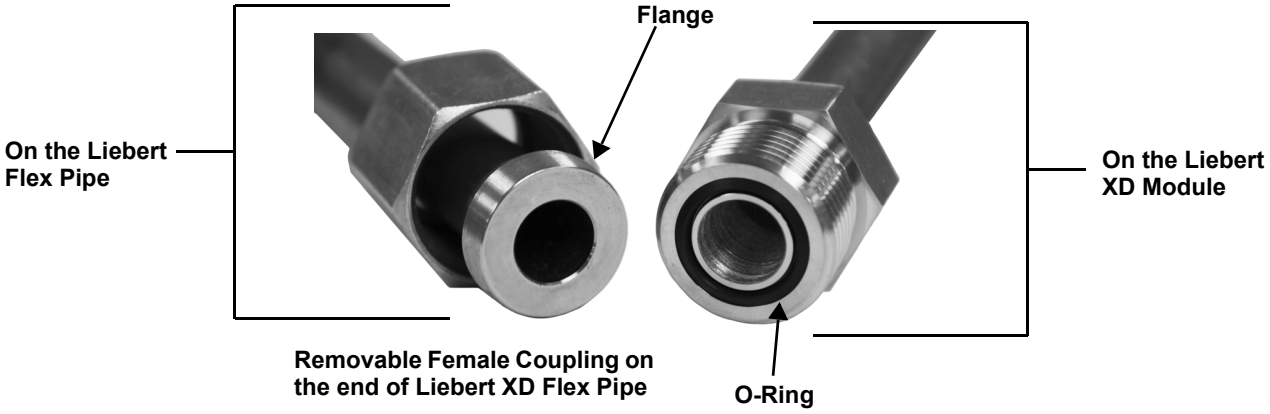


Table 4 O-ring part number

Liebert Part #	Size, in.	Fitting
192917P1	1/2	FD57-1224-08-10
192917P2	5/8	FD57-1224-10-11
192917P3	7/8	FD57-1224-14-12

6.7.5 Connect a Liebert XDR with Liebert XD Flex Pipe to a Liebert XD System

NOTE

Check the entire system for leaks before connecting the Liebert XDR with Liebert XD Flex Pipe to the prefabricated piping mains.

Read all instructions before beginning installation.

NOTICE

Risk of refrigerant loss. Can cause environmental pollution and equipment malfunction.

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

Check the Liebert XDR to ensure that the module has no refrigerant leaks.

Read all instructions before beginning installation.

Tools Required

- One adjustable wrench with a maximum adjustment size of 2 inches
- One torque wrench, half-inch drive
- Crowsfoot (supplied with Liebert XDP and Liebert XDC)
- Liebert XDP or Liebert XDC user manual

NOTE

This operation requires two or more 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 caps from only the required ports. Do not remove caps from the unused ports.
4. Remove the pipe plugs that are supplied on the Liebert XD Flex Pipe.
5. Inspect both halves of the coupling and remove any foreign contamination from the sealing surfaces and threads before connecting the fittings.
6. Determine the coupling size by locating the number scribed on the Liebert XD Flex Pipe coupling. See **Figure 23**.

Figure 23 Coupling size indicator

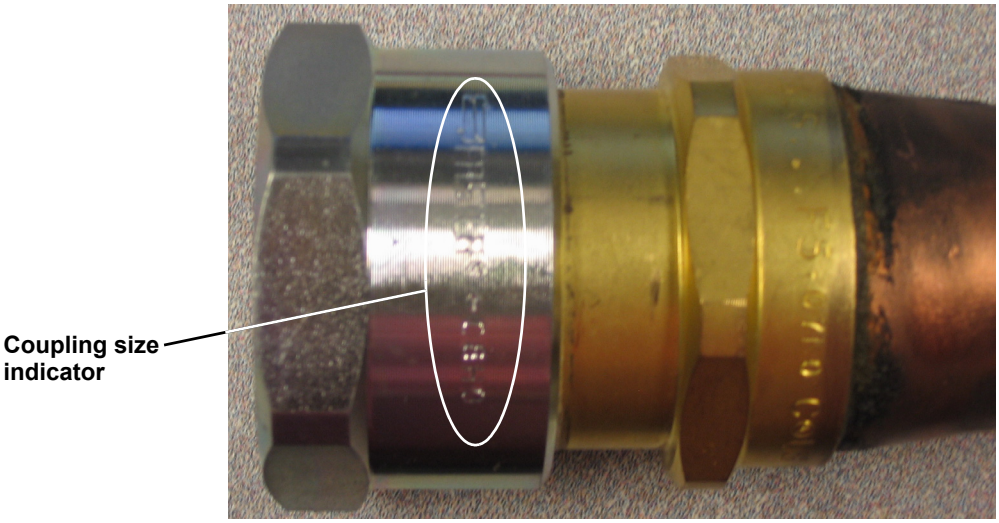
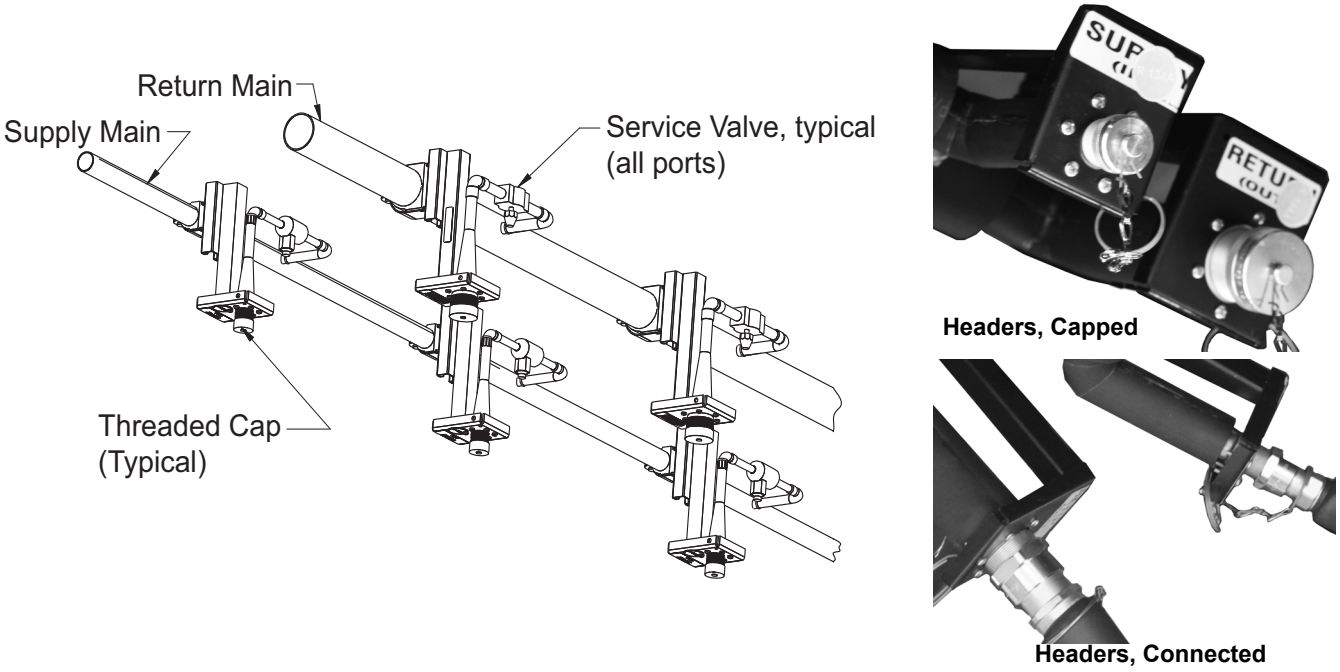
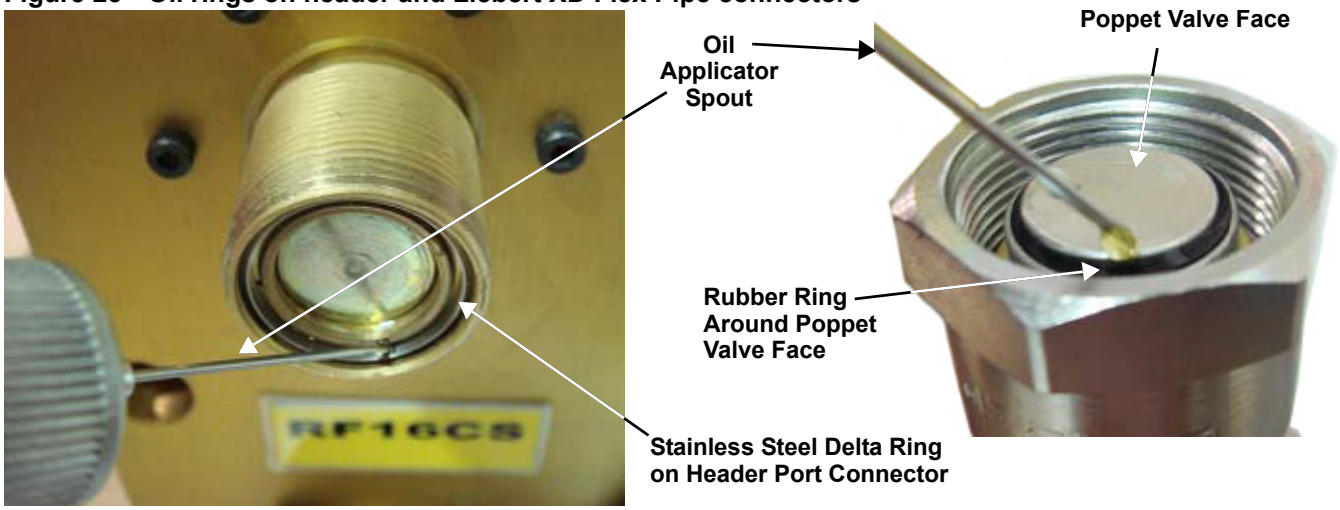


Figure 24 Liebert XD prefabricated piping assembly



7. Use mineral oil or polyol ester oil to lubricate the face of the poppet valve and the seal around the poppet valve on the female connector (on the Liebert XD Flex Pipe) (see **Figure 25**).
8. Apply mineral oil or polyol ester oil to the stainless steel delta ring on the male connector (header port connector) (see **Figure 25**).

Figure 25 Oil rings on header and Liebert XD Flex Pipe connectors



9. Thread the union nut of the Liebert XD Flex Pipe coupling onto the port coupling to ensure the threads mate properly.
10. Using the wrench arrangement shown in **Figure 26**, torque the couplings to the values in **Table 5**.

NOTICE

Risk of twisted or kinked piping. Can cause flow restriction or leaks.

It is imperative that the brass body of the Liebert XD Flex Pipe coupling does not rotate while the couplings are being tightened. Failing to do so may damage the female coupling.

Table 5 Torque for connecting Liebert XD Flex Pipe to prefabricated piping

Coupling Size	Crowsfoot Size, in (mm)	Torque, ft-lb (Nm)
RF08	1-3/16 (30)	25.8 (30-35)
RF12	1-5/8 (41)	48.0 (60-65)
RF16	1-31/32 (50)	62.7 (80-85)

Figure 26 Wrench arrangement for tightening couplings

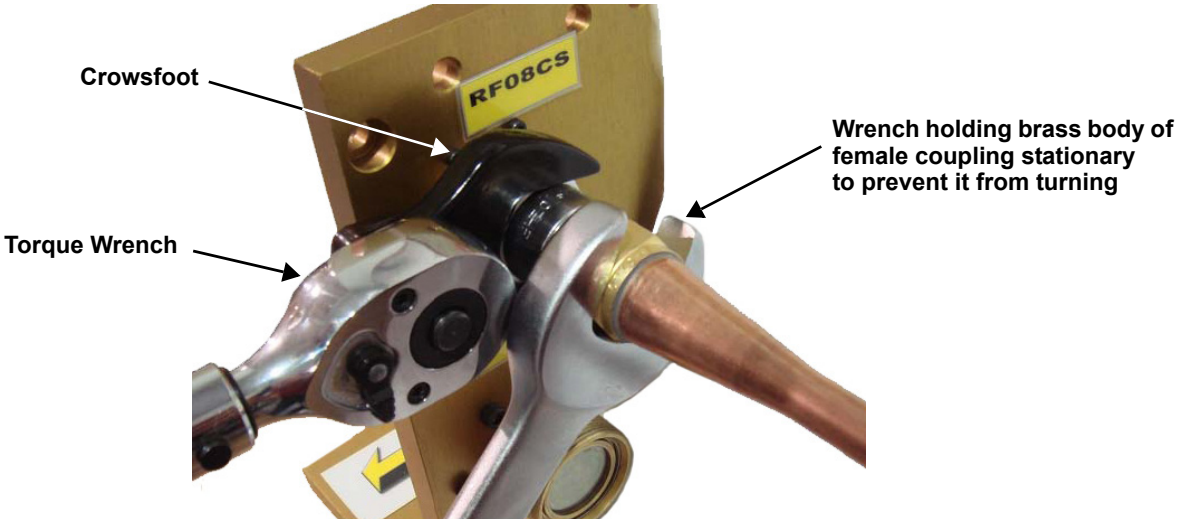
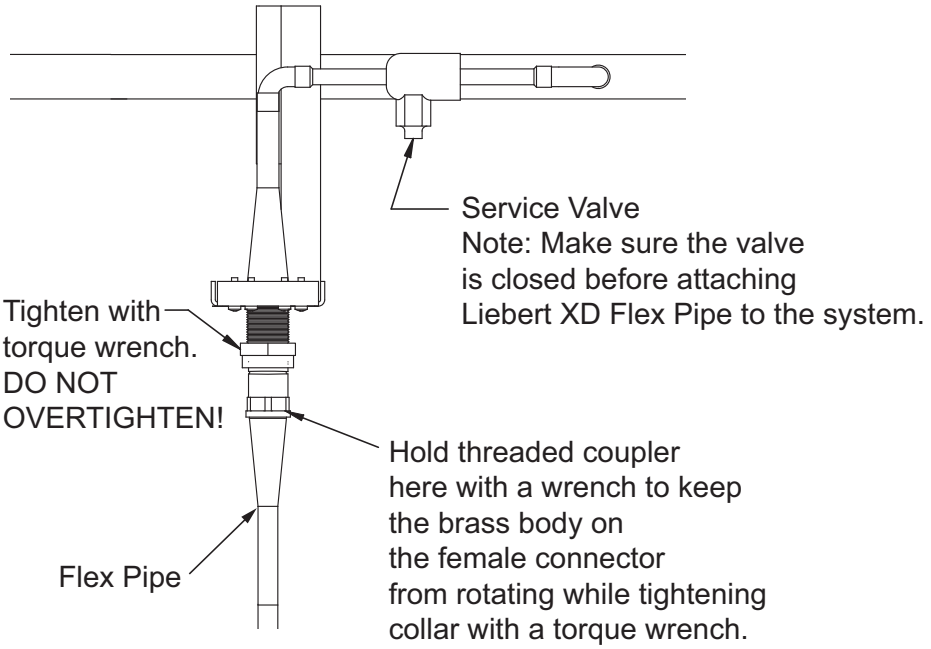


Figure 27 Detail view of Liebert XD Flex Pipe and prefabricated piping port

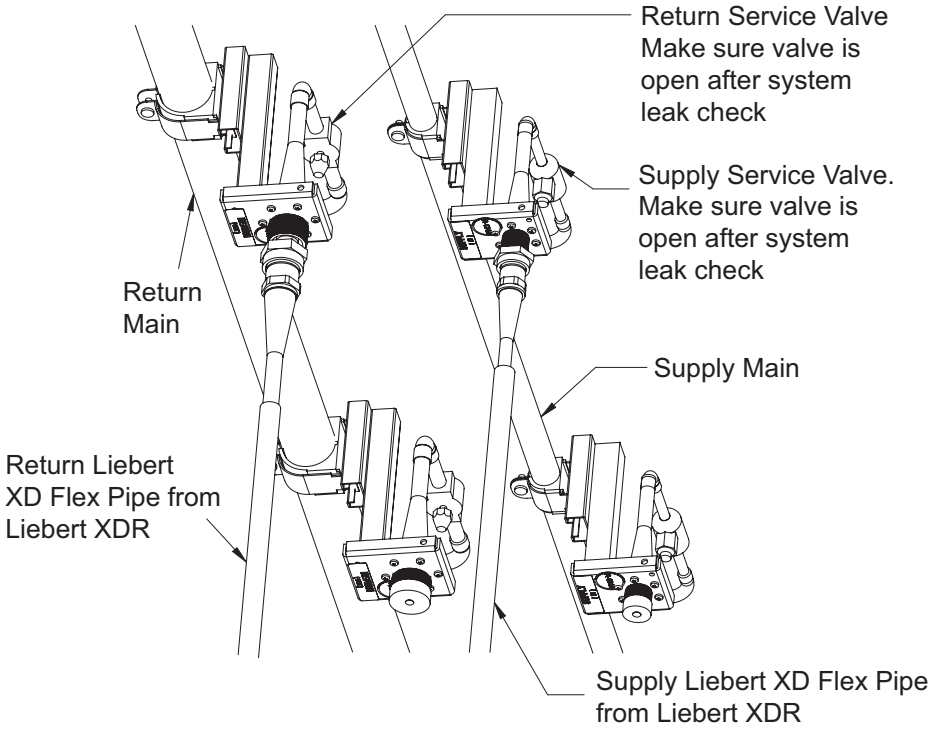


11. Repeat **Steps 3** through **10** for the remaining Liebert XD Flex Pipe.
12. For a Liebert XDR module with removable couplings, open the return and then supply service valves. If the Liebert XDR is pre-charged DO NOT open either of the service valves.
13. **Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.**

If adding a one-shot, pre-charged Liebert XD module with one-shot pre-charged Liebert XD Flex Pipes to an operational Liebert XD system, after connecting to the header system:

1. Open the return service valve.
2. Open the supply service valve.

Figure 28 Liebert XD prefabricated piping assembly and Liebert XD Flex Pipe



6.7.6 Disconnect a 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 couplings at the module cabinet end without relieving system pressure. Reclaim any refrigerant during removal of module from system.

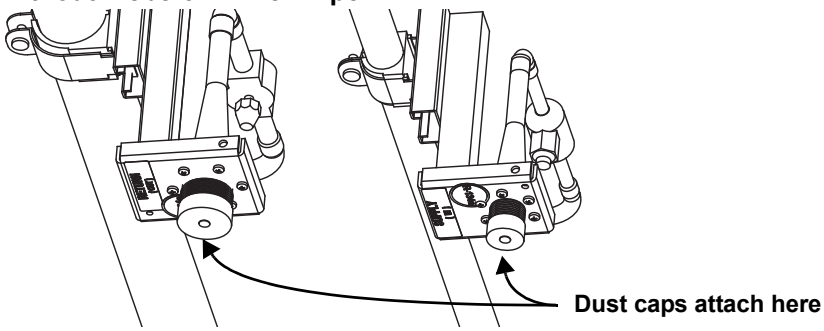
Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2 inches

1. Close the service valve in the supply line.
2. Ensure there is airflow across the coil.
3. Wait two minutes for the refrigerant to flow out of the module.
4. Close the service valve in the return line.
5. Loosen the Liebert XD Flex Pipe coupling from the header port coupling. This requires a wrench. Refer to **Figure 27**.

   The Liebert XD Flex Pipe coupling must be held stationary while the union nut on the coupling is being loosened.
6. Disconnect the coupling.
7. Place the protective dust cap on the port.
8. Place the protective plug back on the Liebert XD Flex Pipe.
9. Repeat **Steps 5** through **7** for the remaining Liebert XD Flex Pipe.

Figure 29 Piping mains without Liebert XD Flex Pipe



6.7.7 Disconnecting the Liebert XD Flex Pipe from the Liebert XDR

NOTICE

Risk of improper reuse of Liebert XD Flex Pipes with one-shot connections. Can cause refrigerant leaks.

Liebert XD Flex Pipes with one-shot connections must not be removed from the Liebert XDR unless they are being replaced with Liebert XD Flex Pipes with one-shot couplings. Do not reuse Liebert XD Flex Pipes with one-shot connections. Reuse may result in refrigerant leaks.

Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2 inches

1. Reclaim the refrigerant in the Liebert XD Flex Pipe and in the module by attaching a refrigerant reclaim device to the Schrader valve. For help finding the Schrader valve, see **Figures 14**, **17** and **21**.
2. Hold the Liebert XD Flex Pipe so it does not rotate.

   For the Liebert XD Flex Pipe with one-shot couplings, additionally, hold the brass body of the coupling so it does not rotate while loosening the couplings. Failing to do so may cause damage.
3. Loosen the Liebert XD Flex Pipe coupling from the module with a wrench.
4. Replace the dust plug on the Liebert XD Flex Pipe.
5. Replace the dust cap on the Liebert XD module.
6. Lay the Liebert XD Flex Pipe with removable couplings aside where it will not be damaged. Discard or recycle the one-shot Liebert XD Flex Pipes.

NOTICE

Risk of permanent damage to the Liebert XD Flex Pipes. Do not fold or bend pipe tightly.

6.7.8 Removing the Liebert XDR from a Cabinet

WARNING

Risk of 130-pound (59 kg) module falling. Can cause equipment damage, personal injury or death.

Removing a Liebert XDR from above a cabinet will require two properly trained and qualified people. Read all instructions before beginning.

1. Reinstall the four removable installation handles.
2. Loosen the bolts holding the Liebert XDR on the cabinet.
3. With the help of another person, lift the Liebert XDR from the cabinet or hanging bracket onto a stable surface.

7.0 INSTALLATION CHECKLIST AND SYSTEM FILL FOR STARTUP

7.1 Checklist for Proper Installation

___ 1. Liebert XDR modules are securely attached to the cabinet and aligned properly with the rack.

___ 2. Check to ensure there are no obstructions that prevent the Liebert XDR from opening.

___ 3. Piping from Liebert XDP or Liebert XDC, with isolation valves, is properly connected to each Liebert XDR module.

___ 4. Liebert XD Flex Pipe couplings to prefabricated header assembly are secure and according to specifications.

___ 5. System checked for leakage.

___ 6. Check the R-134a refrigerant charge (see the user manual for either the Liebert XDP, SL-16671 or the Liebert XDC, SL-16644; each is available on the Liebert Web site, **www.liebert.com**).

___ 7. Run system and verify that the Liebert XDP or Liebert XDC and the Liebert XDR modules operate properly.

___ 8. Piping is insulated.

7.2 Charging with Refrigerant

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 Liebert XD modules with refrigerant and the starting of the system. The complete Liebert XD system includes all Liebert XD cooling modules, a Liebert XDC or Liebert XDP and any other connected equipment.

8.0 STARTING THE LIEBERT XD SYSTEM

Refer to the user manual for the refrigerant supply unit, either a Liebert XDP or Liebert XDC, for details on starting the system. The Liebert XDP user manual is SL-16644 and the Liebert XDC user manual is SL-16671. The user manuals were supplied with the units and are available on the Liebert Web site, **www.liebert.com**

9.0 MAINTENANCE

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

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

9.1 Fluorinated Greenhouse Gas Requirements

Stationary air conditioning, refrigeration, heat pump equipment 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.

10.0 SPECIFICATIONS

Table 6 Liebert XDR specifications

Models	XDR20B1- *	XDR20B1P * (Pre-Charged R-134a)	XDR20B1R *
Cooling Capacity, Nominal, rated at 104ºF (40°C) EAT & 2400ft^3/m (68m^3/m)	20.5 kW (5.8 tons)		
Conditions	55°F (13°C) entering fluid temperature 50°F (10°C) or lower dew point		
Dimensions, inches (mm)			
Height, Including Pipe Connections	82-3/8 (2093)	83-1/2 (2121)	80 (2032)
Width With Handles Attached	27-3/8 (695)		
Handles Removed	23-1/2 (597)		
Depth	6-1/2 (165)		
Shipping Length	90 (2286)		
Shipping Width	30-1/2 (775)		
Shipping Depth	15-1/2 (394)		
Max Shipping Depth (4 modules)	62 (1575)		
Weight, lb (kg)			
Module Only	130 (59)	133 (60)	130 (59)
Shipping	225 (103)	228 (104)	225 (103)
Pipe Connections			
Refrigerant Supply	1/2" OD Type ACR		
Refrigerant Return	7/8" OD Type ACR		
Exterior Finish	Black Matte, Heat-Fused Powder Coat		
Safety	CSA, CE Approved		

* Refer to **Figure 2** for the complete part number.

Table 7 Rack mounting kit

Rack	Part #
Knurr Miracel	198163G1
Dell PowerEdge 4210	199050G1
HP 10642	199051G1
APC AR3100	199054G1

Table 8 Liebert XD Flex Pipe one-shot assemblies, supply and return

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

Table 9 Liebert XD Flex Pipe removable assemblies, supply and return

Description	Length ft (m)	Liebert P/N Straight Connection Assembly	Liebert P/N 90-Degree Connection Assembly	Minimum Bend Radius in (mm)	
				Supply	Return
Liebert XD Flex Pipe Kit	10 (3.0)	187865G2	187864G2	7 (178)	9 (229)
	8 (2.5)	187865G3	187864G3		
	6 (1.8)	187865G1	187864G1		
	4 (1.2)	187865G4	187864G4		

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