

Precision Cooling
For Business-Critical Continuity™

Liebert® XDO™
User Manual—50 & 60 Hz



IMPORTANT SAFETY GUIDELINES

SAVE THESE INSTRUCTIONS



WARNING

Risk of electric shock. Can cause injury or death.

Disconnect all local and remote electric power supplies before working within.

Before proceeding with installation of Liebert XD cooling modules, read all instructions, verify that all the parts are included and check the nameplate to be sure the Liebert XD cooling module's voltage matches available utility power.

Follow all local codes.



WARNING

Risk of module falling over. Can cause injury, death or property damage.

The Liebert XDO is top-heavy. Use extreme caution and care when moving and installing this module.



NOTE

This document shall be used together with site specific documentation and documentation for other parts of the system (heat rejection devices and cooling modules).



NOTE

Before any action that could cause a disturbance in the Liebert XD system's cooling function is begun, the facility manager MUST be informed. In addition, after the action is taken and the work is finished, the facility manager MUST be informed.



CAUTION

Risk of piping and component rupture. May cause injury or equipment damage. Closing service valves may isolate liquid refrigerant, causing high pressure and rupture of piping. Do not close valves without follow recommended procedures for repair, maintenance and replacement of components. Installing pressure relief valves in field piping that may become isolated by service valves.



NOTE

Remote Emergency Power Off Switch Required

A field-supplied disconnect switch for the electric power supply to the Liebert XDO must be installed at eye level in the room with the Liebert XDO to provide for emergency shutdown in accordance with local electrical codes.

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 XDO COMPONENT LOCATIONS AND MODEL NUMBER NOMENCLATURE

Figure 1 Liebert XDO component locations

1. Hinged, Removable Fan Tray
2. Evaporator Coil
3. Evaporator Fan
4. Serial Tag
5. Internal Mounting Bracket
6. On/Off Switch - Liebert XDO Standard Module
7. Circuit Breaker - Liebert XDO Standard Module
8. Quarter-Turn Fasteners
9. Knockout High-Voltage Connection
10. Knockout Low-Voltage Connection
11. LEDs - Liebert XDO Smart Module
12. Circuit Breakers - Liebert XDO Smart Module
13. On/Off Push Button Switch - Liebert XDO Smart Module

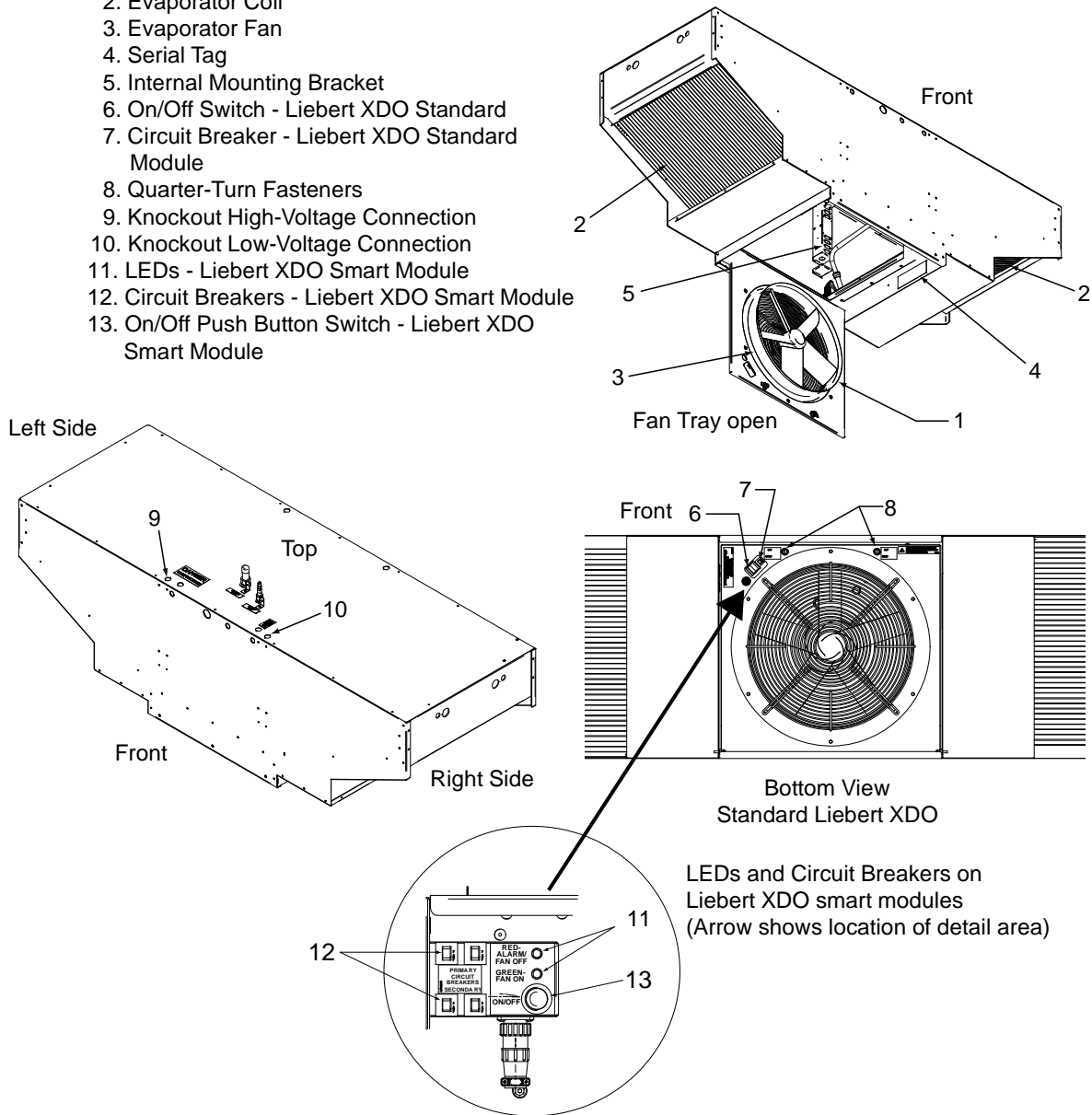
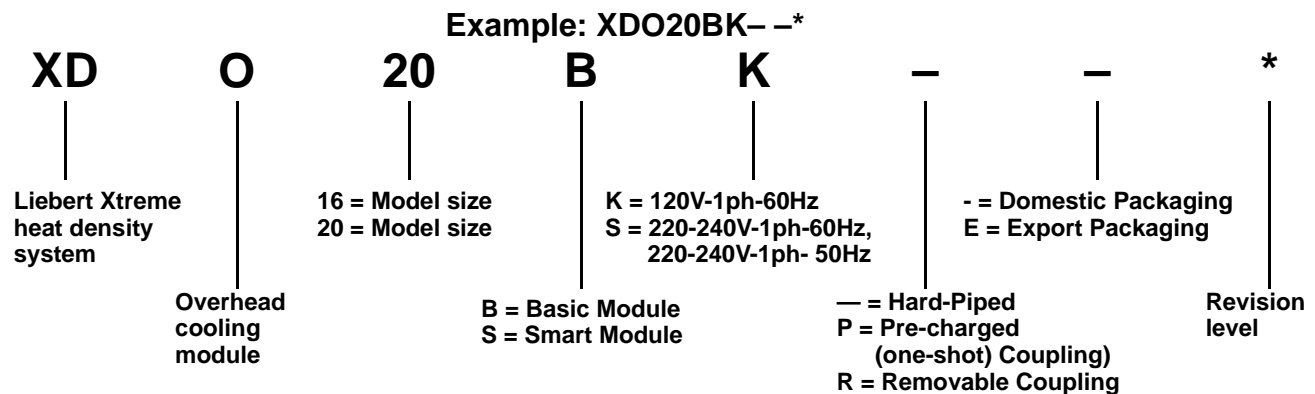


Figure 2 Model number nomenclature



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

- Verify that the Liebert XDO module voltage matches the available utility power. The serial tag with this information is on the bottom of the cooling module, near the fan.
- Check the received materials to be sure all required assemblies and parts have been received. If you discover any external damage, report them to the shipping company and your local Emerson Network Power representative.
- When unpacking and handling the Liebert XDO module, extra care should be taken to prevent damage to the coils.

2.3 Packing List

- User manual (this document)
- Liebert XDO module
- Mounting kit parts with the following items:

Part	Qty	Qty Required
3/8" hex nuts:	16	8
3/8" small washers:	4	4
rubber bushings:	8	8
metal sleeves:	8	4
3/8" large washers:	4	4
3/8" Nylok nuts:	4	4

2.3.1 Optional Items

- Lighting units
- External mounting kit

Part	Qty
external mounting brackets	2
1/4-20 x 3/4 bolts	6
1/4-20 Nylok nuts:	6

2.4 Installation Considerations

The Liebert XDO module is to be securely mounted to the overhead building structure. It is typically hung 18-24" (457-610mm) above the heat-dissipating equipment. A suspended ceiling, if one exists, should be at the same level as the top of the Liebert XDO. If the suspended ceiling has open grates, it may be the same level as the bottom of the Liebert XDO.

Determine whether the Liebert XDO being installed includes the smart module control board (factory-installed). Each of these options requires separate low-voltage connections to a monitoring unit.

Determine whether the installation will include the optional lighting units. Attaching a lighting unit requires two Liebert XDO modules mounted against each other (see **8.0 - Mounting Optional Light Units**). The lights require separate power connections.

Table 1 Application limits

Input Voltage		Range of Return Air Conditions to Module	
Minimum	Maximum	Dry Bulb Temp.	Relative Humidity
-10%	+5%	60° to 100°F (16° to 38°C)	20% to 80%

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

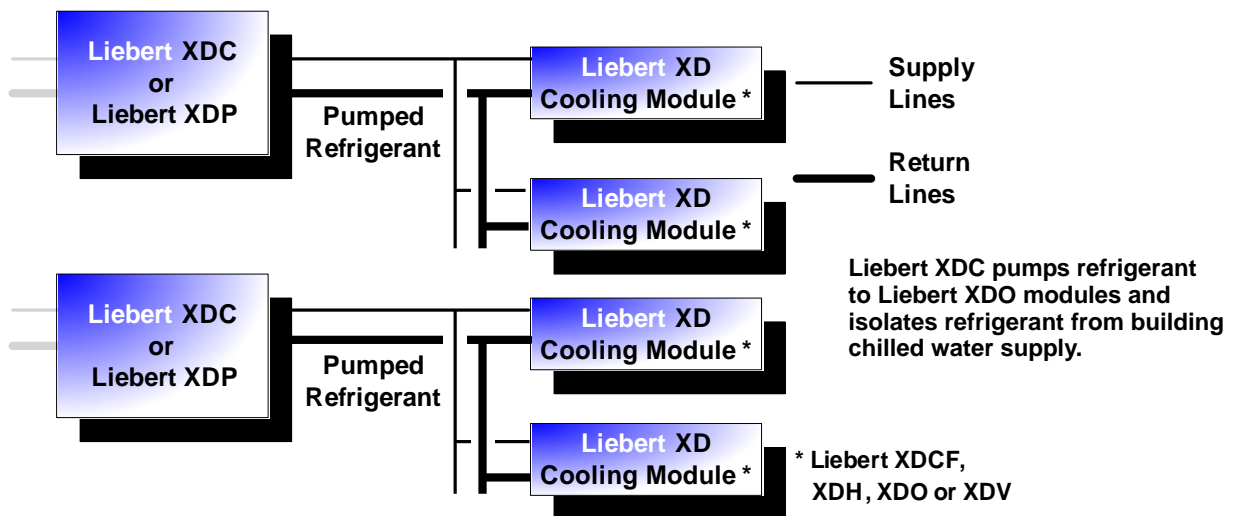
3.1 Product/System Description

The Liebert XDO is an overhead cooling system designed for installation above heat-dissipating equipment. A fan draws hot air exhausted from the equipment through two cooling coils and discharges cool air back down to the equipment (see **Figure 10**).

A Liebert XDO smart module will allow remote monitoring, shutdown, fan failure alarms and condensate detection.

Liebert's XDP/Liebert XDC monitors room conditions and prevents coil condensation by maintaining the temperature of the refrigerant pumped to the Liebert XDOs above the room dew point. The complete system consists of Liebert XDO modules, Liebert XDP/Liebert XDC refrigerant distribution modules, power and signal cabling and interconnecting piping (see **Figure 3**).

Figure 3 Generic piping layout



3.2 Checking and Unpacking

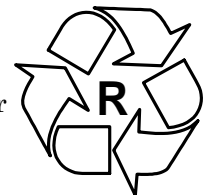
Upon arrival of the module, and before unpacking, verify that the labeled equipment matches the bill of lading. Carefully inspect all items for either visible or concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Emerson or to your sales representative. If any concealed damage is later discovered, 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 XDO is shipped in a protective carton and secured to a pallet. Do not remove these protective items from the Liebert XDO before it is at the installation location. When unpacking and handling the Liebert XDO, 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.



WARNING

Risk of improper handling. Can cause equipment damage, injury or death.

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

CAUTION

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

If the optional pre-charged option is chosen, the Liebert XDO module 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 XDO module 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 XDO.

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 the module for installation.

NOTICE

Risk of improper storage. Can cause module damage.

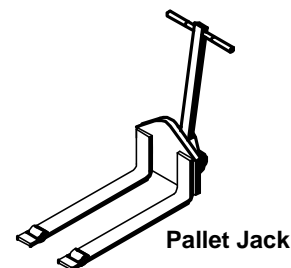
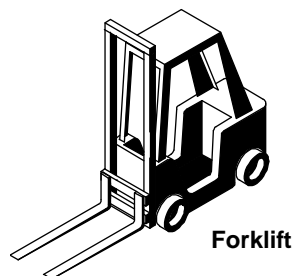
Keep the module indoors and protected from dampness, freezing temperatures and contact damage.

NOTICE

Risk of damage from forklift. Improper handling with the forklift can cause exterior and/or underside damage.

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

Figure 4 Recommended module handling equipment



3.3 Module Handling

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

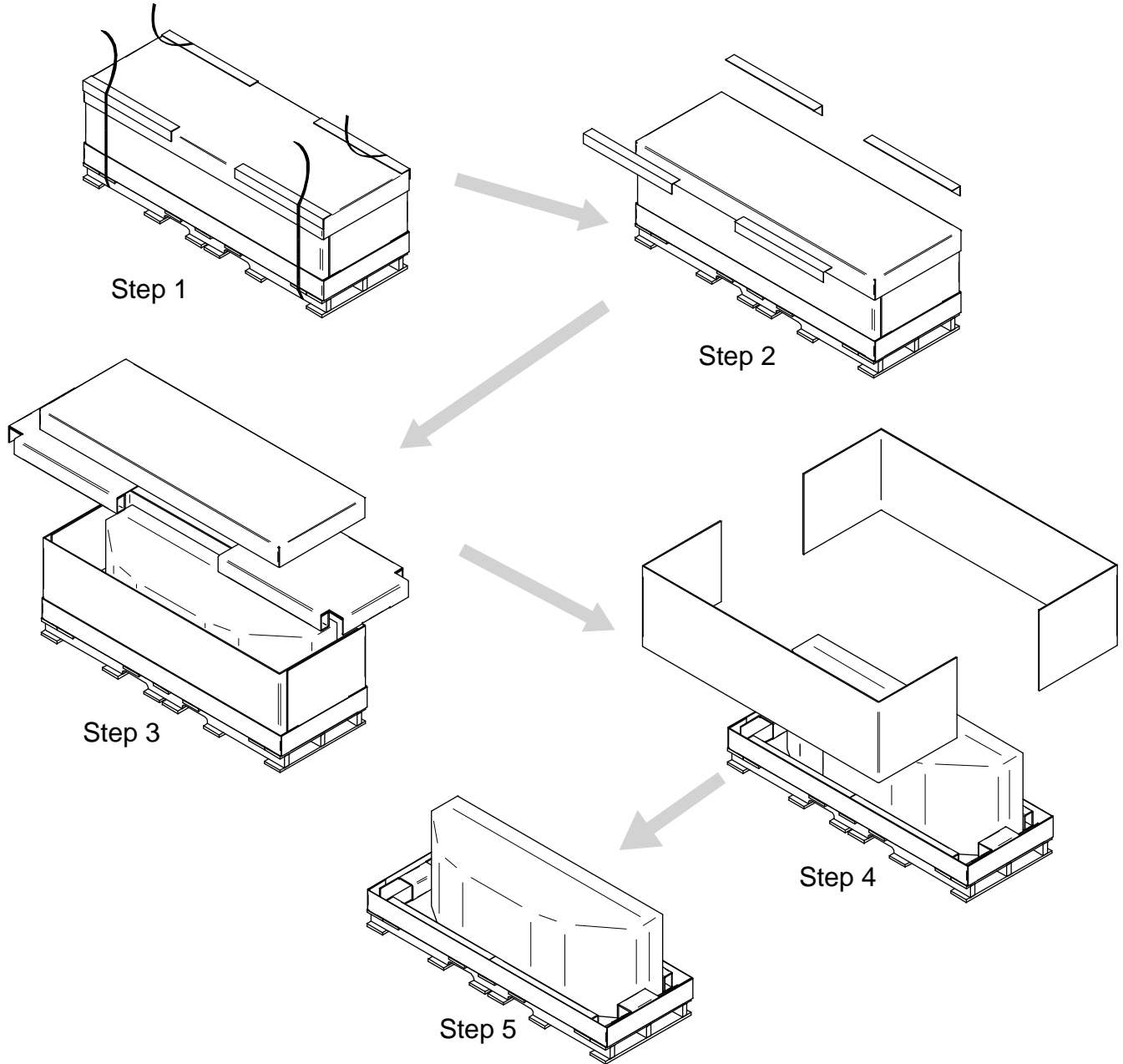
- If using a forklift or pallet jack, ensure that the fork tine length is suitable to safely move the packaged module.
- Emerson recommends that the module remain in the protective packaging until located at the installation site.
- When handling and unpacking the module, exercise great care to prevent damage to the coil fins (see **Figures 5, 6 and 7**).

3.4 Unpacking the Module

3.4.1 Domestic Packaging

- Remove outer packaging when ready to install the Liebert XDO.
- Keep the Liebert XDO covered by the module bag until removal from pallet.

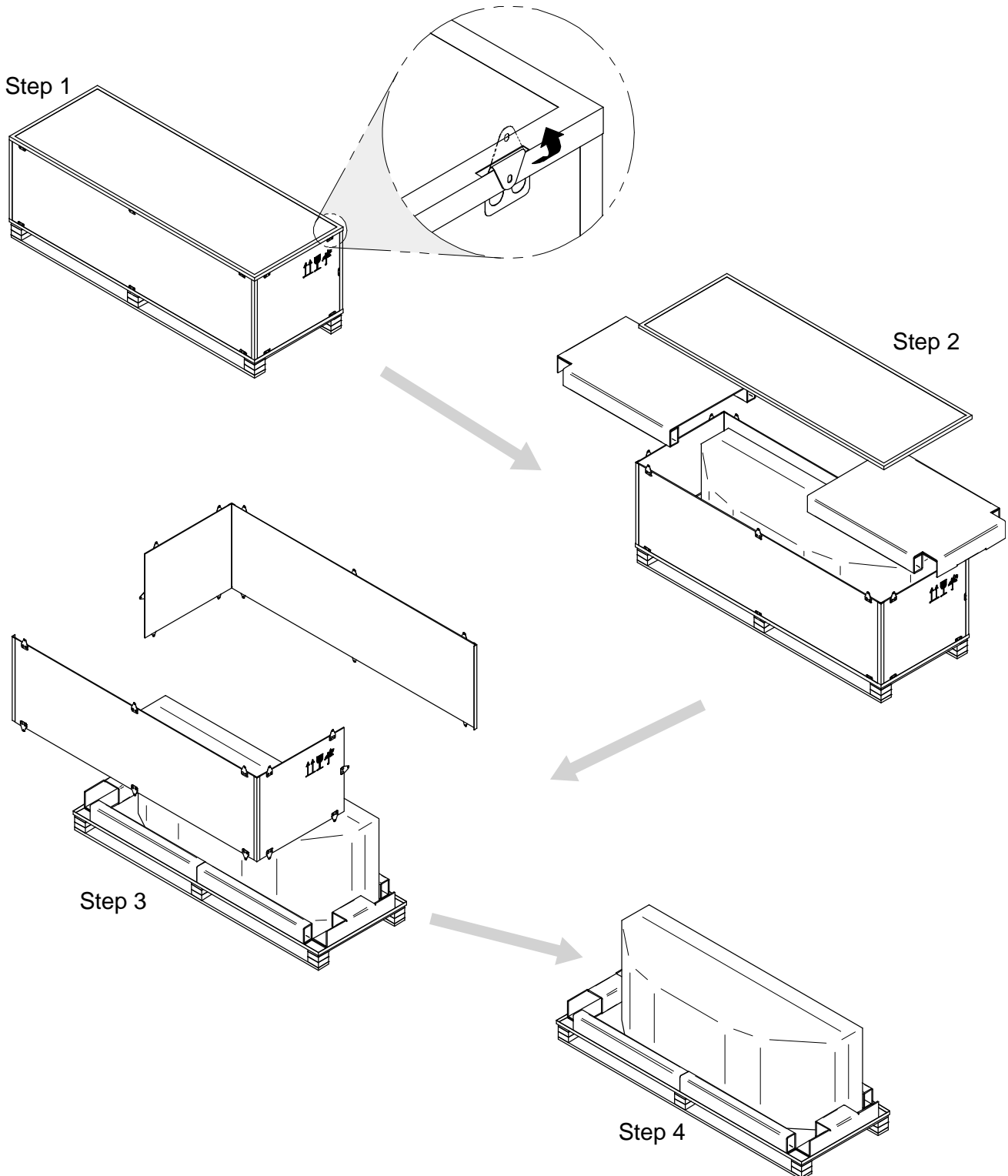
Figure 5 Removing domestic shipping package



3.4.2 Export Packaging

- Unbend all metal tabs as indicated in Step 1 in **Figure 6** below.
- Remove outer packaging when ready to install the Liebert XDO.
- Keep the Liebert XDO covered by the module bag until removal from pallet.

Figure 6 Removing export shipping package



3.4.3 Removing the Liebert XDO from the Pallet

1. Unfold the module bag to expose the Liebert XDO.
2. Verify the nameplate information found on the Liebert XDO against the bill of lading information. If the information does not match the product specified, contact your Emerson representative.
3. At least two properly trained personnel may lift the Liebert XDO off of the pallet and onto a flat surface, as shown in **Figure 7**.
4. To protect the painted surface of the Liebert XDO, lay a piece of protective material, the length of the module, on the flat surface before moving the Liebert XDO.

Figure 7 Removing Liebert XDO from shipping pallet

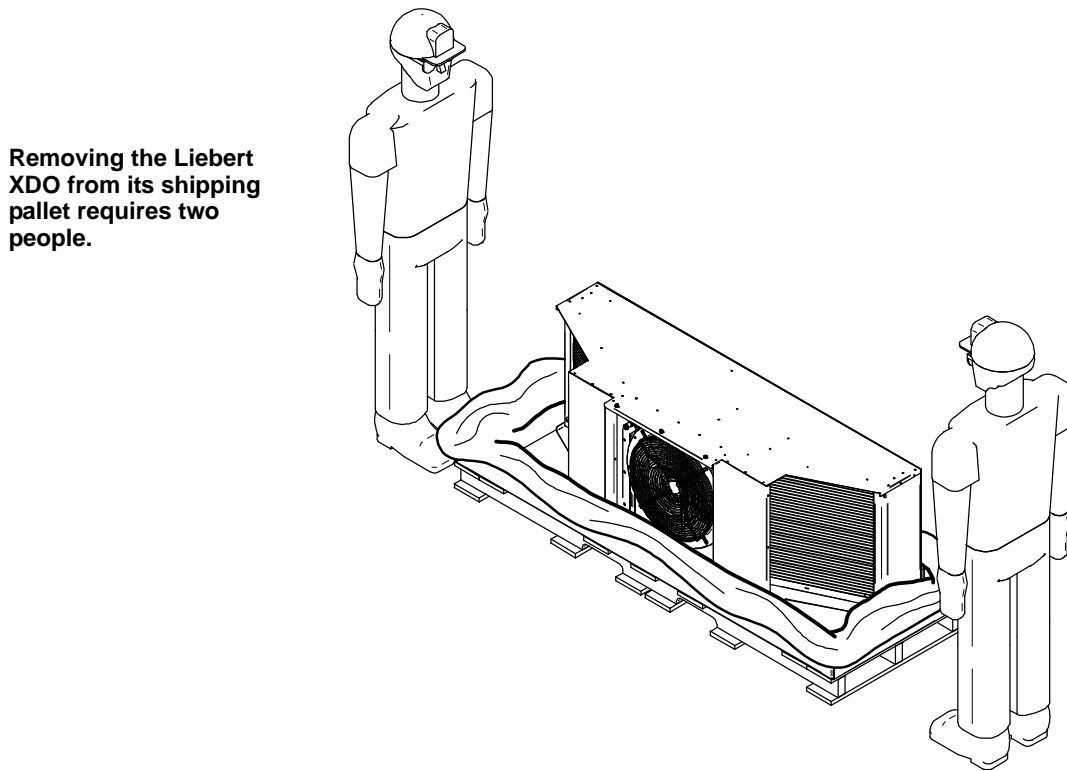
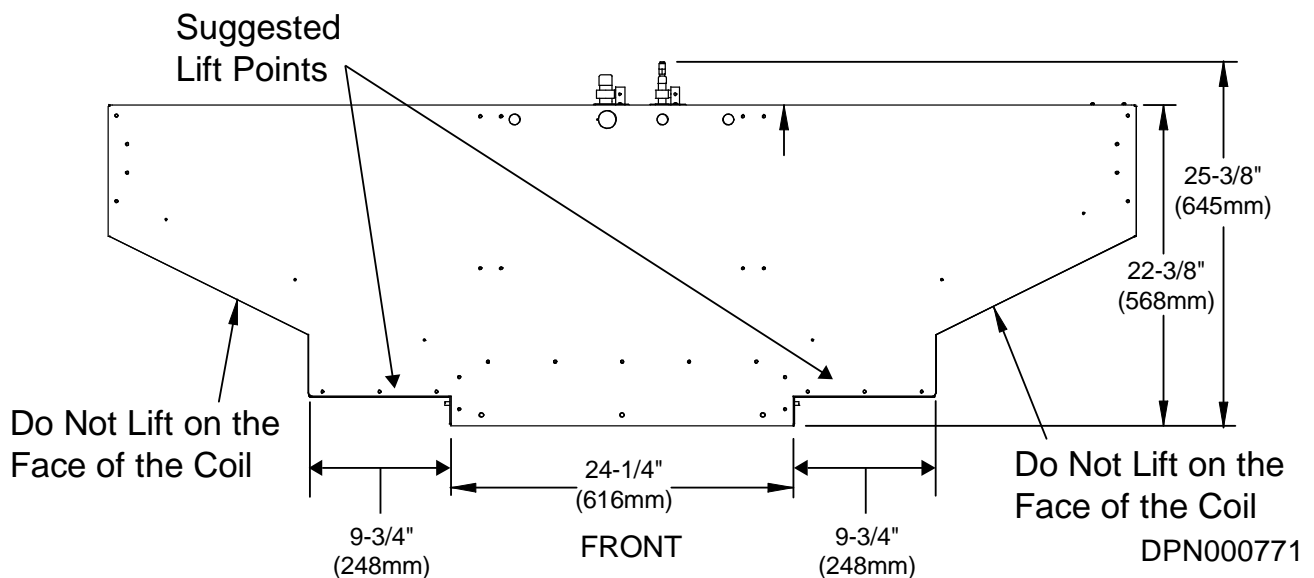


Figure 8 Liebert XDO lift points



4.0 MECHANICAL CONSIDERATIONS

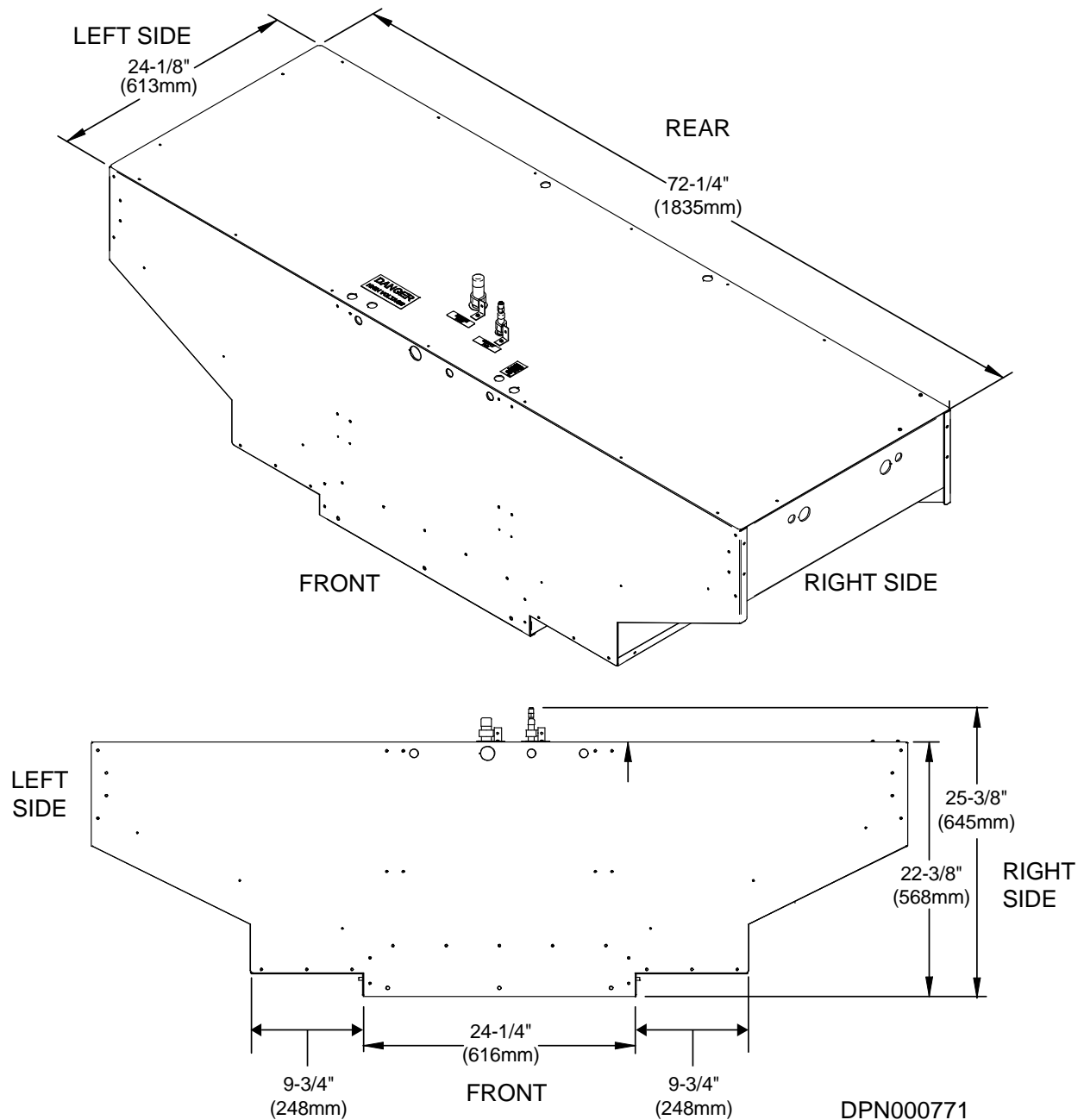


WARNING

Risk of module suddenly falling. Can cause property damage, injury and death.
Be sure to securely anchor the top ends of the suspension rods. Make sure all nuts are tight.

4.1 Liebert XDO Dimensions

Figure 9 General arrangement and overall dimensions—hard-piped connections



4.2 Determining Placement in Overhead Space

The distances between the Liebert XDO modules are determined by the heat density to be cooled. Refer to site-specific drawings for exact spacing.

The optional lighting units require a pair of Liebert XDO modules installed either front-to-back or back-to-back (determined by electrical and refrigerant access locations).

4.2.1 Weight Distribution

The weight is evenly distributed within the Liebert XDO module.

4.3 Leveling

The Liebert XDO modules must be mounted so that they are level within 1/2" (13mm) end-to-end.

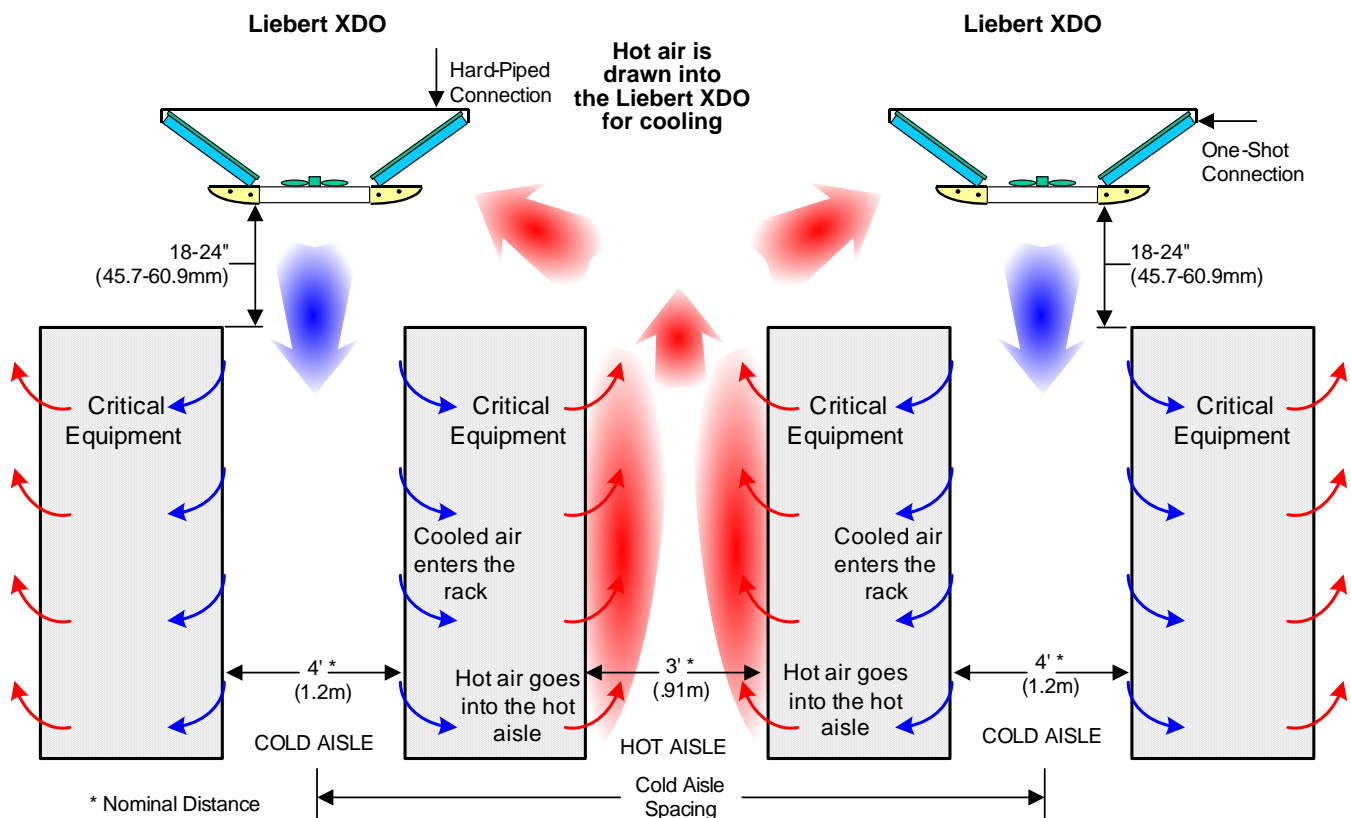
4.4 Ceiling Preparation

The Liebert XDO module must be securely mounted to the overhead building structure. This may require reinforcing the overhead building structure and supports of existing buildings.

Be sure to follow all applicable codes.

4.5 Airflow Direction

Figure 10 Generic airflow diagram



The Liebert XDO is the most sensitive type of Liebert XD cooling module to system load and placement. The Liebert XDO's air intake and its air discharge are not separated by a barrier, such as a rack. This can lead to recirculating the cold air.

5.0 INSTALLING THE MODULE

The Liebert XDO must be suspended using field-supplied, threaded suspension rods from the overhead building structure in either of two ways:

- Inserting the rods through internal mounting brackets (refer to **5.2 - Installation With Internal Mounting Brackets**)
- Attaching the rods to external brackets and attaching those to the Liebert XDO's front and rear panels (refer to **5.3 - Installation With External Mounting Brackets**).

5.1 Internal Access: Opening the Fan Tray



WARNING

Risk of high-speed moving parts. Can cause death, injury and equipment damage. Before opening the Liebert XDO, shut the module Off and disconnect all electrical power. Wait for the Liebert XDO's fan to stop rotating before beginning to open the module.



WARNING

Risk of heavy component falling downward suddenly. Can cause equipment damage, injury and death. Before opening the Liebert XDO fan tray, support the tray to prevent it from falling downward suddenly.

Internal mounting brackets and some wiring connections are accessible only when the Liebert XDO's fan tray is open. To open the fan tray:

1. Shut off power to the Liebert XDO module to be opened by flipping power switch to the Off position before working on the module (see **Figure 11**).
2. Disconnect all electrical power.
3. Wait for the Liebert XDO's fan to stop rotating before beginning to open the module.
4. Slowly unthread the electrical connector from its mating half before opening the fan tray.
5. Support the tray to prevent it from falling downward suddenly.
6. Turn the quarter-turn fastener to open the fan tray.

Figure 11 Opening hinged fan tray

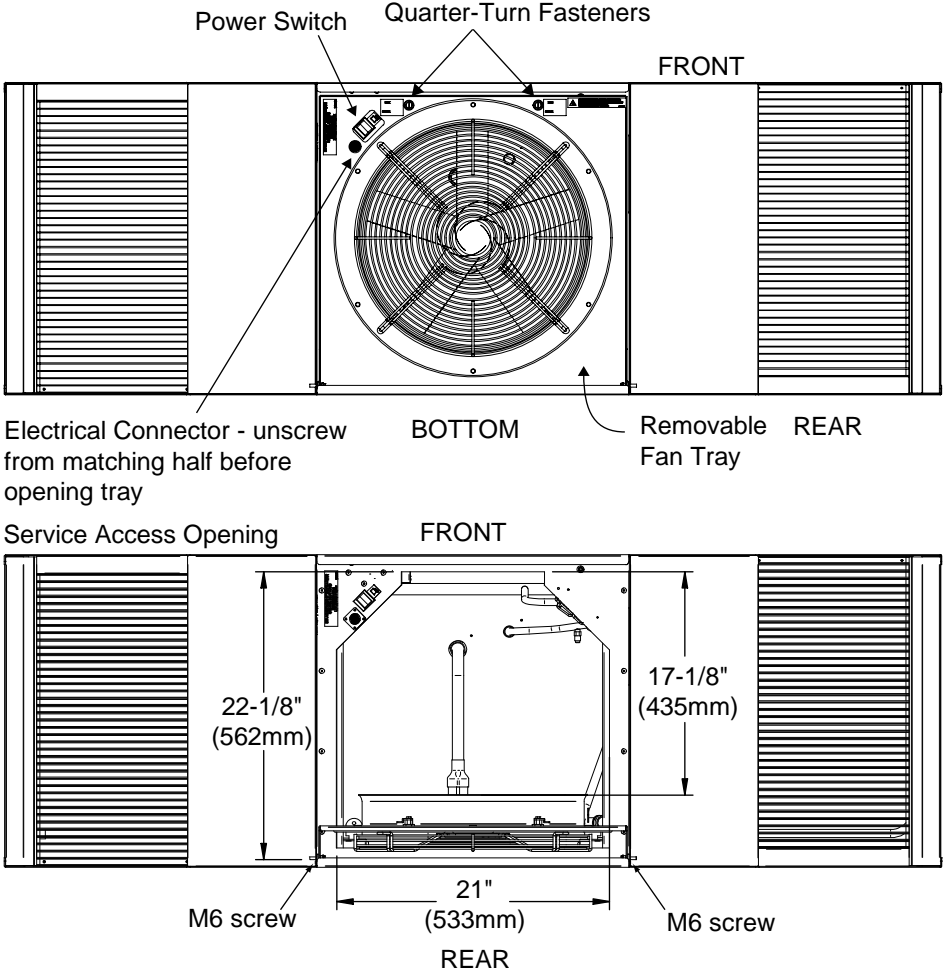
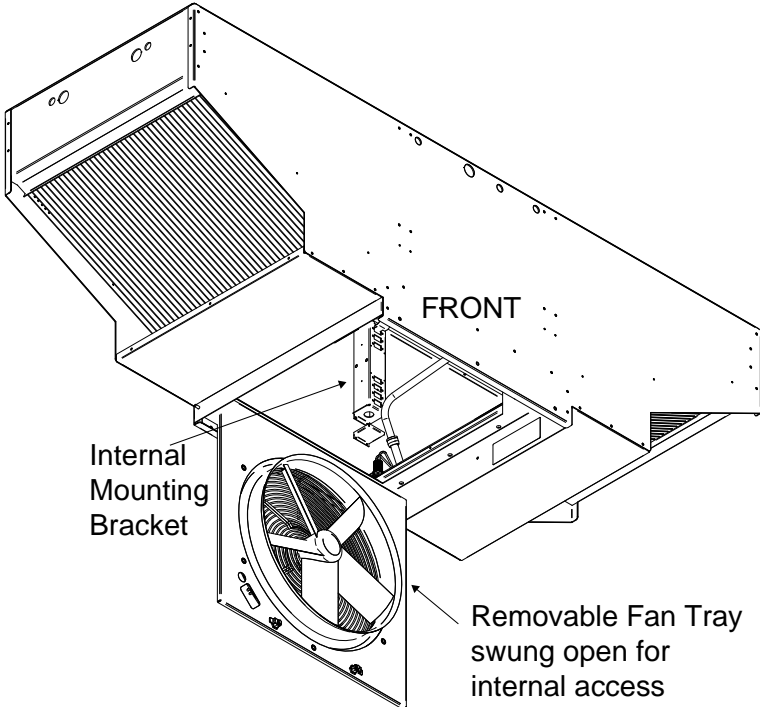


Figure 12 Fan tray opened for access



5.2 Installation With Internal Mounting Brackets

Before beginning, take precautions to ensure that the equipment below the Liebert XDO will not be damaged if the Liebert XDO, a piece of hardware or installation tool is dropped. For details on gaining internal access, refer to **5.1 - Internal Access: Opening the Fan Tray**.

1. Insert a 3/8" threaded rod into one of the internal mounting brackets.
Two mounting brackets and their associated access holes are near the front of the Liebert XDO and two are near the back of the module. Locate the holes by referring to **Figure 13**.
2. Hardware to secure the rod to the Liebert XDO must be installed as shown in **Figure 14** (above the bracket, arrange the components from top to bottom: Nylok nut, 3/8" small washer and a bushing; below the bracket, from bottom to top: Nylok nut, 3/8" large washer, a bushing and a sleeve).
3. Tighten the Nylok nuts firmly.
Repeat for each of the four rods, checking to ensure that the Liebert XDO will be level when suspended for operation.
4. Using either lifting equipment or adequate personnel, raise the Liebert XDO to mounting connections in the overhead building structure and secure the module using field-supplied hardware.
5. Adjust the Nylok nuts so that the weight of the module is supported evenly by the four (4) rods and the module is level within 1/2" (13mm) end-to-end.

Figure 13 Mounting hole locations

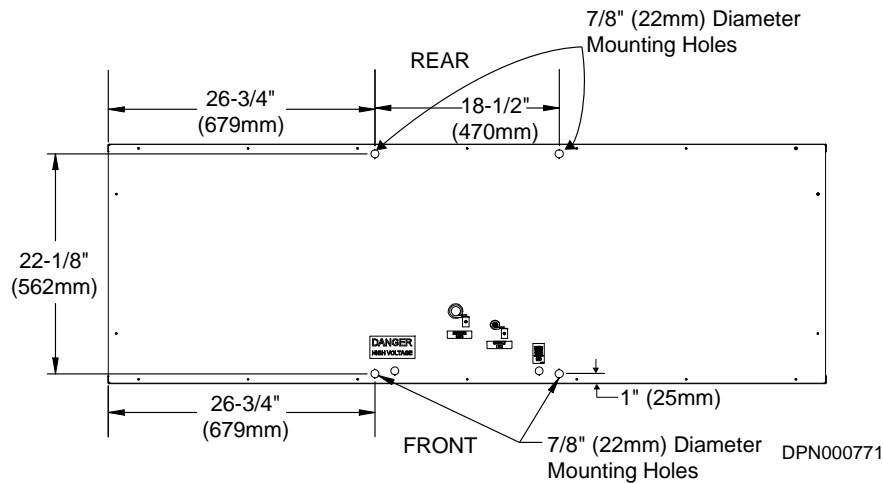
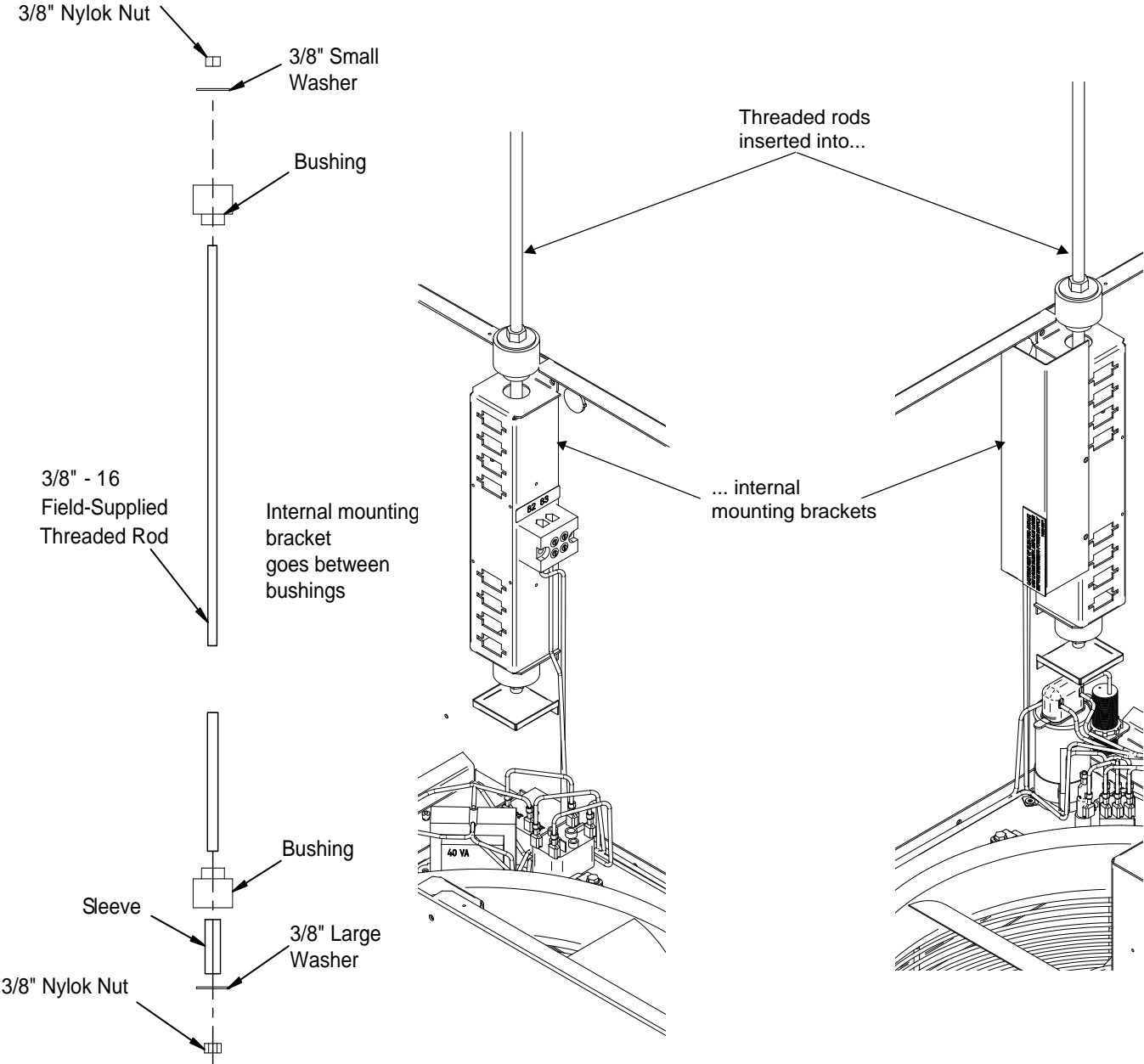


Figure 14 Threaded rod and internal mounting kit installation



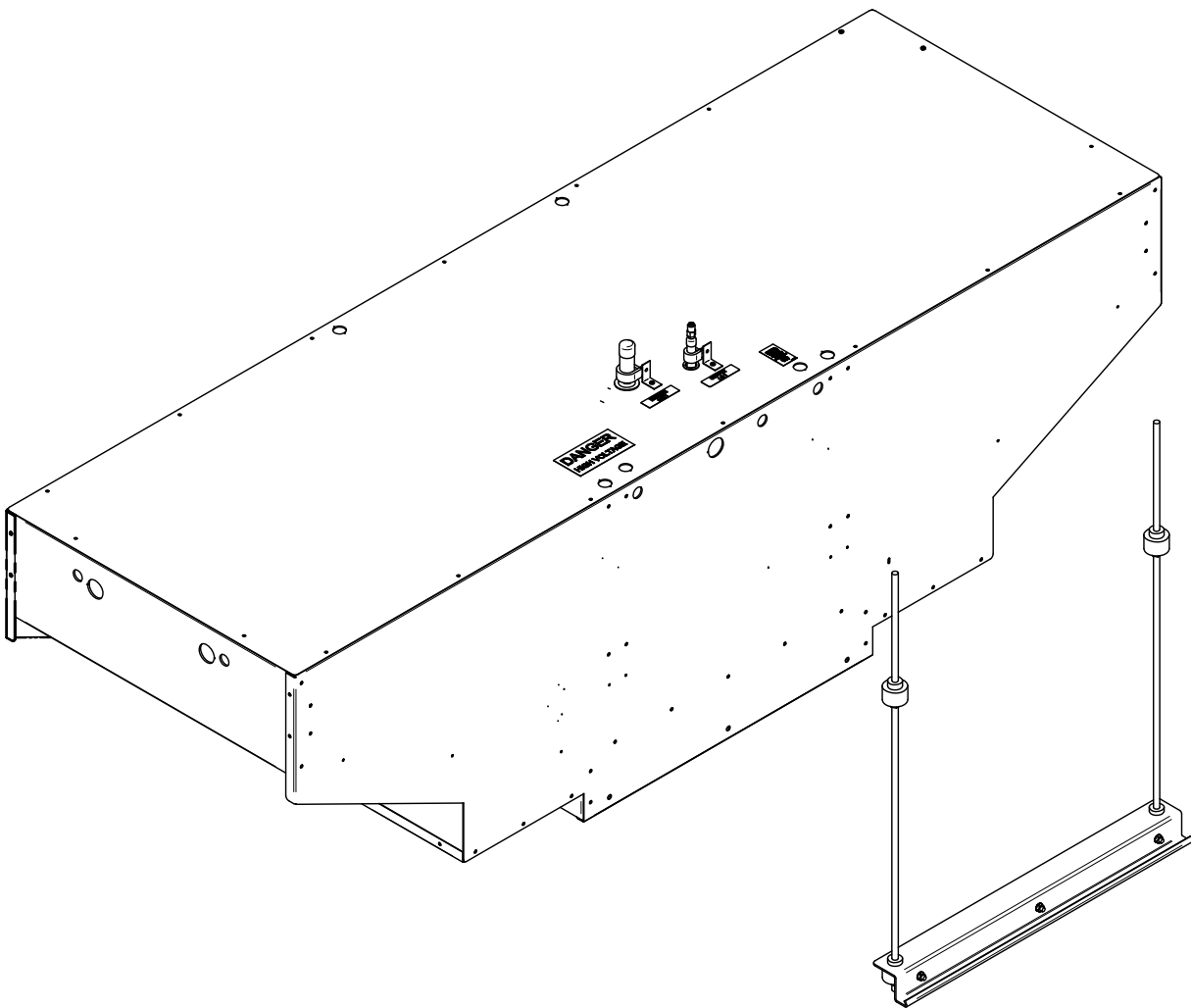
5.3 Installation With External Mounting Brackets

An optional external mounting bracket kit may be used to hang Liebert XDO modules. This kit attaches to the front and rear of the Liebert XDO and are used to secure the module to the overhead building structure.

To use the external mounting brackets:

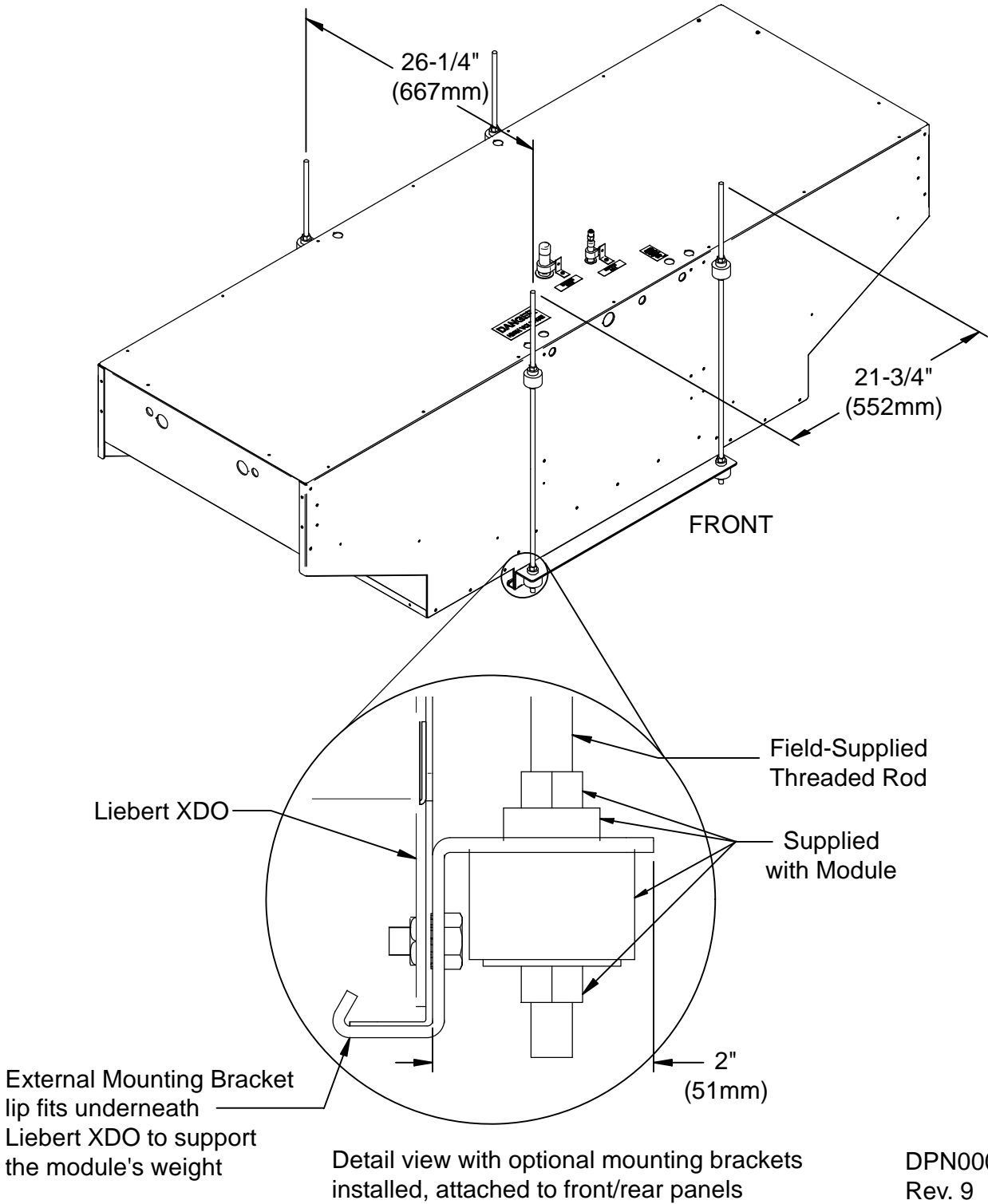
1. Attach two field-supplied threaded rods to a mounting bracket, using two nuts, two washers and a bushing, as shown in **Figure 16**.

Figure 15 External mounting kit for Liebert XDO



2. Place the bracket against either the front or rear panel of the Liebert XDO, making sure that the lip along the bottom of the bracket fits under the bottom of the panel.
3. Secure the bracket to the Liebert XDO using three nuts and bolts supplied with the mounting kit as shown in **Figure 16**.
4. Using either lifting equipment or adequate personnel, raise the Liebert XDO to mounting connections installed in the overhead building structure and secure the module using field-supplied hardware.

Figure 16 Detailed view of mounting kit attached to front panel



6.0 PIPING

Refer to site-specific drawings for general locations of the piping connections. These drawings should specify where the piping connects to the Liebert XDO (top, front and side).

6.1 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.

6.2 System Connection Configuration

If possible, connect the Liebert XDO modules to Liebert XDPs or Liebert XDCs in an interlaced configuration (see **Figure 17**). 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 XDO modules operating and maintain even cooling in the conditioned space should one of the Liebert XDP or Liebert XDC units fail.

However, if this is not possible, connect Liebert XDO modules in a non-interlaced configuration (see **Figure 18**).

Figure 17 Typical Liebert XDO piping—interlaced connections

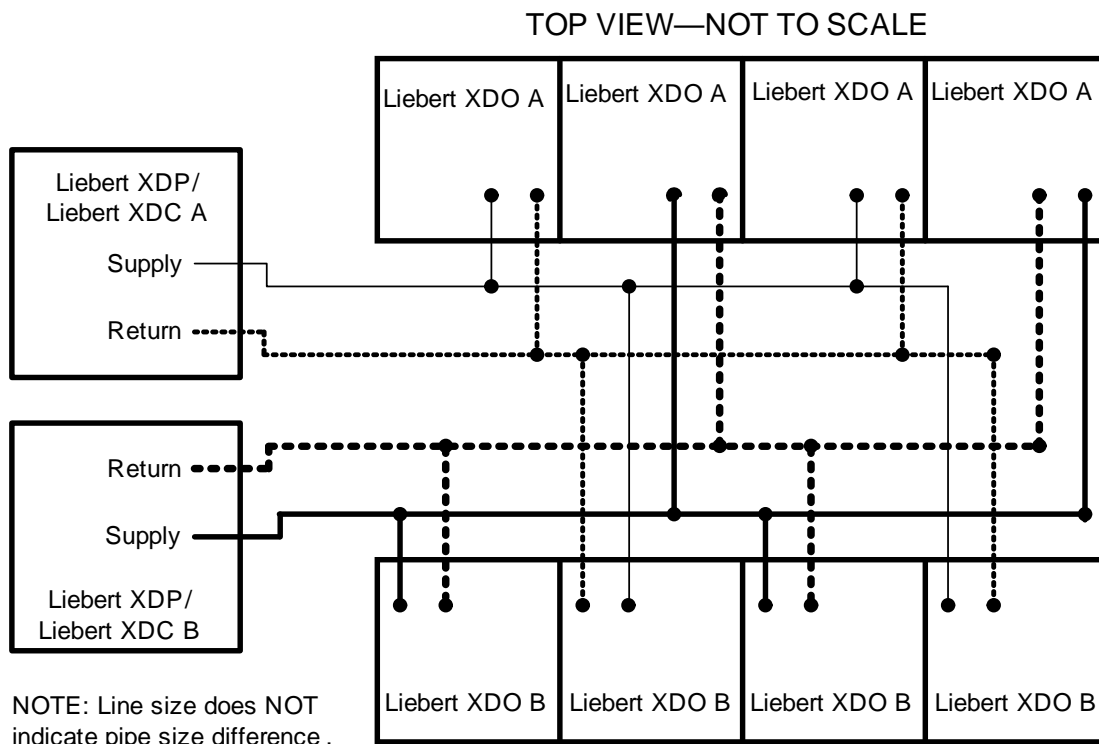
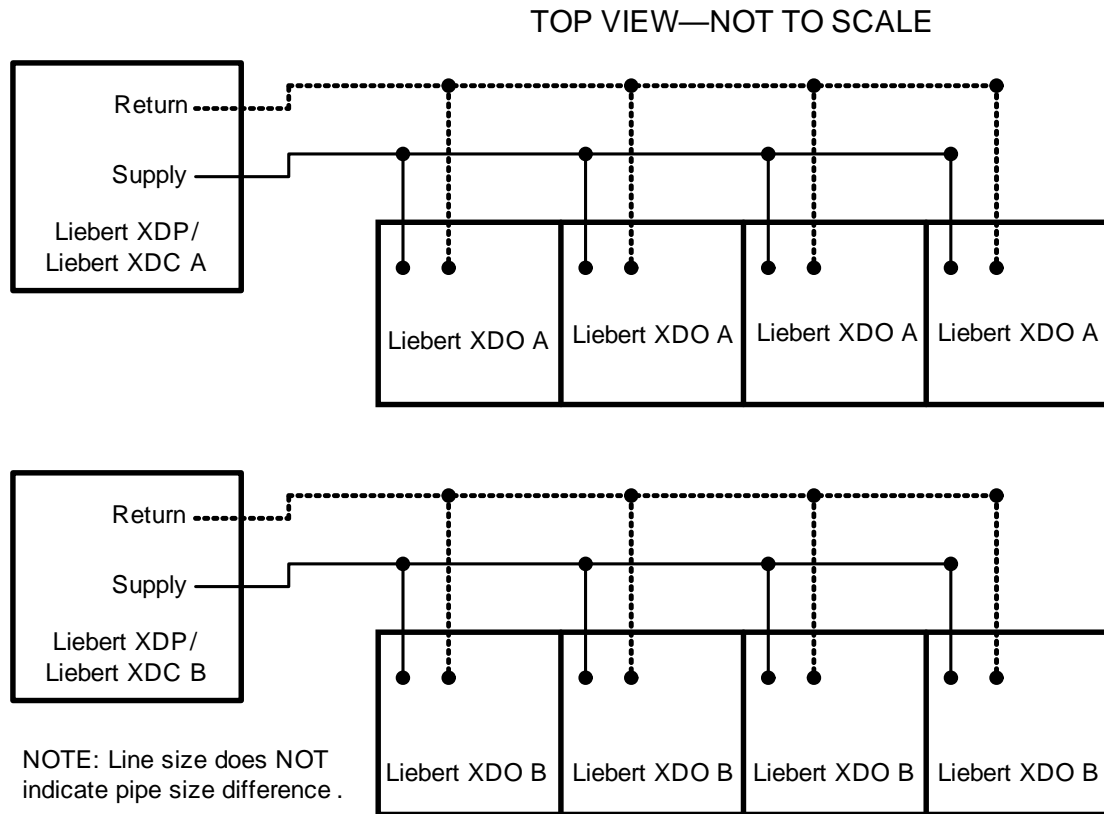


Figure 18 Typical Liebert XDO piping—non-interlaced connection



6.3 Connection Methods and Points

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 pipe.

For hard-piped Liebert XDOs, supply piping connection is 1/2" OD copper pipe, and return piping connection is 7/8" OD copper and will have copper caps soldered in place along with a holding charge of nitrogen. For Liebert XDOs with the pre-charged option, both supply and return fittings are one-shot connections. These fittings contain pressurized R-134a refrigerant inside the Liebert XDO. Connections may be found on the right side of the Liebert XDO.

For ease of connection, the hard-piped Liebert XDO offers supply and return piping access on the top or through the front or either side (see **Figure 19**). Piping connections extend through the Liebert XDO’s top, the most frequently used access point. Should access from another direction be required, the factory-installed pipes can be shortened and elbows installed inside the module to accommodate the alternate entrances. To locate the side and front access points, see **Figures 20** and **21**.

6.4 Insulation

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

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

The Liebert XDO in hard-piped configuration is shipped with a low-pressure holding charge (about 30 psi) of nitrogen to prevent oxidation and moisture. This must be vented before removing the caps on the ends of the supply and return piping.



NOTE

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

To vent the holding charge:

1. Find the Schrader valve that contains the nitrogen holding charge in the Liebert XDO (see **Figure 20**).
2. Vent the holding charge in the circuit by depressing the pin in the Schrader valve.
3. Replace and secure the cap on the Schrader valve that was opened.

Figure 19 Top piping access points—hard-piped modules

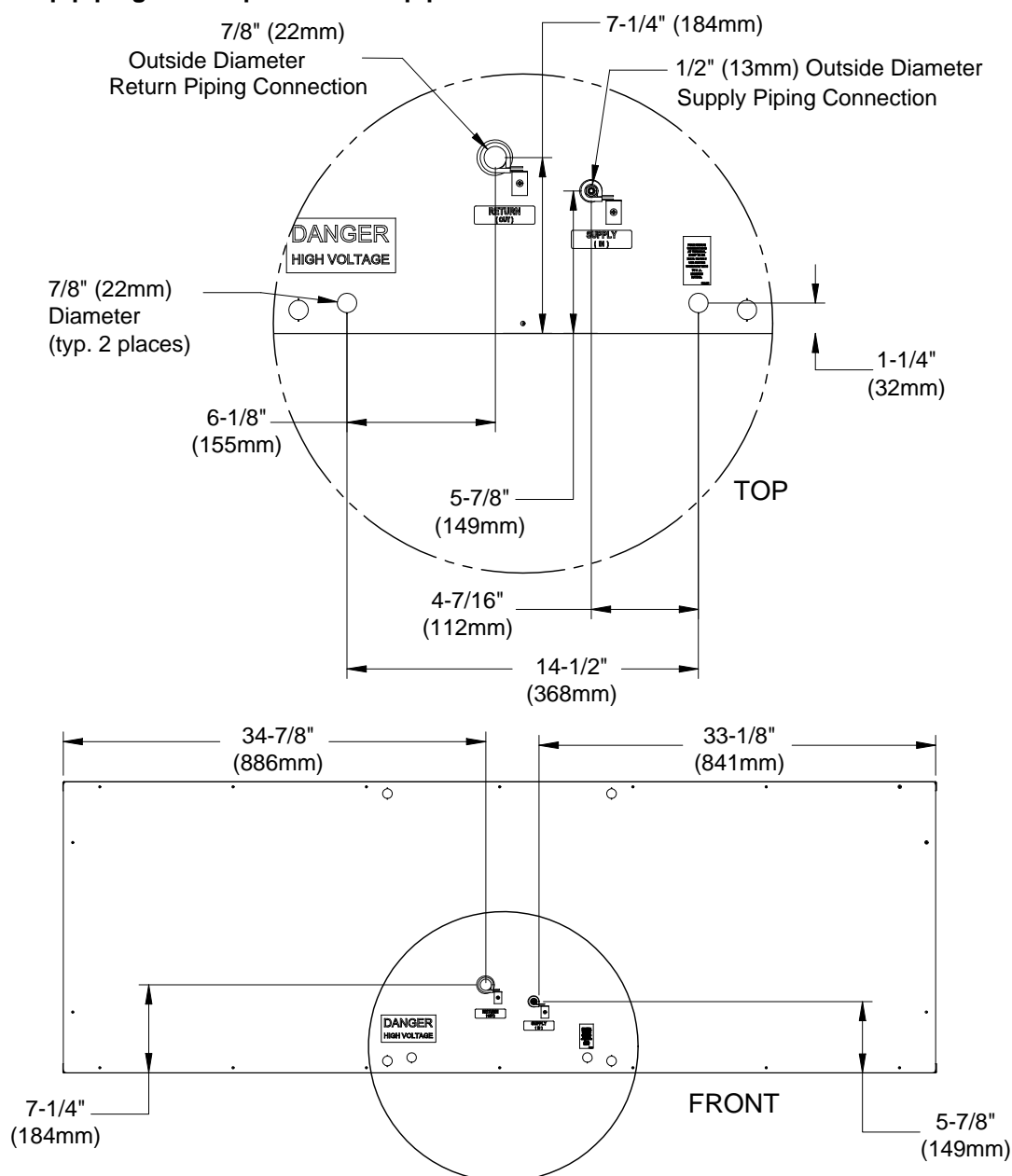


Figure 20 Front piping access points—hard-piped modules

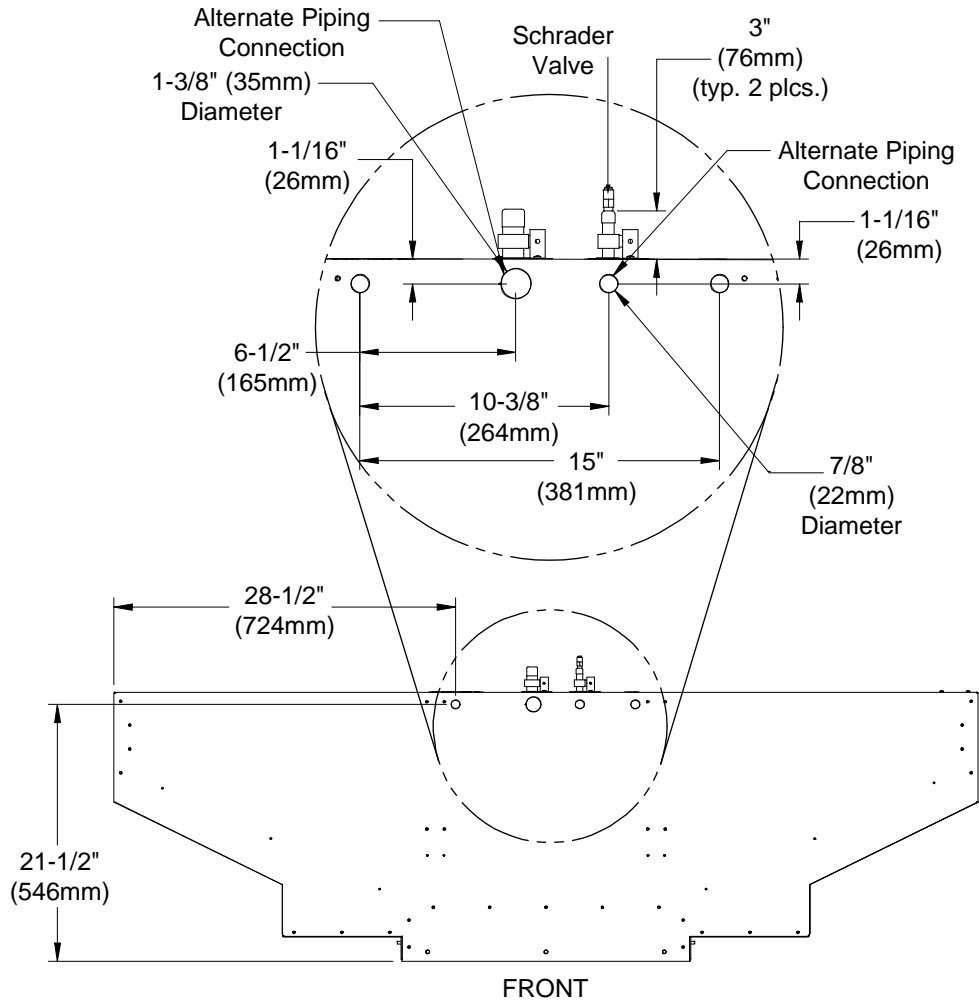
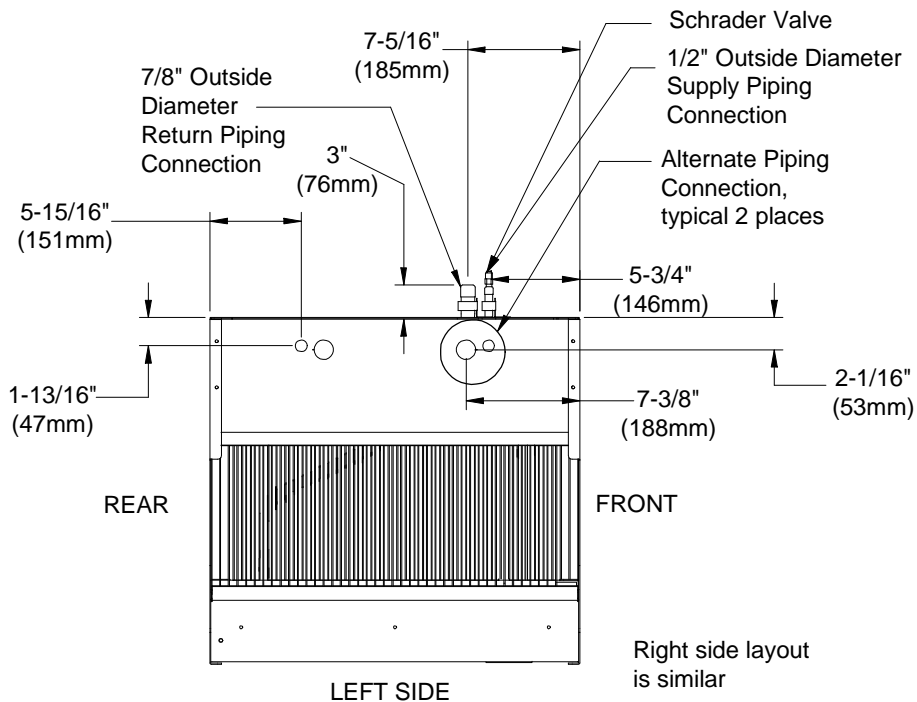


Figure 21 Side piping access points—hard-piped modules



6.6 Brazing Preparations

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.

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.

6.7 Recommended Piping Size

NOTICE

Risk of oversized piping. Can require the use of excess refrigerant.

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

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

Table 2 Branch piping sizes for pumped refrigerant loop

Pipe Function	Key to Piping in Figure 22	Size / Equivalent Pipe Length
Liebert XDP supply line, from Liebert XDP supply to farthest Liebert XD cooling module	A	1-1/8" OD for lengths up to 60 feet (18.3m)
		1-3/8" OD for lengths more than 60ft. (18.3m) but less than 175ft. (53m)
Liebert XDP return line, from farthest Liebert XD cooling module to Liebert XDP return	B	2-1/8" OD for lengths up to 60 feet
		2-5/8" OD for lengths more than 60ft. (18.3m) but less than 175ft. (53m)
Supply Line Drop from the Supply Main to the Liebert XDO	C	1/2" OD (0.430" ID) for lengths up to 10 feet (3m)
		1/2" OD (0.430" ID) for lengths up to 10 feet (3m)
Return Line Drop from the Liebert XDO to the Return Main	D	7/8" OD(0.545" ID) for lengths up to 10 feet (3m)
		1-1/8" OD(1.025" ID) for lengths more than 10 but less than 25ft. (3-7.6m)

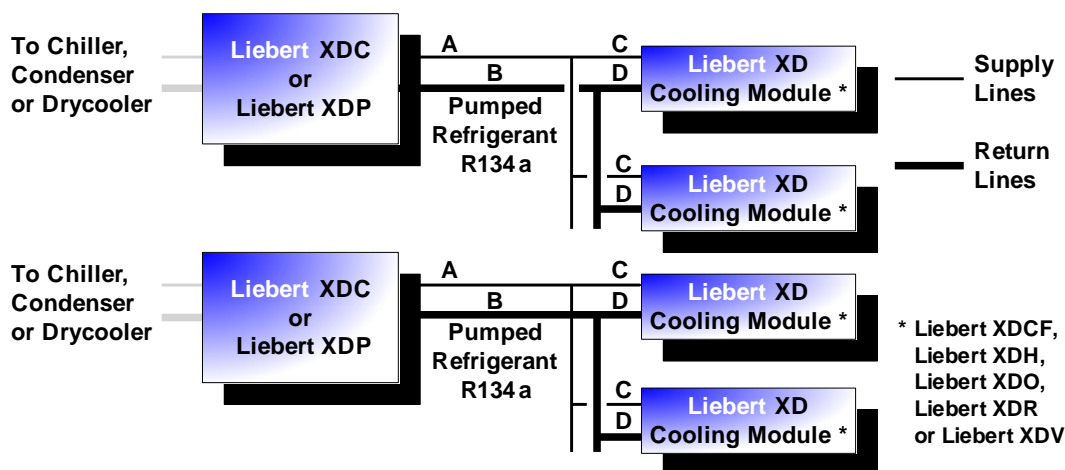


NOTE

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

See **Figure 23** for piping recommendations for hard-piping between the Liebert XDO and the header system.

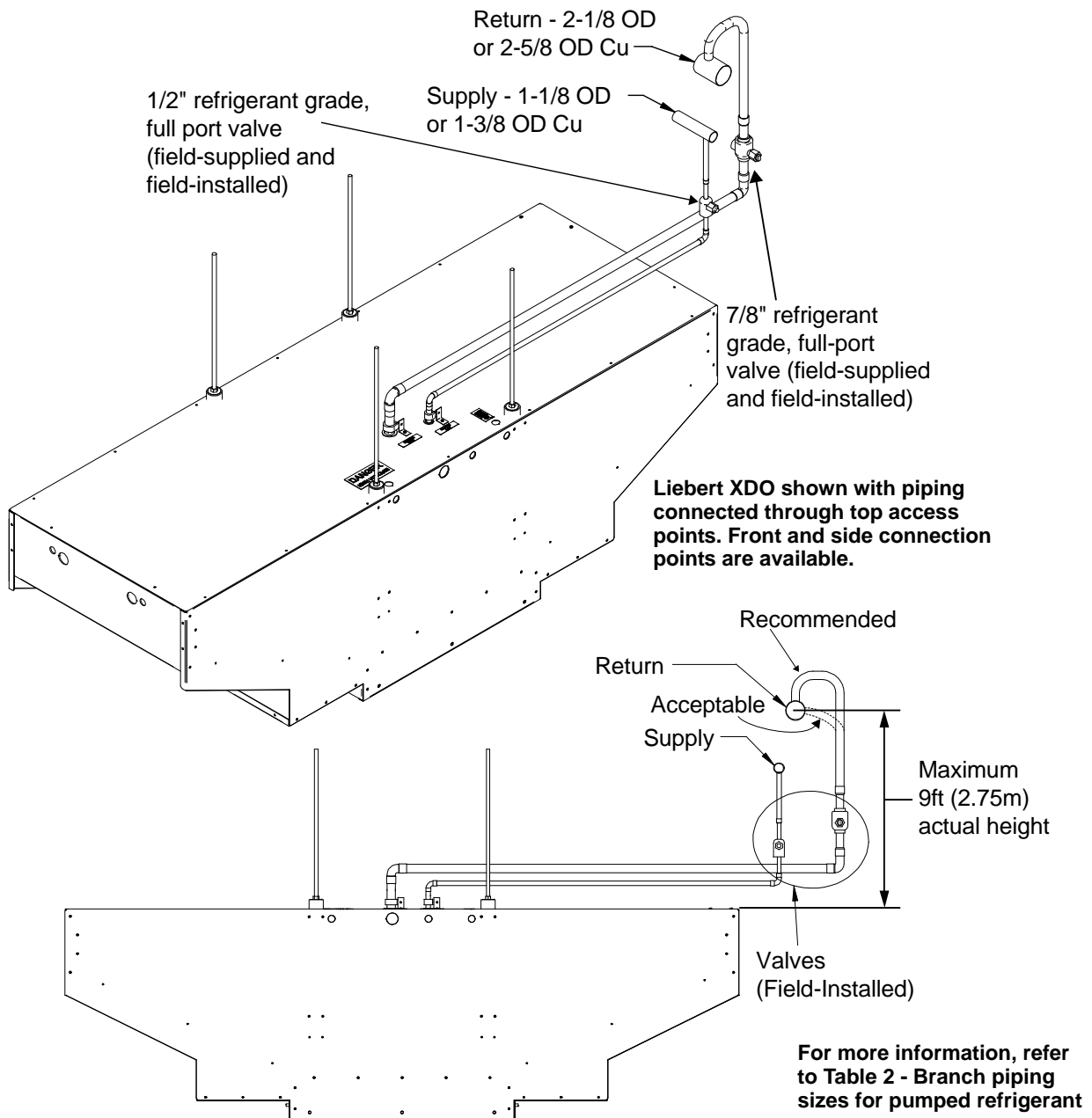
Figure 22 Generic piping layout



6.8 Hard-Piped Connection Sizes

Supply piping connection is 1/2" OD copper pipe and return piping connection is 5/8" OD copper. Liebert XDOs that are intended for hard-piped configurations will have copper caps soldered in place and a holding charge of nitrogen.

Figure 23 Hard-piped connection diagram



6.9 Liebert XD Piping Slope

The main supply and return lines to and from the Liebert XDP/XDC must be sloped downward toward the Liebert XDP/XDC at a rate of 1-2" per 20 feet (25-51mm per 6m) of pipe run. Horizontal connector lines should also be sloped downward from the cooling modules toward the main supply and return lines.

6.10 Piping Details—Shutoff / Isolation Valves

To allow for fluid isolation of each Liebert XDO module, install a full port isolation valve (field-supplied) on each branch circuit, see **Figure 23**, site-specific documentation, Liebert Xtreme Density System Design Manual, SL-16655, and documentation for other parts of the system.

6.11 Leak Checking and Evacuation

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

6.12 Header System

The Liebert XDV 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 XDV modules. For the details on piping connection locations, see **Figures 19, 20 and 21**.

6.13 Connecting Pipes to the Top of the Liebert XDO—Hard-Piped Modules

To connect the pipes:

1. Vent the nitrogen holding charge as specified in **6.5 - Venting the Holding Charge for Hard-Piped or Removable Liebert XD Flex Pipe Connections**.
2. 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.
3. Connect the supply and return pipes, soldering or brazing them in place. Before brazing the pipes, refer to **6.6 - Brazing Preparations**.

6.14 Connecting Pipes Through the Side or Front of the Liebert XDO—Hard-Piped Modules

To connect the pipes:

1. Vent the nitrogen holding charge as specified in **6.5 - Venting the Holding Charge for Hard-Piped or Removable Liebert XD Flex Pipe Connections**.
2. 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. Be careful to not damage internal components when making internal piping connections.
3. Remove the top panel; it is held in place with screws.
4. Cut the supply and return pipes to the proper length, permitting pipe connections with the panel replaced.
5. Remove the knockouts on the side or front panel where pipes will enter the Liebert XDO.
6. Bring the supply and return pipes into the Liebert XDO, soldering or brazing them in place. Before brazing the pipes, refer to **6.6 - Brazing Preparations**.
7. Replace the top panel.

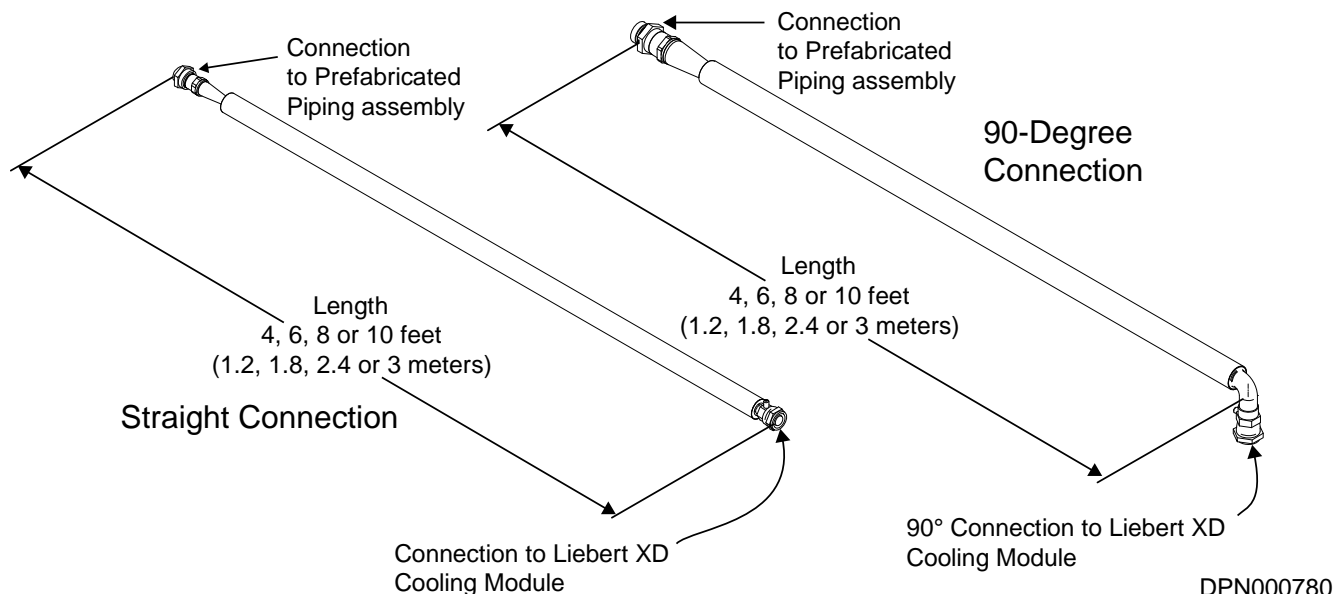
6.15 Field Installation of Liebert XD Flex Pipe Kit on Liebert XDO

If you are not performing a service installation or a field-retrofit, skip this section and proceed with the instructions in **6.15.2 - Connect a Liebert XDO 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 10**.

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 Liebert XD Flex Pipe.

Figure 24 Liebert XD Flex Pipe dimensions—straight and 90-degree connections



6.15.1 Connection Method—One-Shot Connections for Pre-Charged Refrigerant Option



CAUTION

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

If the optional pre-charged option is chosen, the Liebert XDO 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 XDO modules 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 XDO.

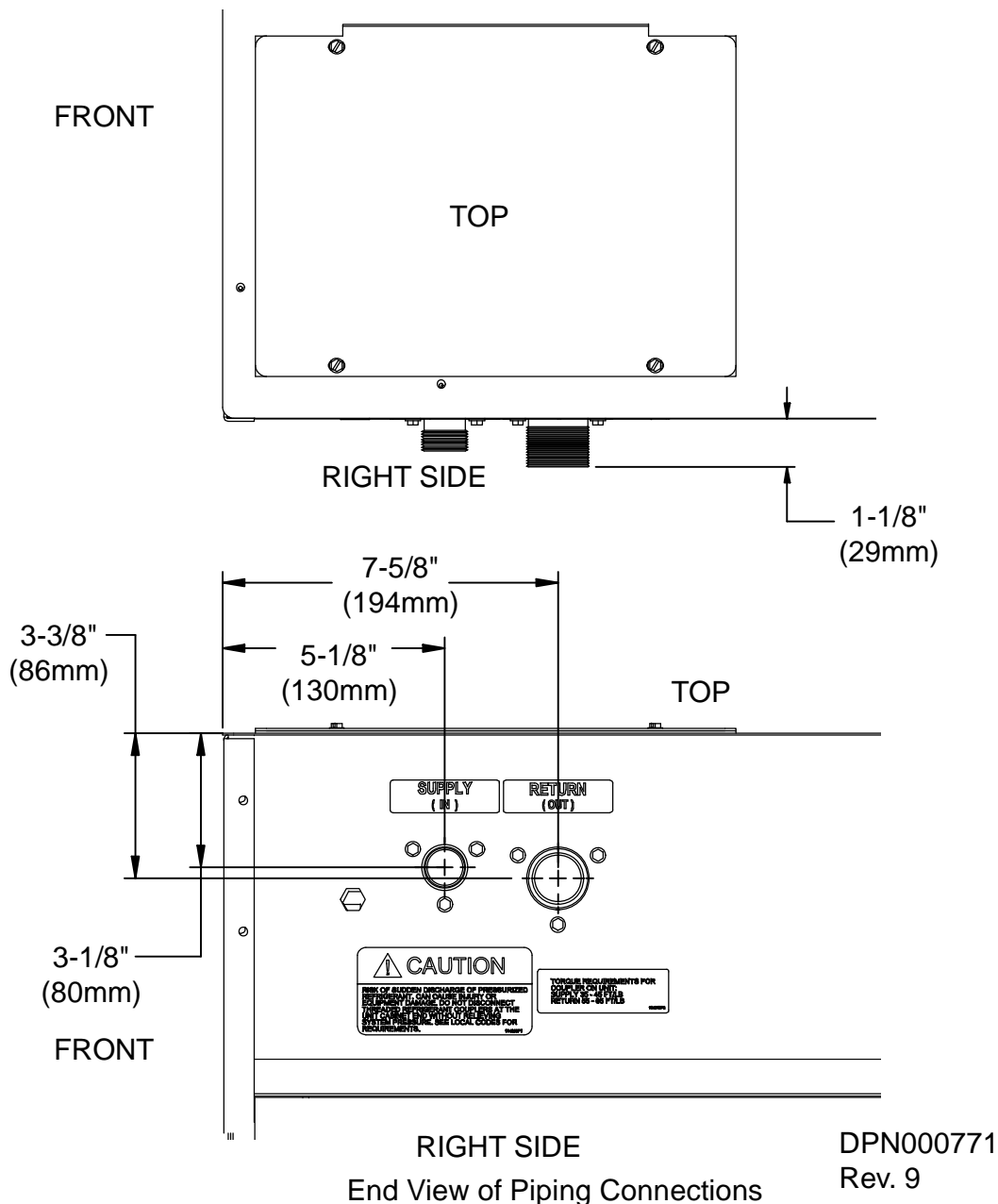
Do not remove the pipe caps or plugs before the module is ready for connection to the Liebert XD Flex Pipe. The Liebert XDOs with the pre-charged option are equipped with one-shot couplings. The module and the Liebert XD Flex Pipe contain a charge of R-134a refrigerant under pressure. This charge must not be vented.

Do not disconnect the one-shot Liebert XD Flex Pipes after they have been connected to the module.

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.

If the module includes the optional, factory-installed, one-shot style connections, proceed with **6.15 - Field Installation of Liebert XD Flex Pipe Kit on Liebert XDO** and see **Figure 25**.

Figure 25 Piping location and connection sizes—pre-charged modules with one-shot connections



6.15.2 Connect a Liebert XDO with One-Shot Couplings to Liebert XD Flex Pipe

NOTICE

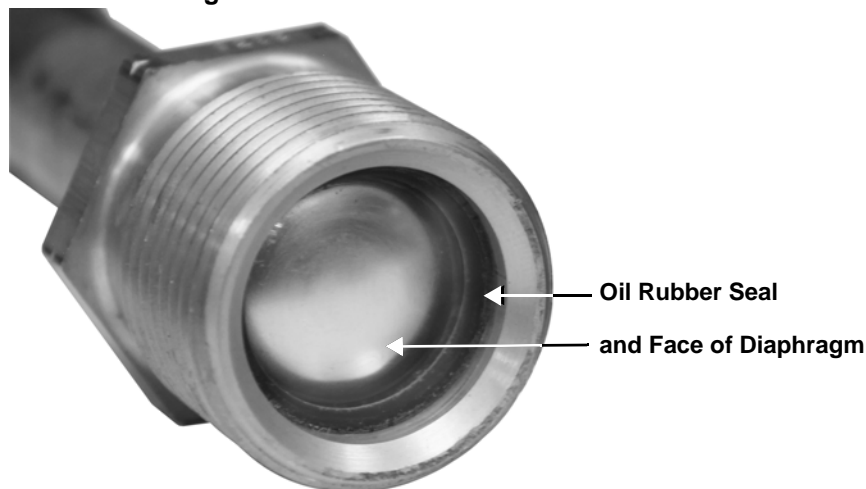
Risk of improper reuse of Liebert XD Flex Pipes with one-shot couplings. Can cause refrigerant leaks.

Liebert XD Flex Pipes with one-shot couplings may be disconnected from the header assembly and reconnected, but Liebert XD Flex Pipes with one-shot couplings must not be removed from the Liebert XDO unless they are being replaced with new 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
 - One torque wrench, half-inch drive (see **Table 3** 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, the O-ring and the threaded area of male coupling assembly. Refer to **Figure 26**.

Figure 26 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 27 Female one-shot coupling Liebert XD Flex Pipe: Schrader valve location

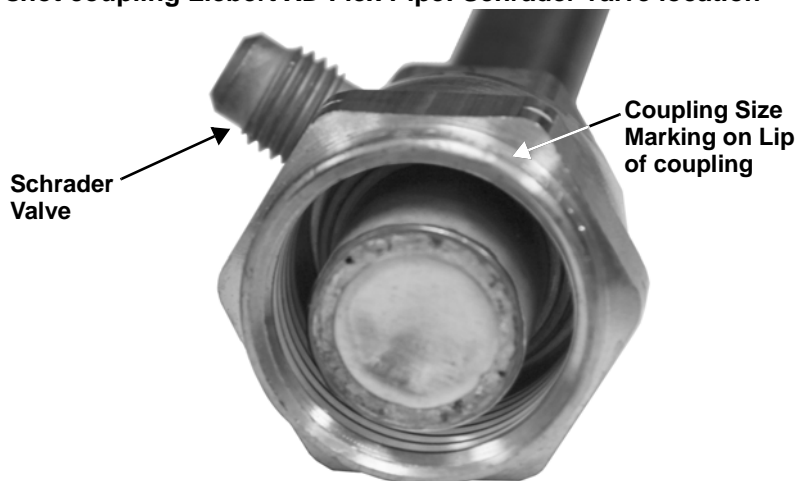
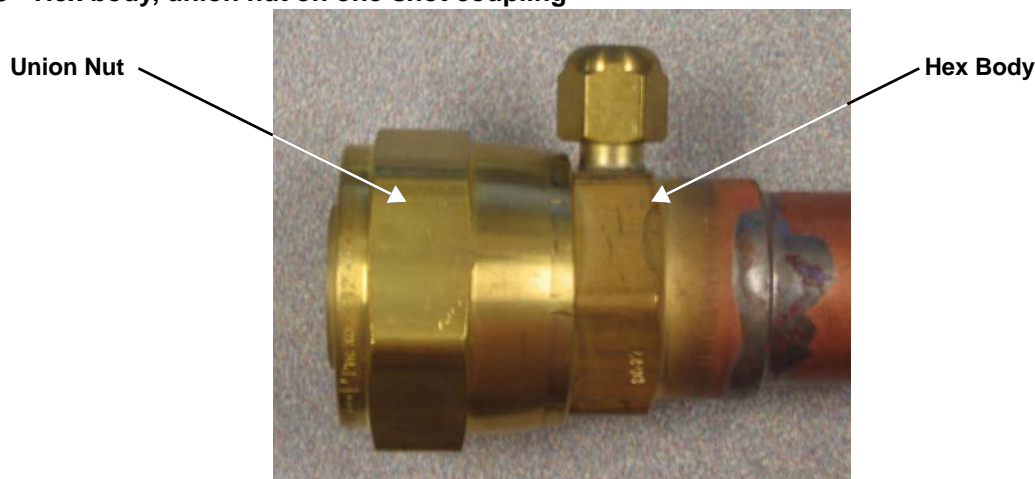


Figure 28 Hex body, union nut on one-shot coupling



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 3**.

Table 3 Torque and wrench size for connecting Liebert XDO with one-shot couplings to Liebert XD Flex Pipe

Coupling Size	Wrench Sizes, in. (mm) Union Nut	Torque, Union Nut Only, ft-lb (Nm)
#10 (Supply)	1-5/16 (34)	35-45 (47.5- 61.0)
#11 (Supply)	1-5/6 (47)	35-45 (47.5- 61.0)
#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 wrench flat (60°), judging the amount by the mark drawn in **Step 7**.

6.16 Connect a Liebert XDO with Liebert XD Flex Pipe to a Liebert XD System

NOTICE

Risk of refrigerant loss. Can cause environmental pollution and equipment malfunction. Before connecting the Liebert XDO with Liebert XD Flex Pipe to the prefabricated piping mains, check the whole system for leaks.

Check the Liebert XDO 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. Use the lift mechanism to raise the Liebert XDO into position and connect it to the suspension structure (refer to **5.0 - Installing the Module**).
4. Skip this step if reconnecting Liebert XD Flex Pipes with one-shot connections. Remove caps from only the required ports. Do not remove caps from the unused ports.
5. Remove the pipe plugs that are supplied on the Liebert XD Flex Pipe.
6. Inspect both halves of the couplings and remove any foreign contamination from the sealing surfaces and threads before connecting the fittings.
7. Determine the coupling size by locating the number scribed on the Liebert XD Flex Pipe coupling. See **Figure 29**.

Figure 29 Coupling size indicator

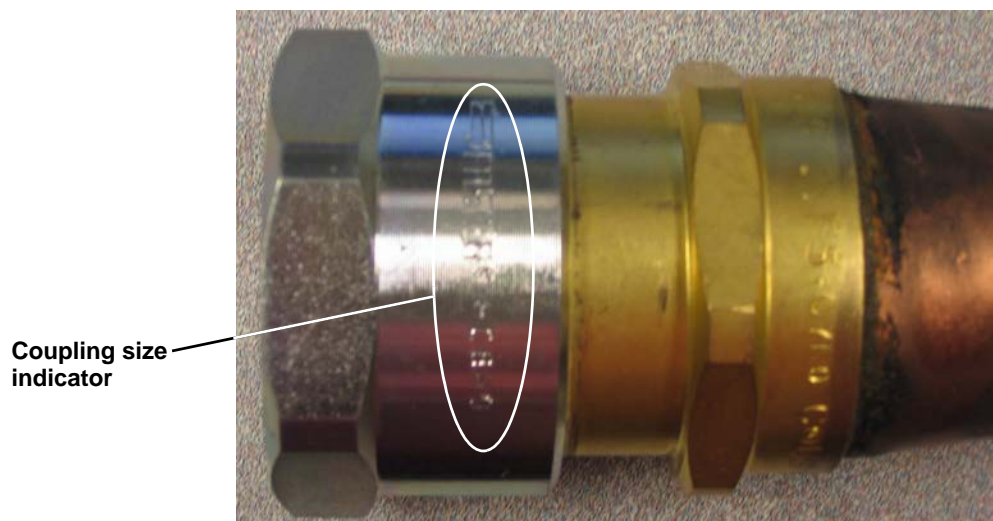
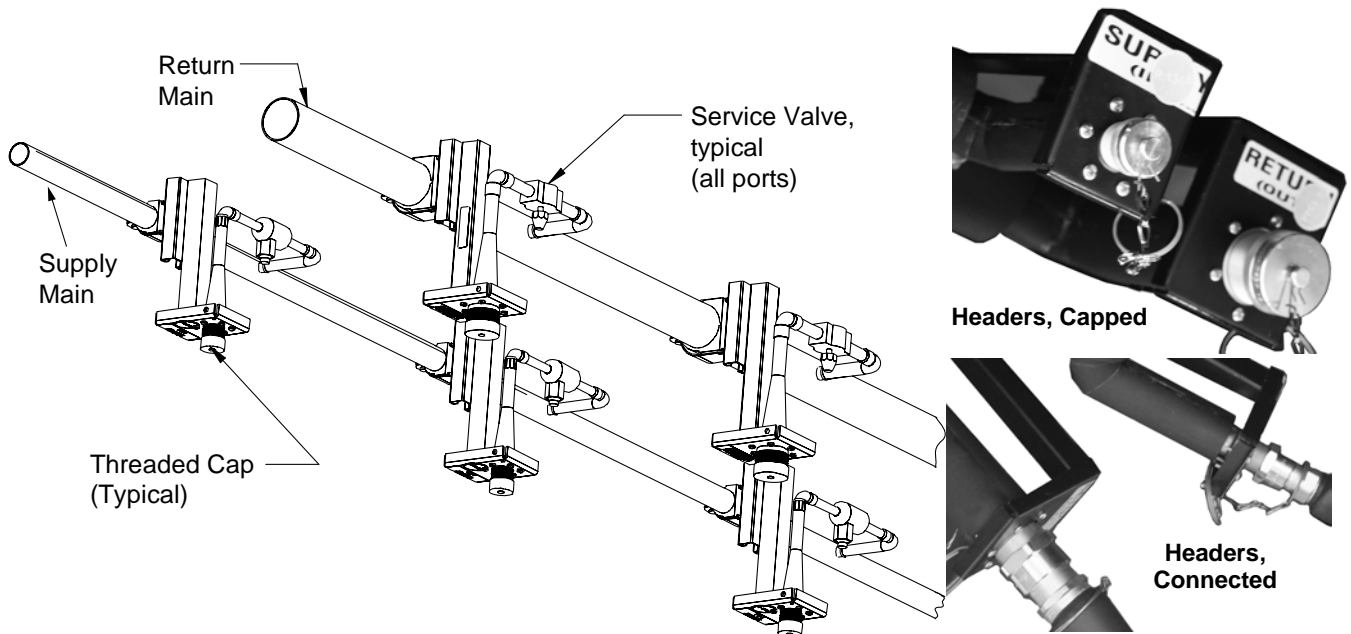
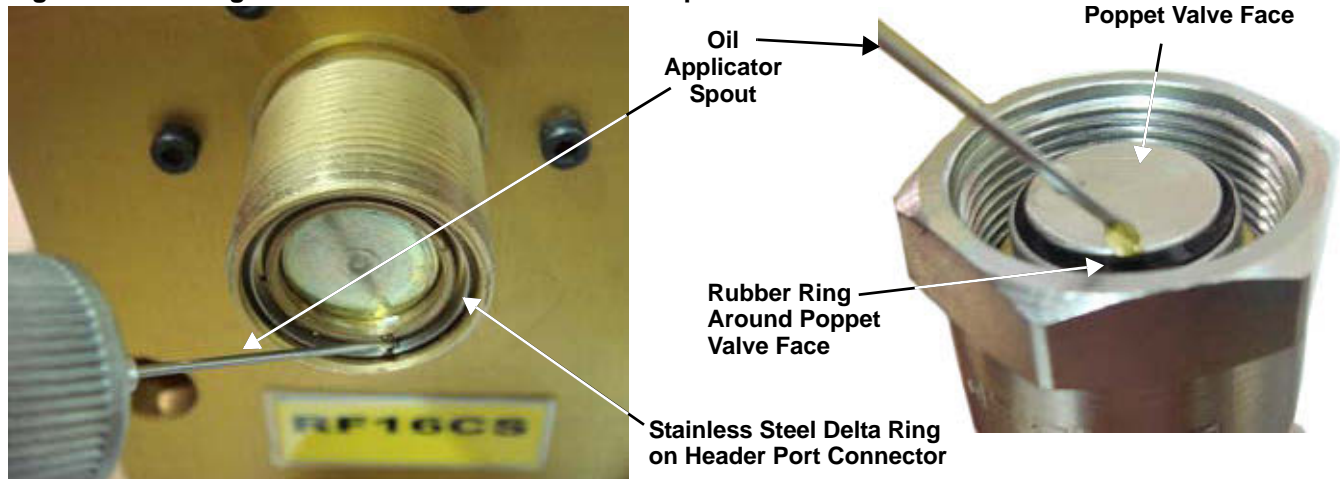


Figure 30 Liebert XD prefabricated piping assembly



8. 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 coupling (on the Liebert XD Flex Pipe) (see **Figure 31**).
9. Apply mineral oil or polyol ester oil to the stainless steel delta ring on the male coupling (header port connector) (see **Figure 31**).

Figure 31 Oil rings on header and Liebert XD Flex Pipe connectors



10. Thread the union nut of the Liebert XD Flex Pipe coupling onto the port coupling to ensure the threads mate properly.
11. Using the wrench arrangement shown in **Figure 32**, torque the couplings to the values in **Table 4**.

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 4 Torque for connecting Liebert XD Flex Pipe to prefabricated piping

Coupling Size	Crowsfoot Size, in. (mm)	Torque, ft-lb (Nm)
1/2"	1-3/16 (30)	25.8 (30-35)
3/4"	1-5/8 (41)	48.0 (60-65)
1"	1-31/32 (50)	62.7 (80-85)

Figure 32 Wrench arrangement for tightening couplings

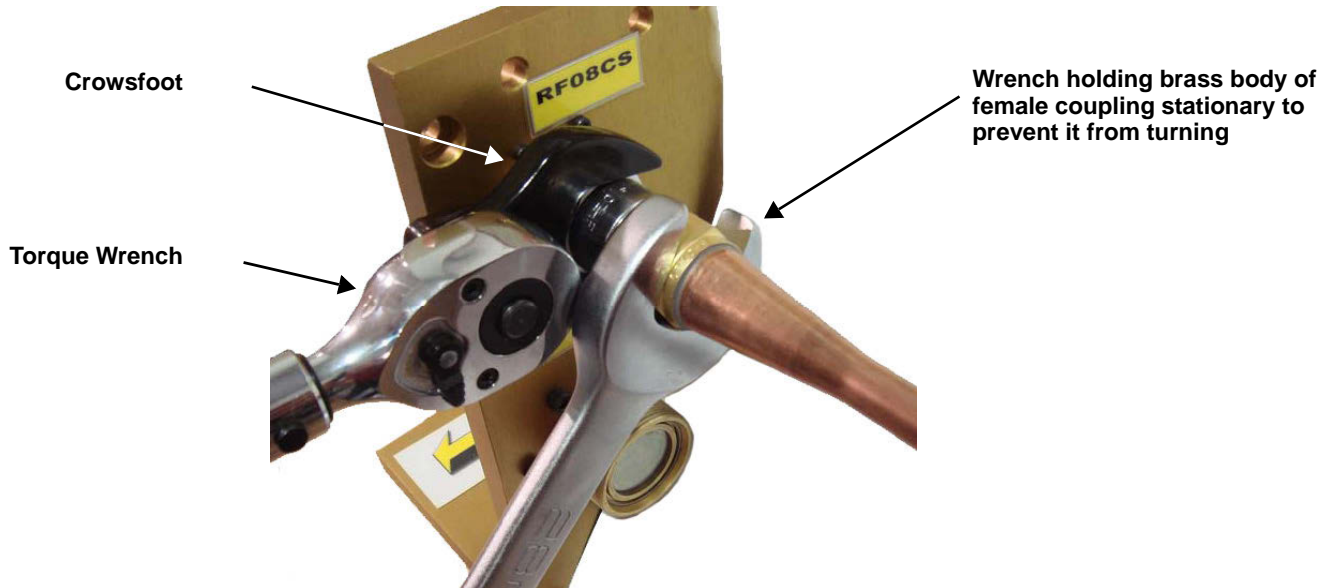
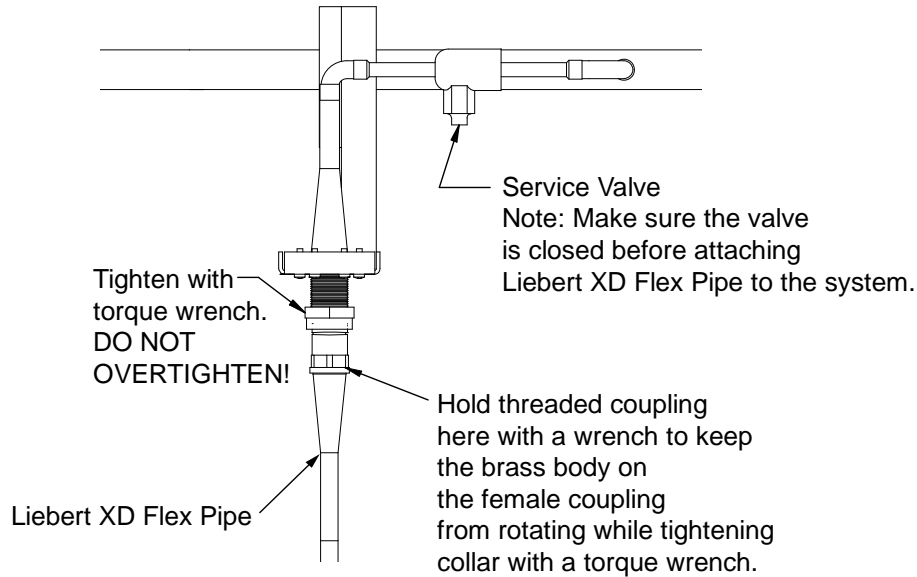


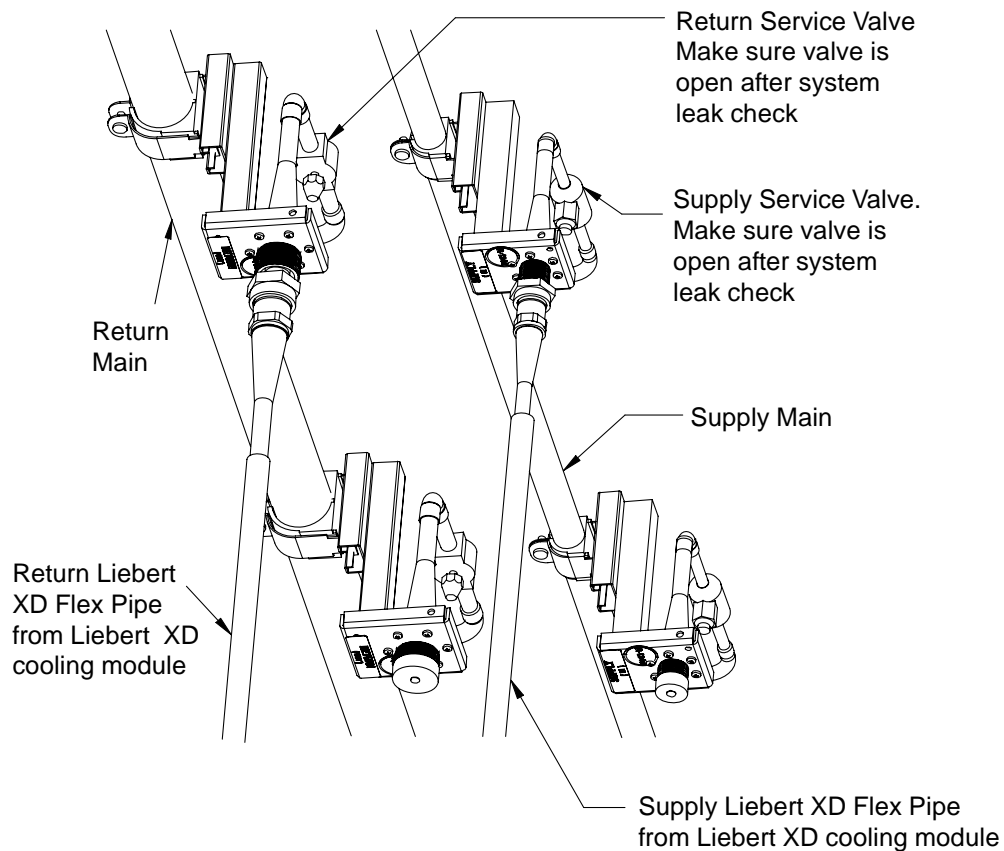
Figure 33 Detail view of Liebert XD Flex Pipe and prefabricated piping port



12. Repeat **Steps 4** through **11** for the remaining Liebert XD Flex Pipe.
13. Once the supply and return connections are completed, check to make sure the Liebert XDO fan power switch is Off, then connect the power cord to its power source.
14. Turn the fan switch On. Ensure that the fan operates.

15. Proceed with **Step a, b** or **c** below, depending on your installation:
- a. **For a non-operational Liebert XD system and Liebert XDOs NOT pre-charged:**
 1. Open the return service valve first, then open the supply service valve.
 2. Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.
 3. With the Liebert XDO fan operating, cool air is discharged from the Liebert XDO.
 - b. **For a non-operational Liebert XD system and Liebert XDOs pre-charged:**
 1. Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.
 2. With the Liebert XDO fan operating, open the return service valve first, then open the supply service valve. Cool air is discharged from the Liebert XDO.
 - c. **For an operational Liebert XD system and Liebert XDOs pre-charged:**
 1. Open the return service valve.
 2. Open the supply service valve.
 3. With the Liebert XDO fan operating, cool air is discharged from the Liebert XDO.

Figure 34 Liebert XD system with prefabricated piping assembly and Liebert XD Flex Pipe



6.17 Disconnect a Liebert XD Flex Pipe from a Liebert XD System



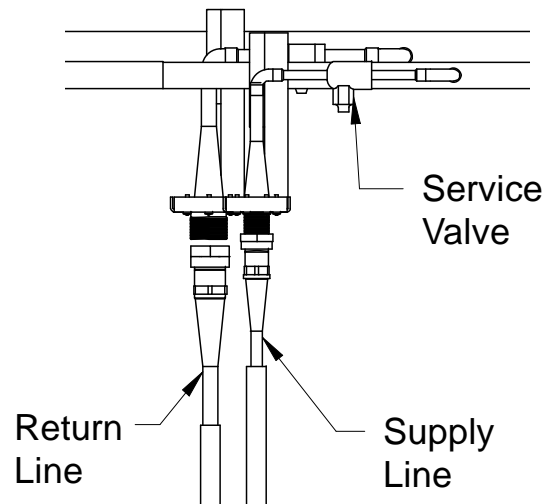
CAUTION

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

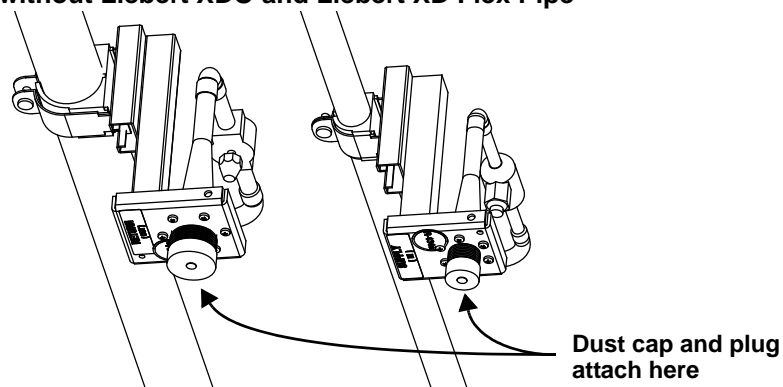
- Two adjustable wrenches with a maximum adjustment size of 2 inches
1. Ensure the Liebert XDO fan switch is On and the fan is operational.
 2. Close the service valve in the supply line to the Liebert XDO.
 3. With the Liebert XDO fan running, wait two minutes for the refrigerant to flow out of the module.
 4. Close the service valve in the return line to the Liebert XDO.
 5. Turn the fan power switch to the Off position. Once the fan switch is turned Off, unplug the power power cord from its source. See **7.0 - Electrical Connections** for details.
 6. Loosen the Liebert XD Flex Pipe coupling from the header port coupling. This requires an adjustable wrench. Refer to **Figure 33**.
 7. Disconnect the coupling.

Figure 35 Profile view of the Liebert XD header



8. Place the protective dust cap on the port.
9. Place the protective plug back on the Liebert XD Flex Pipe.
10. Repeat **Steps 6** through **9** for the remaining Liebert XD Flex Pipe.

Figure 36 Piping mains without Liebert XDO and Liebert XD Flex Pipe



6.17.1 Disconnecting the Liebert XD Flex Pipe from the Liebert XDO

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.

6.17.2 Removing the Liebert XDO

Tools Required

- Lift mechanism
1. Unbolt the Liebert XDO from the suspension structure.
 2. With the help of another person, use the lift mechanism to lower the Liebert XDO from the suspension structure.

7.0 ELECTRICAL CONNECTIONS

The module must be installed in accordance with national wiring regulations. Refer to the module's serial tag for electrical requirements. Refer to **Figure 8** for details.



WARNING

Risk of electrical shock. May cause death or injury.

Disconnect all local and remote electrical power before working within the module.

Replacement of any wiring must be performed only by the manufacturer's service agent or other similarly qualified person.

NOTICE

Risk of improper wiring. Can cause equipment damage.

Use copper wiring only. Make sure that all connections are tight.

The voltage supplied must agree with the voltage specified on the module's serial tag.

For Liebert XDO smart modules, if only one power source is available, then only the power connection labeled "SECONDARY" should be connected to the power source.



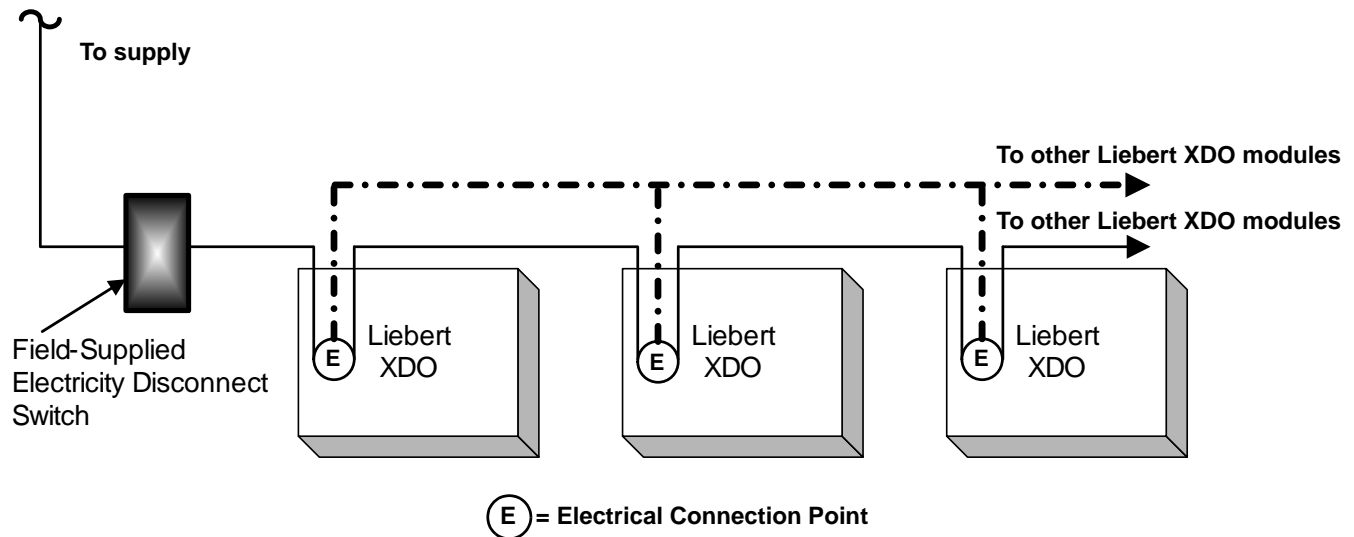
NOTE

All electrical data maybe found in *Table 7 - Liebert XDO20 specifications*.

7.1 Remote Emergency Power Off Switch Required

A field-supplied disconnect switch for the electric power supply to the Liebert XDO must be installed at eye level in the room with the Liebert XDO to provide for emergency shutdown of the Liebert XDO in accordance with local electrical codes.

Figure 37 Liebert XDO electrical connection diagram



7.2 Connecting High-Voltage Cables—All Liebert XDO Modules



WARNING

Risk of electric shock. Can cause injury or death.
Disconnect all local and remote electric power before working within the module.



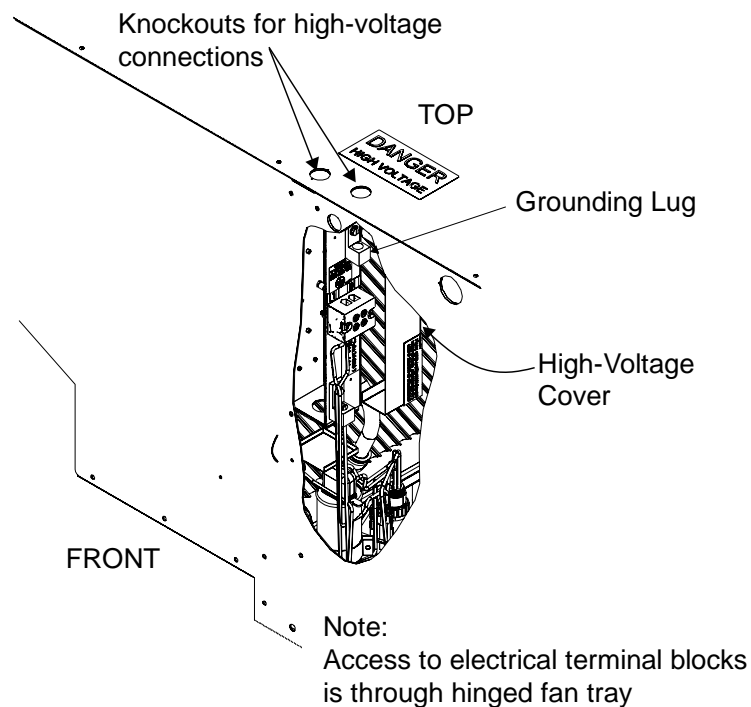
CAUTION

Sharp edges and heavy parts may cause personal injury.
Wear gloves to prevent injury to hands.
Damage to wiring or components may make module unsafe to operate.
Use caution when installing wiring to prevent damage to factory wiring.
Install protective bushings in wiring knockouts as required
Do not disturb factory wiring or route field-installed wiring over electrical terminals.
Use NEC Class 1 wiring for all hazardous voltage electrical power supplies.
Check and retighten all wiring connections before starting.

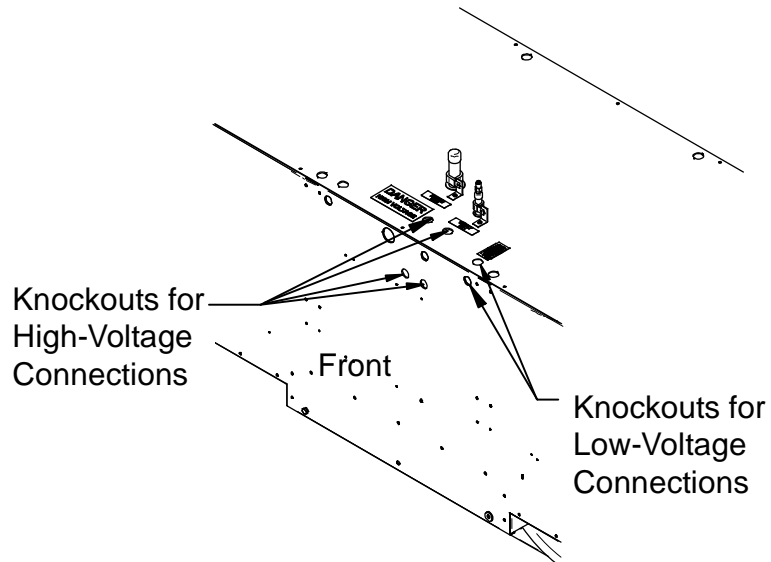
1. The Liebert XDO is designed for electrical access through the top or front (see **Figures 38** and **39**). Route the electrical service conduit through the hole provided in the top or front of the Liebert XDO. The electrical connections are on the front of the inside compartment of the Liebert XDO on the internal mounting brackets, which, in addition to serving as electrical terminal blocks, also are used to secure internal piping.

Looking at the Liebert XDO from the front, the knockout for the high-voltage wiring and the high-voltage terminal block will be on the left (see **Figure 38** for standard Liebert XDO modules; see **Figure 39** for Liebert XDO smart modules); the low-voltage locations will be on the right. (The low-voltage connection is present only if the Liebert XDO is equipped with a smart module.)

Figure 38 Top and front electrical access points and terminal block—Liebert XDO basic modules



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Figure 39 Top and front electrical access points—Liebert XDO smart modules

2. Open the hinged, removable fan tray (see **5.1 - Internal Access: Opening the Fan Tray**).
3. Remove two screws to remove the protective cover from the high-voltage terminal block (see **Figure 40** for standard Liebert XDO modules; see **Figure 41** for Liebert XDO smart modules).
4. Connect the high-voltage power supply wires and the earth ground wire to the Liebert XDO (see **Figure 40** for standard Liebert XDO modules; see **Figure 41** for Liebert XDO smart modules).
The black wire in the power supply line connects to L1 on the terminal block and the white wire connects to N on the terminal block. The earth (ground) wire connects to the earth (ground) location above the L1 and N connectors.
5. Reinstall the cover over the high-voltage terminal block.

Figure 40 High-voltage terminal block and connection locations—standard Liebert XDO modules

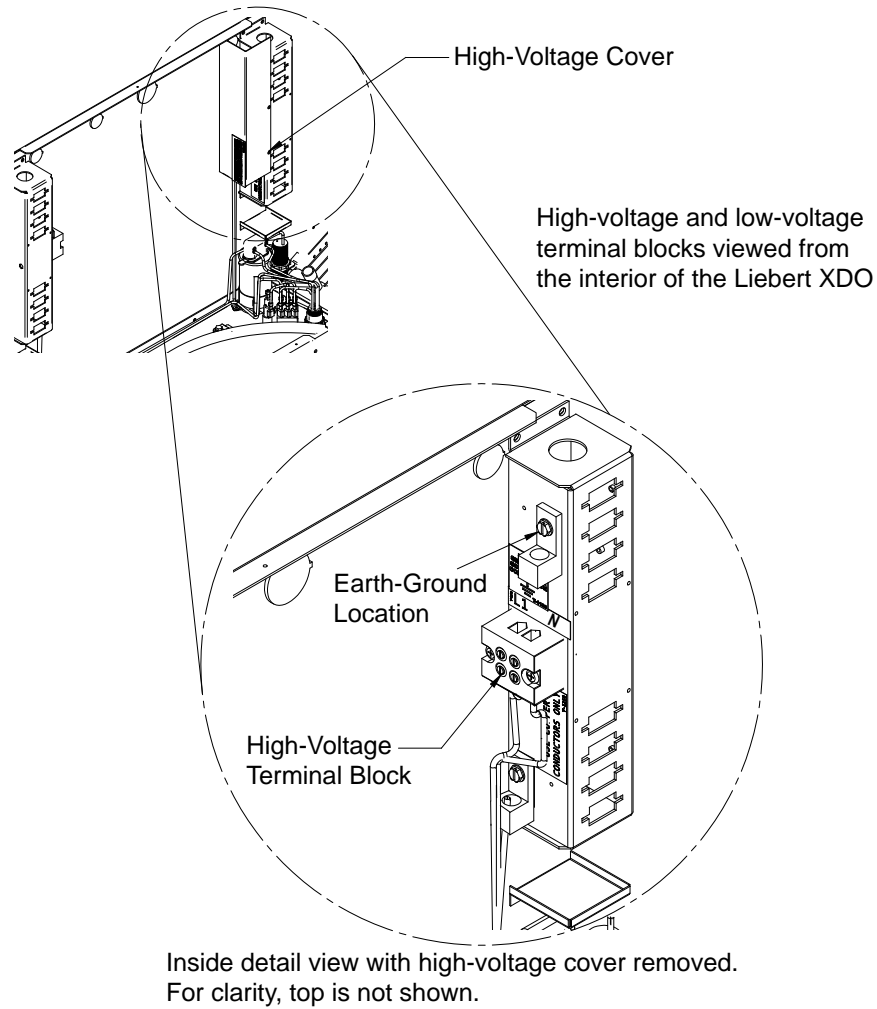
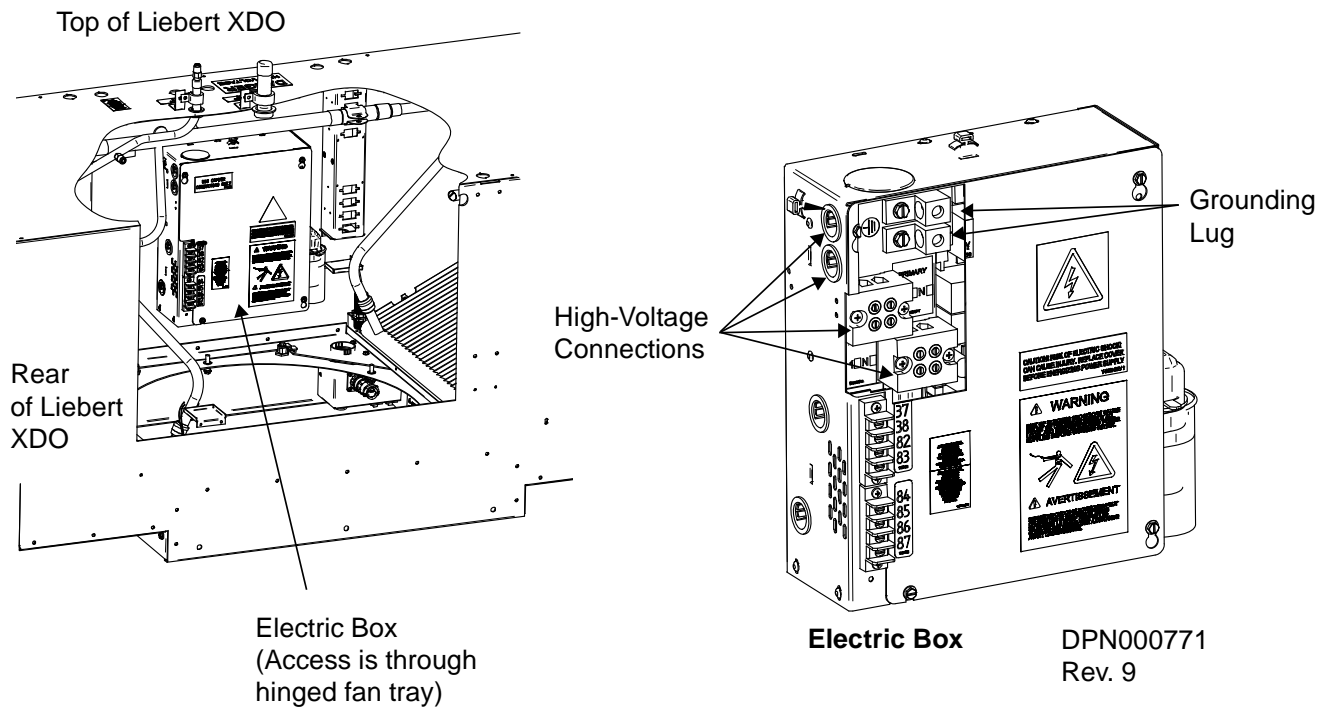


Figure 41 High-voltage terminal block connection locations—Liebert XDO smart modules



7.3 Connecting Low-Voltage Wiring—Liebert XDO Smart Modules

Low-voltage connections to the Liebert XDO are available only on smart modules.

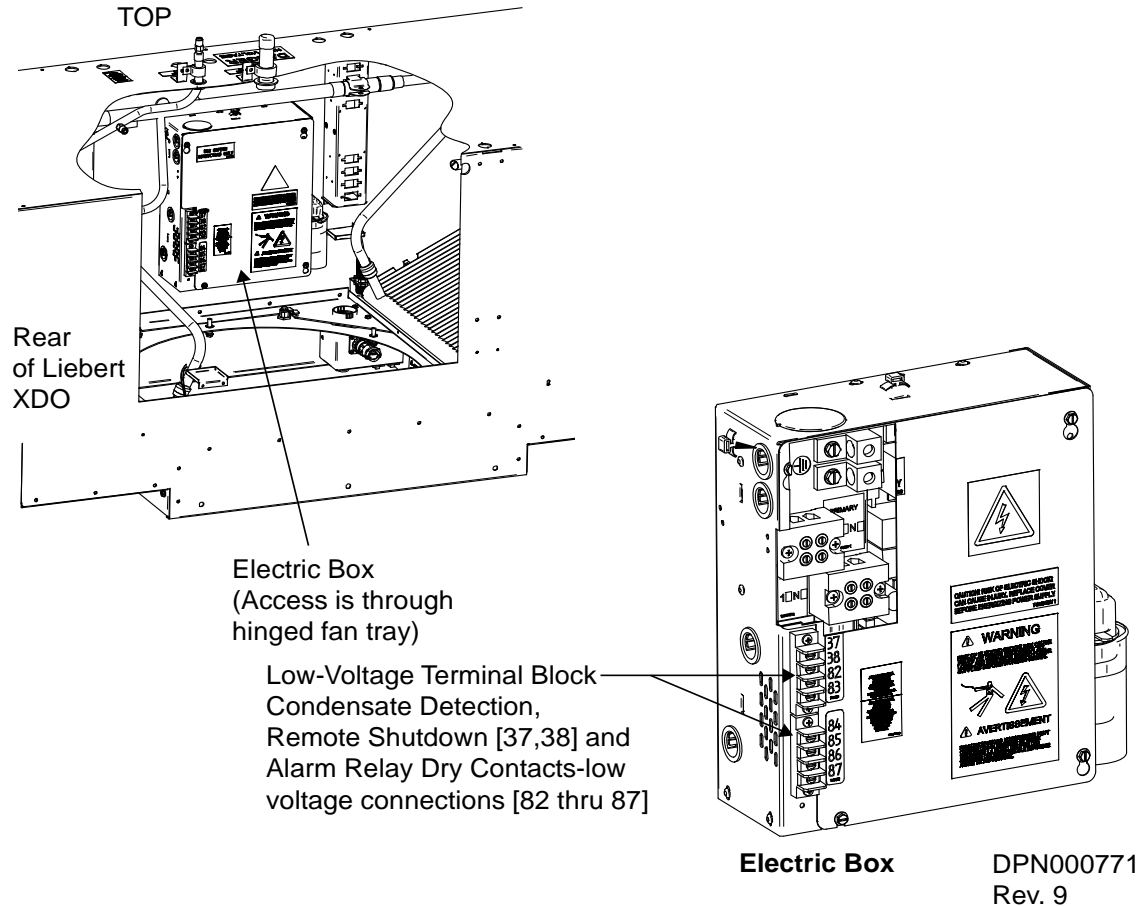
Viewing the Liebert XDO from the front or from above, the low-voltage terminal block is on the right side of the module (see **Figure 42**). Make low-voltage connections on these modules according to site-specific drawings. The module must be installed in accordance with national and local wiring regulations.

For Liebert XDO smart modules, the low-voltage connections are on the electric box inside the Liebert XDO. Knockouts for the low-voltage connections are on the front of the Liebert XDO, near the top (see **Figure 42**).

Terminal block connections 37, 38 and 82 through 87 can be connected to a monitoring unit, such as Liebert SiteScan[®]. The remote shutdown, condensate detection alarm and fan failure alarms operate independently of each other.

- Contacts 37 and 38 are for remote shutdown.
- Contacts terminals 82, 83 and 84 are activated by the condensate detection alarm.
 - T82 is used for normally open contact closure requirements.
 - T83 is common.
 - T84 is used when normally closed contact closure is required.
- Contacts terminals 85, 86 and 87 are activated by the fan failure alarm.
 - T85 is for normally open contact closure requirements.
 - T86 is common.
 - T87 is used when normally closed contact closure is required. The condensate detection alarm and the fan failure alarm operate independently of each other.
- P66 and P67 are CAN bus ports.

Figure 42 Low-voltage wiring—Liebert XDO smart modules



8.0 MOUNTING OPTIONAL LIGHT UNITS

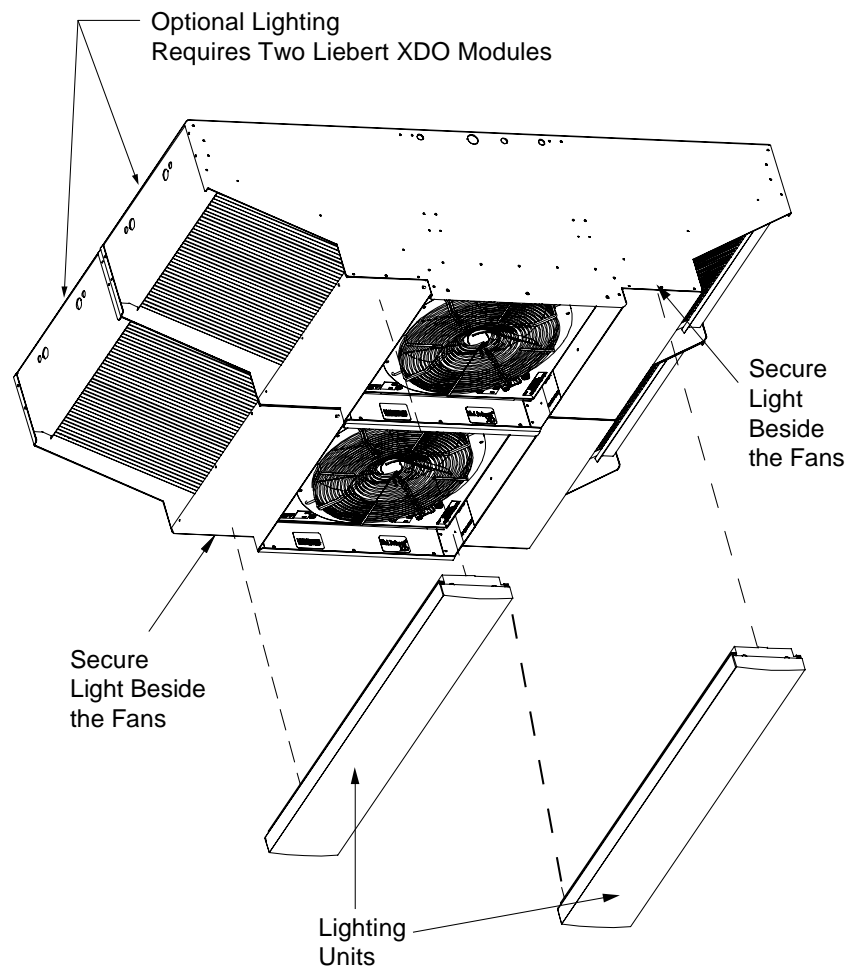
Liebert offers optional lighting units that may be mounted on Liebert XDOs to save space and improve illumination in the conditioned space.

The Liebert XDO modules serve as a mounting platform for the lights, but do not provide power to the lights. The lights require separate power connections.

Follow all local and national electrical codes when making power and control connections to the lights.

Attach the lights to the bottom of the Liebert XDO on either side of the fan trays as shown in **Figure 43**.

Figure 43 Adding optional lighting units



9.0 CANBUS LIEBERT XDP OR LIEBERT XDC INTERCONNECTION WITH SMART MODULES

A Controller Area Network (CAN) is a specialized internal communication network. It allows a Liebert XDP, Liebert XDC and Liebert XD smart modules to communicate without a host computer. Networking the Liebert XDP or Liebert XDC to smart modules enables the smart modules to be controlled and monitored from the Liebert XDP or Liebert XDC.

Figure 44 shows a typical Liebert XD system in a CANbus network. Liebert XD smart modules should be connected to the Liebert XDP or Liebert XDC that supplies the modules with refrigerant.

Figure 44 Liebert XD system with CANbus



NOTE

Only six Liebert XDO20S* are shown in **Figure 44**. A CANbus network can accommodate a maximum of eight Liebert XDO20S* or a maximum of 10 Liebert XDO16S*.

Plan wiring runs for Unit-to-Module communication when designing the layout of the conditioned space. In addition to general good wiring practices for CANbus cables:

- Keep control and communication cables away from power cables to prevent electromagnetic interference.
- Do not bend cables to less than four times the diameter of the cable.
- Do not deform cables when securing them in bundles or when hanging them.
- Keep cables away from devices that can introduce noise into them, (e.g., machines, fluorescent lights and electronics).
- Avoid stretching cables; tension when pulling cables should not exceed 25 pounds (11kg).
- Do not secure cables with any method that might damage them; use approved hangers, such as telephone wire/RG-6 coaxial wire hangers, available at most hardware stores.

Do not run cables through conduit. Cables should be treated as any other data cable. Running CANbus cables through conduit will increase the total length required.

9.1 Network Layout Options

The Liebert XDP and Liebert XDC have two CANbus ports (P2 and P4) each on the CAN isolator in the low voltage side of the electrical box (see **Figure 49**). This allows creating two network chains to minimize the total network length.

9.1.1 Remote Sensor Temperature/Humidity Sensor Placement and Connection to the CANbus

The Liebert XDP and Liebert XDC are shipped with two remote temperature/humidity sensors. One sensor should be placed closer to the Liebert XDP or Liebert XDC; the other should be placed in the warmest part of the cold aisle or in the return air stream of a computer room air conditioning unit, such as the Liebert DS™ or Liebert CW™.

The remote sensors can be placed at the end of a chain or in the middle of a daisy chain as shown. Refer to **Figures 45** and **46** for acceptable network layouts.

Figure 45 Modules on a single chain

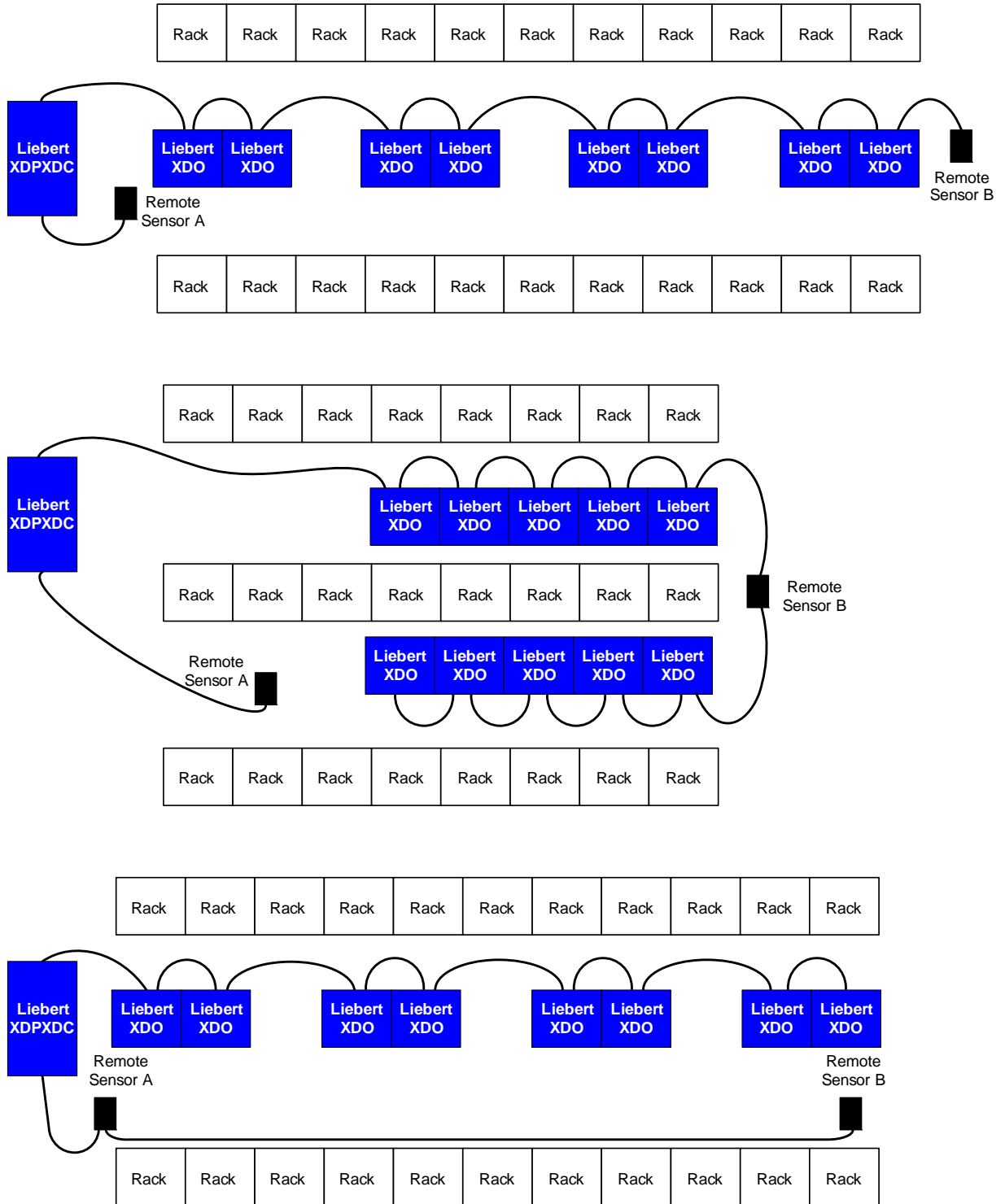
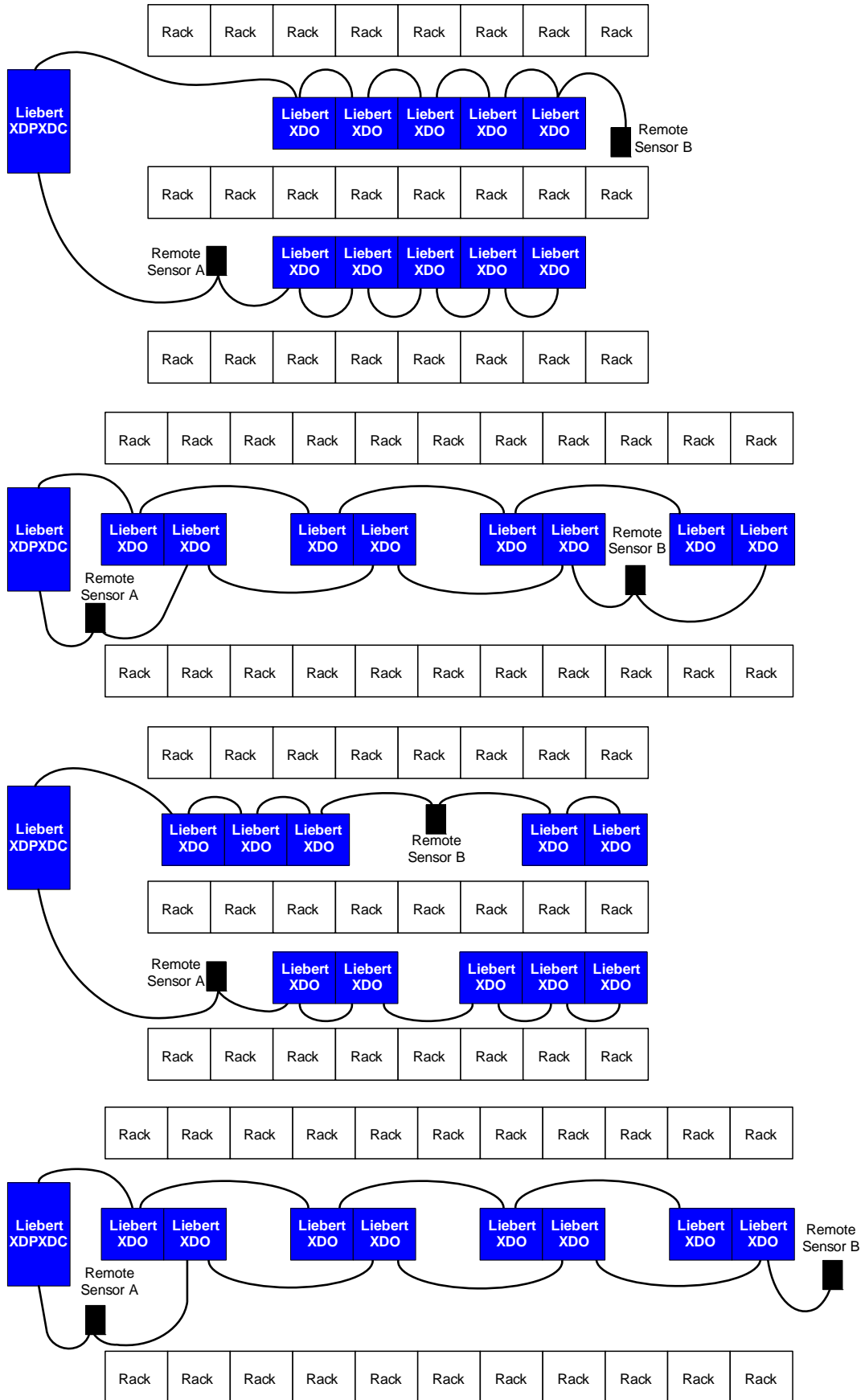


Figure 46 Modules on two chains



9.1.2 CANbus maximum length

The CANbus network (the sum of the two CANbus chains) has a maximum length limitation. If the Liebert XDP or Liebert XDC with Liebert iCOM does not have a CAN isolator, the maximum total network length is 150ft. (45m) without measuring the final device voltage. The total network length must include the remote temperature and humidity sensor cable lengths. If the Liebert XDP or Liebert XDC contains a CAN isolator, the maximum network length is 300ft. (91m). To exceed this length, the final device voltage must be measured.

Measuring Final Device Voltage

Required tools

- RJ11 6-way modular adapter; shown Paladin Tools RJ11 6-way Modular Adapter (Paladin part number 1903) or similar tool
- Voltmeter

Testing the voltage requires the Liebert XDP or Liebert XDC and all connected smart modules to be turned On.

1. Start the Liebert XDP or Liebert XDC. Refer to SL-16644 or SL-16674.
2. Locate P67 on the final device.
3. Plug the RJ11 Adapter into P67.
4. Measure the DC voltage between Pins 1 (-) and 2 (+). The voltage should be between 8 and 17.5VDC.
5. Measure the DC voltage between Pins 5 (+) and 6 (-). The voltage should be between 8 and 17.5VDC.
6. Remove the RJ11 adapter.
7. Repeat for second chain if the smart modules are separated into two chains within the network.

9.2 CANbus Cables

The Liebert XDP may be connected to the smart modules with a CANbus cable. The shielded cable consists of three pairs of twisted wires with a 6-pin RJ12 connector.

NOTICE

Risk of improper cable construction. Can cause equipment damage.

Mismatching wire pins at the RJ12 connection will damage the CAN device. Extreme caution should be taken when making cables.

Figure 47 CANbus cable

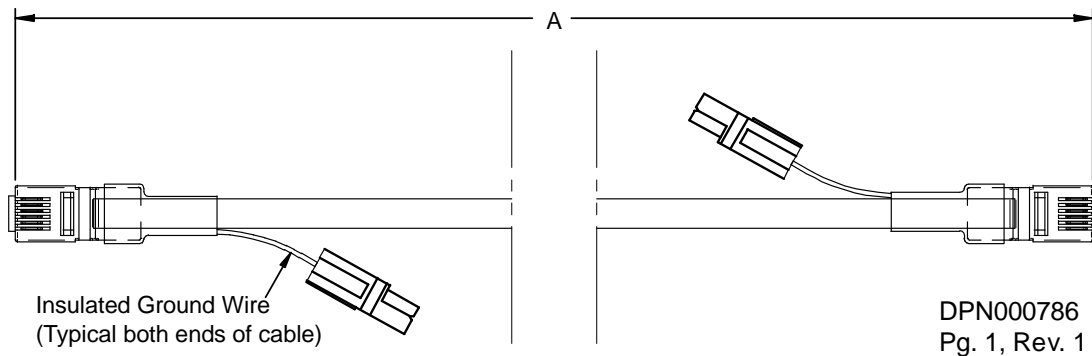
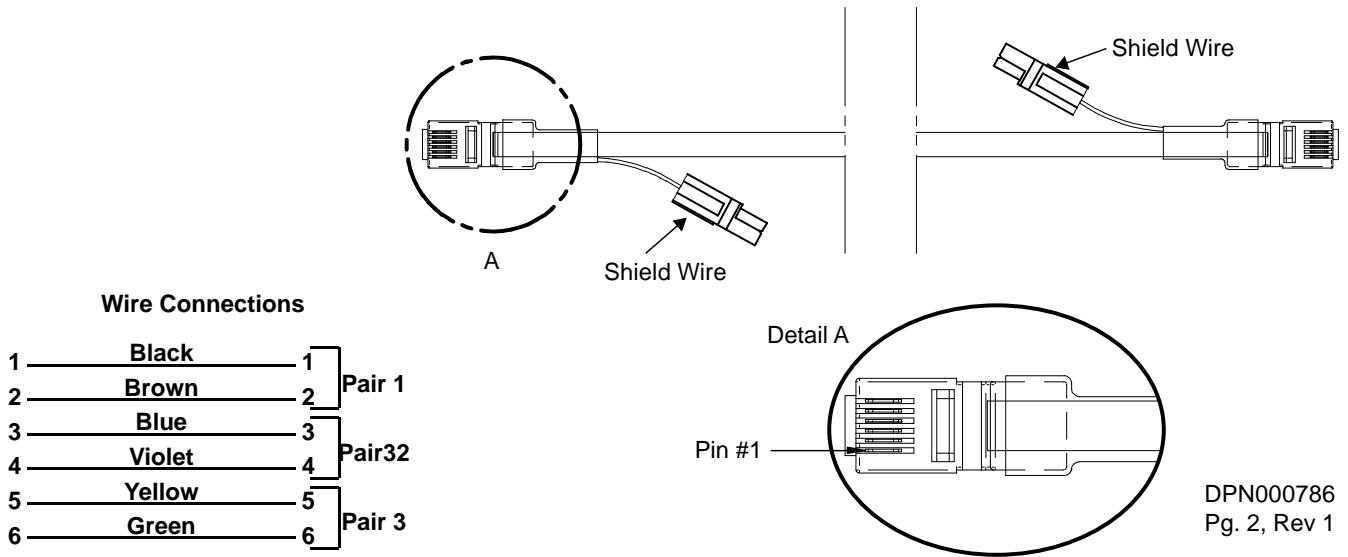


Table 5 CANbus cable lengths and part numbers

Liebert Part #	Dimension A ft. (m)
300157G1	6 (1.8)
300157G2	10 (3)
300157G3	20 (6)
300157G4	30 (9.1)
300157G5	60 (18.3)
300157G6	90 (27.4)
300157G7	120 (36.6)
300157G8	150 (45.7)
300157G9	6.25 (1.9)
300157G10	3 (0.9)
300157G11	15 (4.6)
300157G13	40 (12.2)
300157G14	50 (15.2)
300157G15	70 (21.3)
300157G16	80 (24.4)
300157G17	100 (30.5)
300157G18	110 (33.5)

Figure 48 CANbus cable plug



9.3 Connecting CANbus Network

9.3.1 Connection to the Liebert XDP or Liebert XDC

The Liebert XDP and Liebert XDC have two CANbus ports (P2 and P4) each located on the CAN isolator in the low voltage side of the electrical box (see **Figure 49**). This allows creating two network chains to minimize the total network length.

Figure 49 CAN isolator location in the Liebert XDP/XDC

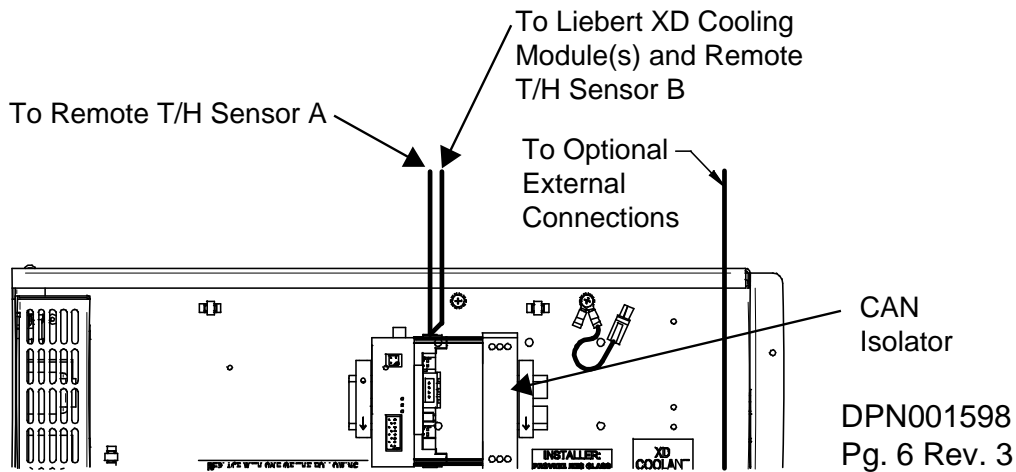
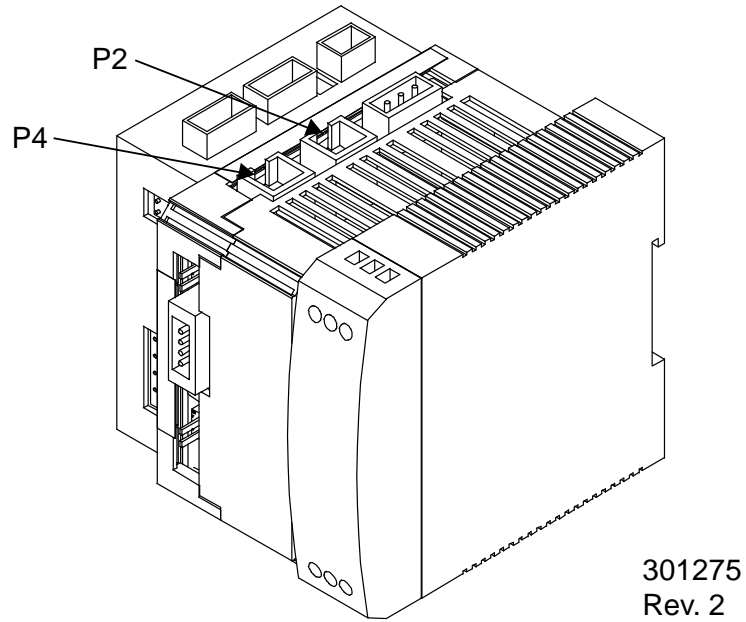


Figure 50 P2 and P4 locations on the CAN isolator

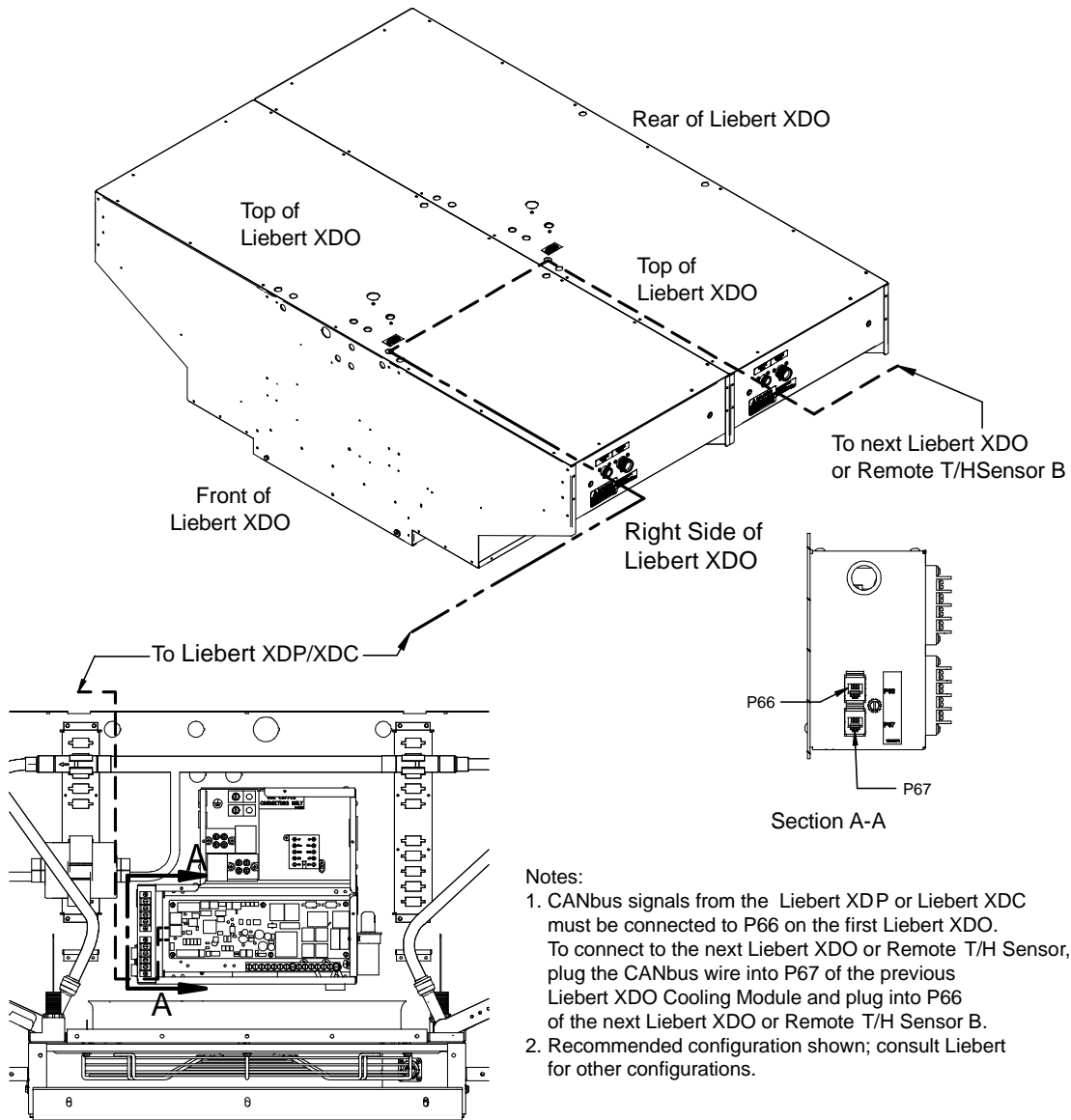


9.3.2 Connecting to the Liebert XD Smart modules

Liebert XDO CANbus Port Locations

The Liebert XDO CANbus ports are located on the side of the electrical box. Refer to **7.0 - Electrical Connections** for accessing the electrical box. The cable from the Liebert XDP or Liebert XDC side will be connected to Port P66. The leaving cable will be connected to Port P67. See **Figure 51**.

Figure 51 Liebert XDO CANbus port locations



- Notes:
1. CANbus signals from the Liebert XDP or Liebert XDC must be connected to P66 on the first Liebert XDO. To connect to the next Liebert XDO or Remote T/H Sensor, plug the CANbus wire into P67 of the previous Liebert XDO Cooling Module and plug into P66 of the next Liebert XDO or Remote T/H Sensor B.
 2. Recommended configuration shown; consult Liebert for other configurations.

Refer to the Liebert Xtreme Density System Design Manual, SL-16655

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9.4 CANbus Termination

The last device in the chain must be terminated.

- The remote temperature and humidity sensors are terminated at the factory.
- The Liebert XD smart modules are **not** terminated at the factory.

Improper termination will cause communication errors.

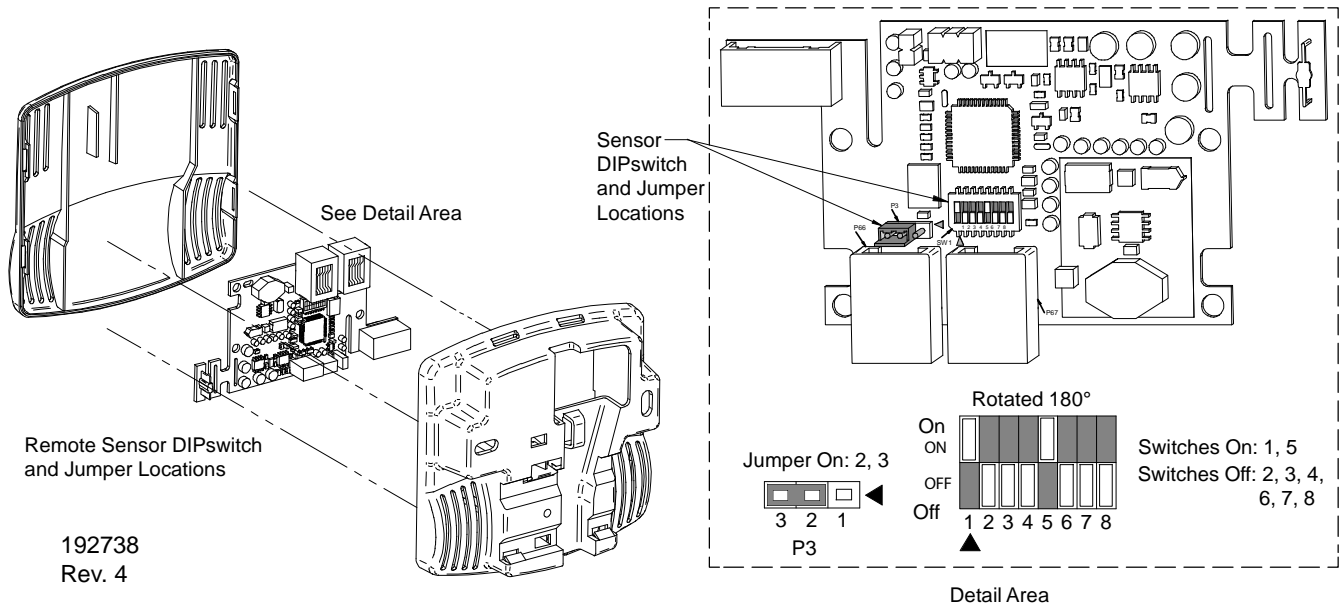
9.4.1 Remote Temperature and Humidity Sensors Termination

The control board is terminated at the factory. If a remote sensor is the last device in the CANbus chain, no changes are necessary. The termination jumper must be removed if a remote sensor is not the last device in the CANbus chain.

To remove the termination jumper:

1. Remove the sensor cover.
2. Place a jumper on Pins 1 and 2 on P3 (see **Figure 54**).
3. Replace the sensor cover.

Figure 52 Removing the remote sensor cover



To terminate a temperature and humidity sensor:

1. Remove the sensor cover.
2. Place a jumper on pins 2 and 3 on P3 (see **Figure 54**).
3. Replace the sensor cover.

9.4.2 Terminating a Smart Module

Liebert XD smart modules must be properly terminated or communication errors will result. Smart modules are shipped from the factory unterminated. If the smart module is the last device in the chain—in other words, the last module is not connected to a remote sensor—the smart module control board must be terminated. Refer to **Figure 41** for the module control board location.

To terminate a smart module:

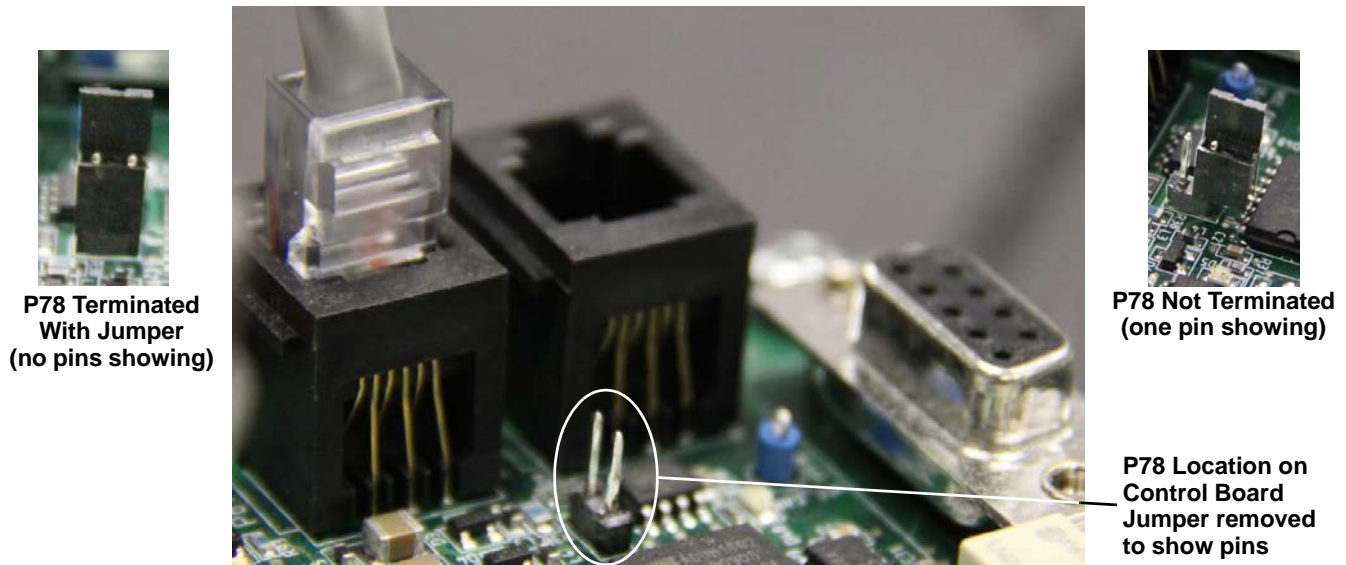
1. Locate the smart module control board.
2. Locate P78 on the control board (see **Figure 55**).
3. Place a jumper on P78 (see **Figure 55**).

To unterminate a smart module:

Refer to the appropriate Liebert XD smart module for instructions to access the control board.

1. Locate the smart module control board.
2. Locate P78 on the control board (see **Figure 55**).
3. Remove the jumper from P78 (see **Figure 55**).

Figure 53 Liebert XD smart module R38 location



9.4.3 Testing Network Termination

Required Tools

- RJ11 6-way Modular Adapter (use Paladin Tools RJ11 6-way modular adapter, Paladin part number 1903, or similar tool)
- Ohmmeter

Checking the Chain Termination

This procedure applies to the last device connected to each end of the chains, either a Liebert XD smart module or a remote temperature and humidity sensor.

This procedure requires the Liebert XDP or Liebert XDC and the connected modules to be Off.

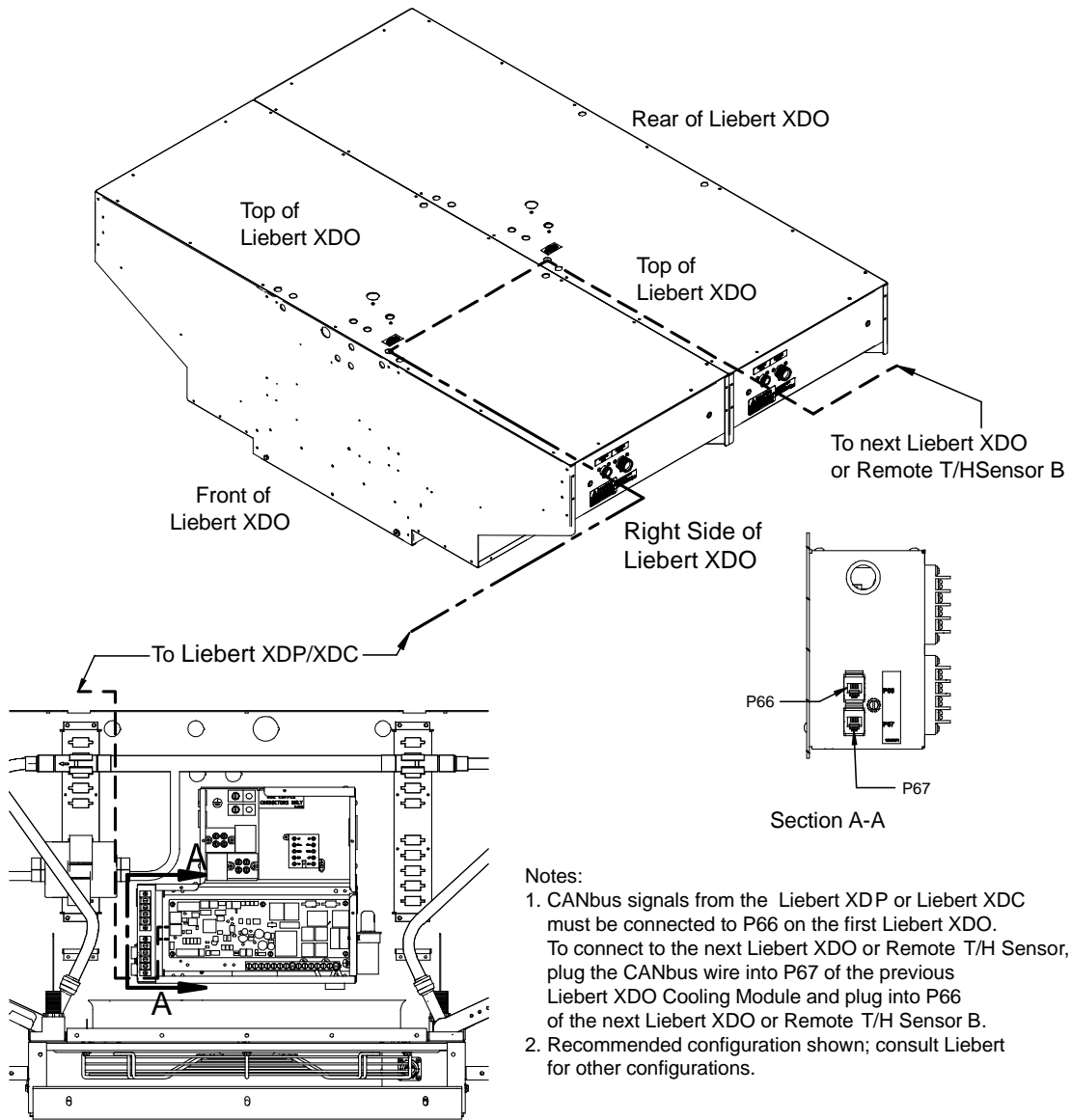
1. Turn Off the Liebert XDP or Liebert XDC. If needed, refer to SL-16644 for the Liebert XDP or SL-16674 for the Liebert XDC to turn Off the system.
2. Locate P66 on the last control board of the first chain.
3. With the system NOT powered, remove the cable from P66.
4. Connect the cable from P66 to the RJ11 adapter tool.
5. Measure resistance across Pin 3 and Pin 4.
 - a. If the resistance is between 100 and 200 ohms, the chain is properly terminated.
 - b. If the resistance is less than 100 ohms, the chain is not properly terminated: More than one control board is terminated. Each control board must be checked.
6. Remove the cable from the RJ11 adapter tool.
7. Connect the adapter into P66 using the cable provided with the RJ11 adapter tool.
8. Measure the resistance on the final control board.
 - a. If the resistance is between 110 and 140 ohms, the control board is properly terminated.
 - b. If the resistance is greater than 200, the control board is not terminated. See **9.4.1 - Remote Temperature and Humidity Sensors Termination** to terminate a remote temperature and humidity sensor and **9.4.2 - Terminating a Smart Module** to terminate a Liebert XD smart module.
9. Reconnect the CANbus cable to P66.
10. Repeat for the second chain.

Checking Individual Control Board Termination

This procedure applies to the devices that are not at the end of the chains, typically a Liebert XD Smart Module.

1. Find P66 and P67 on the control board.
2. Remove the cables from P66 and P67.
3. Plug the RJ11 adapter tool into P67.
4. Measure the resistance between Pin 3 and Pin 4.
 - a. If the resistance is between 110 and 140 ohms and it is not the last control board, the device is not properly terminated. See **9.4.1 - Remote Temperature and Humidity Sensors Termination** for unterminating a remote temperature and humidity sensor or **9.4.2 - Terminating a Smart Module** for unterminating a smart module.
 - b. If the resistance is greater than 200 ohms and it is not the last control board, the device is unterminated.
5. Remove the RJ11 adapter tool.
6. Reconnect the CANbus cables into P66 and P67.
7. Repeat for all devices until the final connected device is reached.
8. Repeat for the second chain.

Figure 54 Liebert XDO CANbus connections



Notes:

1. CANbus signals from the Liebert XDP or Liebert XDC must be connected to P66 on the first Liebert XDO. To connect to the next Liebert XDO or Remote T/H Sensor, plug the CANbus wire into P67 of the previous Liebert XDO Cooling Module and plug into P66 of the next Liebert XDO or Remote T/H Sensor B.
2. Recommended configuration shown; consult Liebert for other configurations.

Refer to the Liebert Xtreme Density System Design Manual, SL-16655

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10.0 INSTALLATION CHECKLIST AND SYSTEM FILL FOR STARTUP

- ___ 1. Threaded rods installed in the overhead building structure.
- ___ 2. Liebert XDO module secured on threaded rod using mounting hardware provided. See **2.3 - Packing List** and **2.3.1 - Optional Items**.
- ___ 3. The Liebert XDO module is level within 1/2".
- ___ 4. High-voltage wiring to the Liebert XD modules.
- ___ 5. CANbus cables connected to smart modules, T/H sensor and Liebert XDP/Liebert XDC.
- ___ 6. Piping from the Liebert XDP/Liebert XDC to the Liebert XD modules, including isolation valves piped to each Liebert XD module.
 - a. Hard-piped modules connected to overhead piping.
 - b. Liebert XD Flex Pipes connected to header assembly.
- ___ 7. Leak check.
- ___ 8. Fan tray closed and securely latched.
- ___ 9. Start the Liebert XD module to ensure proper operation (see **11.0 - Operation**).
- ___ 10. Shut down the Liebert XD module.
- ___ 11. Piping insulated.

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

11.0 OPERATION

The Liebert XDO's fan controls are on the fan tray for easy access. The Liebert XDO's primary and secondary circuit breakers are also on the fan tray (see **Figure 57**).



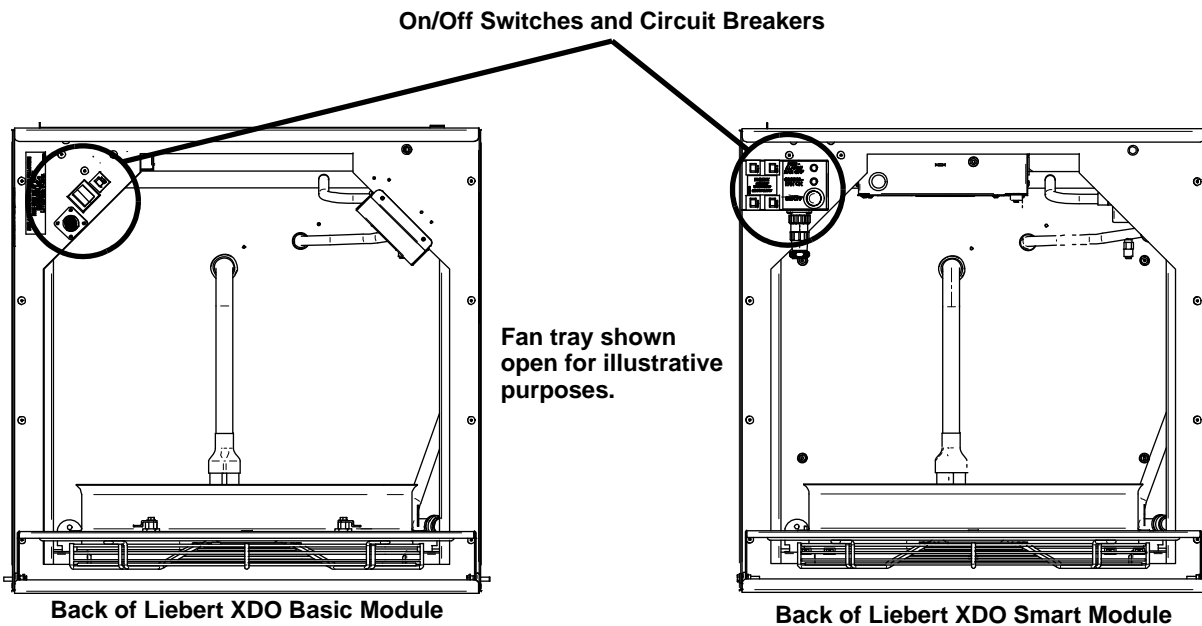
CAUTION

Risk of improper operation. Can cause equipment damage.

The Liebert XDO's fan must be turned On before either Liebert XDP or Liebert XDC connected to the system is switched On.

The Liebert XDO's fan must be operating at all times that the system's Liebert XDP or Liebert XDC is operating. Operating either the Liebert XDP or the Liebert XDC without the Liebert XDO's fan rotating may cause a system malfunction.

Figure 55 Fan switch and circuit breaker locations



11.1 Start the Liebert XDO Basic Module

To start the Liebert XDO:

1. Turn the ON/OFF switch to the On position to start the Liebert XDO's fan.
2. Wait for the fan to start and then start the refrigerant supply unit, either a Liebert XDC or Liebert XDP.

11.2 Start the Liebert XDO Smart Module

When the Liebert XDP/XDC with Liebert iCOM is turned On, the Liebert XDO's fans will turn On automatically.

To start the Liebert XDO:

1. Push the ON/OFF button once to start the Liebert XDO's fan.
The green LED illuminates continuously.
2. Wait for the fan to start and then start the refrigerant supply unit, either a Liebert XDC or Liebert XDP.

11.3 LED Indicators on Liebert XDO Smart Modules

Liebert XDO smart modules have two LEDs on the front, one red and one green (see **Table 6**).

- Red LED indicates alarms
- Green LED indicates the fan's status

Table 6 Key to LED indicators

Red LED	Green LED	Condition
BLINKING: On - short (< 1/2 second), Off - long (nearly 2 seconds)	OFF	Module has power, but fan is Off. User can turn fan On.
OFF	ON continuously	No alarms. Fan is On continuously.
ON continuously	ON continuously	Alarm condition (condensate detected or fan failure). Fan is On continuously.
BLINKING: On - long (nearly 2 seconds), Off - short (< 1/2 second)	OFF	Remote shutdown activated.

11.3.1 Activating Remote Shutdown Option

The optional remote shutdown option can be made operational by removing the jumper on Terminal Blocks 37 and 38. If the jumper is not removed, the module will stay active.

If the remote shutdown jumper is present, then remote shutdown is not operational.

12.0 MAINTENANCE

Minimal maintenance is required to keep the Liebert XDO operating at optimal levels. The module 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 fan—Clean any dust from fan blades.



WARNING

Risk of high-speed moving parts. Can cause death, injury and equipment damage.

Before opening the Liebert XDO, shut the module off and disconnect all electrical power. Wait for the Liebert XDO's fan to stop rotating before beginning to open the module.

12.1 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.

13.0 SPECIFICATIONS

Table 7 Liebert XDO20 specifications

Models *	XDO20BK XDO20SK	XDO20BS XDO20SS	
	60Hz	60Hz	50Hz
Cooling Capacity	Nominal (92°F [33°C] EAT): 20kW / 5.7 Tons Maximum (100°F [38°C] EAT): 23.1kW / 6.6 Tons		Nominal (92°F [33°C] EAT): 17.7kW / 5 Tons Maximum (103°F [39°C] EAT): 23.1kW / 6.6 Tons
Conditions	Capacity rating is @ 55°F (13°C) Entering Fluid Temperature and 50°F (10°C) or lower dew point		
Electrical Requirements			
Input Voltage	1ph-60Hz-120V	1ph-60Hz-220-240V	1ph-50 Hz-220-240V
Input Power Connections	Terminal blocks provided internal to module		
Full Load Amps	2.7A @ 120V	1.64A @ 230V	1.64A @ 230V
Wire Size Amps	3.4	2.0	2.0
Overcurrent Protection Device	15	15	15
Power consumption, nominal, watts	335	350	350
Dimensions, inches (mm)			
Length	72-1/4 (1835)		
Width	24-1/8 (613)		
Height	22-1/2 (572) not including electrical and piping access		
Weight, lb (kg)			
Module only	150 (68)		
Shipping weight	238 (108)	296 (134)	
Installed, with refrigerant, without options	155 (70)		
Number of Fans	1	1	1
Airflow, Nominal, ft³/ min (m³/ hr)	2700 (4590)		2250 (3820)
Audible Noise	85 dBA sound power		83 dBA sound power
Pipe Connections (without flex pipe)			
Refrigerant Supply from Liebert XDP/Liebert XDC	1/2" OD, Copper		
Refrigerant Return to Liebert XDP/Liebert XDC	7/8" OD, Copper		
Serviceable Parts	Fan and electrical components		
Exterior Finish – Bottom, Sides, Front and Rear	Black matte finish, heat-fused powder coat		
Exterior Finish - Top	Hot-dipped galvanized steel		
Agency			
Approvals	CSA 60 Hz		CE 50Hz

* Refer to **Figure 2** for full part number.

Table 8 Liebert XDO16 specifications

Models *	XDO16BK XDO16SK (60Hz)	XDO16BS XDO16SS (60Hz)	XDO16BS XDO16SS (50Hz)
Cooling Capacity	Nominal (85°F [29.4°C] EAT): 16kW / 4.5 Tons Maximum (90°F [32°C] EAT): 17.3 kW / 4.9 Tons		Nominal (85°F [29.4°C] EAT): 14kW/4.0 Tons Maximum (93°F [34°C] EAT): 17.3 kW / 4.9 Tons
Conditions	Capacity rating is @ 55°F (13°C) Entering Fluid Temperature and 50°F or lower dew point		
Electrical Requirements			
Input Voltage	1ph-60Hz-120V	1ph-60 Hz-220-240V	1ph-50 Hz-220-240V
Input Power Connections	Terminal blocks provided internal to module		
Full Load Amps	2.7A @ 120V	1.50 @ 230V	1.50 @ 230V
Wire Size Amps	3.4	2.0	2.0
Overcurrent Protection Device	15	15	15
Power consumption, nominal, watts	335	350	350
Dimensions, inches (mm)			
Length	72-1/4 (1835)		
Width	24-1/8 (613)		
Height	22-1/2 (572) not including electrical and piping access		
Weight, lb (kg)			
Module only	150 (68)		
Shipping weight	238 (108)	296 (134)	
Installed, with refrigerant, without options	155 (70)		
Number of Fans	1	1	1
Airflow, Nominal, ft³/ min (m³/ hr)	2700 (4587)	2250 (3822)	
Audible Noise	85 dBa sound power	83 dBa sound power	
Pipe Connections			
Refrigerant Supply from Liebert XDP/Liebert XDC	1/2" OD, Copper		
Refrigerant Return to Liebert XDP/Liebert XDC	7/8" OD, Copper		
Serviceable Parts	Fan and electrical components		
Exterior Finish – Bottom, Sides, Front and Rear	Black, matte finish, heat-fused powder coat		
Exterior Finish - Top	Hot-dipped galvanized steel		
Agency			
Approvals	CSA 60 Hz	CSA 60Hz	CE 50Hz

* Refer to **Figure 2** for full part number.

Table 9 Options for Liebert XDO20 and Liebert XDO16

Option	Liebert XDO - 60Hz Models	Liebert XDO - 50Hz Models
Lighting Fixtures (ship loose)	2 Liebert XDOs per lighting unit; 120V or 277V; 4' standard fluorescent tubes (not included)	
Power, optional lighting fixture	0.9A per 120V light fixture; 0.4A per 277V light fixture	None
Smart Module control board (factory-installed)	Dry contact 24VAC - 1A maximum	
Pre-Charged Refrigerant	R-134a Refrigerant, one-shot connections	

Table 10 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 inches (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 11 CANbus cable lengths and part numbers

Liebert Part #	Dimension A ft. (m)
300157G1	6 (1.8)
300157G2	10 (3)
300157G3	20 (6)
300157G4	30 (9.1)
300157G5	60 (18.3)
300157G6	90 (27.4)
300157G7	120 (36.6)
300157G8	150 (45.7)
300157G9	6.25 (1.9)
300157G10	3 (0.9)
300157G11	15 (4.6)
300157G13	40 (12.2)
300157G14	50 (15.2)
300157G15	70 (21.3)
300157G16	80 (24.4)
300157G17	100 (30.5)
300157G18	110 (33.5)

Notes

COMPLIANCE WITH EUROPEAN UNION DIRECTIVES



Fabbricante – Manufacturer – Hersteller – Fabricant – Fabricante
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Il Produttore dichiara che, se munito di marchio CE, il prodotto è conforme alle direttive dell'Unione europea:

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