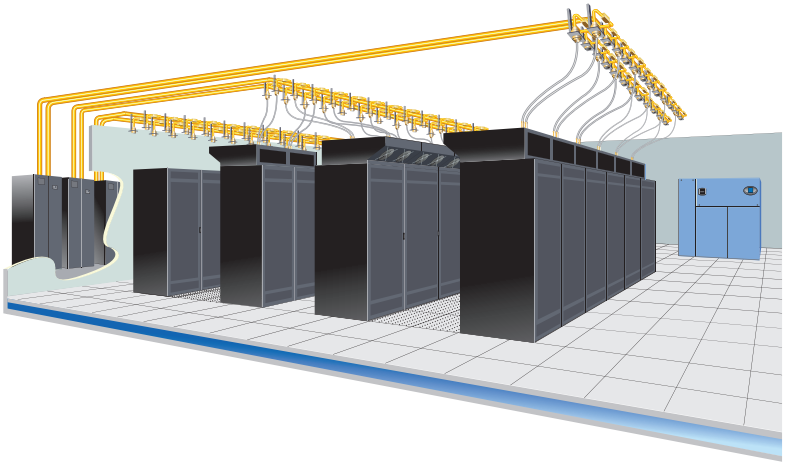
Precision Cooling
For *Business-Critical Continuity™*

Liebert XDV™

User Manual—50 & 60 Hz



EMERSON
Network Power

GENERAL 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 XD cooling unit's, read all instructions, verify that all the parts are included, and check the nameplate to be sure the XD cooling unit's voltage matches available utility power.

Follow all local codes.

WARNING

Risk of unit falling over when installed on top of cabinet. Can cause property damage, injury or death.

The XDV is top-heavy. Use extreme caution and care when moving and installing this unit.

WARNING

Risk of explosive discharge. Can cause equipment damage, injury or death.

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

This document must 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.

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 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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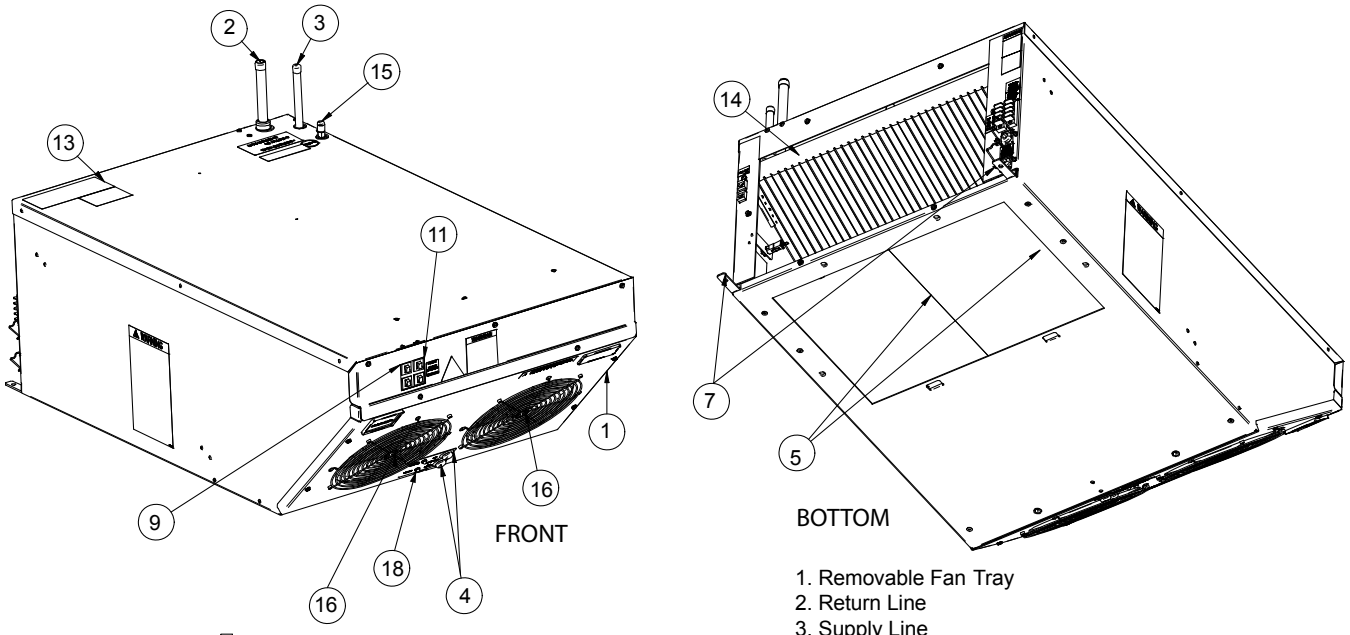
1.0 LIEBERT XDV COMPONENT LOCATIONS AND MODEL NUMBER NOMENCLATURE

Figure 1 Liebert XDV component locations



1. Removable Fan Tray
2. Return Line
3. Supply Line
4. Fan Switches
5. Removable Blocker Plates
6. Removable Rear Inlet Grille
7. Mounting Clips for Cabinets
8. Primary Power Inlet (CE-approved units have non-detachable power cord)
9. Primary Circuit Breaker
10. Secondary Power Inlet (CE-approved units have non-detachable power cord)
11. Secondary Circuit Breaker
12. Connections for Condensate Detection Option and Remote Shutdown
13. Serial Tag
14. Heat Exchanger
15. Schrader Valve
16. Fans
17. CANbus Ports - Liebert XDV Smart Modules
18. LEDs - Liebert XDV Smart Modules

Figure 2 Liebert XDV model number nomenclature

Example: XDV10BK– –*

XD — Liebert X-treme Heat Density System

V — Vertical Top Cooler

10 — 8 = Model Size; 10 = Model Size

B — B = Base unit; D = Condensate Detection (Discontinued April 2009); S = Smart Module

K — K = 120V-1ph-60Hz; S= 230V, 1ph-50Hz; T = 208-240V-1ph-60Hz, 220-240-1ph-50Hz

— — — = Hard Piped; P = Pre-Charged One-Shot Coupling; R = Removable Coupling

— — — = Domestic Packaging; E = Export Packaging

***** — Revision Level

2.0 INSTALLATION

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 XDV voltage matches the available utility power. The serial tag with this information is on the top of the unit, near the rear.
- 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 Network Power representative.

2.3 Packing List

- Installation manual (this document)
- Liebert XDV module
- Parts bag including
  - IEC 10 ft. (3m) power cords, 2 (60Hz only; power cords for 50Hz are attached)
  - 1/4 - 20 full thread 1" bolts, 4
  - 1/4 inch locking hex nuts, 2
  - mounting clips, 2

2.4 Installation Considerations

Each Liebert XDV module is to be securely mounted either on the top of a computer cabinet or rack or above the heat-producing equipment. Mounting the Liebert XDV above the rack requires Liebert's optional mounting kit.

The units are designed to be mounted without modification on Liebert Foundation™ cabinets. Mounting clips included with the Liebert XDV permit installation on other manufacturers' cabinets and racks. The clips also can be used with the Foundation for stronger attachment.

Determine whether the Liebert XDV includes either the condensate detection option (factory-installed—discontinued April 2009) or the smart module control board (factory-installed). Each of these options requires separate low-voltage connections to a monitoring unit.

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

Table 1 Application limits

Input Voltage		Range of Return Air Conditions to Unit	
Minimum	**Maximum**	**Dry Bulb Temp.**	**Relative Humidity**
-10%	+10%	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 XDV cooling system is designed to be attached to the top of a computer cabinet or rack containing heat-dissipating equipment. Two fans draw hot air exhausted from the equipment or from the hot aisle, pass it through a cooling coil and discharge cool air back down to the cold aisle, where the equipment's air intake is located.

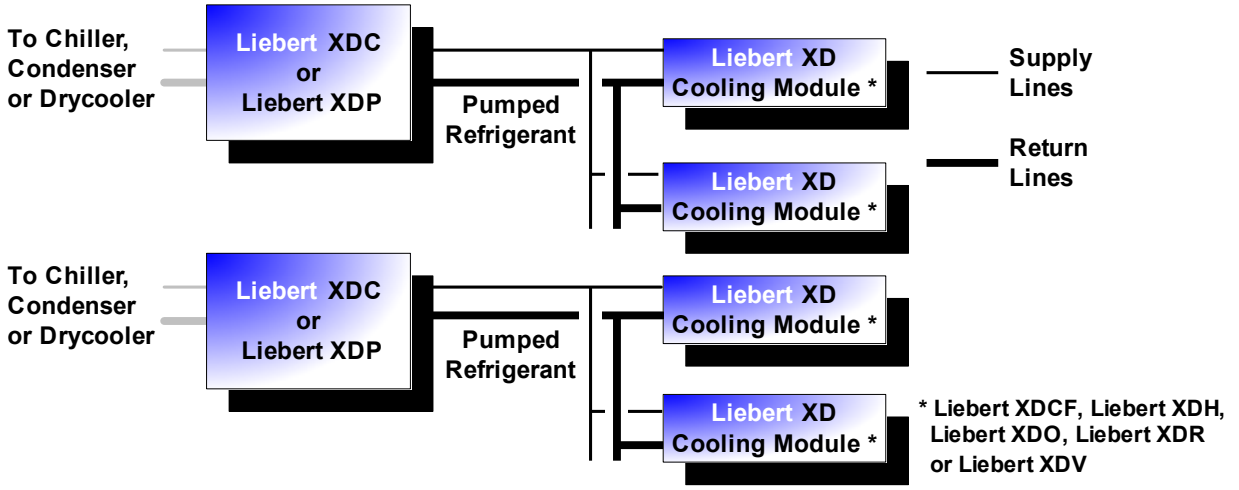
The Liebert XDV comes from the factory ready to draw heated air through a perforated grille on the back of the unit. The Liebert XDV is easily modified to draw hot air through the bottom of the unit, should that cooling method be better suited to your application.

A condensate detection option gives notification if any condensation occurs in the Liebert XDV (option discontinued in April 2009).

Liebert XDV smart modules allow remote shutdown, fan failure alarms and automatically switching the second fan On and Off. This saves energy by permitting the unit to run with one fan and switching on a second fan when the temperature requires both fans for cooling.

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

Figure 3 Generic piping layout



3.2 Checking and Unpacking

Upon arrival of the unit and before unpacking, 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 XDV is shipped in a protective carton and secured to a pallet (see **Figures 5** and **6**). Do not remove these protective items from the Liebert XDV before it is at the installation location. When unpacking and handling the Liebert XDV, exercise extra care to prevent damage.

CAUTION

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

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

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

3.2.1 Recyclable Packaging

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

WARNING

Risk of 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 unit for installation.

CAUTION

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

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

NOTICE

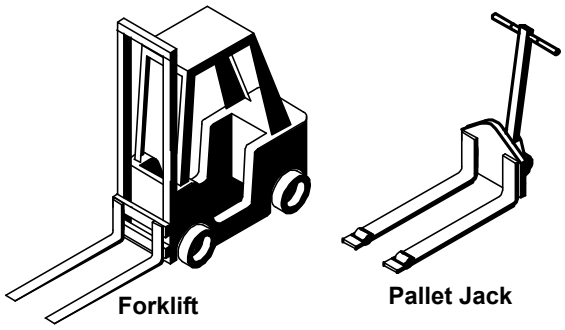
Risk of unit damage if improperly stored. Keep the unit indoors and protected from dampness, freezing temperatures and contact damage.

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 skid.

Figure 4 Recommended unit handling equipment



3.2.2 Unit Handling

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

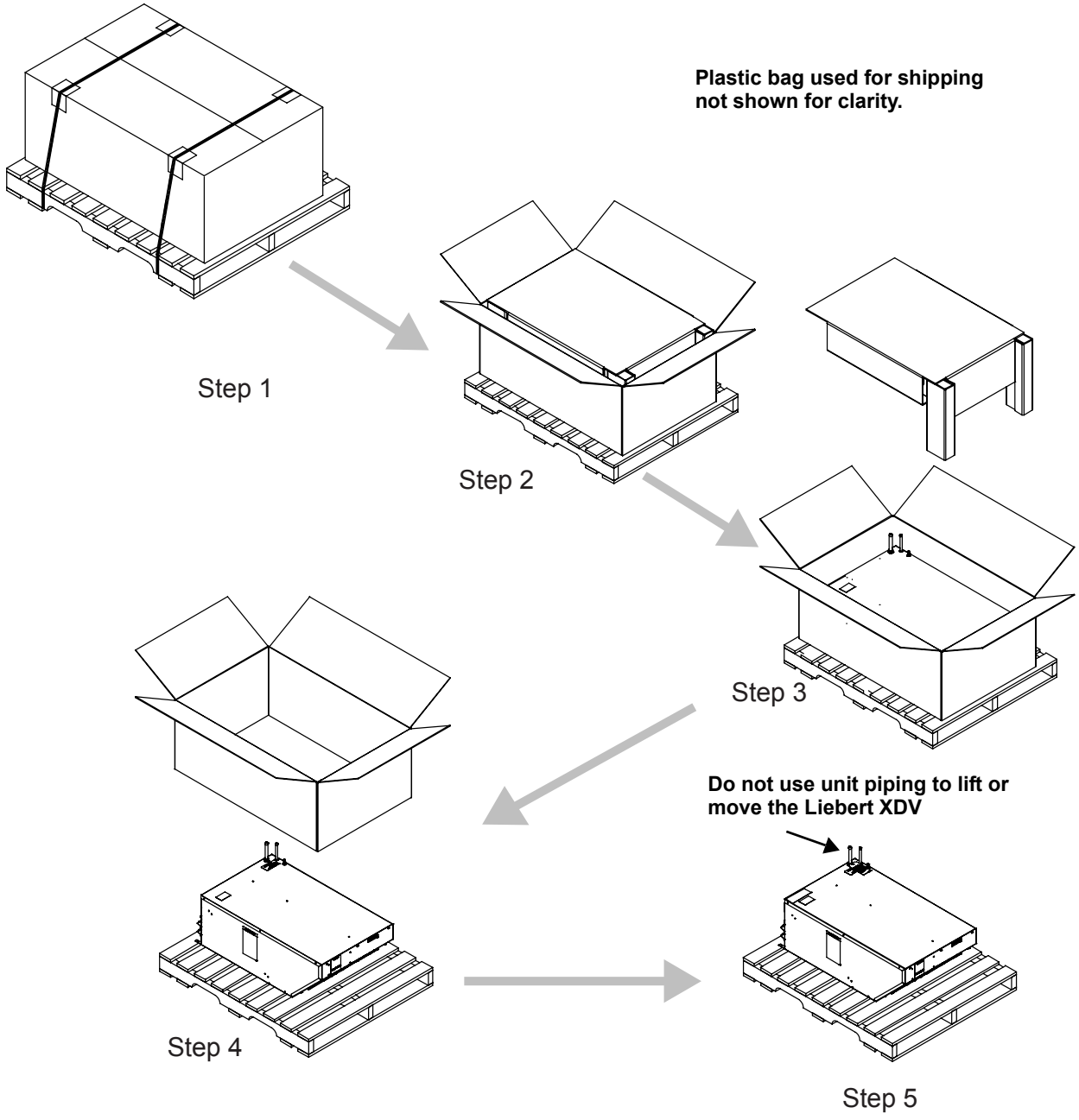
- If using a forklift or pallet jack, ensure that the fork tine length is suitable to safely move the packaged unit.
- Emerson recommends that the unit remain in the protective packaging until it has been moved to the installation site.
- When handling and unpacking the unit, exercise great care to prevent damage.
- Do not use unit piping to lift or move the Liebert XDV

3.2.3 Unpacking the Unit

Domestic Packaging

1. Remove outer packaging when ready to install the Liebert XDV.
2. Keep the Liebert XDV covered by the unit bag until removal from pallet.

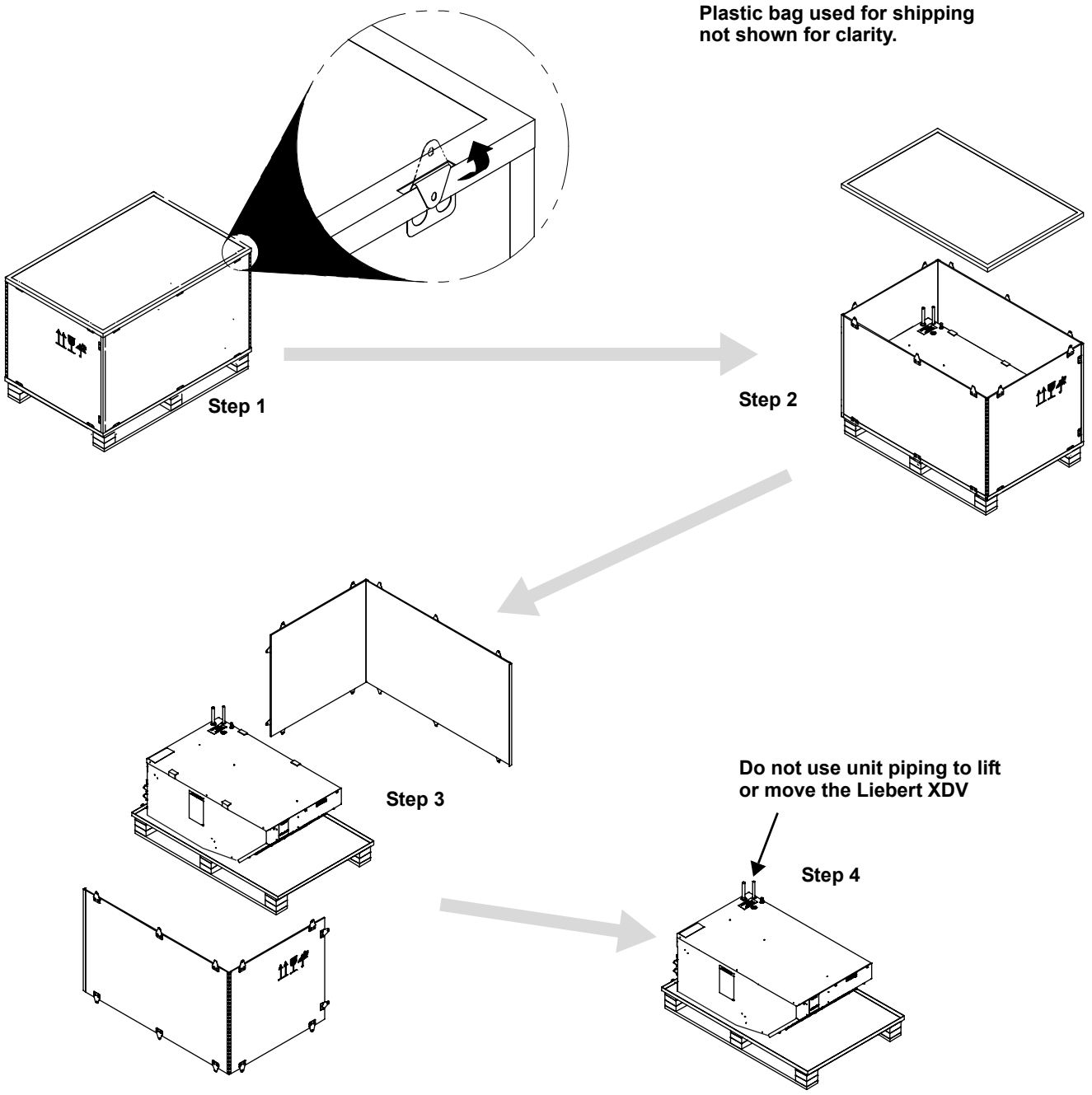
Figure 5 Removing domestic shipping package



Export Packaging

1. Unbend all metal tabs as indicated in **Step 1** in **Figure 6**.
2. Remove outer packaging when ready to install the Liebert XDV.
3. Keep the Liebert XDV covered by the unit bag until removal from pallet.
4. Do not use unit piping to lift or move the Liebert XDV.

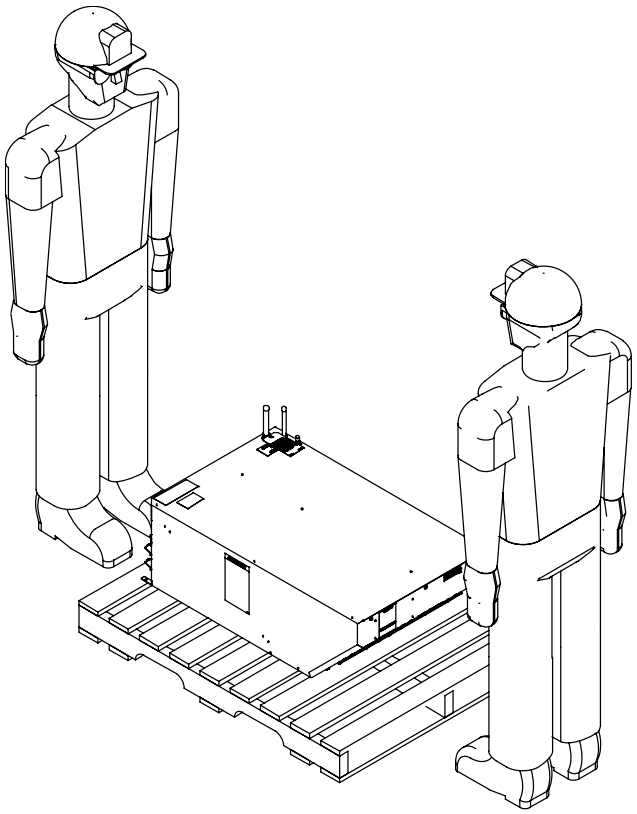
Figure 6 Removing export shipping package



Removing the Liebert XDV from the Pallet

1. Unfold the unit bag to expose the Liebert XDV.
2. Verify the nameplate information found on the Liebert XDV against the bill of lading. If the information does not match the product specified, contact your local Emerson sales representative.
3. At least two properly trained and qualified personnel may lift the Liebert XDV off the pallet and onto a flat surface.
4. To protect the Liebert XDV's paint, lay non-abrasive material, longer and wider than the unit, on the flat surface before moving the Liebert XDV.

Figure 7 Removing Liebert XDV from shipping pallet



Removing the Liebert XDV from its shipping pallet requires two people.

4.0 MECHANICAL CONSIDERATIONS

4.1 Liebert XDV Dimensions

Figure 8 Liebert XDV dimensions

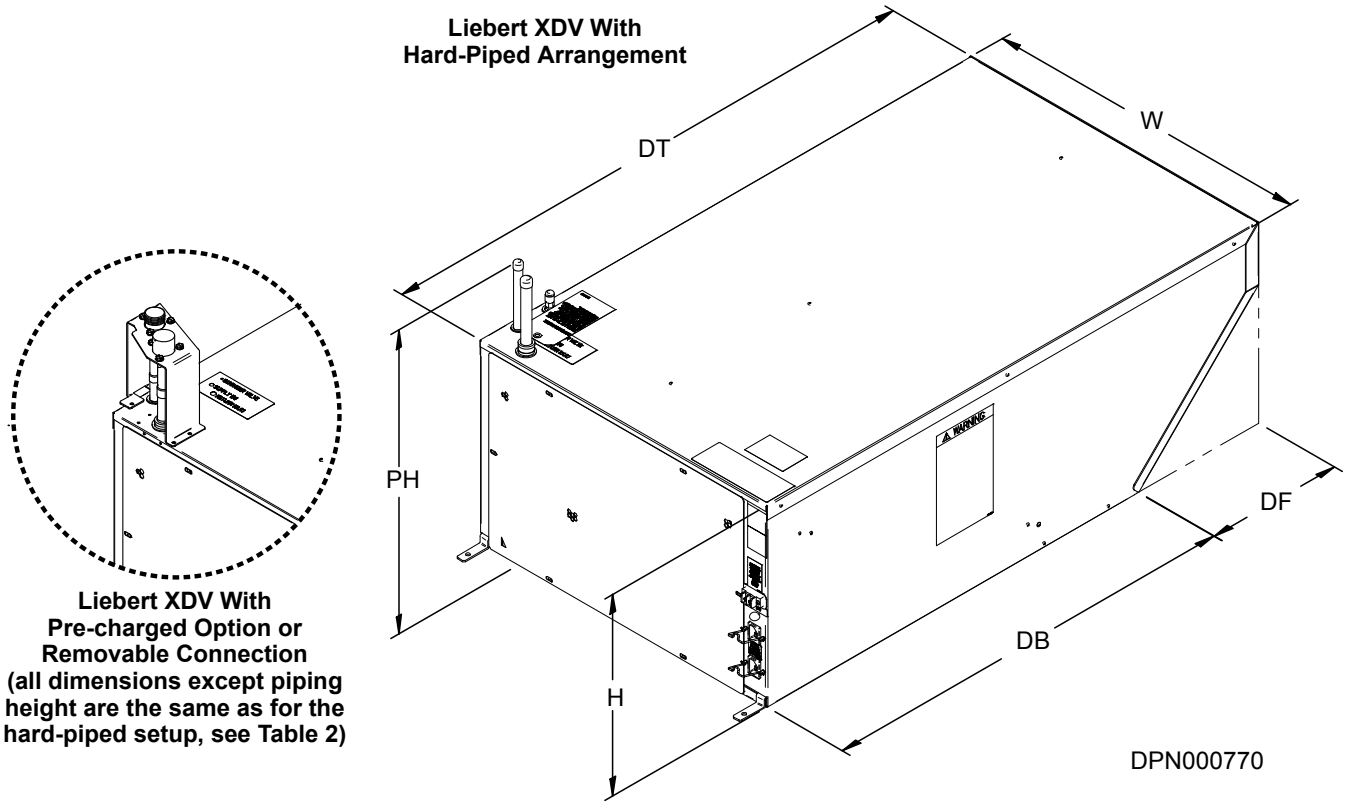


Table 2 Dimensional data

Illustration Key	Dimension	Measurement, in. (mm)
DT	Depth Top	39-1/2 (1003)
DB	Depth Bottom	29-5/8 (752)
W	Width	22-7/8 (581)
H	Height	14 (356)
PH	Piping Height, hard-piped	18-5/8 (473)
	Piping Height, one-shot option or removable connection	19-5/8 (498)
DF	Depth Front	9-7/8 (250)

4.2 Determining Placement in the Conditioned Space

Refer to site-specific drawings for exact spacing. Liebert XDVs should be placed above or on top of the cabinets that generate the greatest amount of heat. If heat loads are dispersed evenly throughout the room, the Liebert XDV modules may be spread out accordingly. Refer to site-specific drawings for exact spacing.

The Liebert XDV is engineered to fit atop computer enclosure cabinets. **Figure 8**, below, illustrates the unit's dimensions and the location of pipes, the fan tray and power connections. (An optional kit is available to permit suspending the Liebert XDV from either field-supplied unistruts or from the overhead structure; see **5.2 - Suspended Mounting Method**).

4.3 Changing the Air Intake Location

The Liebert XDV comes from the factory with the air intake on the rear of the unit. If required for your application, this can be changed so that the Liebert XDV takes in heated air from the bottom. This is done more easily and safely before the unit is mounted on a computer cabinet.

WARNING

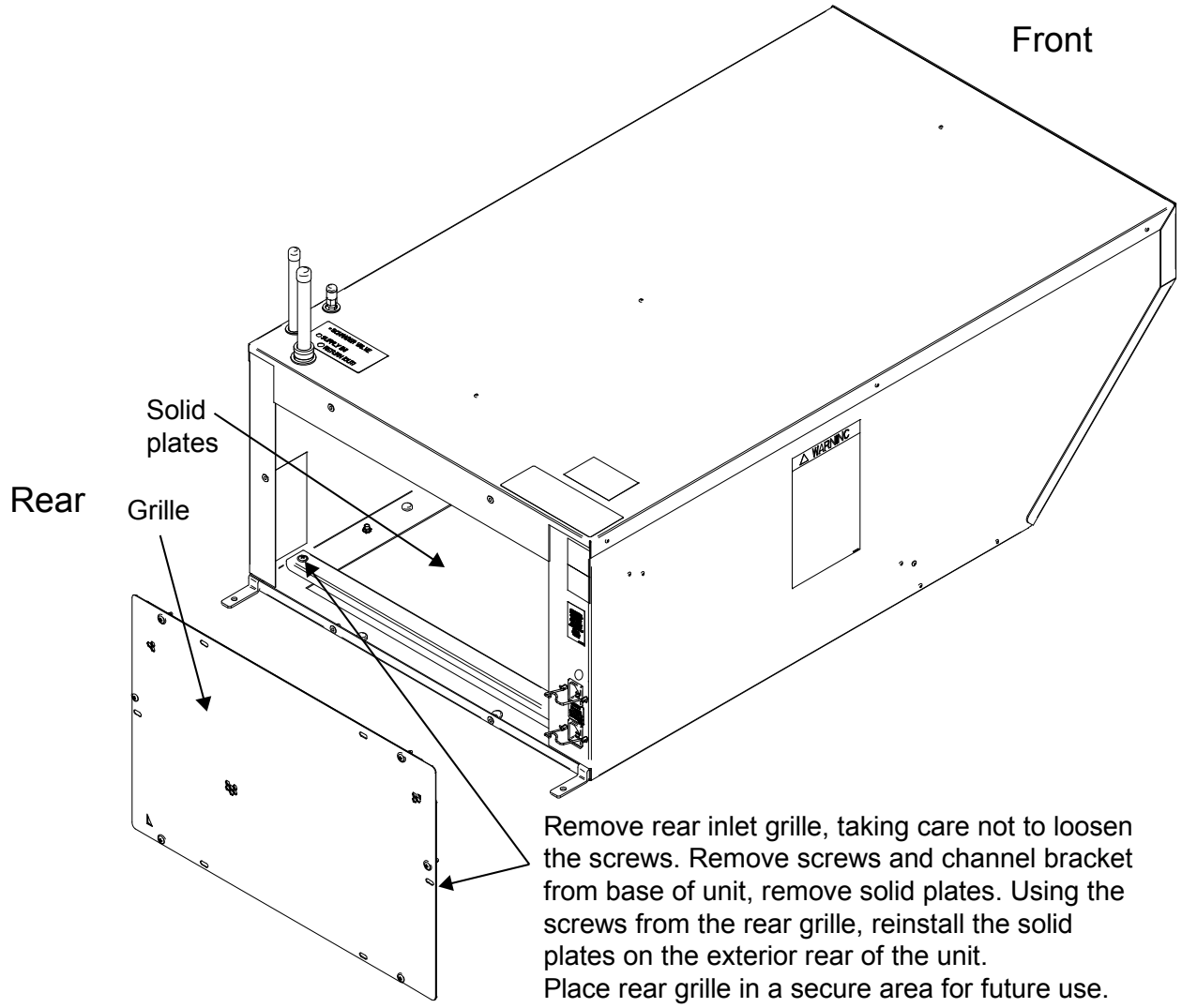
Risk of high-speed moving parts. Can cause injury or death.

Before opening the Liebert XDV, shut the unit off and disconnect all electrical power. Wait for the Liebert XDV's fans to stop rotating before beginning to open the unit.

To change the air intake:

1. Loosen the six screws holding the grille on the rear of the Liebert XDV (see **Figure 9**).
2. Remove the grille and lay it aside for use later.
3. Remove the channel bracket holding the two solid metal plates to the bottom of the Liebert XDV. It is secured with two screws, one on either end.
4. Lift the two solid plates out of the bottom of the Liebert XDV.
5. Optional—replace the channel bracket, securing it with the two screws removed in **Step 3**.
6. Lay the perforated grille down with the screws pointing up
7. Lay the two solid plates on the grille with the screws through the matching holes of the plates.
8. Hold the grille and plates together and attach the assembly to the rear of the Liebert XDV with the screws.

Figure 9 Changing the Liebert XDV's air intake location



5.0 INSTALLING THE UNIT

The Liebert XDV module must be securely attached to the top of the computer cabinet or, alternatively, suspended above the cabinet. For mounting atop the computer cabinet, see **5.1 - Mounting the Liebert XDV on Top of the Cabinet**; to hang the Liebert XDV above the computer cabinet, refer to **5.2 - Suspended Mounting Method**. Be sure to follow all applicable codes.

WARNING

Risk of top-heavy cabinet falling. Can cause equipment damage, injury or death.

A lightly loaded cabinet may become top-heavy after a Liebert XDV is mounted on it, causing the cabinet to tip over.

Before beginning to place the Liebert XDV on the cabinet, ascertain whether the cabinet or rack requires additional stabilization; secure the cabinet to the floor if necessary to prevent tip-over.

Always use at least two persons to mount the Liebert XDV on top of a cabinet.

5.1 Mounting the Liebert XDV on Top of the Cabinet

The Liebert XDV may be installed on a computer cabinet by securing it with either the two included bolts, the two included clips or both the bolts and clips.

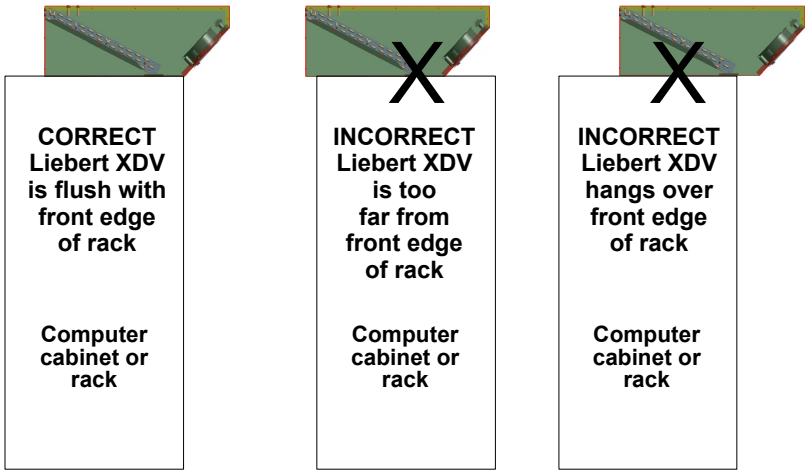
The Liebert XDV has mounting holes below the fans that match holes in the Liebert Foundation computer system cabinet. Other cabinets may require that holes be drilled to accommodate the bolts or the clips.

5.1.1 Bolting Liebert XDV to Top of Cabinet

To mount the Liebert XDV:

1. With at least one additional person, lift the Liebert XDV and set it down on top of the cabinet. The front edge of the Liebert XDV should be even with the front edge of the cabinet. See **Figure 10**.

Figure 10 Positioning the Liebert XDV



2. **If your cabinet has mounting holes matching those on the Liebert XDV**, align the Liebert XDV properly and insert the bolts from the bottom of the cabinet and secure them to the factory-installed cage nuts (see **Figure 11**). Tighten the bolts.

   If your cabinet's mounting holes do not match those on the Liebert XDV, drill holes as required. To prevent metal shavings and particles from falling into the equipment in the cabinet or into the Liebert XDV, use a vacuum or other method to collect them while drilling the holes.
3. After drilling the holes, insert bolts from the bottom of the cabinet and secure them to the factory-installed cage nuts (see **Figure 11**).
4. Tighten the bolts.

   If also using mounting clips in conjunction with bolting method above, see **5.1.2 - Using Supplied Clips for Mounting**.

Figure 11 Mounting hole locations—standard mounting method

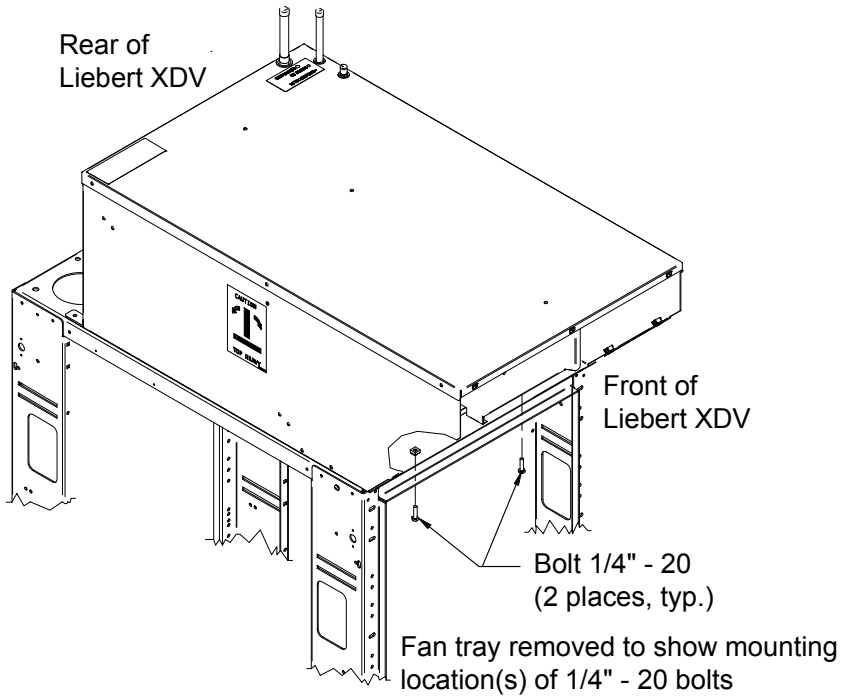
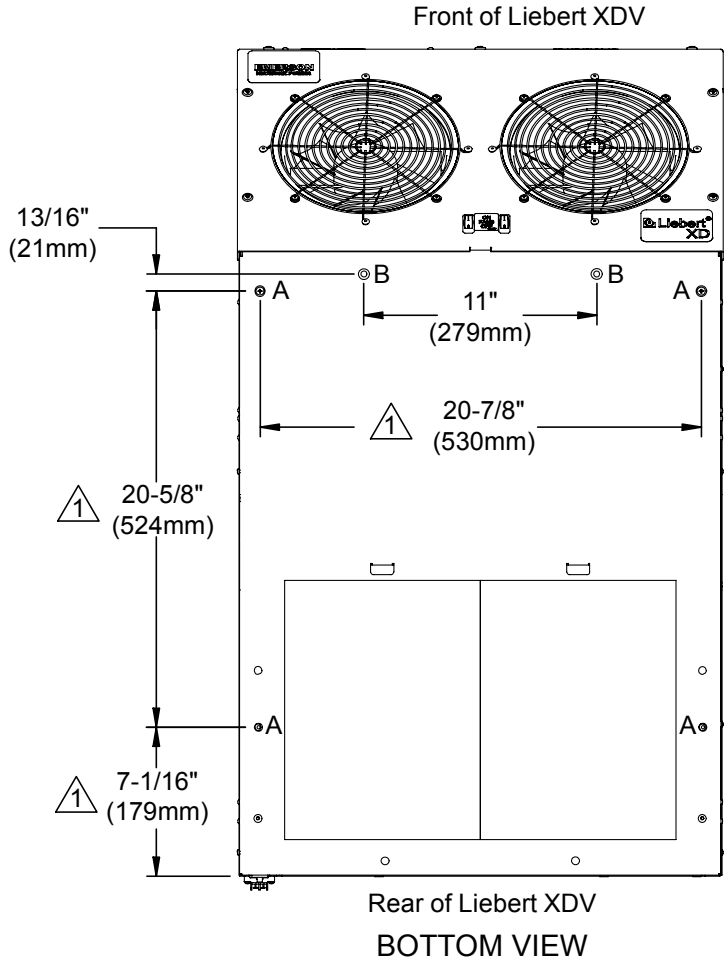


Figure 12 Mounting hole locations—alternate mounting points



Notes

1. These dimensions may be used when attaching a Liebert XDV to a non-Liebert cabinet.
2. Drill clearance holes as indicated:
   "A" #10-32 screw--0.22" (5mm) diameter
   "B" 1/4 - 20 bolt--0.28" (7mm) diameter.
3. Field to supply #10/32 screws, quantity of 4.
   Factory to supply 1/4 - 20 bolts.
4. Base pan of a standard Liebert XDV and Liebert XDV with control board is the same.

Type of Cabinet	Mounting Holes
Liebert Foundation	B
Knurr Miracel Cabinet	A, B
Non-Liebert Cabinet	A or B

DPN000770

5.1.2 Using Supplied Clips for Mounting

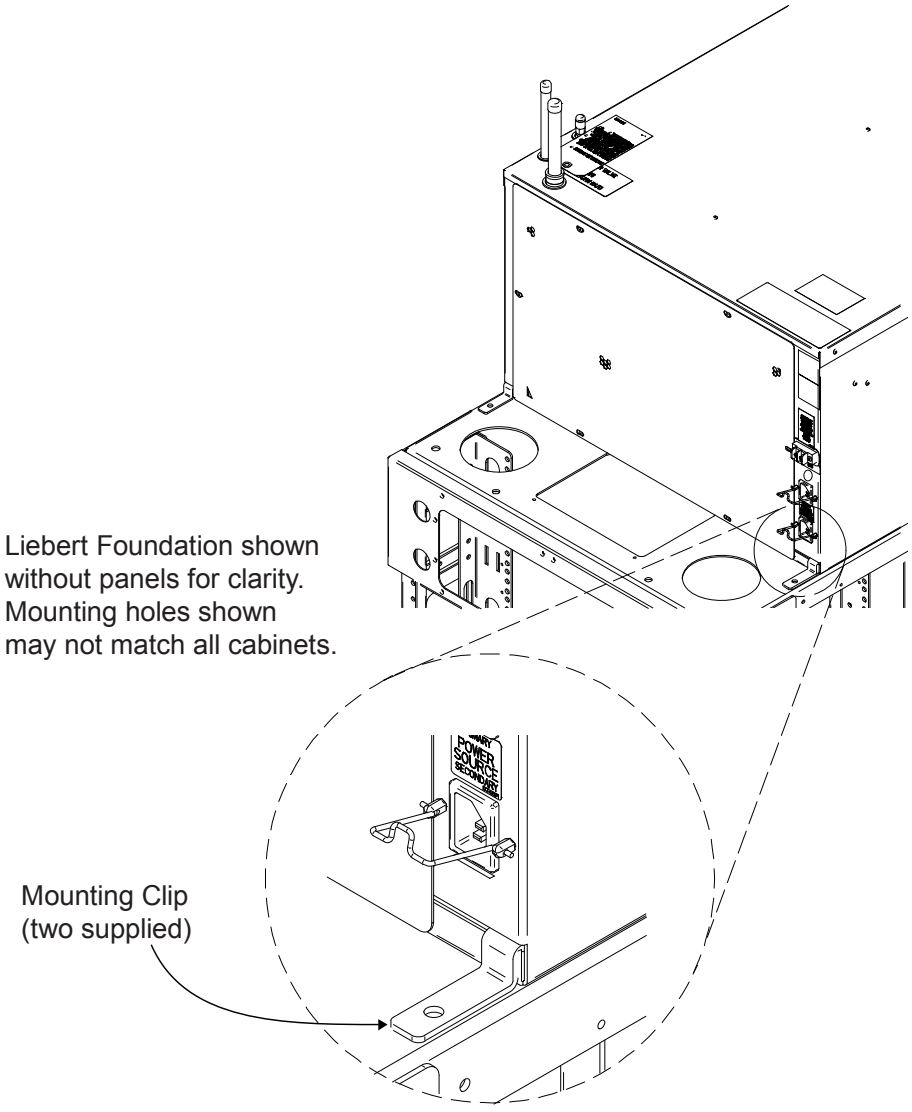
1. Attach the mounting clips to the back of the Liebert XDV by fitting them into the machined slots. Tighten the bolts.
2. **If your cabinet has mounting holes in position for the clips**, align the Liebert XDV properly and insert the bolts from the bottom of the cabinet and secure them with the included lock washers and nuts (see **Figure 13**). Tighten the nuts.

   If your cabinet's mounting holes do not match the clips, drill holes as required. To prevent metal shavings and particles from falling into the equipment in the cabinet or into the Liebert XDV, use a vacuum or other method to collect them while drilling the holes.

   After drilling the holes, insert bolts from the bottom of the cabinet and secure them with lock washers and nuts (see **Figure 13**). Tighten the nuts and bolts.

   If also using mounting clips in conjunction with bolting method above, see **5.1.1 - Bolting Liebert XDV to Top of Cabinet**.

Figure 13 Mounting clip placement



5.2 Suspended Mounting Method

The Liebert XDV also may be mounted above the cabinet by suspending it either from overhead components or from field-supplied unistruts above the cabinets (see **Figures 15** and **16**). An optional kit available from Emerson will simplify mounting the Liebert XDV above the computer cabinet.

Each suspended-mounting method requires that the supporting components be strong enough to support the Liebert XDV's weight with coolant, 79 lb. (36kg). Each method also requires that the Liebert XDV's placement above the computer cabinet meets the criteria in **Figure 10**.

To ensure efficient cooling, a baffle or similar object must be installed between the suspended Liebert XDV and the computer cabinet (see **Figure 16**). The baffle's purpose is to prevent the Liebert XDV from drawing in the cooled air that it has just discharged.

Figure 14 Dimensions—optional external hanging brackets

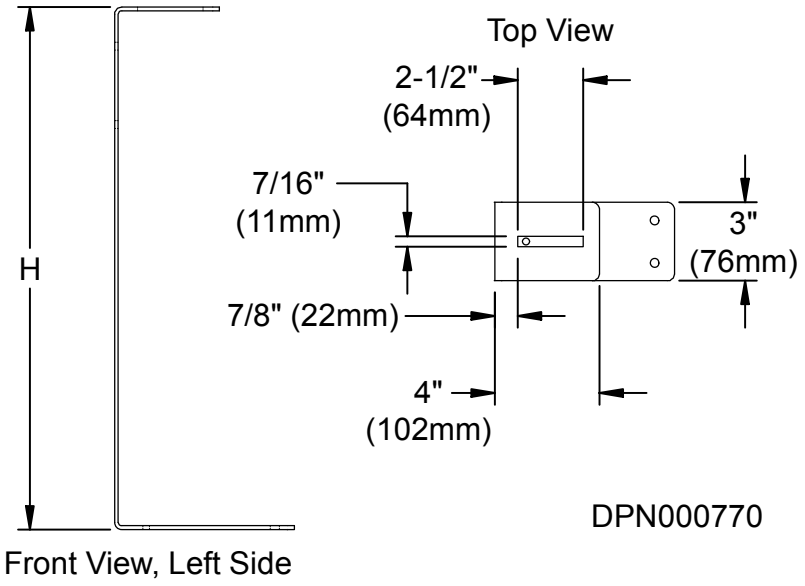


Table 3 Suspension hardware and bracket dimensional data

Bracket Kit Part #	Dimension H in (mm)	Liebert XDV Units to be Suspended	Brackets in Kit
180427G1	20 (508)	1	4
180427G5		5	20
180427G11	34-5/16 (872)	1	4
180427G15		5	20
180427G22*	18-11/16 (474)	2	8
	33 (838)		

* Bracket kit for double-stacked Liebert XDVs

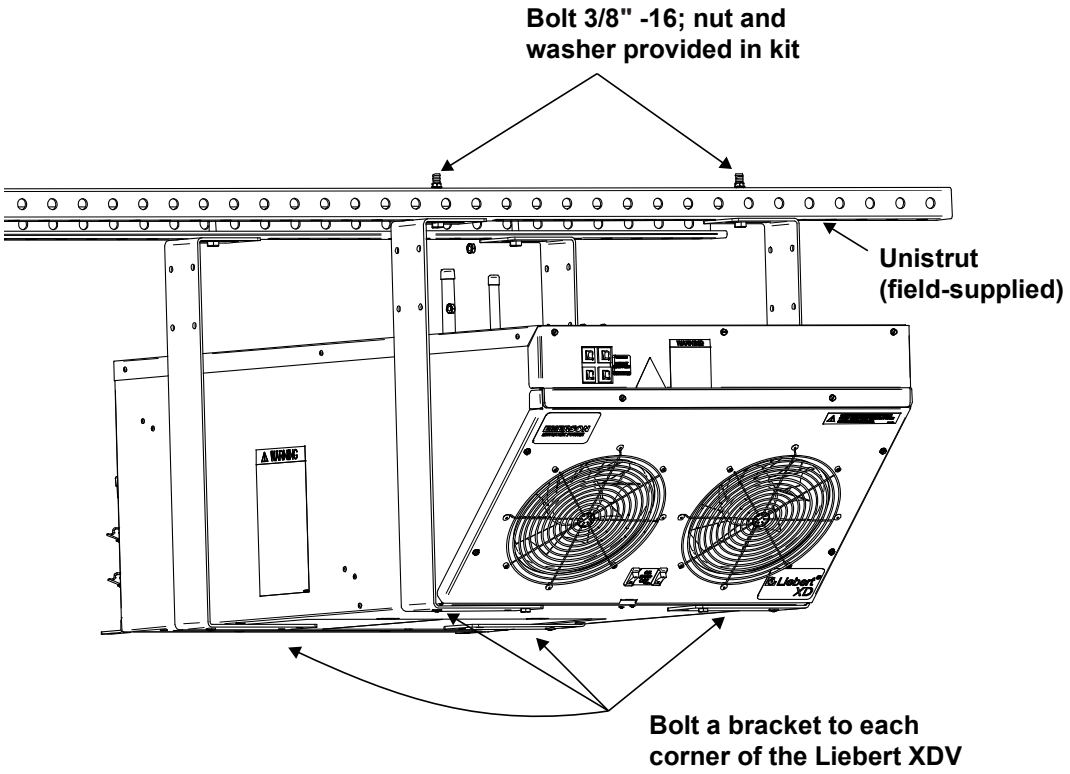
5.2.1 Suspending the Liebert XDV from Unistruts

The Liebert XDV may be bolted to customer-supplied unistruts. The height of the unistruts above the computer cabinet must be adequate to accommodate the combined height of the Liebert XDV and the baffle.

To suspend the Liebert XDV from a unistrut system:

1. Bolt the hangers to each corner of the Liebert XDV, inserting the Liebert-supplied bolts into factory-fabricated holes in the bottom of the Liebert XDV. See **Figure 15**.
2. Tighten all bolts firmly, taking care not to overtighten the bolts.
3. Using a lifting mechanism, raise the Liebert XDV, with brackets attached, to the proper height and bolt the brackets to the unistruts.

Figure 15 Suspending Liebert XDV from unistruts

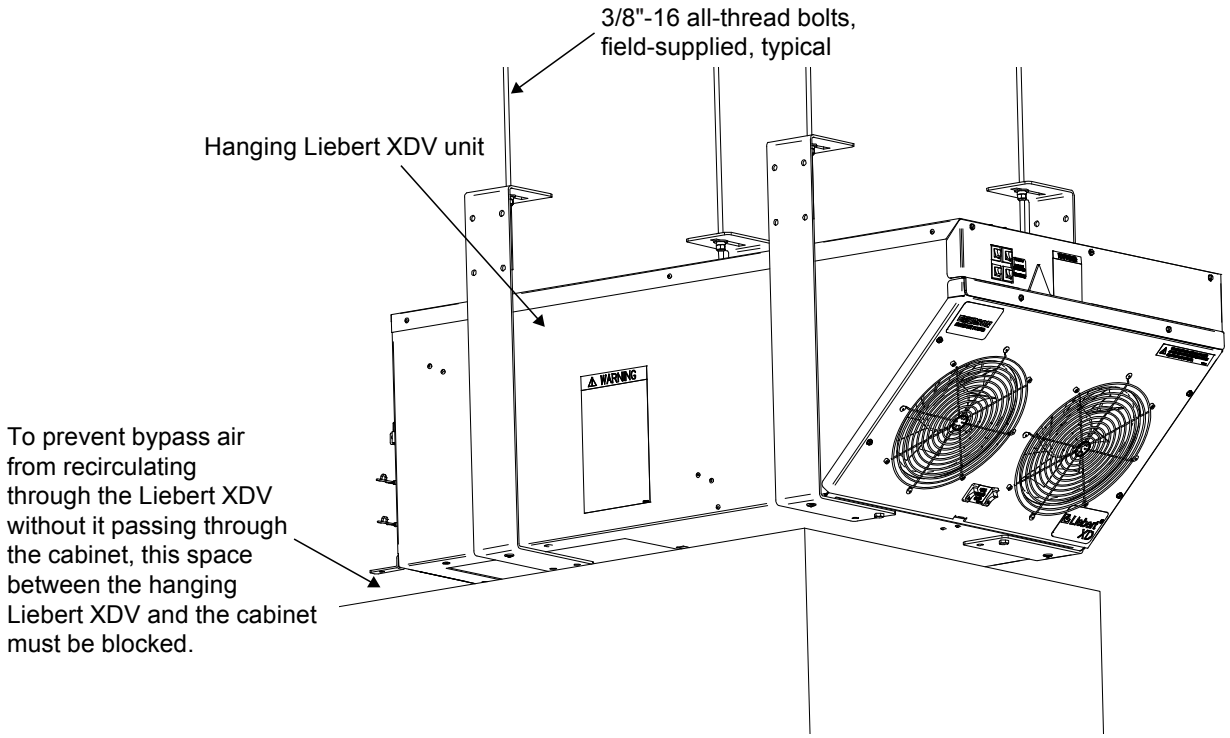


5.2.2 Suspending the Liebert XDV from Overhead Structures

To suspend the Liebert XDV from the overhead structure using the optional overhead mounting kit and field-supplied all-thread bolts:

1. Bolt the hangers to each corner of the Liebert XDV, inserting the Liebert-supplied bolts into factory-fabricated holes in the bottom of the Liebert XDV.
2. Tighten all bolts firmly, taking care not to overtighten the bolts.
3. Install the field-supplied all-thread bolts into the overhead structure, securing them to components so they will match the layout of the brackets
4. Using a lifting mechanism, raise the Liebert XDV inserting the all-thread bolts through the bolt holes in the brackets
5. Install field-supplied nuts and washers, on the all-thread bolts, placing them on the bolts at the level desired for hanging the Liebert XDV.
6. Again using field-supplied nuts and washers, secure the Liebert XDV to the all-thread bolts.
7. Tighten the nuts until the Liebert XDV is level and well-secured.

Figure 16 Suspending Liebert XDV from the overhead structure



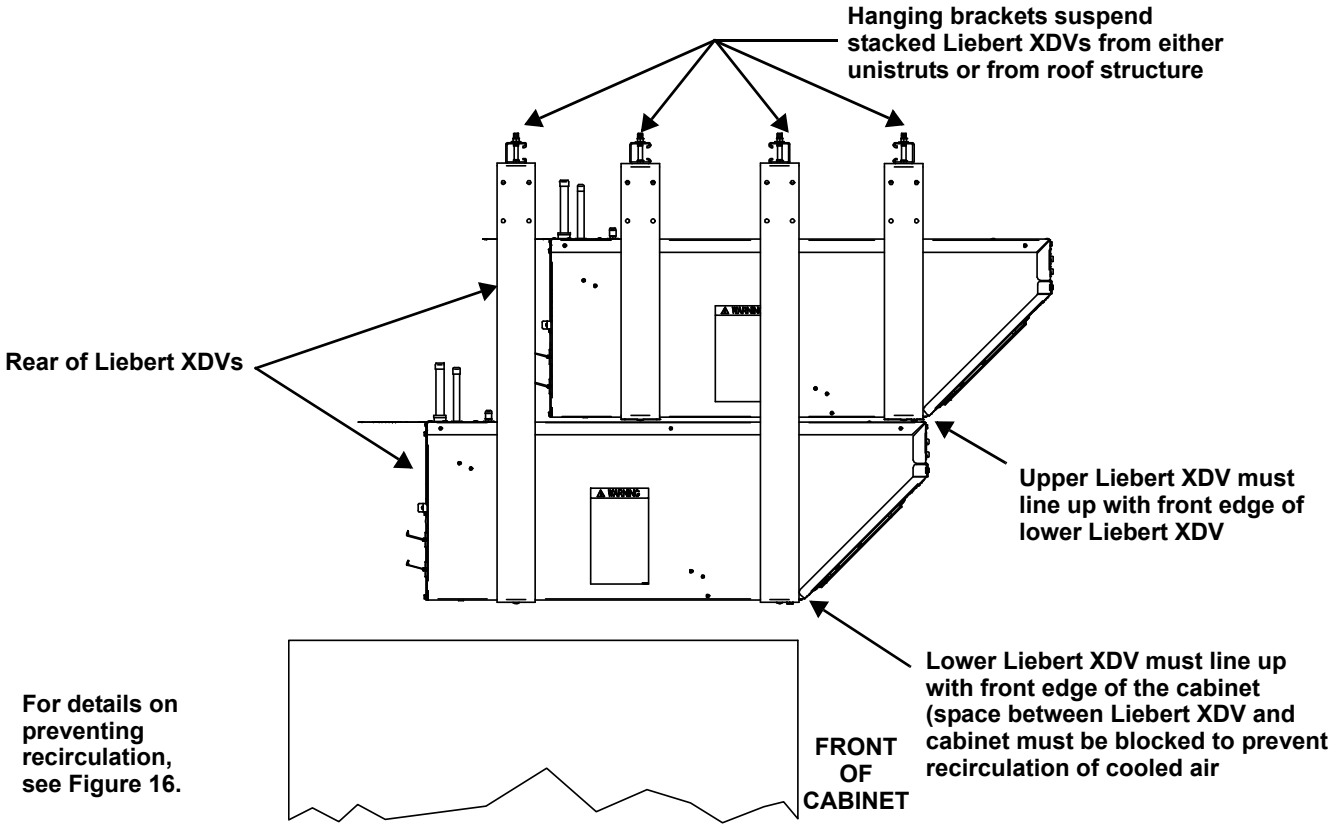
5.3 Mounting Liebert XDVs in Stacked Setup

Liebert designed the Liebert XDV to permit mounting the units in a stacked arrangement to increase the system's heat-removal. Stacking may be done either during the original system or added later to an existing configuration.

Stacking Liebert XDVs is possible when suspending units from either unistruts or from the overhead structure. Hanger brackets are available in two lengths to ease hanging Liebert XDVs in a stacked arrangement.

The upper Liebert XDV must be positioned forward of the front of its companion Liebert XDV for efficient heat removal (see **Figure 17**).

Figure 17 Stacking configuration offset



5.3.1 Hanging Stacked Liebert XDVs from Unistruts

Because the upper Liebert XDV in a stacked arrangement must be positioned farther forward than the lower Liebert XDV, two sets of field-supplied unistruts are required. The second set of unistruts must be installed 9-7/8 inches (251mm) forward of the first set. This arrangement positions the stacked Liebert XDVs so that they meet the air-intake criteria shown in **Figure 10** and **Figure 17**.

After installing the unistruts at the proper location, hang the Liebert XDVs as outlined in **5.2.1 - Suspending the Liebert XDV from Unistruts**.

Figure 18 Attach hanger brackets to Liebert XDV for stacked arrangement

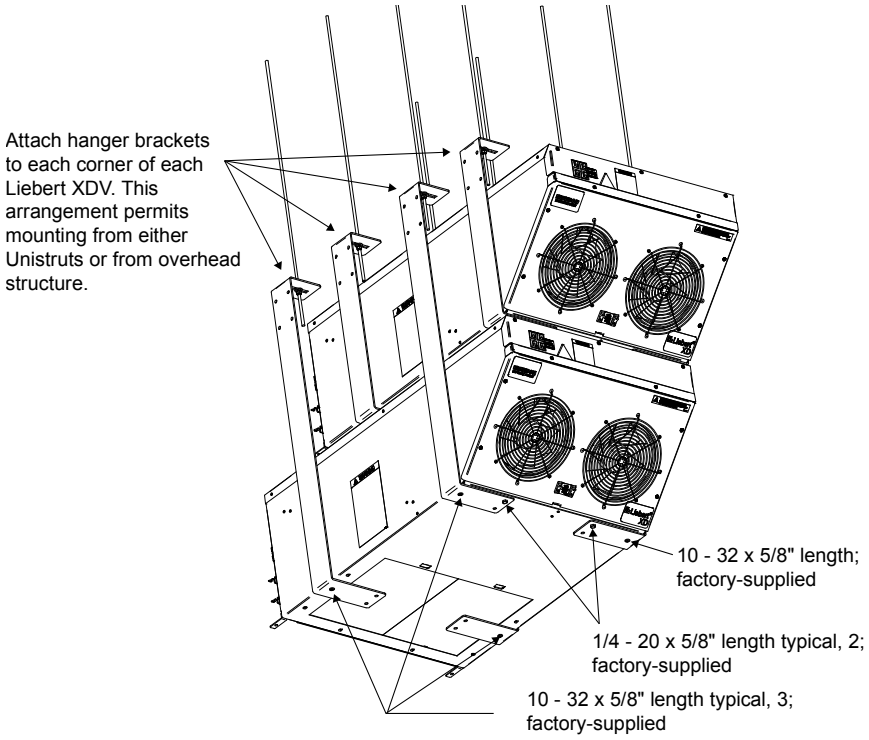
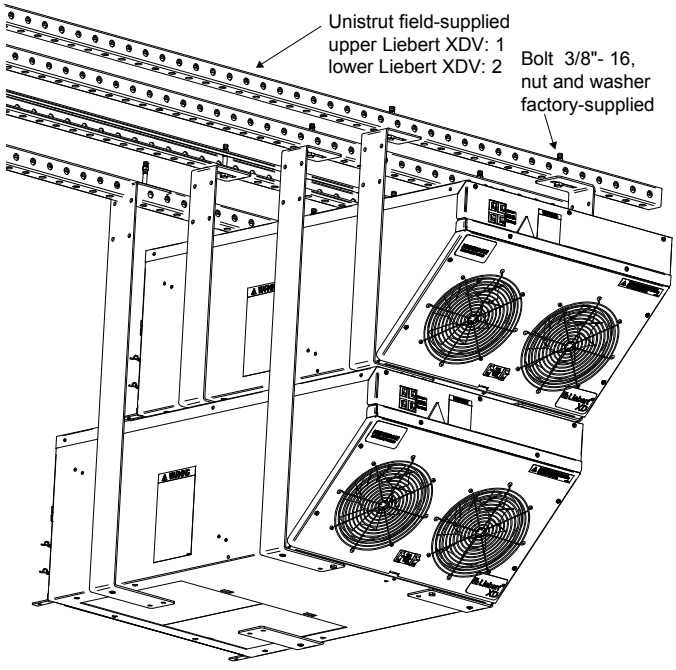


Figure 19 Stacked Liebert XDVs suspended from unistruts

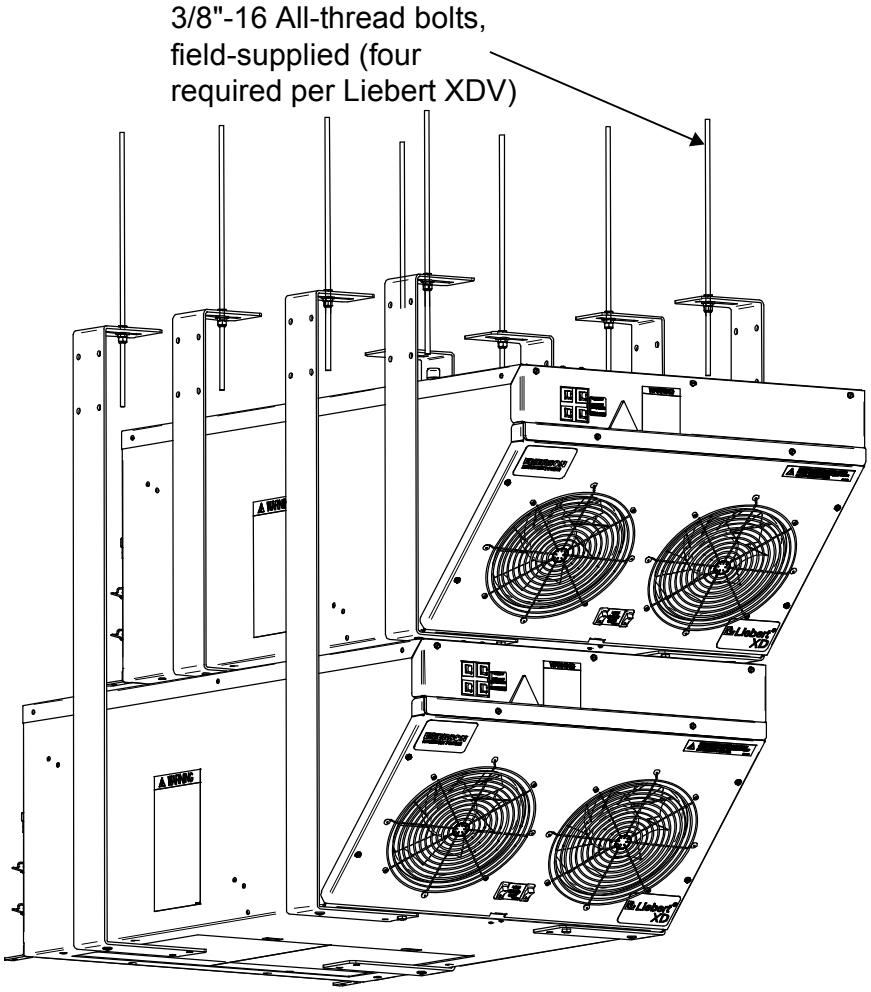


5.3.2 Hanging Stacked Liebert XDVs from the Overhead Structure

Because the upper Liebert XDV in a stacked arrangement must be positioned farther forward than the lower Liebert XDV, the place where the hangers attach to the overhead structure must be offset accordingly. The second row of attachment locations must be 9-7/8 inches (251mm) forward of the first row of hanger mounting locations. This arrangement positions the stacked Liebert XDVs so that they meet the air-intake criteria shown in **Figures 10** and **17**.

After determining the proper for attachment to the overhead structure, hang the Liebert XDVs as outlined in **5.2.2 - Suspending the Liebert XDV from Overhead Structures**.

Figure 20 Stacked Liebert XDVs ready for suspension from overhead structure



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 XDV.

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, 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 XDV modules to Liebert XDPs or Liebert XDCs in an interlaced configuration (see **Figure 21**). In an interlaced configuration, half the cooling units 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 XDV units operating and maintain even cooling in the conditioned space should one of the Liebert XDP or Liebert XDC units fail.

However, in a system with just one Liebert XDP or Liebert XDC, connect Liebert XDV modules in a non-interlaced configuration (see **Figure 22**).

Figure 21 Typical Liebert XDV piping—interlaced connections

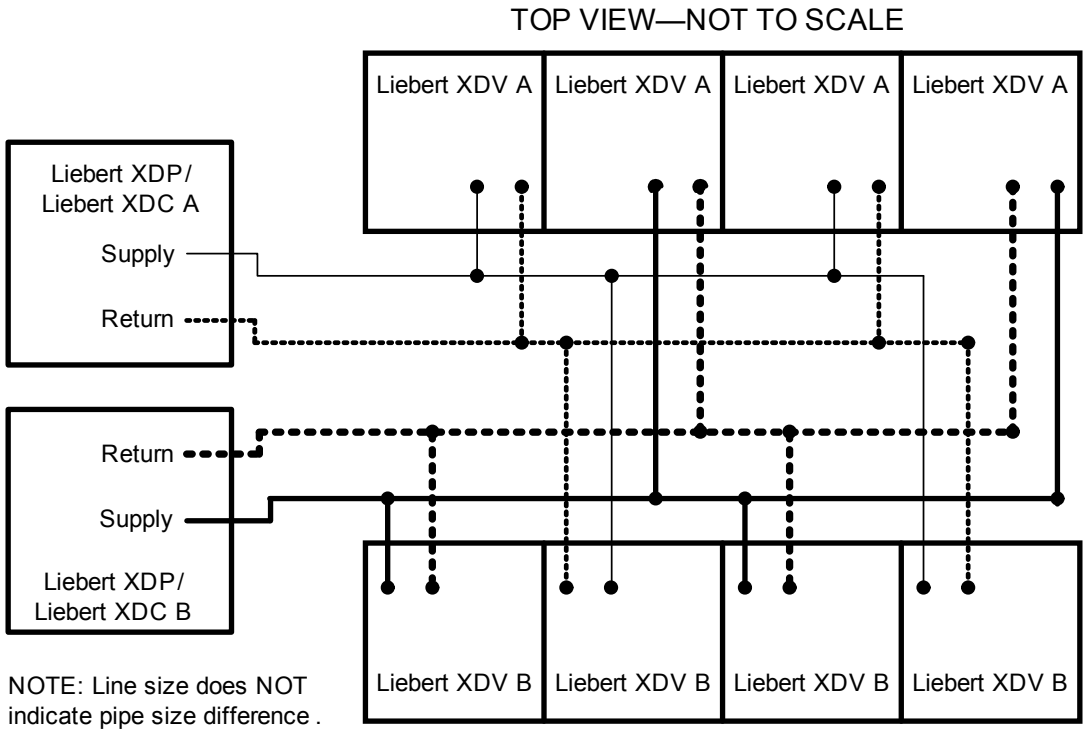
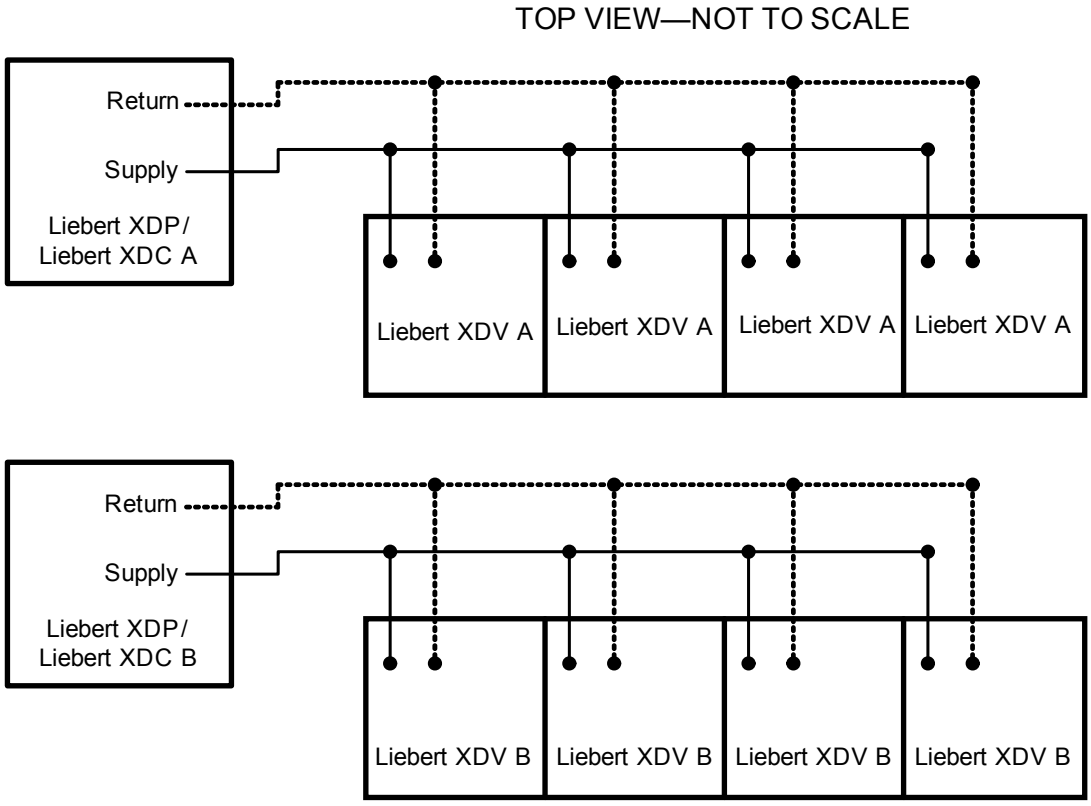


Figure 22 Typical Liebert XDV piping—non-interlaced connection



6.3 Connection Methods and Points

Refer to site specific drawings for general locations of the piping connections. For Liebert XDV connection locations, refer to **Figures 1** and **23**.

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 “L” copper pipe.

For hard-piped Liebert XDVs, the supply piping connection is 1/2" OD copper pipe, and the return piping connection is 5/8" OD copper. The hard-piped Liebert XDV has a low-pressure nitrogen holding charge.

For Liebert XDVs with the pre-charged option, both supply and return fittings are one-shot connections. These fittings contain pressurized R-134a refrigerant inside the Liebert XDV. The Liebert XD Flex Pipe with one-shot connections also contains pressurized R-134A refrigerant.

For Liebert XDVs with removable connections, the supply piping connection is 1/2" OD and the return piping connection is 5/8" OD. Both the Liebert XDV and the Liebert XD Flex Pipe with removable connections have a low pressure nitrogen holding charge.

6.4 Hard Piped Connection Sizes

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

6.4.1 Venting the Holding Charge for Hard-Piped and Removable Liebert XD Flex Pipe Connections

The Liebert XDV 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.

To vent the holding charge:

1. Find the Schrader valve that contains the nitrogen holding charge in the Liebert XDV (see **Figure 23** for hard-piped and see **Figure 29** for removable connections).
2. Vent the holding charge by depressing the pin in the valve.
3. Replace and secure the cap on the Schrader valve.

Figure 23 Piping location and connection sizes—hard-piped units

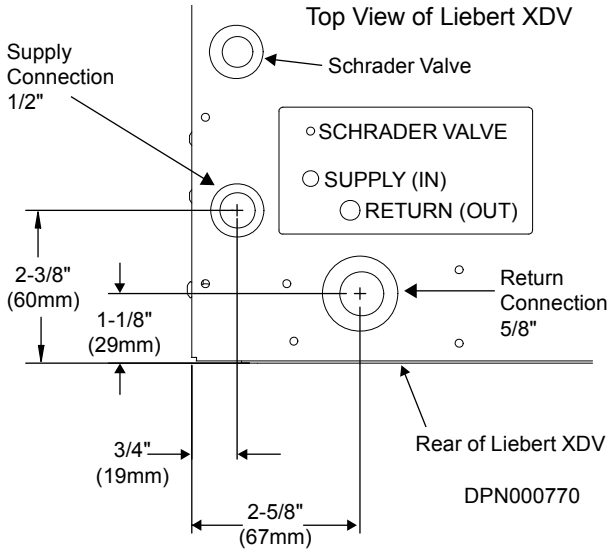
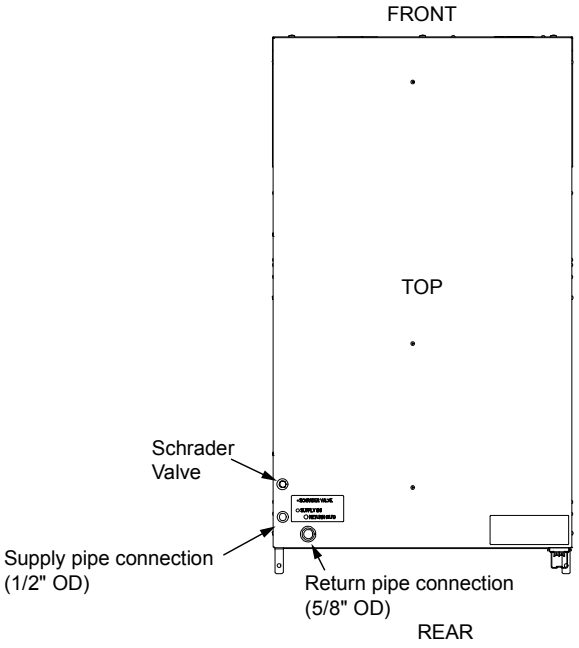


Figure 24 Schrader valve location for venting holding charge



6.4.2 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 for a hard-piped Liebert XDV has been vented, 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 piping.

6.5 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 XDV branch piping and the Liebert XDP or Liebert XDC according to **Table 4**. Elbows and restrictions must be minimized to ensure good fluid flow.

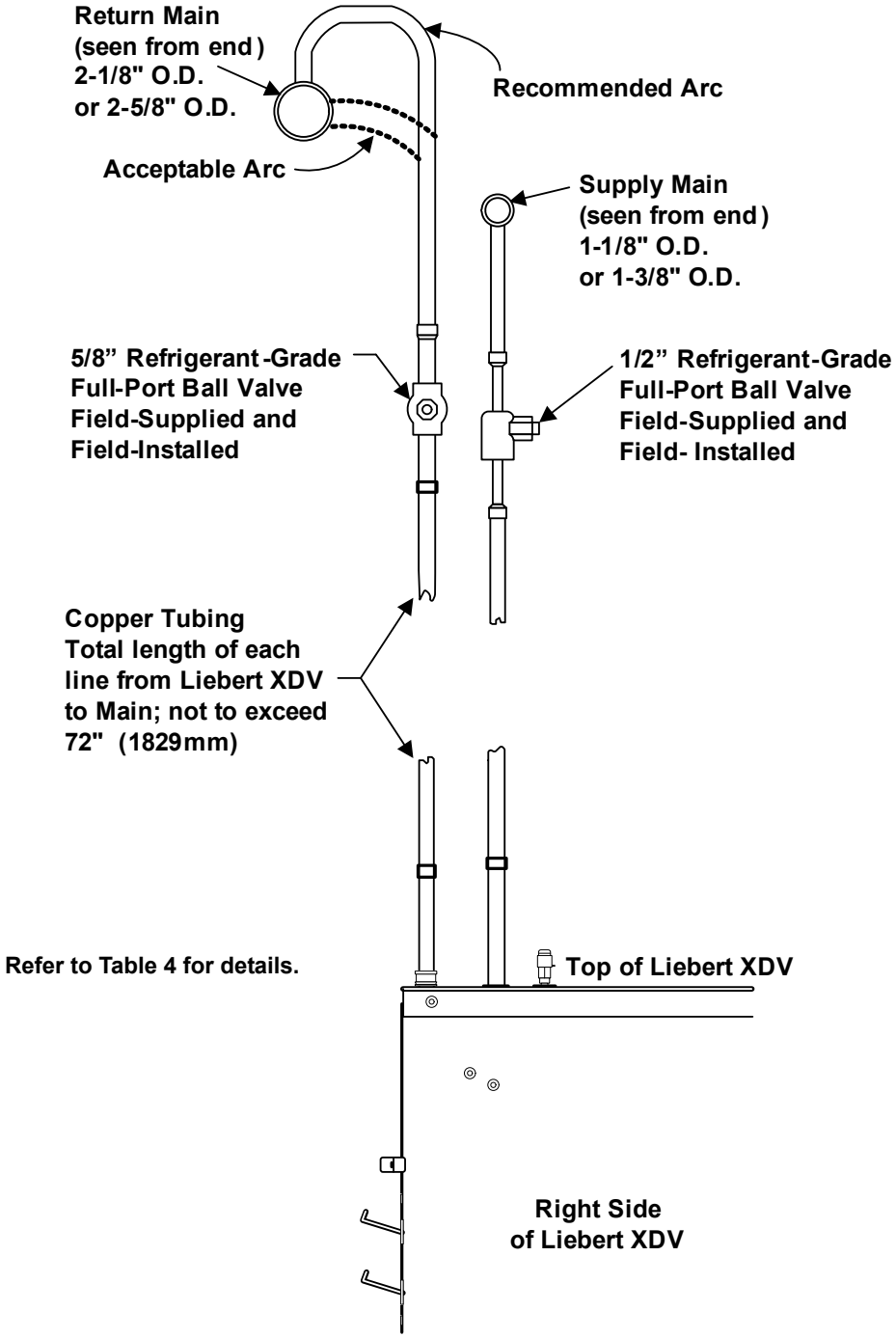
See **Table 4** for recommended pipe sizes and **Figure 3** for piping segment locations.

Table 4 Branch piping sizes for refrigerant loop

Pipe Function	Size / Equivalent Pipe Length
Liebert XDP/Liebert XDC supply line, from Liebert XDP/Liebert XDC supply to farthest Liebert XDV	1-1/8" OD (1.025" ID) for lengths up to 60 feet (18m)
	1-3/8" OD (1.265" ID) for lengths over 60 but less than 175 feet (18 to 53m)
Liebert XDP/Liebert XDC return line, from farthest Liebert XDV to Liebert XDP/Liebert XDC return	2-1/8" OD (1.985" ID) for lengths up to 60 feet (18m)
	2-5/8" OD (2.465" ID) for lengths over 60 but less than 175 feet (18 to 53m)
From Liebert XDV supply to supply line of Liebert XDP/Liebert XDC	1/2" OD (0.430" ID) for lengths up to 10 feet (3m)
	5/8" OD (0.545" ID) for lengths over 10 feet (3m) but less than 35 feet (1.8-10.6m)
From Liebert XDV return to return line of Liebert XDP/Liebert XDC	5/8" OD (0.545" ID) for lengths up to 10 feet (3m)
	7/8" OD (0.785" ID) for lengths over 10 feet (3m) but less than 35 feet (1.8-10.6m)

See **Figure 25** for piping recommendations for hard-piping between the Liebert XDV and the header system.

Figure 25 Hard-piped connection diagram

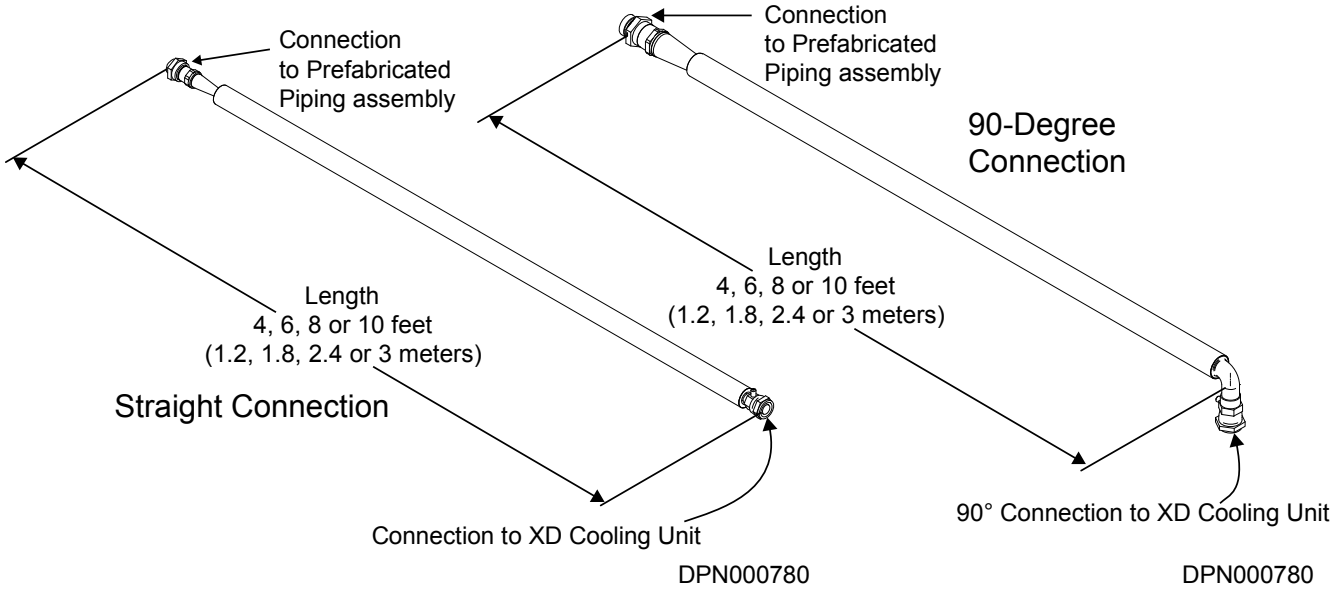


6.6 Field Installation of Liebert Flex Pipe Kit on Liebert XDV

If you are not performing a service installation or a field-retrofit, skip this section and proceed with the instructions in **6.6.1 - Connection Methods—One-Shot Connections for Pre-Charged Refrigerant Option**.

Liebert Flex Pipe kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8,2.4 and 3 meters). Connection style to the unit end may be straight or 90 degrees. Connection to the prefab piping assembly is a threaded coupler. For data on acquiring the correct kit for your installation, see **Table 11**.

Figure 26 Liebert XD Flex Pipe dimensions—straight and 90-degree connections



6.6.1 Connection Methods—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 XDV unit is shipped with a full charge of R-134a refrigerant under pressure. Do not remove the pipe caps or plugs before the unit is ready for connection to Liebert XD Piping.

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

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

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

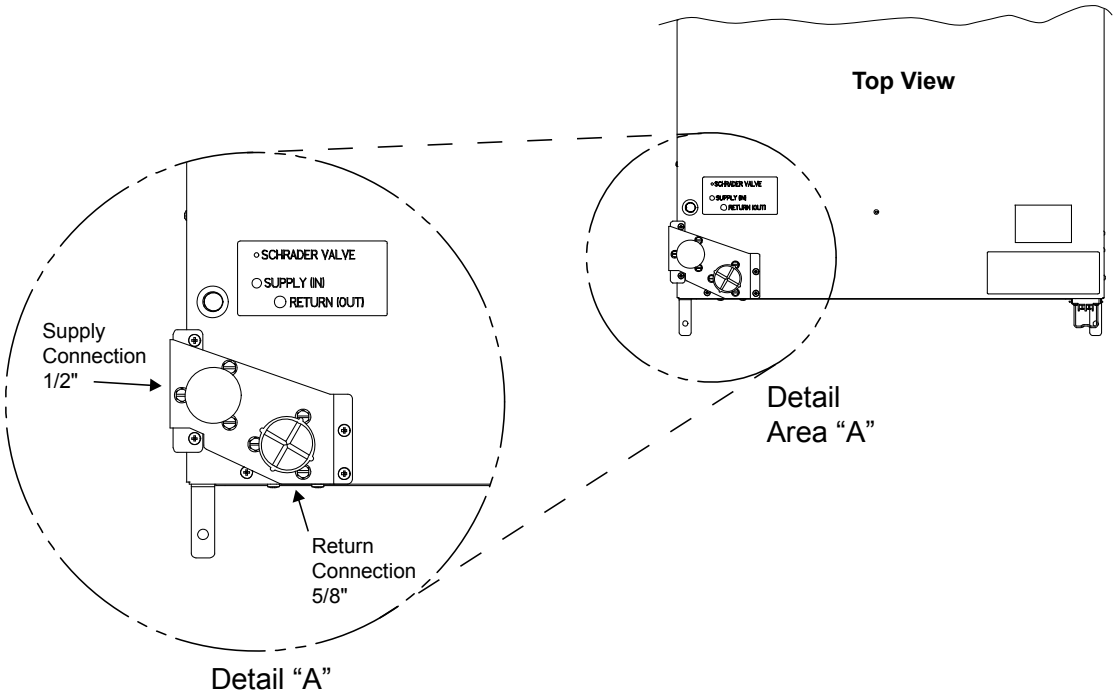
The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

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

If the unit includes the optional, factory-installed, one-shot style connections, proceed with **6.6 - Field Installation of Liebert Flex Pipe Kit on Liebert XDV** and see **Figure 27**.

If the unit does not include Liebert Flex Pipes, refer to **6.4.1 - Venting the Holding Charge for Hard-Piped and Removable Liebert XD Flex Pipe Connections**.

Figure 27 Piping location and connection sizes—pre-charged units with one-shot connections



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 XDV unless they are being replaced with new Liebert XD Flex Pipes with one-shot connections. Do not reuse Liebert XD Flex Pipes with one-shot connections. Reuse may result in refrigerant leaks.

6.6.2 Connect a Liebert XDV with One-Shot Couplers to Liebert XD Flex Pipe

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 XDV unless they are being replaced with new Liebert XD Flex Pipes with one-shot connections. Do not reuse Liebert XD Flex Pipes with one-shot connections. Reuse may result in refrigerant leaks.

Tools Required

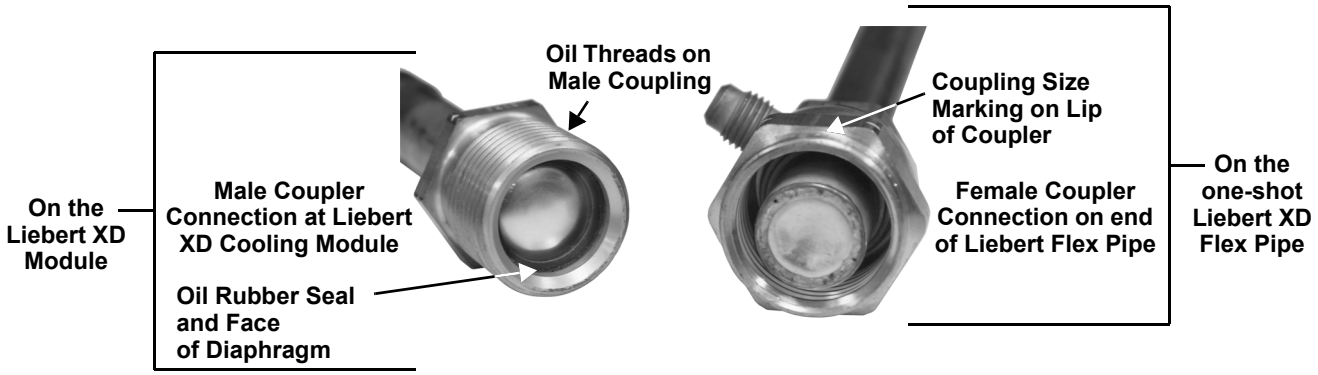
- Two adjustable wrenches with a maximum adjustment size of 2-1/2 inches
  OR two open-end wrenches (see **Table 5** for sizes)
- One torque wrench, half-inch drive (see **Table 5** for sizes)

1. Remove the protector cap and plug from the connections and carefully wipe the fittings and threaded surfaces clean.
2. 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 28**.
   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.
3. Thread the coupling halves together by hand to ensure that the threads mate properly. Ensure that the Schrader valve is oriented so that it points to the rear of the Liebert XDV.
4. Tighten the coupling body hex nut and union nut with the proper-sized wrench until the coupling bodies bottom out or definite resistance is felt.
5. Use a marker or pen to draw a line lengthwise across the body hex nut and onto the union nut.
   The line should parallel the refrigerant flow.
6. Tighten the nuts an additional quarter-turn, judging the amount by the mark drawn above.
7. If a torque wrench is used, Emerson recommends using the following torque values:

Table 5 Torque and wrench size for connecting Liebert XDV with one-shot couplers to Liebert Flex Pipe

Coupling Size	Wrench Sizes, in. (mm)		Torque, Female Coupling Only, ft-lb (Nm)
	Male Coupling	Female Coupling	
#10	1-1/16 (26.98)	1-5/16 (33.33)	35-45 (13.5- 16.2)
#11	1-1/8 (28.57)	1-5/16 (46.55)	35-45 (47.5- 61.0)
#12	1-7/16 (36.51)	1-3/8 (34.9)	50-60 (67.8- 88.1)

Figure 28 One-shot fittings: Liebert XDV and Liebert XD Flex Pipe



6.6.3 Connection Methods—Removable Connections

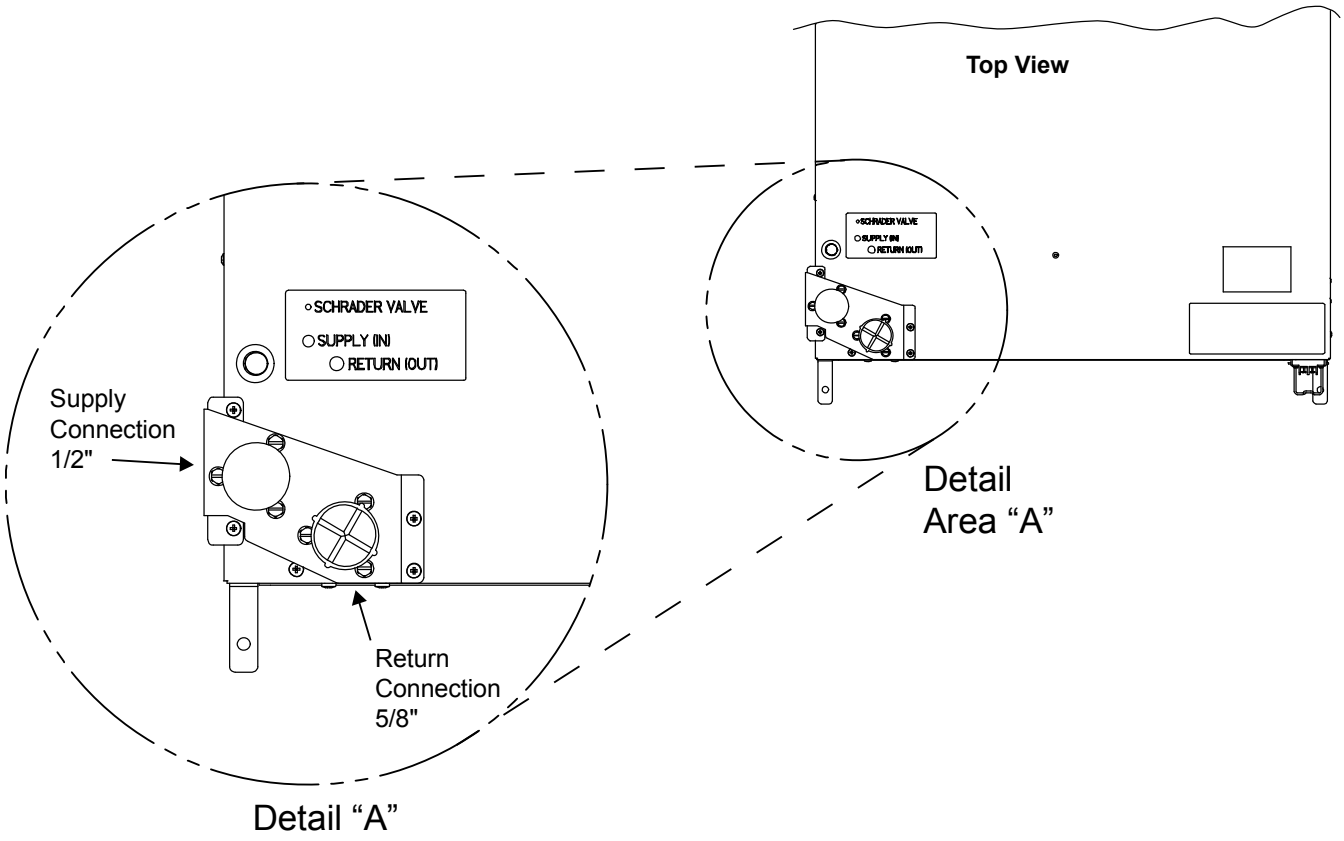
The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

Both supply and return fittings may be supplied with optional, removable connections.

If the unit includes the optional, factory-installed, removable connections, proceed with **6.6 - Field Installation of Liebert Flex Pipe Kit on Liebert XDV** and see **Figure 27**.

If the unit does not include Liebert Flex Pipes, refer to **Steps 1** through **3** in **6.4.1 - Venting the Holding Charge for Hard-Piped and Removable Liebert XD Flex Pipe Connections**.

Figure 29 Piping location and connection sizes—removable connections



6.6.4 Connect Liebert XD Flex Pipe with Removable Coupling to Liebert XD Cooling Module

Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2-1/2 inches OR two open-end wrenches (see **Table 6** for sizes)
- One torque wrench, half-inch drive (see **Table 6** for sizes)

1. Remove the protector cap and plug from the couplers on the Liebert XDV.
2. Wipe the fittings and threaded surfaces clean of particles and other foreign substances.
3. Place the Liebert Flex Pipe assembly against the fitting body so that the flat face of the flange comes into contact with the O-ring. The O-ring is on the front of the male fitting.
4. Tighten the coupling body hex nut and union nut with the proper-sized wrench until the coupling bodies bottom out or definite resistance is felt.
5. Use a marker or pen to draw a line lengthwise across the body hex nut and onto the union nut. The line should parallel the refrigerant flow.
6. Tighten the nuts an additional quarter-turn, judging the amount by the mark drawn above.
7. If a torque wrench is used, the following torque values are recommended:

Table 6 Torque and wrench sizes for connecting Liebert Flex Pipe to the Liebert XDV with removable couplings

Fitting Size	Wrench Size, in. (mm)		Torque, Female Coupling Only, ft-lb (Nm)
	Male Coupling	Female Coupling	
1/2"	7/8 (22.23)	15/16 (23.81)	40 (55)
5/8"	1-1/16 (26.98)	1-1/8 (23.58)	60 (80)
1"	1-1/2 (38.1)	1-5/8 (41.28	110 (150)

Figure 30 Removable couplings

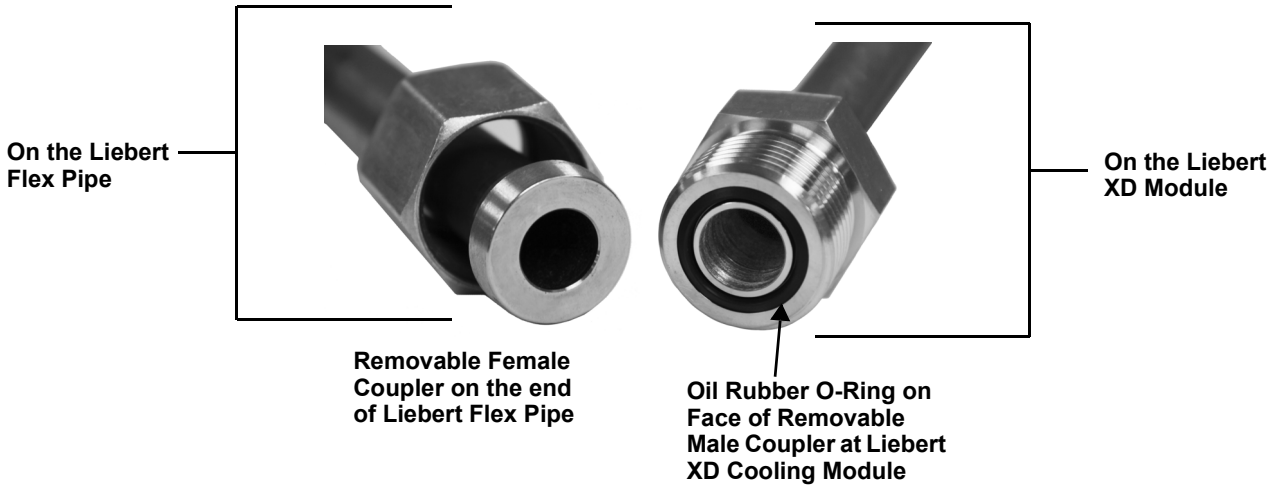


Table 7 O-ring part number

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

6.6.5 Header System

The Liebert XDV module system with optional Liebert XD Flex Pipe requires using 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. See **Figure 29** for details. For additional information, refer to the Liebert X-treme Density System Design Manual, SL-16655, available at the Liebert Web site: **www.liebert.com**

6.6.6 Connect a Liebert XDV with Liebert Flex Pipe to an Operational Liebert XD System

NOTE

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

Read all instructions before beginning installation.

Tools Required

- One adjustable wrench with a maximum adjustment size of 2-1/2 inches
- One torque wrench, half-inch drive
- Crowsfoot (supplied with Liebert XDP and Liebert XDC)

NOTE

This operation requires two or more people.

6.6.7 Connecting/Reconnecting the Liebert Flex Pipe to the Header Assembly

NOTICE

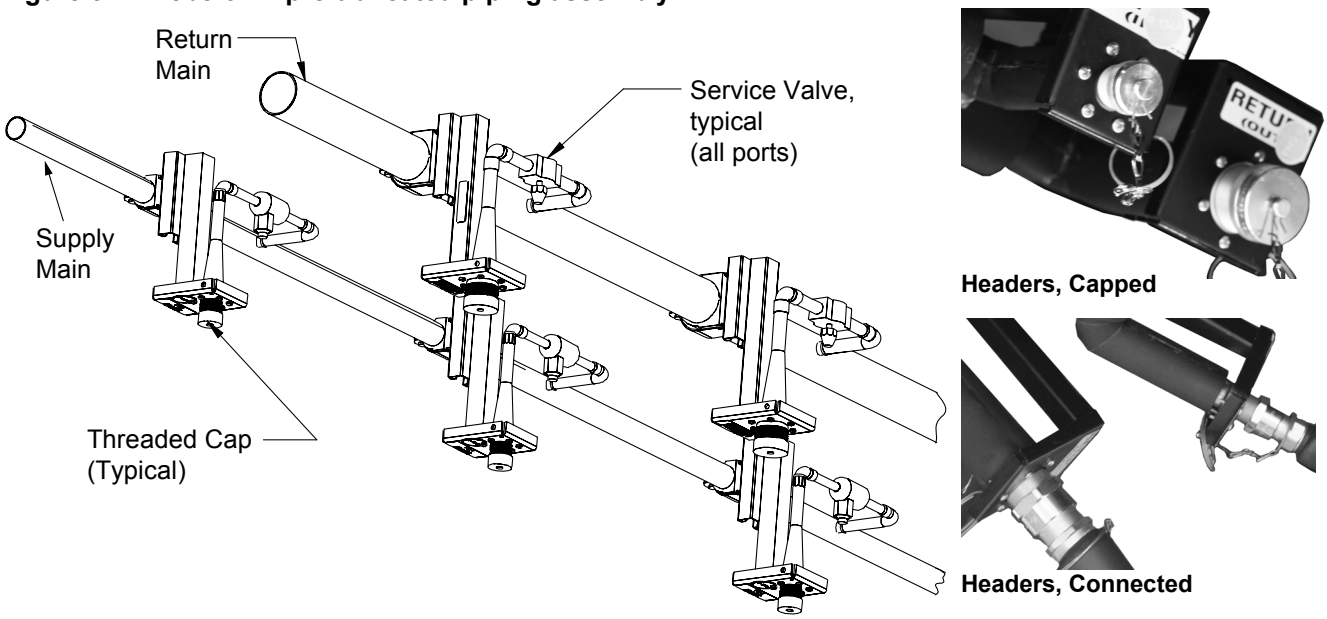
Risk of improper reuse of Liebert XD Flex Pipes with one-shot connections. Can cause refrigerant leaks.

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

Proper connection requires that both connections are clean and have been oiled. Proper torque must be applied.

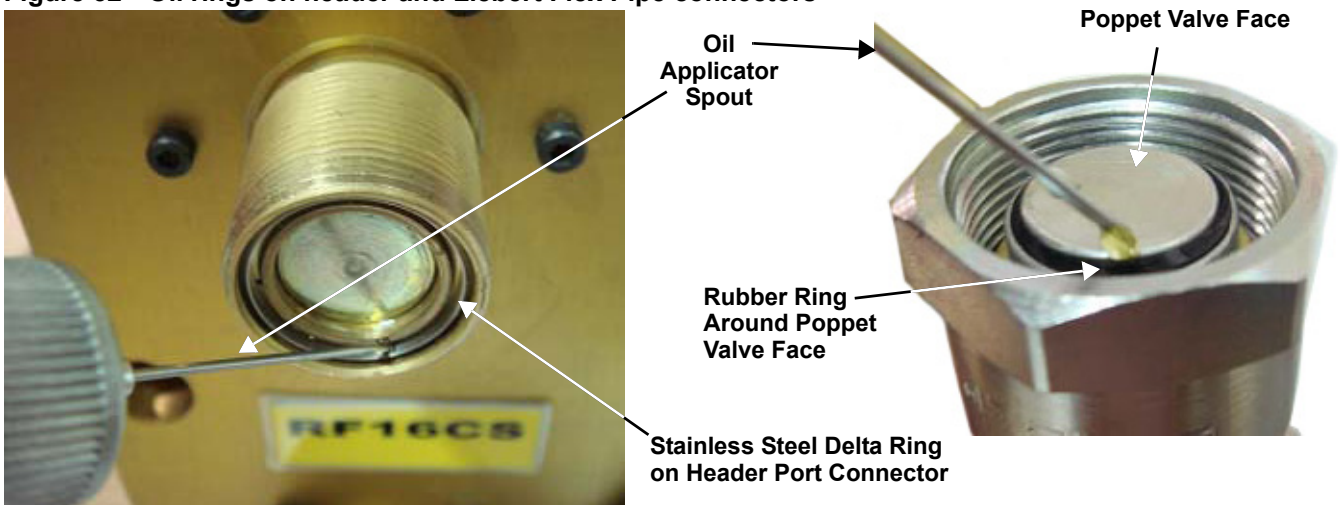
1. Determine the port location of the supply and return piping overhead.
2. Make sure the service valve for each port is closed.
3. Skip this step **if reconnecting** Liebert XD Flex Pipes with one-shot connections. Remove caps from only the required ports. Do not remove caps from the unused ports.
4. Remove the pipe plugs that are supplied on the Liebert Flex Pipe on the Liebert XDV.
5. Inspect both halves of the fittings and remove any foreign contamination from the sealing surfaces and threads before connecting the fittings.

Figure 31 Liebert XD prefabricated piping assembly



6. 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 Flex Pipe) (see **Figure 32**).
7. Apply mineral oil or polyol ester oil to the stainless steel delta ring on the male connector (header port connector) (see **Figure 32**).

Figure 32 Oil rings on header and Liebert Flex Pipe connectors



8. Thread the union nut of the female coupler onto the male coupler until they are hand tight.
9. Using the wrench arrangement shown in **Figure 33**, torque the couplers to the values in **Table 8**.

NOTICE

It is imperative that the brass body of the female connector be held stationary with a wrench while the fittings are being tightened. Failing to do so may damage the female connector.

Table 8 Torque for connecting Liebert XD Flex Pipe to prefabricated piping

Coupler 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 33 Wrench arrangement for tightening couplers

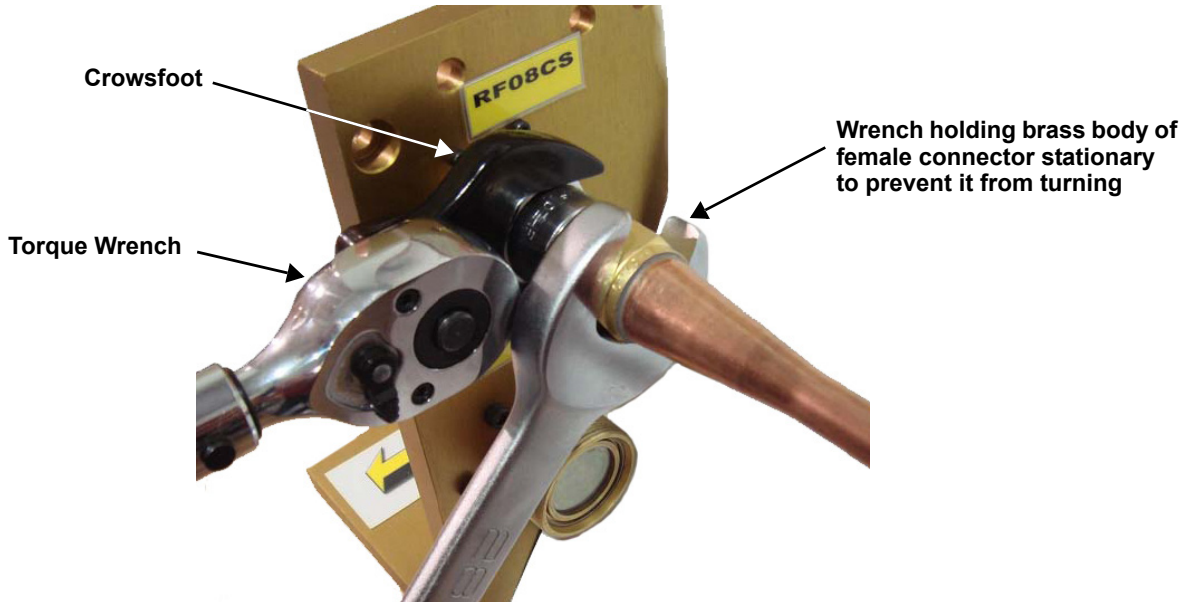
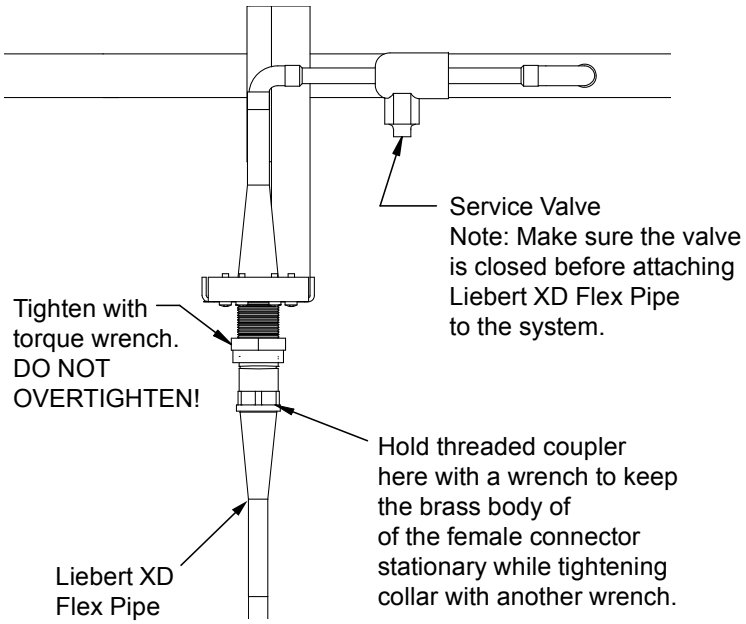
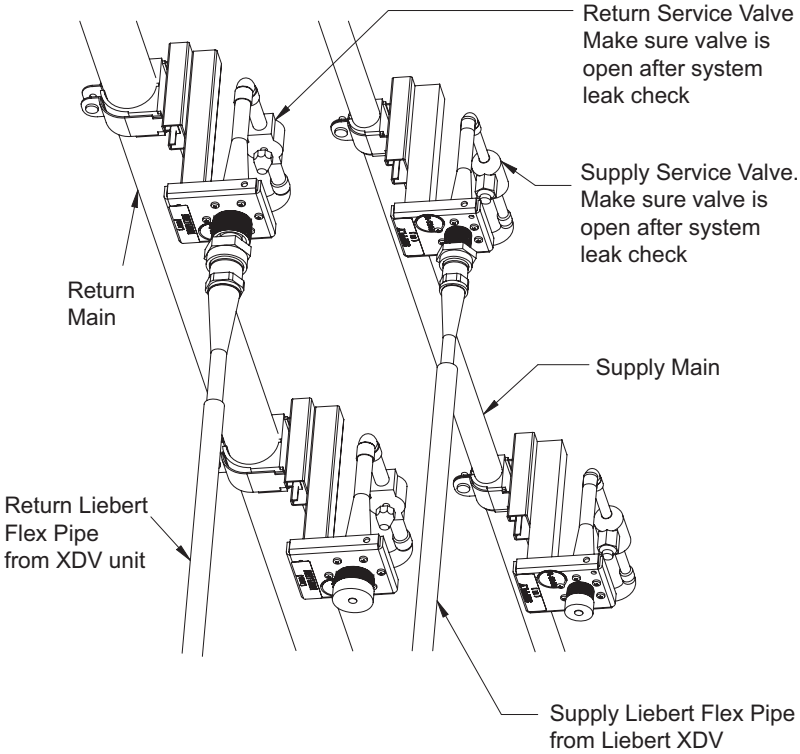


Figure 34 Detail view of Liebert XD Flex Pipe and prefabricated piping port



10. Repeat **Steps 3** through **9** for the smaller coupler (supply line).
11. Once the supply and return connections are completed, check to make sure the Liebert XDV fan power switches are Off, then connect the power cords to their power sources.
12. Turn the fan switches on. Ensure that the fans operate.
13. Open the return service valve first, then open the supply service valve.
    With the fans running, cool air is discharged from the front of the Liebert XDV.

Figure 35 Liebert XD system with prefabricated piping assembly and Liebert XD Flex Pipe



6.6.8 Disconnect a Liebert XDV With Liebert Flex Pipe from a Liebert XD System

CAUTION

Risk of sudden discharge of pressurized refrigerant. Can cause equipment damage or injury.

Do not disconnect threaded refrigerant couplers at the unit cabinet end without relieving system pressure. Reclaim any refrigerant during removal of unit from system.

NOTE

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

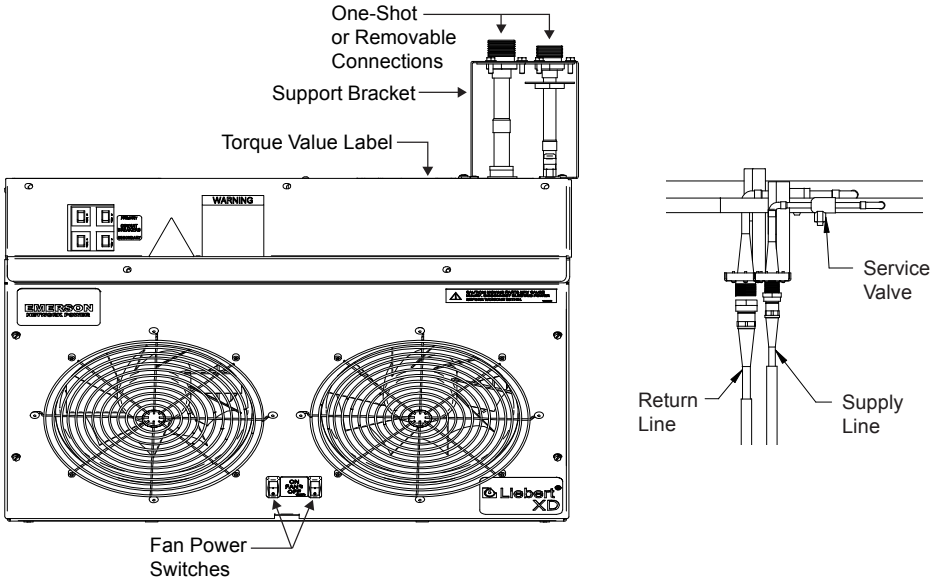
Removing a Liebert XDV from above a cabinet will require two people. Read all instructions before beginning.

Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2-1/2 inches
  OR two open end wrenches (see **Table 5** for wrench sizes)
- Lift mechanism

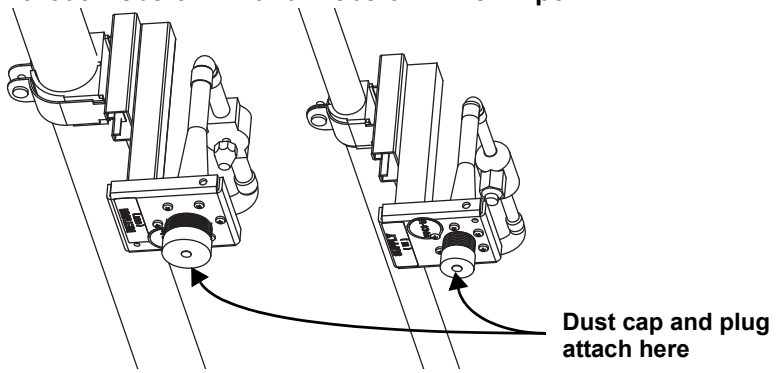
1. Ensure the Liebert XDV fan switches are both On and the fans are operational.
2. Close the service valve in the supply line to the Liebert XDV (smaller coupler).
3. With the Liebert XDV fans running, wait two minutes.
4. Close the service valve in the return line to the Liebert XDV (larger coupler).
5. Turn the fan power switches to the Off position. Once the fan switches are turned Off, unplug the power cords from their power source. See **7.0 - Electrical Connections** for details.
6. Locate and have at the ready the caps and plugs for both ends of the supply and return couplers.
7. Loosen the female supply coupler from the male supply coupler (smaller coupler). This requires an adjustable wrench and a torque wrench. Refer to **Figure 34**; use the torque values in **Table 8** and on the label on top of the Liebert XDV (see **Figure 36**.
8. The Liebert XDV side of the female coupler must be held stationary while the collar on the coupler is being loosened.
9. Disconnect the coupler.

Figure 36 Profile view of the Liebert XD system with Liebert XD Flex Pipe connections



10. Place the protective dust cap and plug back onto both ends of the coupler on the Liebert XDV and the port pipe.

Figure 37 Piping mains without Liebert XDV and Liebert XD Flex Pipe



11. Repeat **Steps 8** through **10** for the return coupler (larger coupler).
12. Evacuate the refrigerant in the Liebert XD Flex Pipe and in the Liebert XDV.
13. Lay the Liebert Flex Pipe on the top of the Liebert XDV.

NOTICE

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

14. Unbolt the Liebert XDV from the cabinet or hanging bracket, if applicable.
15. With the help of another person, use the lift mechanism to lower the Liebert XDV from the cabinet or hanging bracket onto a stable surface.

6.7 Insulation

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

7.0 ELECTRICAL CONNECTIONS

The unit must be installed in accordance with national wiring regulations. Refer to the unit's serial tag for electrical requirements. Refer to **Table 9** for details.

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

7.1 Connecting High-Voltage Cables to Liebert XDV

WARNING

Risk of electric shock. Can cause injury or death.

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

Connect IEC power cords to each receptacle on the Liebert XDV and to power sources. If only one power source is available, then only the power connection labeled "SECONDARY" should be connected to the power source. See **Figures 40** and **41** for location of power connections.

Figure 38 Electrical connections for CSA-approved standard Liebert XDV modules

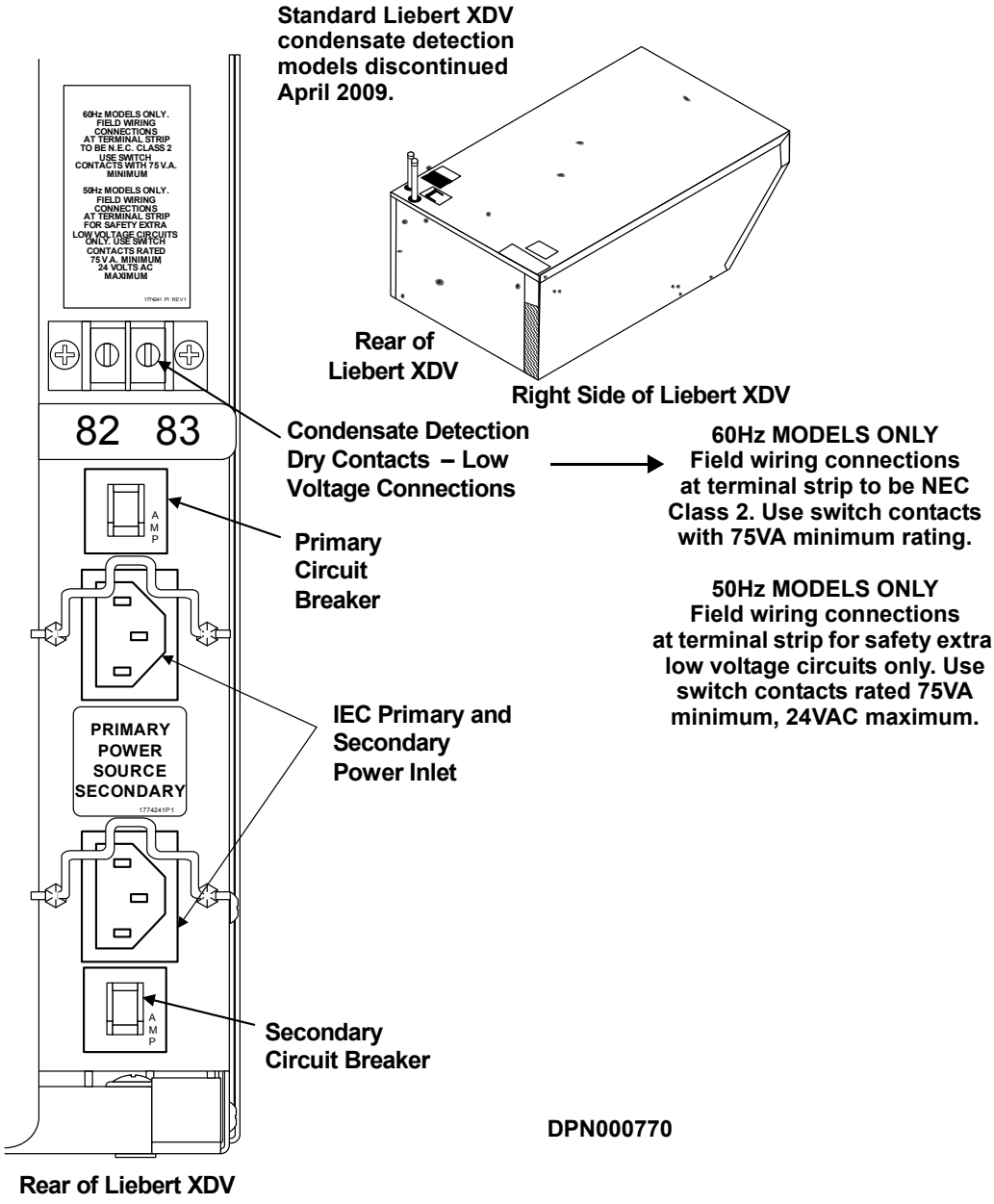


Figure 39 Electrical connections for CE-approved standard Liebert XDV modules

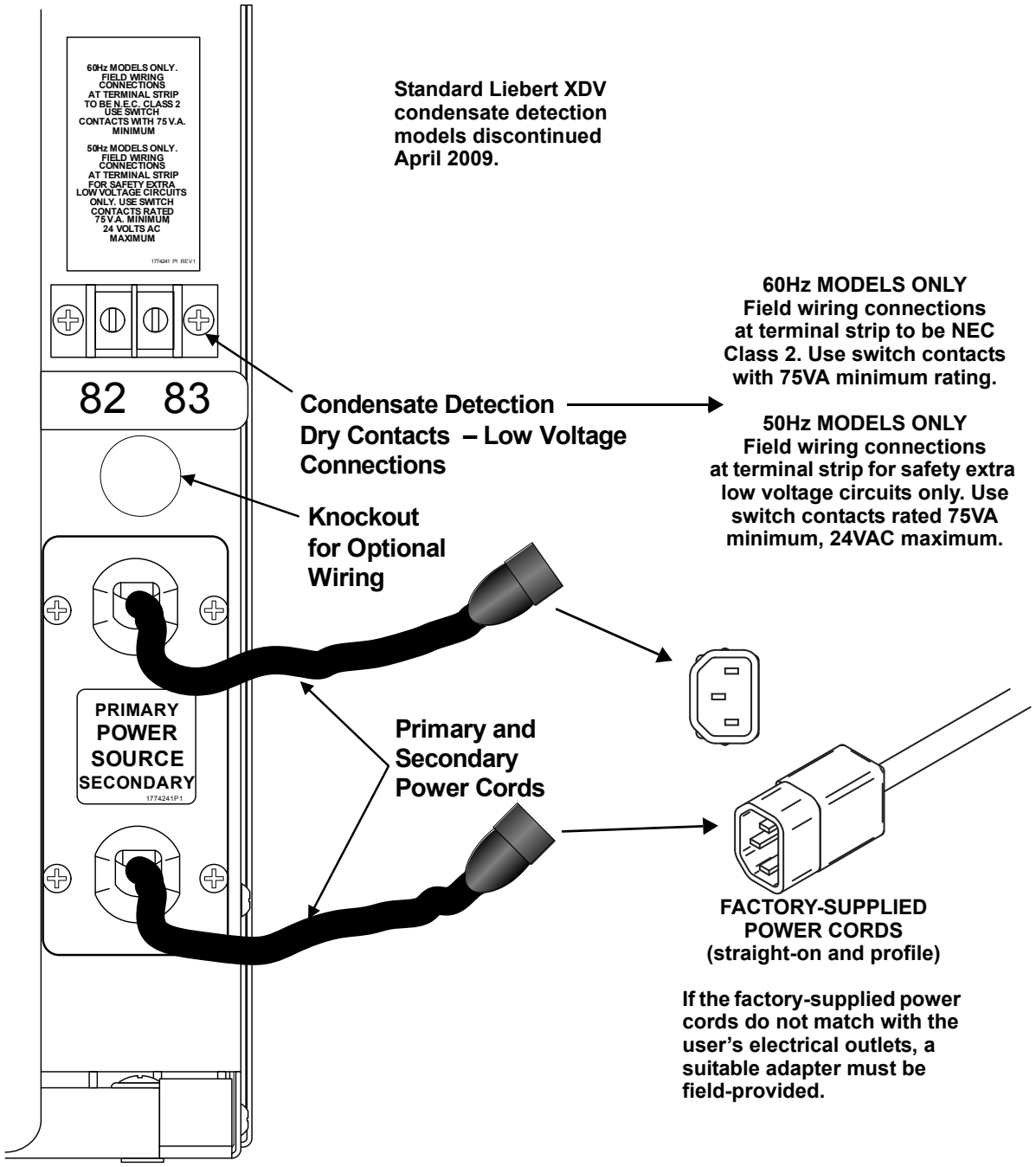


Figure 40 Electrical connections for CSA-approved Liebert XDV smart modules

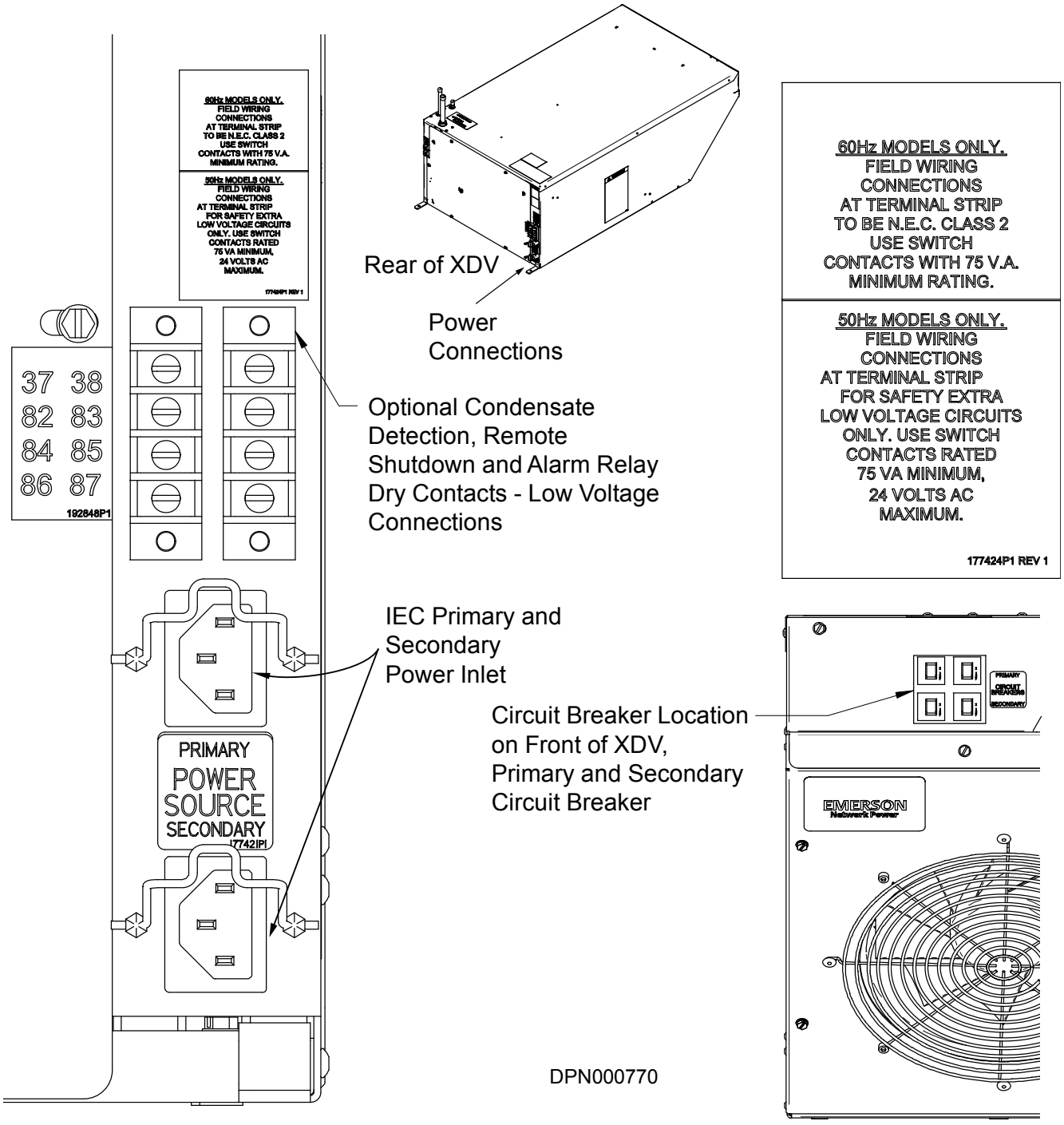
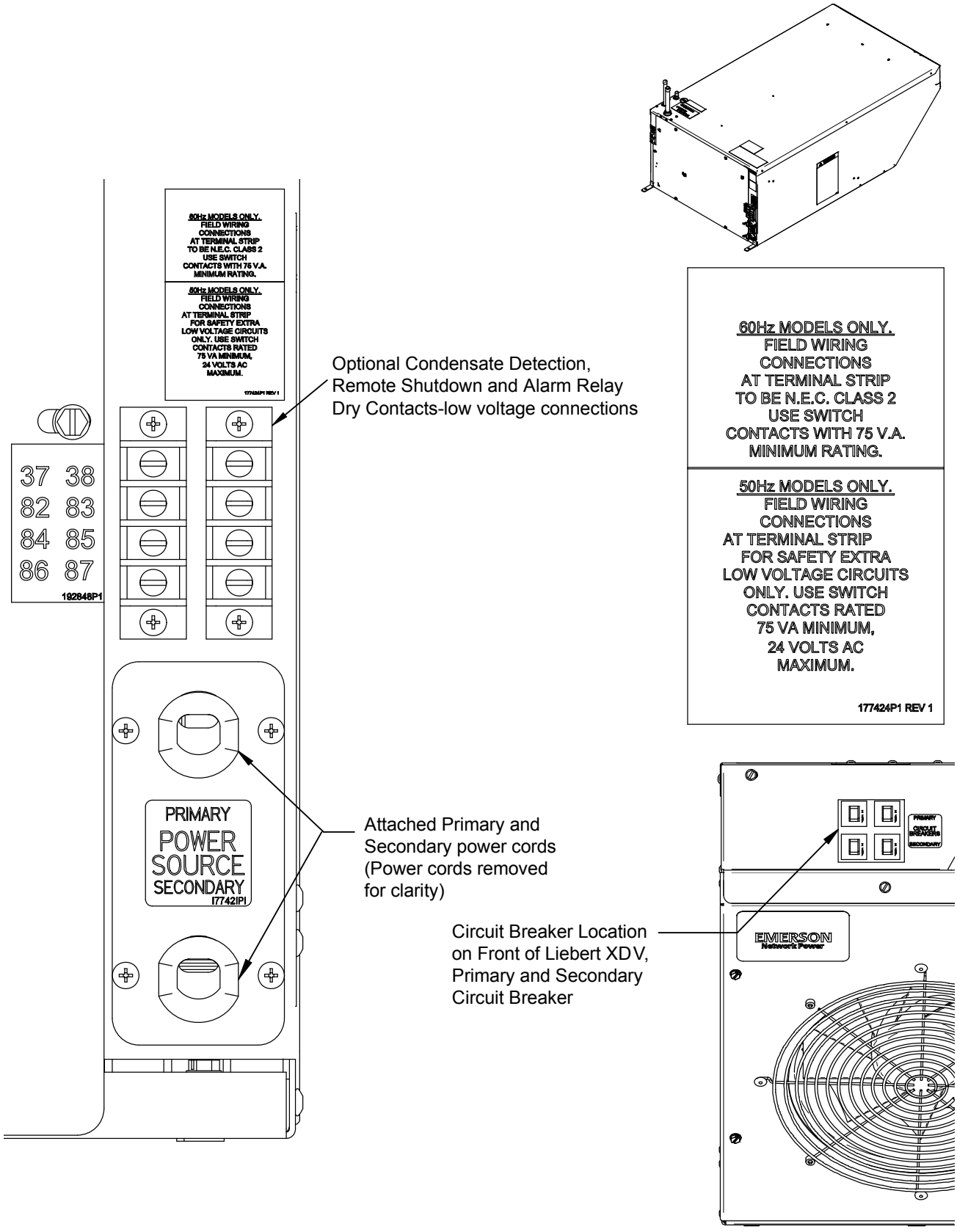


Figure 41 Electrical connections for CE-approved Liebert XDV smart modules



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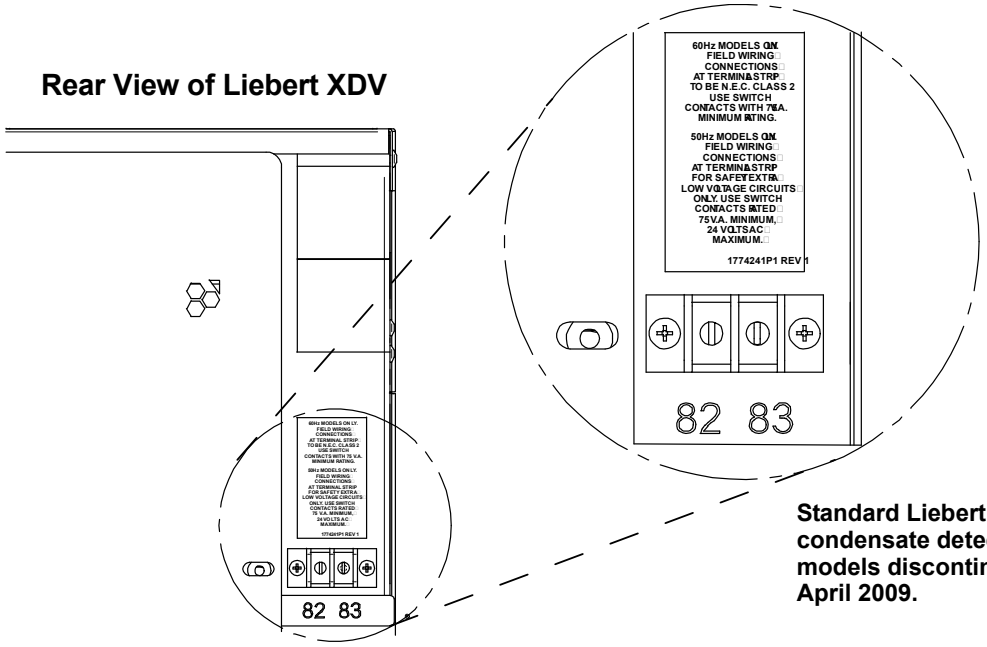
7.2 Connecting Low-Voltage Wiring—Standard Liebert XDV Modules

Low-voltage connections to the Liebert XDV are available only on units with the optional condensate detection feature (discontinued April 2009). The low-voltage connections are on the right side of the electrical connections box, just above the power connections (see **Figure 43**). These dry contacts can to be connected to a monitoring unit, such as Liebert's SiteScan®.

For units equipped with condensate detection, make low-voltage connections according to site-specific drawings. The unit must be installed in accordance with national wiring regulations.

Figure 42 Low-voltage connections

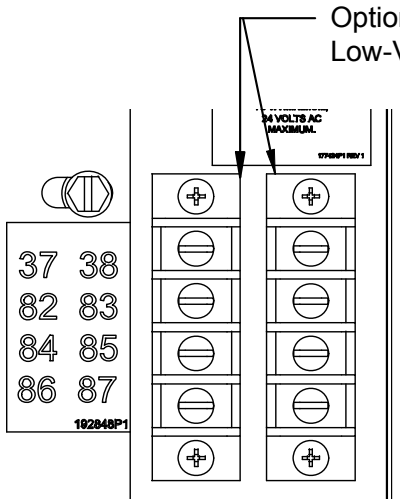


7.3 Low-Voltage Wiring—Liebert XDV Smart Modules

The low-voltage connections for Liebert XDV smart modules are on the rear right side of the units. The power connections are shown in **Figure 43** and the dry contacts can be connected to a monitoring unit, such as Liebert's SiteScan. Make low-voltage connections on these units according to site-specific drawings. The unit must be installed in accordance with national and local wiring regulations.

Terminal block connections 37, 38 and 82 through 87 can be connected to a monitoring unit, such as Liebert's SiteScan (Contacts 37 and 38 are for remote shutdown and 82 through 87 are for reporting alarms). P66 & P67 are CAN bus ports.

Figure 43 Low-voltage connections for Liebert XDV smart modules



8.0 INSTALLATION CHECKLIST AND SYSTEM FILL FOR STARTUP

8.1 Checklist for Proper Installation

___ 1. Liebert XDV module is properly mounted, secured either to the cabinet, overhead structure or to the unistruts (field-supplied).

___ 2. Power cords connected to electrical supply.

___ 3. Low-voltage wiring to optional condensate detection on the Liebert XD modules (discontinued April 2009) or smart module control board.

___ 4. Piping from the Liebert XDP to the Liebert XD modules, with isolation valves piped to each Liebert XD module.

a. Hard-piped units connected to prefabricated headers

b. Liebert XD Flex Pipes connected to prefabricated header assembly.

___ 5. Leak check.

___ 6. Start the Liebert XD module to ensure proper operation (see **9.1 - Start the Standard Liebert XDV Module**).

___ 7. Shut down the Liebert XD module.

___ 8. Piping insulated.

8.2 Charging with Refrigerant and Starting the Liebert XD System

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

9.0 OPERATION

The Liebert XDV's fan controls are on the front of the unit, near the fans, for easy access. Each switch controls the operation of one fan (see **Figure 44**). The separate switches permit the use of only one fan at a time, reducing the airflow if the Liebert XDV's full cooling capacity is not needed.

The Liebert XDV's primary and secondary circuit breakers are also on the front of the unit. They are at the top left when the Liebert XDV is viewed from the front (see **Figure 44**).

NOTICE

Risk of improper operation. May cause equipment malfunction.

One of the Liebert XDV's fans must be turned on before either the Liebert XDP or Liebert XDC is switched on.

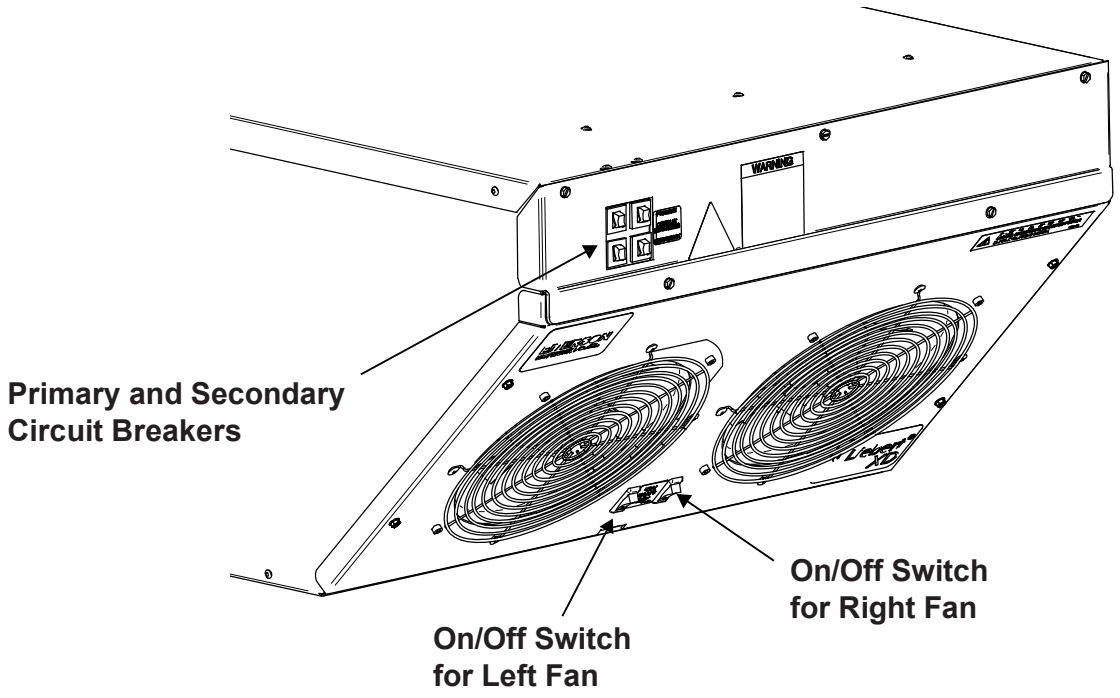
One of the Liebert XDV's fans must be operating at all times that the Liebert XDP or Liebert XDC is operating. Operating either the Liebert XDP or the Liebert XDC without at least one of the Liebert XDV's fans rotating may cause a system malfunction.

9.1 Start the Standard Liebert XDV Module

The Liebert XDV fans must be On before starting the Liebert XDP or Liebert XDC that will supply coolant to the system.

To start the Liebert XDV, press either of the rocker switches to turn on one or both of the Liebert XDV's fans.

Figure 44 Fan switches location for standard Liebert XDV



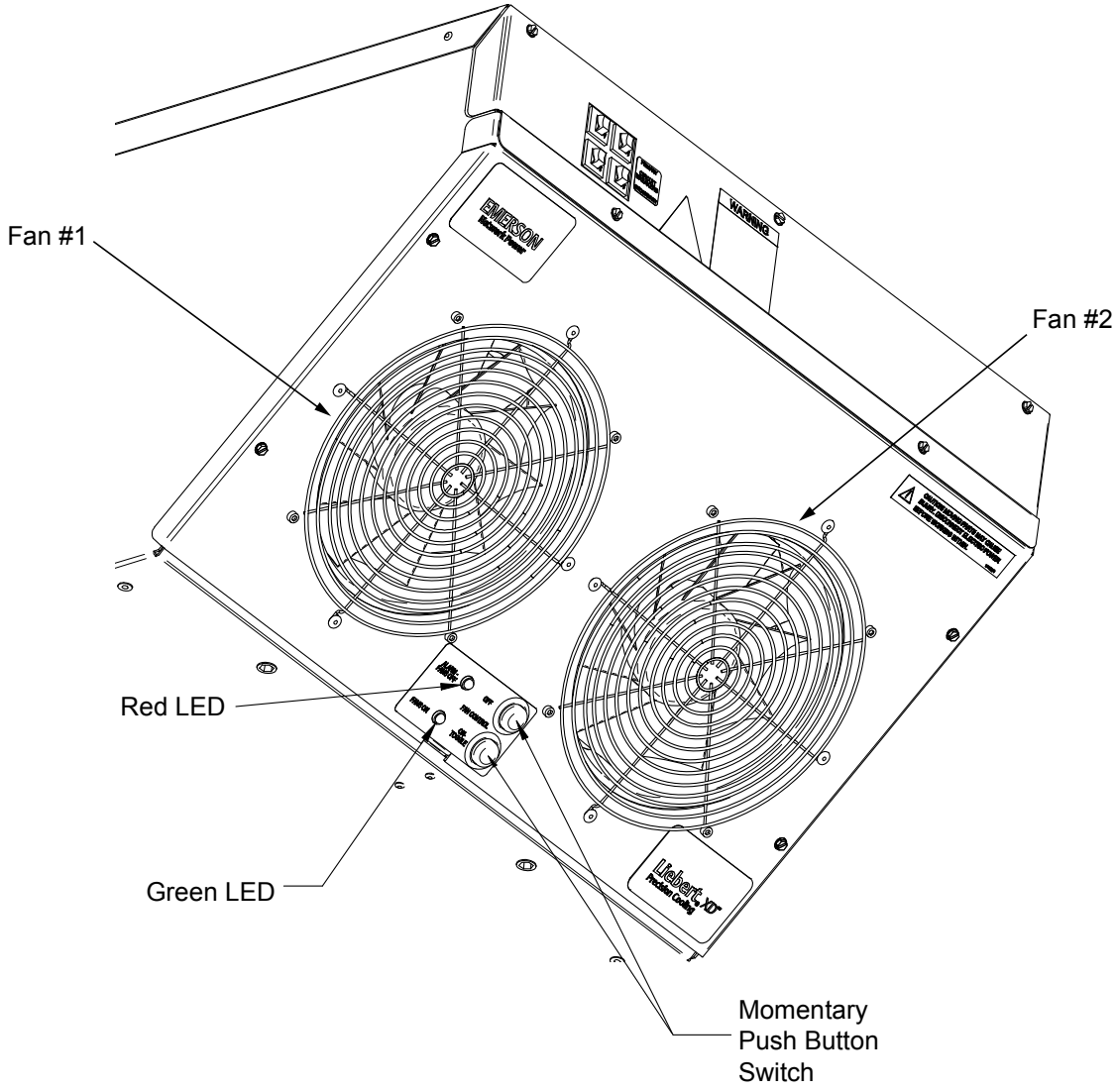
9.2 Start the Liebert XDV Smart Module

The Liebert XDV's fans must be On before starting the Liebert XDP or Liebert XDC that will supply coolant to the system.

The Liebert XDV's fan controls are on the front of the unit, near the fans, for easy access.

1. Press the lower On-Toggle push button once to turn Fan 2 On continuously.
2. Press the lower On-Toggle button a second time to permit the smart module's circuitry to control Fan 1, turning it On and Off as needed.
3. Press the lower On-Toggle button a third time to turn Fan 1 On continuously.

Figure 45 Fan switches with push buttons and LEDs for Liebert XDV smart module



9.3 LED Indicators on Liebert XDV Smart Modules

Liebert XDV smart modules have two LEDs on the front, one red and one green.

- Red LED indicates alarms
- Green LED indicates the status of fan relays

9.3.1 LED Meanings

Red LED

- Blinking every 2 seconds: Fans are off; remote shutdown is not active
- Blinking On for 1 second, Off for 1 second: Remote shutdown is active
- Unlit: No alarms; remote shutdown is not active
- On Continuously (not blinking): Alarm condition, either a fan undercurrent condition or a condensate detection condition. Remote shutdown is not active.

Green LED

- Unlit: No fan relays are active
- Blinking On for 1 second, Off for 1 second: Only one fan relay is active
- On Continuously (not blinking): Both fan relays are active, no fans under temperature control

9.3.2 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 unit will stay active.

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

10.0 MAINTENANCE

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

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

10.1 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.

10.2 Internal Access

WARNING

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

Before opening the Liebert XDV, shut the unit off and disconnect all electrical power. Wait for the Liebert XDV's fans to stop rotating before beginning to open the unit.

WARNING

Risk of electrical shock. May cause death or injury.

Disconnect all power before working within.

- Turn off the main switch (in the center of the fan tray).
- Remove both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDV.

CAUTION

Risk of improper handling. May cause injury.

Use both hands when removing fan tray assembly. Improperly handling the assembly may cause injury during removal.

The conditions required for sensitive electronic equipment should preclude the accumulation of appreciable amounts of dust in the Liebert XDV. Most of that small amount should be found on the rear coils, near the air inlet. The rear covers and the fan tray on the front of the Liebert XDV are easily removed for maintenance. (A wiring diagram is provided on the inside of the fan tray.)

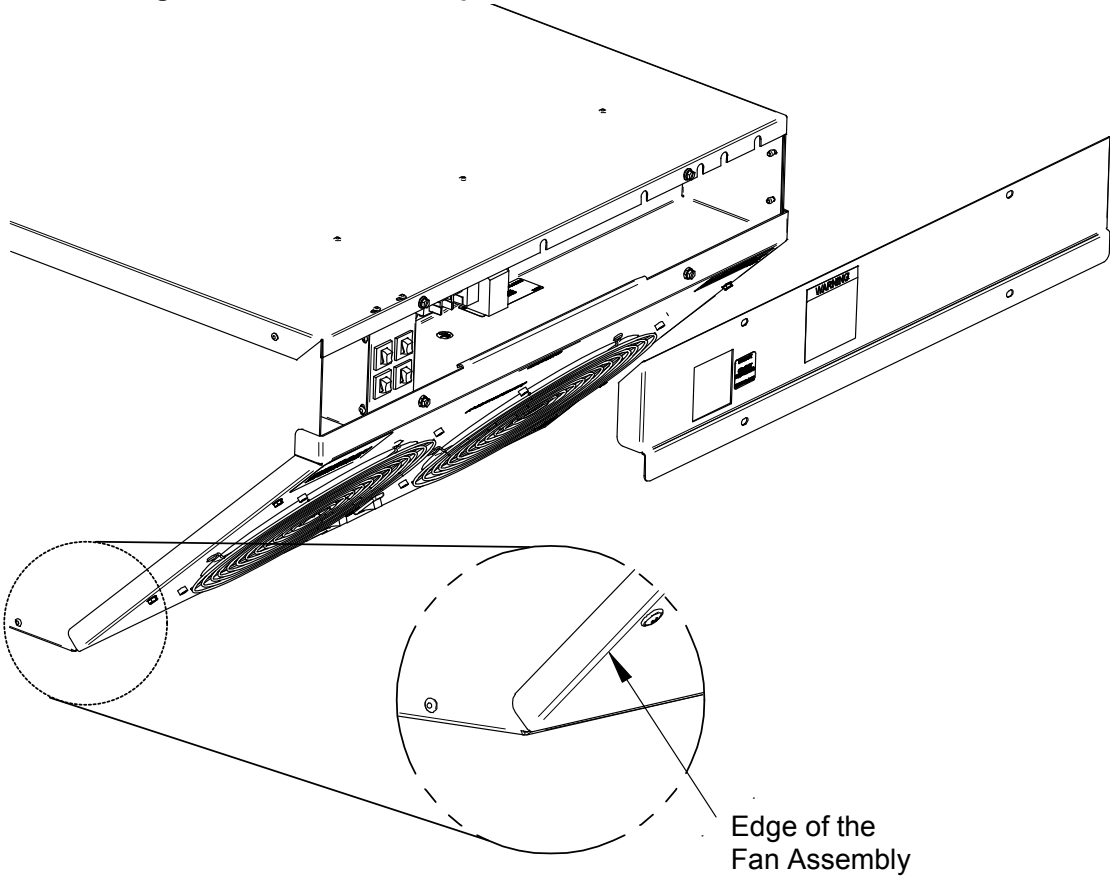
To remove the rear grille:

1. Loosen the six screws holding the grille on the rear of the Liebert XDV.
2. Remove the grille and lay it aside for reinstallation.

10.2.1 Accessing Internal Electrical Components

1. Disconnect all power inputs.
2. Remove five screws to remove the front electrical panel cover. See**Figure 46**.
3. Lift off the panel.

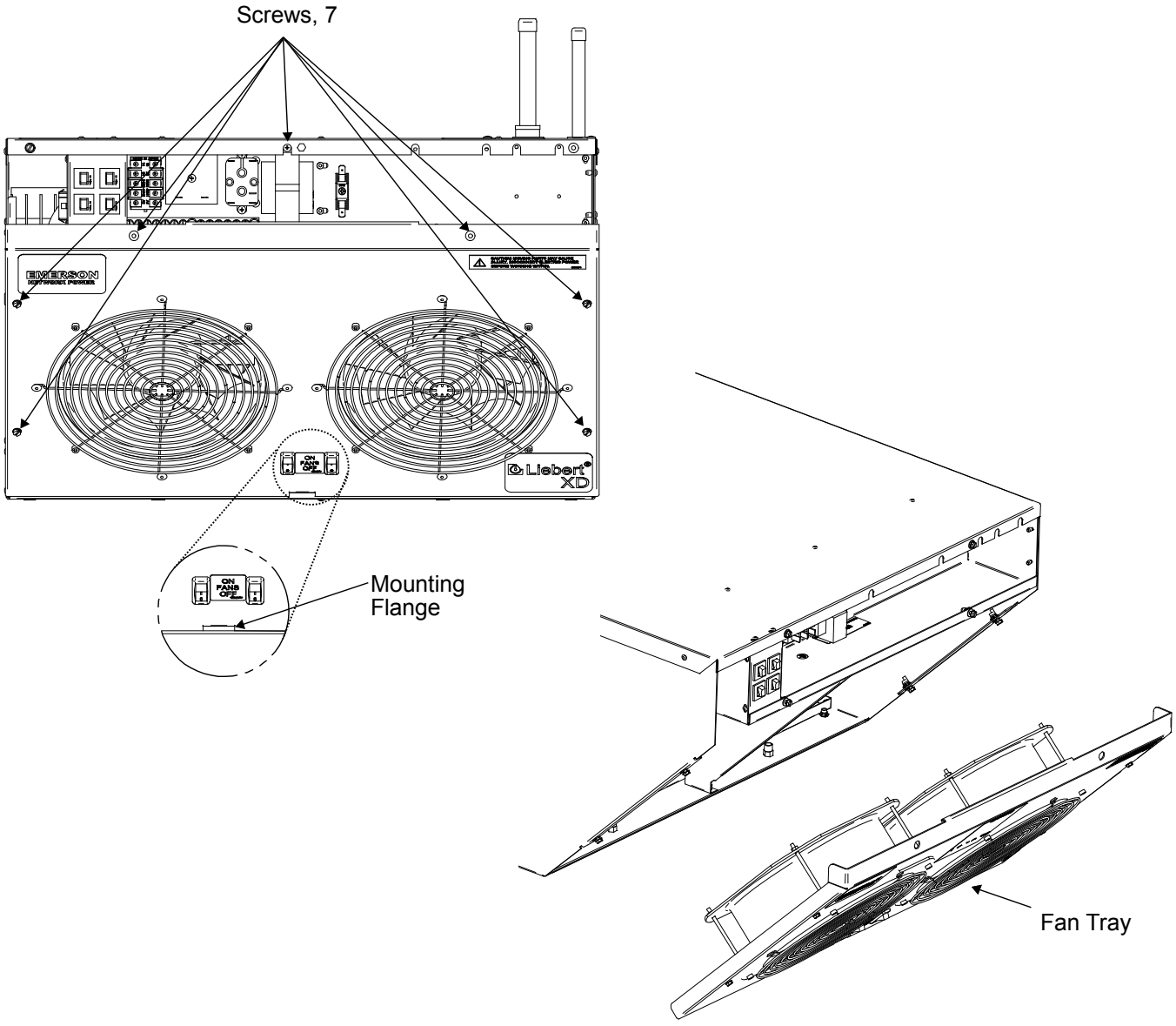
Figure 46 Accessing internal electrical components



10.2.2 Remove the Fan Tray

1. Remove the front electrical panel cover as described in **10.2.1 - Accessing Internal Electrical Components**.
2. Disconnect the 12-pin connector. Take care not to stretch or stress the electrical wires to the fans.
3. Remove the screws holding the fan tray on the Liebert XDV (see **Figure 47**).
4. Support the fan tray when removing the last screw to keep it from falling.
5. Set the screws aside for reinsertion after maintenance is completed.
6. Then lift the fan tray up and set it on top of the Liebert XDV or on a nearby surface.

Figure 47 Removing the fan tray



10.2.3 Reattach the Fan Tray

1. Clean the fan tray to prevent debris from being blown into the computer cabinet.
2. Reconnect the 12-pin connector.
3. Lift the fan tray and fit it against the base of the Liebert XDV housing (see **Figure 47**).
4. Holding the fan tray against the Liebert XDV housing, insert the screws extracted when removing the fan tray.
5. Tighten the screws securely.
6. Reconnect power to the Liebert XDV.

11.0 SPECIFICATIONS

Table 9 Liebert XDV10 specifications

Models	XDV10BK [1] XDV10SK [1] XDV10DK [1, 2]	XDV10BT [1] XDV10ST [1] XDV10DT [1, 2]		XDV10BS [1] XDV10SS [1] XDV10DS [1, 2]
	60 Hz	60 Hz	50 Hz	50 Hz
Cooling Capacity	Nominal (98ºF [37ºC] EAT: 10kW / 2.8 Tons Maximum (106ºF [41ºC] EAT): 11.7kW/3.3 Tons		Nominal (98ºF [37ºC] EAT): 8.3kW / 2.4 Tons Maximum (116ºF [47ºC] EAT): 11.7kW/3.3 Tons	
Conditions	Capacity Rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point, rear air inlet.			
Electrical Requirements				
Input	120V model: 1ph-60 Hz	230V model: 1ph-60 Hz	230V model: 1ph-50 Hz	
Input power connections	2 power connections, each model			
Full Load Amps	120V model: 2.0A	230V model: 1.0A		
Power consumption, nominal, watts	180	190	190	190
Dimensions, in. (mm)				
Height – unit only	14 (355) not including pipe connections			
Height – including hard pipe connections	18-5/8 (473)			
Height – including one-shot connections	19-5/8 (498)			
Width	22-7/8 (581)			
Depth – Top	39-1/2 (1003)			
Depth – Bottom	29-5/8 (752)			
Weight, lb (kg)				
Unit only	77 (35)			
Shipping weight	125 (57)			
Installed, with refrigerant	79 (36)			
Number of fans	2	2	2	2
Airflow, Nominal, ft^3/ min (m^3/ hr)	1000 (1699) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet		833 (1415) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet	
Audible noise	78 dBa sound power		73 dBa sound power	
Pipe Connections (without Liebert Flex Pipe)				
Refrigerant supply from Liebert XDP/ XDC	1/2" OD, Cu, (optional 1/2" threaded coupler flex piping)			
Refrigerant return to Liebert XDP/ XDC	5/8" OD, Cu, (optional 3/4" threaded coupler flex piping)			
Serviceable Parts	Fans and electrical components			
Cabinet Exterior Finish	Black, matte finish, heat-fused powder coat			
Options				
Condensate sensing (factory-installed), discontinued April 2009	Dry contact, 24VAC, 1A maximum			
Smart Module control board (factory-installed)	Dry contact, 24VAC, 1A maximum			
Pre-Charged Refrigerant	R-134a refrigerant, one-shot connections			
Agency				
Approvals	CSA 60Hz		CSA 50Hz	CE 50Hz

1. Refer to **Figure 2** for complete part number.
2. Discontinued April 2009

Table 10 Liebert XDV8 specifications

Models	XDV8BK [1] XDV8SK [1] XDV8DK [1, 2]	XDV8BT [1] XDV8ST [1] XDV8DT [1, 2]		XDV8BS [1] XDV8SS [1] XDV8SK [1, 2]
	60 Hz	60 Hz	50 Hz	50 Hz
Cooling Capacity	Nominal (92°F [33°C] EAT): 8kW / 2.3 Tons Maximum (95°F [35°C] EAT): 8.7kW / 2.5 Tons		Nominal (92°F [33°C] EAT): 7kW/ 2.0 Tons Maximum (103°F [39°C] EAT): 8.7kW/2.5Tons	
Conditions	Capacity rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point, rear air inlet.			
Electrical Requirements				
Input	120V model: 1ph-60 Hz	230V model: 1ph-60 Hz	230V model: 1ph-50 Hz	
Input power connections	2 power connections, each model			
Full Load Amps	120V model: 2.0A	230V model: 1.0A		
Power consumption, nominal, watts	180	190	190	190
Dimensions, in. (mm)				
Height – unit only	14 (355) not including pipe connections			
Height – including pipe connections	18-5/8 (473)			
Width	22-7/8 (581)			
Depth – Top	39-1/2 (1003)			
Depth – Bottom	29-5/8 (752)			
Weight, lb (kg)				
Unit only	77 (35)			
Shipping weight	125 (57)			
Installed, with refrigerant	79 (36)			
Number of Fans	2	2	2	2
Airflow, Nominal, ft^3/ min (m^3/ hr)	1000 (1699) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet		833 (1415) with rear inlet. Bottom inlet airflow may be less, depending on restrictions inside cabinet	
Audible noise	78 dBa sound power		73 dBa sound power	
Pipe Connections (without Liebert Flex Pipe)				
Refrigerant Supply from Liebert XDP/Liebert XDC	1/2" OD Cu, (optional 1/2" threaded coupler flex piping)			
Refrigerant Return to Liebert XDP/Liebert XDC	5/8" OD Cu, (optional 3/4" threaded coupler flex piping)			
Serviceable Parts	Fans and electrical components			
Cabinet Exterior Finish	Black, matte finish, heat-fused powder coat			
Options				
Condensate sensing (factory-installed), discontinued April 2009	Dry contact, 24VAC, 1A maximum			
Smart Module control board (factory-installed)	Dry contact, 24VAC, 1A maximum			
Pre-Charged Refrigerant	R-134a refrigerant, one-shot connections			
Agency				
Approvals	CSA 60Hz		CSA 50Hz	CE 50Hz

1. Refer to **Figure 2** for complete part number.
2. Discontinued April 2009.

Table 11 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)	186568G2	186567G2	7 (178)	8 (203)
	8 (2.5)	186568G3	186567G3		
	6 (1.8)	186568G1	186567G1		
	4 (1.2)	186568G4	186567G4		

Table 12 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 inches (mm)	
				Supply	Return
Liebert XD Flex Pipe Kit	10 (3.0)	187867G2	187866G2	7 (178)	9 (229)
	8 (2.5)	187867G3	187866G3		
	6 (1.8)	187867G1	187866G1		
	4 (1.2)	187867G4	187866G4		

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Web Site
www.liebert.com
Monitoring
800-222-5877
Liebert.monitoring@emerson.com
Outside the US: 614-841-6755
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800-222-5877
upstech@emersonnetworkpower.com
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powertech@emersonnetworkpower.com
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Outside the United States
614-888-0246

Locations
United States
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43229
Europe
Via Leonardo Da Vinci 8
Zona Industriale Tognana
35028 Piove Di Sacco (PD) Italy
+39 049 9719 111
Fax: +39 049 5841 257
Asia
7/F Dah Sing Financial Centre
108 Gloucester Road
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Hong Kong
852 2572 2201
Fax: 852 2519 9210

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