RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.

Installation and service must be performed by a licensed professional installer (or equivalent) or a service agency.

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

⚠ IMPORTANT

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HFCs, and HCFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

⚠ IMPORTANT

This unit must be matched with an indoor coil as specified in Lennox' Engineering Handbook. Coils previously charged with HCFC-22 must be flushed.

INSTALLATION INSTRUCTIONS

Elite® Series XP13 Units

HEAT PUMPS
505,327M
04/08
Supersedes 03/08

Technical Publications
Litho U.S.A.

Table of Contents

Shipping and Packing List

Check the unit for shipping damage and listed times below are intact. If damaged, or if parts are missing, immediately contact the last shipping carrier.

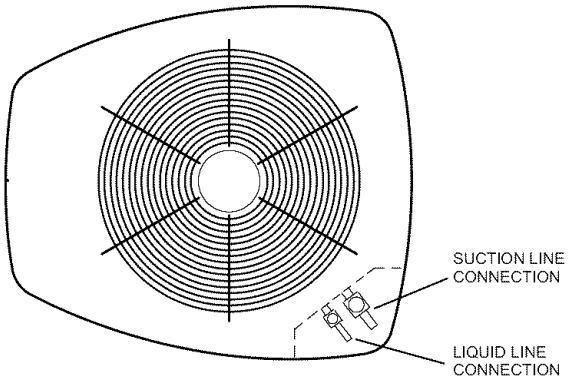
1 — Assembled XP13 outdoor unit

XP13 Heat Pumps

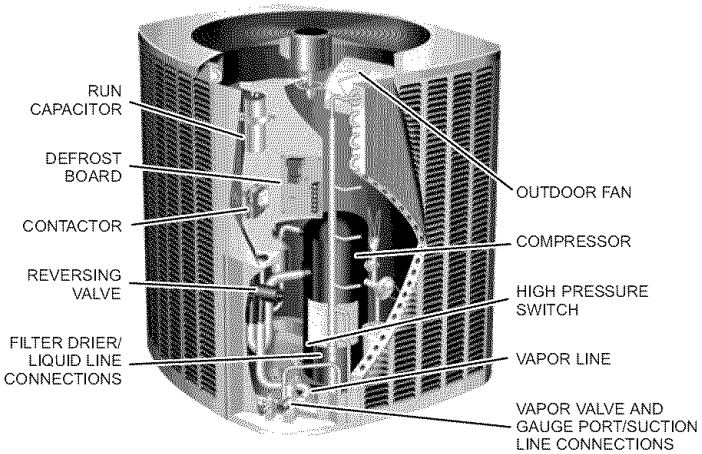
The XP13 Heat Pumps, which will also be referred to in this instruction as the outdoor unit, uses HFC-410A refrigerant. This outdoor unit must be installed with a matching indoor unit and line set as outlined in the *Lennox XP13 Engineering Handbook.*

This outdoor unit is designed for use in systems that use check thermal expansion valve (CTXV) refrigerant metering devices.

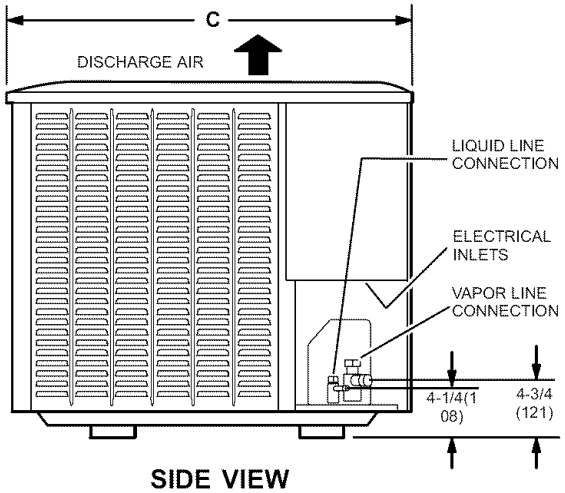
Unit Dimensions - Inches (mm) and Parts Arrangement



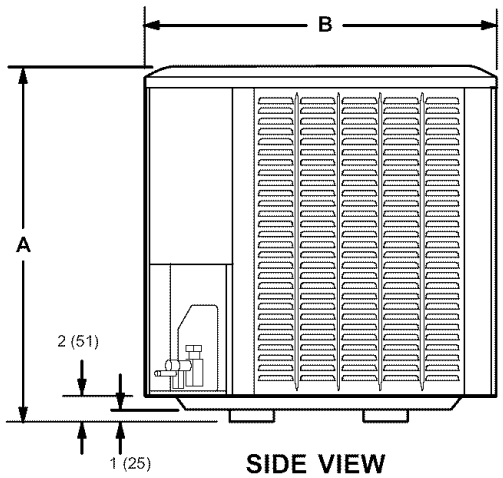
TOP VIEW



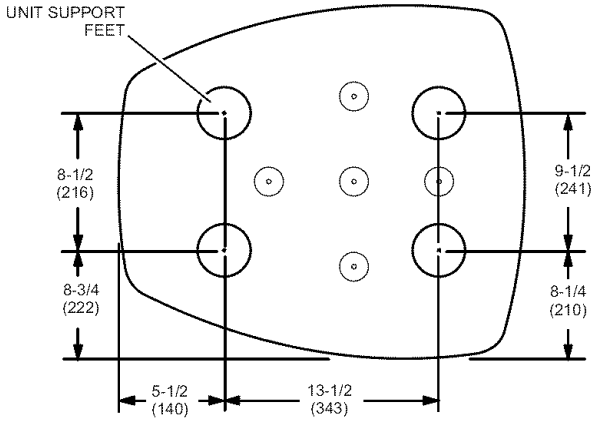
XP13 PARTS ARRANGEMENT



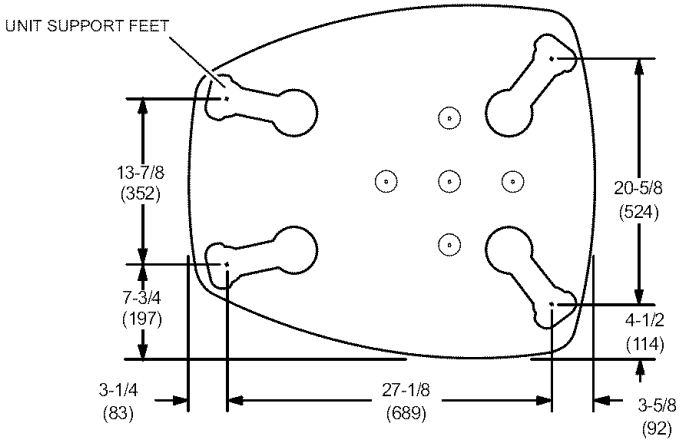
SIDE VIEW



SIDE VIEW



XP13-018, 024, 030 AND 036 BASE SECTION



XP13 BASE WITH ELONGATED LEGS

XP13	A	B	C
-018	31 (787)	27 (686)	28 (711)
-024	31 (787)	27 (686)	28 (711)
-030	31 (787)	27 (686)	28 (711)
-036	35 (889)	27 (686)	28 (711)
-042	35 (889)	30-1/2 (775)	35 (889)
-048	35 (889)	30-1/2 (775)	35 (889)
-060	45 (1143)	30-1/2 (775)	35 (889)

⚠ WARNING

This product and/or the indoor unit it is matched with may contain fiberglass wool.

Disturbing the insulation during installation, maintenance, or repair will expose you to fiberglass wool dust. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379-9900

General Information

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities who have jurisdiction before installation.

When servicing or repairing HVAC components, ensure the fasteners are appropriately tightened. Table 1 shows torque values for fasteners.

Table 1. Torque Requirements

Parts	Recommended Torque	
Service valve cap	8 ft.- lb.	11 NM
Sheet metal screws	16 in.- lb.	2 NM
Machine screws #10	28 in.- lb.	3 NM
Compressor bolts	90 in.- lb.	10 NM
Gauge port seal cap	8 ft.- lb.	11 NM

USING MANIFOLD GAUGE SETS

When checking the system charge, only use a manifold gauge set that features low loss anti-blow back fittings. See figure 2 for a typical manifold gauge connection setup.

Manifold gauge sets used with HFC-410A refrigerant systems must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0 - 800 on the high side and a low side of 30" vacuum to 250 psi with dampened speed to 500 psi. Gauge hoses must be rated for use at up to 800 psi of pressure with a 4000 psi burst rating.

OPERATING SERVICE VALVES

The liquid and vapor line service valves are used for removing refrigerant, flushing, leak testing, evacuating, checking charge and charging.

Each valve is equipped with a service port which has a factory-installed valve stem.

⚠ IMPORTANT

Only use Allen wrenches of sufficient hardness (50Rc - Rockwell Harness Scale minimum). Fully insert the wrench into the valve stem recess.

Service valve stems are factory-torqued (from 9 ft-lbs for small valves, to 25 ft-lbs for large valves) to prevent refrigerant loss during shipping and handling. Using an Allen wrench rated at less than 50Rc risks rounding or breaking off the wrench, or stripping the valve stem recess.

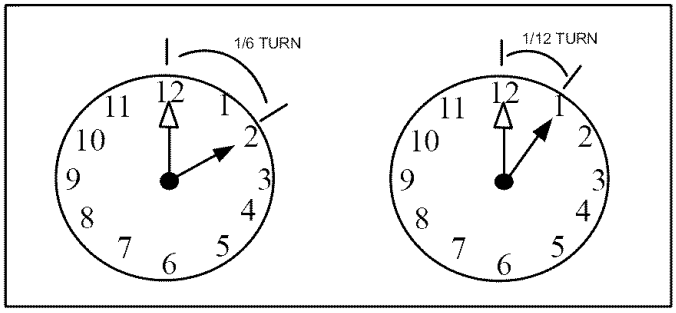


Figure 1. Cap Tightening Distances

⚠ IMPORTANT

To prevent stripping of the various caps used, the appropriately sized wrench should be used and fitted snugly over the cap before tightening.

To Access Angle-Type Service Port:

A service port cap protects the service port core from contamination and serves as the primary leak seal.

1. Remove service port cap with an appropriately sized wrench.
2. Connect gauge to the service port.
3. When testing is completed, replace service port cap and tighten as follows:
   - *With Torque Wrench*: Finger tighten and then tighten per table 1.
   - *Without Torque Wrench*: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise as illustrated in figure 1.

To Open and Close Angle-Type Service Valve:

A valve stem cap protects the valve stem from contamination and assures a leak-free seal.

1. Remove stem cap with an appropriately sized wrench.
2. Use a service wrench with a hex-head extension (3/16" for liquid-line valve sizes and 5/16" for vapor-line valve sizes) to back the stem out counterclockwise as far as it will go.
3. Replace the stem cap and tighten as follows:
   - With Torque Wrench: Tighten finger tight and then tighten per table 1.
   - Without Torque Wrench: Finger tighten and use an appropriately sized wrenched to turn an additional 1/12 turn clockwise as illustrated in figure 1.

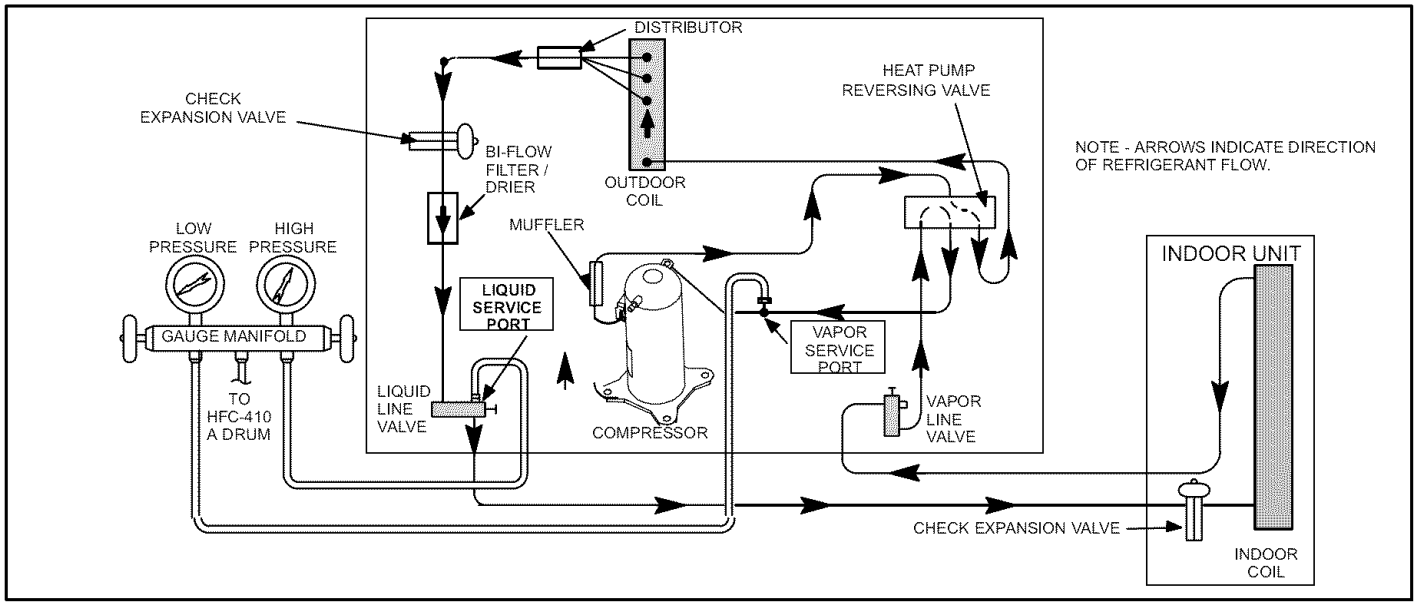


Figure 2. Typical Manifold Gauge Connection Setup

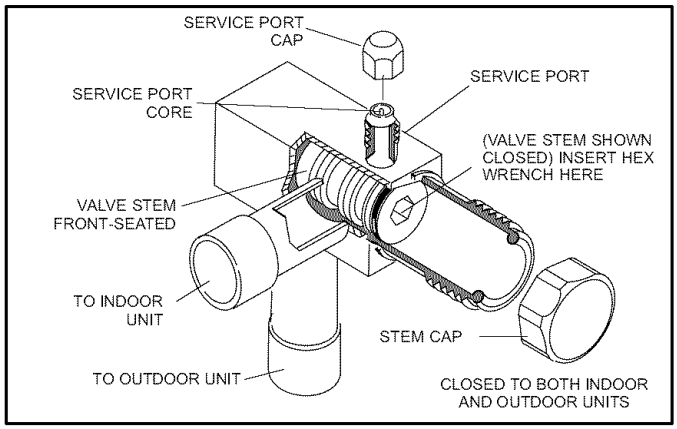


Figure 3. Angle-Type Service Valve (Font-Seated Closed)

NOTE - A label with specific torque requirements may be affixed to the stem cap. If the label is present, use the specified torque.

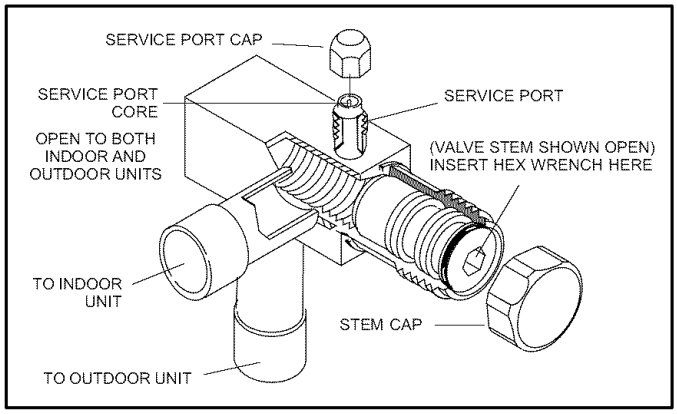


Figure 4. Angle-Type Service Valve (Back-Seated Opened)

NOTE- To prevent stripping of the cap, the wrench should be appropriately sized and fit snugly over the cap before tightening the cap.

To Access Ball-Type Service Port:

A service port cap protects the service port core from contamination and serves as the primary leak seal.

1. Remove service port cap with an appropriately sized wrench.
2. Connect gauge to the service port.
3. When testing is completed, replace service port cap and tighten as follows:
   - *With Torque Wrench*: Finger tighten and then tighten per table 1.
   - *Without Torque Wrench*: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise as illustrated in figure 1.

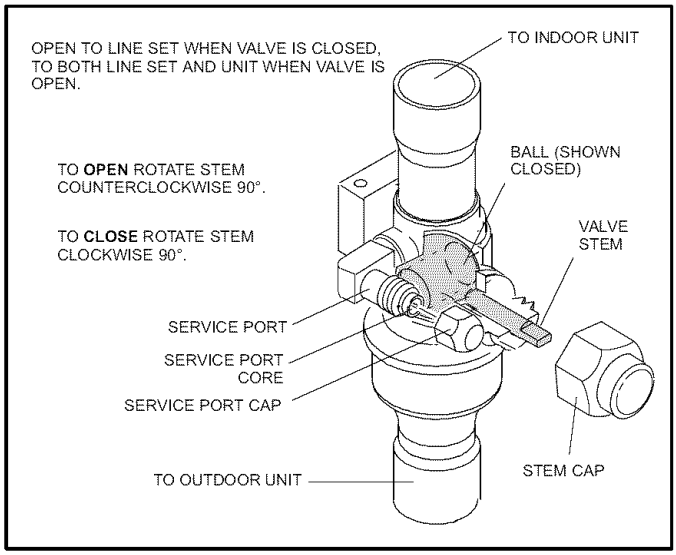


Figure 5. Ball-Type Service Valve

To Open and Close Ball-Type Service Valve:

A valve stem cap protects the valve stem from contamination and assures a leak-free seal.

1. Remove stem cap with an appropriately sized wrench.
2. Use an appropriately sized wrenched to open. To open valve, roate stem counterclockwise 90°. To close rotate stem clockwise 90°.
3. Replace the stem cap and tighten as follows:
   - *With Torque Wrench*: Finger tighten and then tighten per table 1.
   - *Without Torque Wrench*: Finger tighten and use an appropriately sized wrench to turn an additional 1/12 turn clockwise as illustrated in figure 1.

NOTE - A label with specific torque requirements may be affixed to the stem cap. If the label is present, use the specified torque.

Recovering Refrigerant from Existing System

Remove existing HCFC-22 refrigerant using one of the following procedures:

METHOD 1:

If the existing outdoor unit is not equipped with shut-off valves, or if the unit is not operational and you plan to use the existing HCFC-22 to flush the system.

NOTE - Use recovery machine instructions for specific setup requirements.

1. Disconnect all power to the existing outdoor unit.
2. Connect to the existing unit a gauge set, clean recovery cylinder and a recovery machine. Use the instructions provided with the recovery machine on how to setup the connections.
3. Remove all HCFC-22 refrigerant from the existing system. Check gauges after shutdown to confirm that the entire system is completely void of refrigerant.

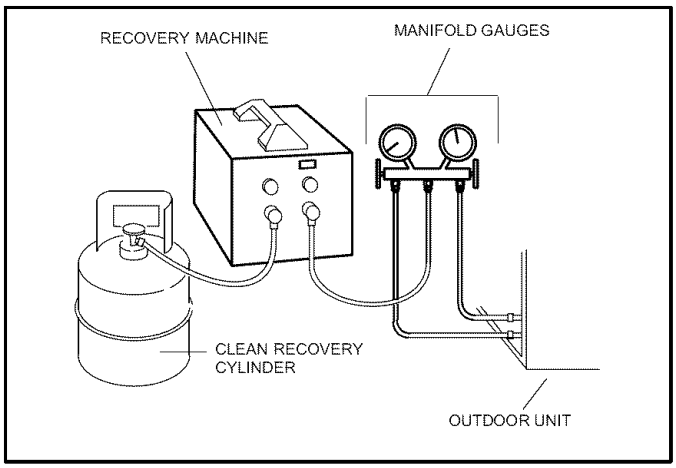


Figure 6. Typical Refrigerant Recovery (Method 1)

NOTE - Use recovery machine instructions for specific setup requirements.

METHOD 2:

Use this method if the existing outdoor unit is equipped with manual shut-off valves, and plan on using new HCFC-22 refrigerant to flush the system.

IMPORTANT: Some system configurations may contain higher than normal refrigerant charge due to either large internal coil volumes, and/or long line sets. The following conditions may cause the compressor to stop functioning:

The following devices could prevent full system charge recovery into the outdoor unit:

- Outdoor unit's high or low-pressure switches (if applicable) when tripped can cycled the compressor **OFF**.
- Compressor can stop pumping due to tripped internal pressure relief valve.
- Compressor has internal vacuum protection that is designed to unload the scrolls (compressor stops pumping) when the pressure ratio meets a certain value or when the suction pressure is as high as 20 psig. (Compressor suction pressures should never be allowed to go into a vacuum. Prolonged operation at low suction pressures will result in overheating of the scrolls and permanent damage to the scroll tips, drive bearings and internal seals).

Once the compressor can not pump down to a lower pressure due to one of the above system conditions, shut off the suction valve. Turn OFF the main power to unit and use a recovery machine to recover any refrigerant left in the indoor coil and line set.

Perform the following task:

1. Start the existing HCFC-22 system in the cooling mode and close the liquid line valve.
2. Pump as much of the existing HCFC-22 refrigerant with the compressor back into the outdoor unit until you have reached the limitations of the outdoor system. Turn the outdoor unit main power **OFF** and use a recovery machine to remove the remaining refrigerant in the system.

NOTE - It may be necessary to bypass the low pressure switches if equipped to ensure complete refrigerant evacuation.

3. When the low side system pressures reach 0 psig, close the suction line valve.
4. Check gauges after shutdown to confirm that the valves are not allowing refrigerant to flow back into the low side of the system.

Removing Existing Outdoor Unit

Perform the following task at the existing outdoor unit:

- Disconnect line set at the service valves.
- Disconnect electrical service at the disconnect switch.
- Remove old outdoor unit.

Positioning New Outdoor Unit

⚠ CAUTION

In order to avoid injury, take proper precaution when lifting heavy objects.

See *Unit Dimensions* on page 3 for sizing mounting slab, platforms or supports. Refer to figure 7 for mandatory installation clearance requirements.

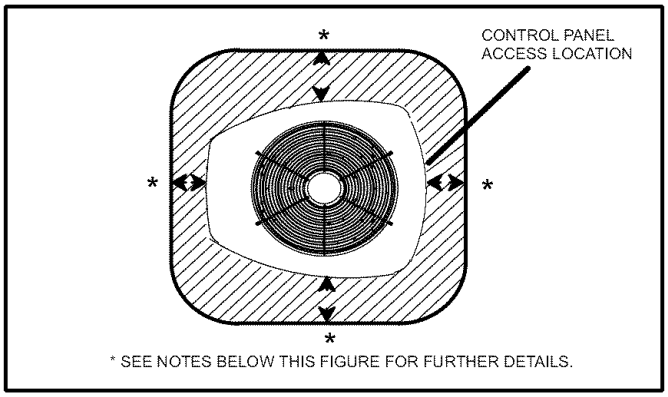


Figure 7. Installation Clearances

NOTES:

- Service clearance of 30 in. (762 mm) must be maintained on one of the sides adjacent to the control box.
- Clearance to one of the other three sides must be 36 in. (914 mm)·
- Clearance to one of the remaining two sides may be 12 in. (305 mm) and the final side may be 6 in. (152 mm)·
- 48 in. (1219 mm) clearance required on top of unit.
- A clearance of 24 in. (610 mm) must be maintained between two units.

POSITIONING CONSIDERATIONS

Consider the following when positioning the unit:

- Some localities are adopting sound ordinances based on the unit's sound level registered from the adjacent property, not from the installation property. Install the unit as far as possible from the property line.
- When possible, do not install the unit directly outside a window. Glass has a very high level of sound transmission. For proper placement of unit in relation to a window see the provided illustration in figure 8.

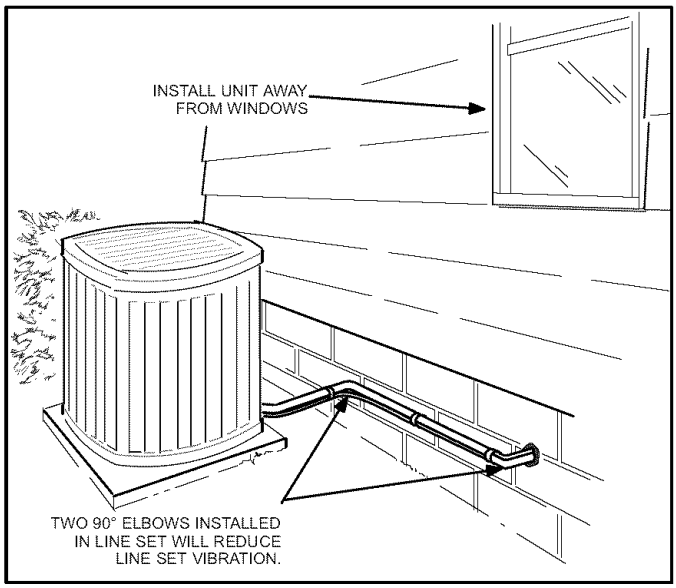


Figure 8. Outside Unit Placement

PLACING UNIT ON SLAB

When installing unit at grade level, the top of the slab should be high enough above grade so that water from higher ground will not collect around the unit. The slab should have a slope tolerance as described in figure 9.

NOTE - If necessary for stability, anchor unit to slab as described in Stabilizing Unit on Uneven Surfaces on page 7.

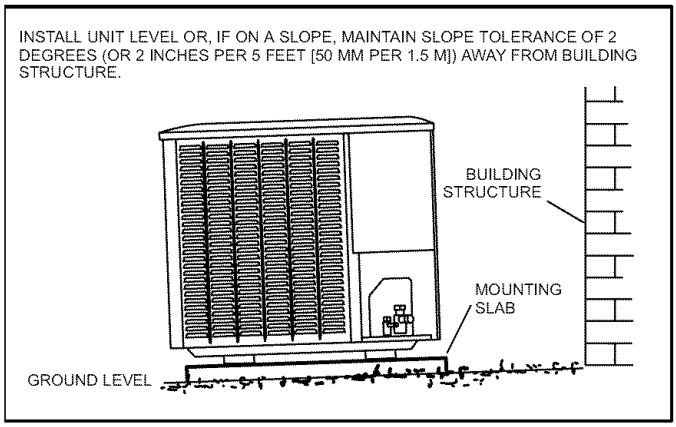


Figure 9. Slab Mounting at Ground Level

ELEVATING THE UNIT (SMALL-BASE UNITS)

If additional elevation is necessary, raise the unit by extending the length of the unit support feet. This may be done by cutting four equal true-cut lengths of Schedule (SCH) 40, 4" (101.6mm) piping to the height required as illustrated in figure 10.

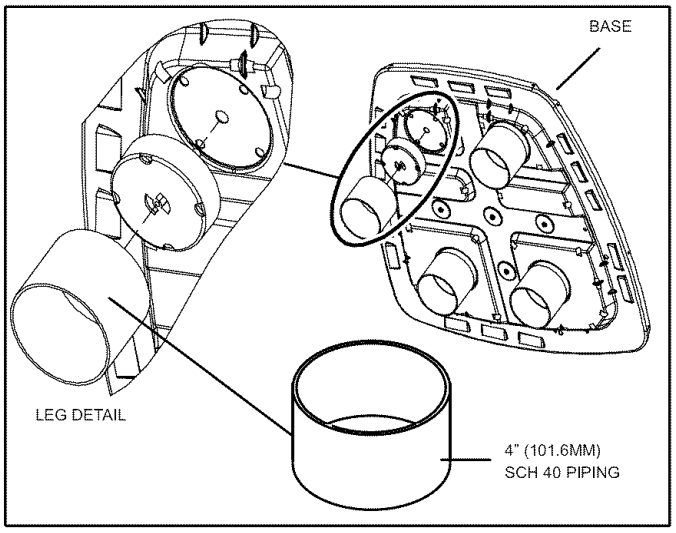


Figure 10. Elevated Slab Mounting using Feet Extenders (Small Base Units)

NOTE - Keep the height of extenders short enough to ensure a sturdy installation. If it is necessary to extend further, consider a different type of field-fabricated framework that is sturdy enough for greater heights.

The inside diameter of the 4" (101.6mm) piping is approximately 0.25" (6.35mm) greater than the pre-installed feet on the unit. Devise a shim that will take up the space and hold the extenders onto the feet during this procedure. Small strips of 0.125" (3.175mm) thick adhesive foam may be used. One or two small 1" (25.4mm) square strips should be adequate to hold the extender in place.

ELEVATING THE UNIT (LARGER-BASE UNITS)

Unlike the small-base units which use round support feet, the larger-base units are outfitted with elongated support feet as illustrated in figure 11 which uses a similar method for elevating the unit.

If additional elevation is necessary, raise the unit by extending the length of the unit support feet. This may be achieved by using a 2" SCH 40 female threaded adapter.

The specified coupling will fit snuggly into the recessed portion of the feet. Use additional 2" SCH 40 male threaded adaptors which can be threaded into the female threaded adaptors to make additional adjustments to the level of the unit.

NOTE - Keep the height of extenders short enough to ensure a sturdy installation. If it is necessary to extend further, consider a different type of field-fabricated framework that is sturdy enough for greater heights.

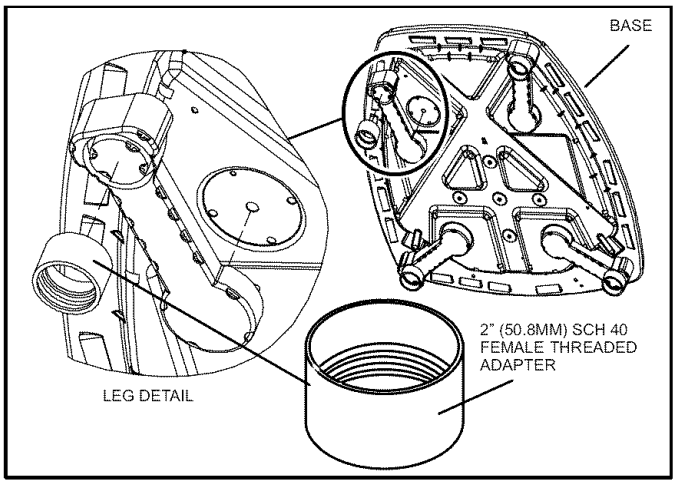


Figure 11. Elevated Slab Mounting using Feet Extenders (Larger Base Units)

ROOF MOUNTING

Install unit at a minimum of four inches above the surface of the roof. Care must be taken to ensure weight of unit is properly distributed over roof joists and rafters. Either redwood or steel supports are recommended.

Removing and Installing Panels

⚠ CAUTION

To prevent personal injury, or damage to panels, unit or structure, be sure to observe the following:

While installing or servicing this unit, carefully stow all removed panels out of the way, so that the panels will not cause injury to personnel, nor cause damage to objects or structures nearby, nor will the panels be subjected to damage (e.g., being bent or scratched).

While handling or stowing the panels, consider any weather conditions, especially windy conditions, that may cause panels to be blown around and battered.

REMOVING PANELS

Remove the louvered panels as follows:

1. Remove two screws, allowing the panel to swing open slightly as illustrated in figure 12.

NOTE - Hold the panel firmly throughout this procedure

2. Rotate bottom corner of panel away from hinge corner post until lower three tabs clear the slots as illustrated in figure 12, detail B.
3. Move panel down until lip of upper tab clears the top slot in corner post as illustrated in figure 12, detail A.

INSTALLING PANEL

Install the louvered panels as follows:

1. Position the panel almost parallel with the unit as illustrated in figure 13, detail D with the screw side as close to the unit as possible.
2. With a continuous motion slightly rotate and guide the lip of top tab inward as illustrated in figure 12, details A and C, then upward into the top slot of the hinge corner post.
3. Rotate panel to vertical to fully engage all tabs.
4. Holding the panel's hinged side firmly in place, close the right-hand side of the panel, aligning the screw holes.
5. When panel is correctly positioned and aligned, insert the screws and tighten.

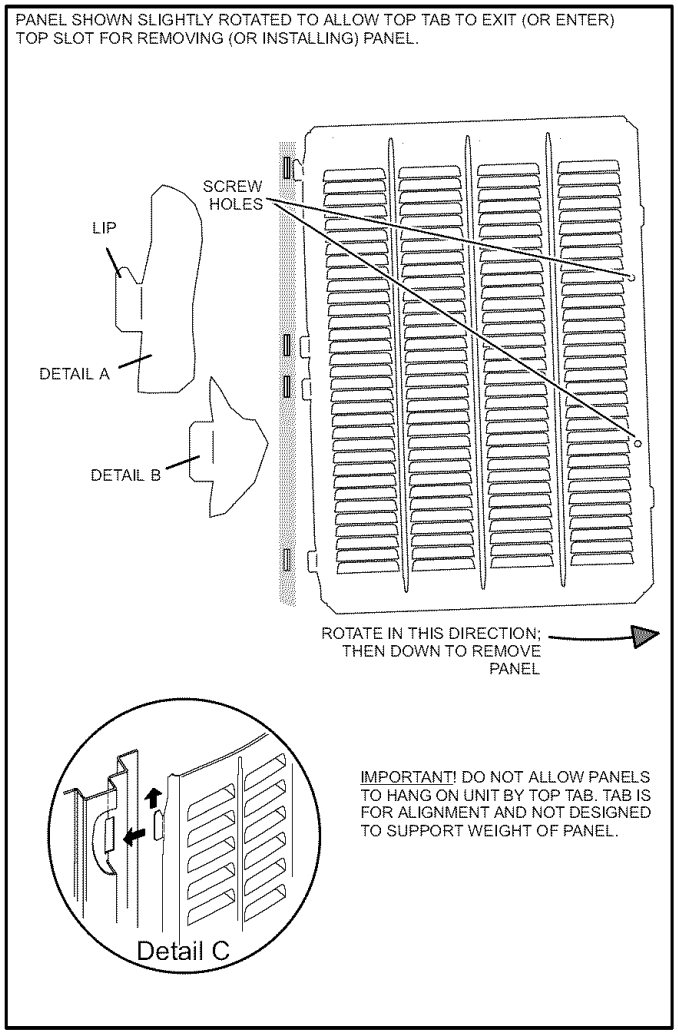


Figure 12. Removing/Installing Louvered Panels (Details A, B and C)

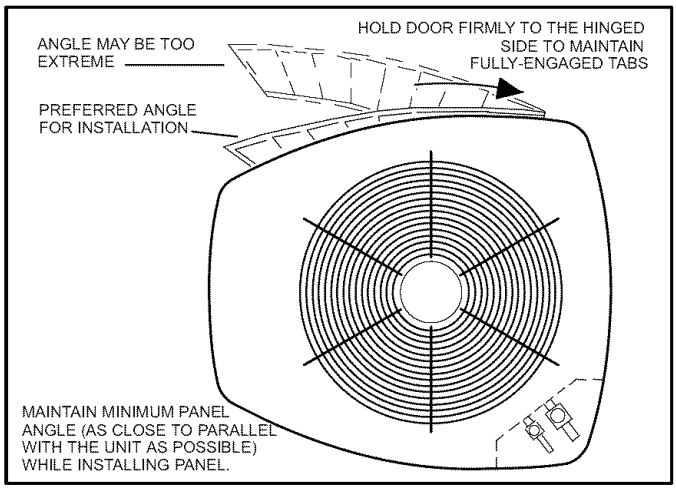


Figure 13. Removing/Installing Louvered Panels (Detail D)

STABILIZING UNIT ON UNEVEN SURFACES

To help stabilize an outdoor unit, some installations may require strapping the unit to the pad using brackets and anchors commonly available in the marketplace.

With unit positioned at installation site, remove two side louvered panels to expose the unit base pan. Install the brackets as illustrated in figure 14 using conventional practices; replace the panels after installation is complete.

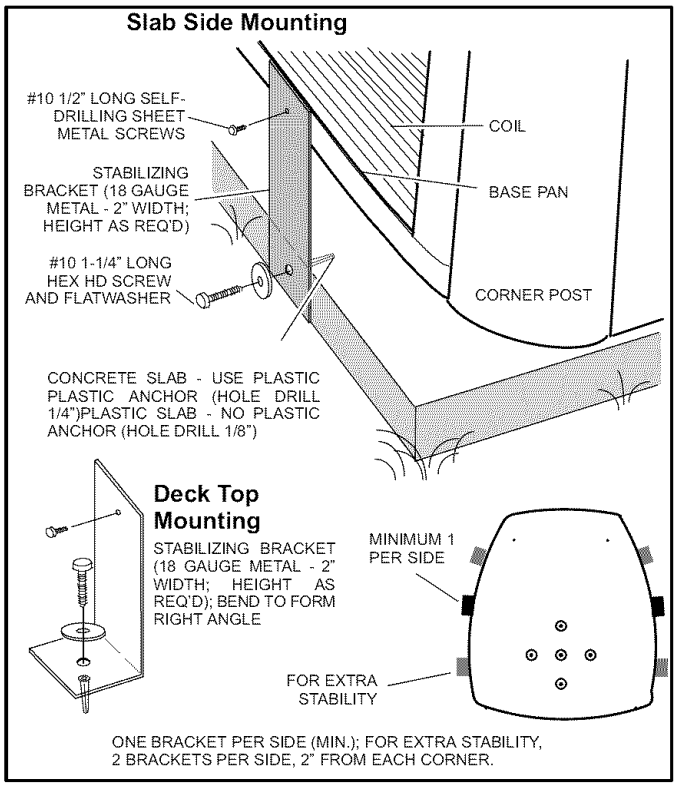


Figure 14. Installing Stabilizer Brackets

⚠ IMPORTANT

Unit Stabilizer Bracket Use (field-provided):

Always use stabilizers when unit is raised above the factory height. (Elevated units could become unstable in gusty wind conditions).

Stabilizers may be used on factory height units when mounted on unstable an uneven surface.

New or Replacement Line Set

This section provides information on installation or replacement of existing line set. If line set are not being installed then proceed to *Brazing Connections* on page 10.

If refrigerant lines are routed through a wall, seal and isolate the opening so vibration is not transmitted to the building. Pay close attention to line set isolation during installation of any HVAC system. When properly isolated from building structures (walls, ceilings. floors), the refrigerant lines will not create unnecessary vibration and subsequent sounds. Also, consider the following when placing and installing a high-efficiency air conditioner.

REFRIGERANT LINE SET

Field refrigerant piping consists of liquid and suction lines from the outdoor unit (braze connections) to the indoor unit coil (flare or sweat connections). Use Lennox L15 (sweat, non-flare) series line set, or use field-fabricated refrigerant lines as listed in table 2.

Table 2. Refrigerant Line Set

Model	Field Connections		Recommended Line Set		
	Liquid Line	Suction Line	Liquid Line	Suction Line	L15 Line Set
-018 -024 -030 -036	3/8". (10 mm)	3/4" (19 mm)	3/8" (10 mm)	3/4" (19 mm)	L15-41 15 ft. - 50 ft. (4.6 m - 15 m)
-042 -048	3/8". (10 mm)	7/8" (22 mm)	3/8" (10 mm)	7/8" (22 mm)	L15-65 15 ft. - 50 ft. (4.6 m - 15 m)
-060	3/8". (10 mm)	1-1/8". (29 mm)	3/8" (10 mm)	1-1/8" (29 mm)	Field Fabricated

NOTE - When installing refrigerant lines longer than 50 feet, see the Lennox Refrigerant Piping Design and Fabrication Guidelines, or contact Lennox Technical Support Product Applications for assistance. To obtain the correct information from Lennox, be sure to communicate the following points:

- Model (XP13) and size of unit (e.g. -060).
- Line set diameters for the unit being installed as listed in table 2 and total length of installation.
- Number of elbows and if there is a rise or drop of the piping.

MATCHING WITH NEW OR EXISTING INDOOR COIL AND LINE SET

The RFC1-metering line consisted of a small bore copper line that ran from condenser to evaporator coil. Refrigerant was metered into the evaporator by utilizing temperature/pressure evaporation effects on refrigerant in the small RFC line. The length and bore of the RFC line corresponded to the size of cooling unit.

If the XP13 is being used with either a new or existing indoor coil which is equipped with a liquid line which served as a metering device (RFCI), the liquid line must be replaced prior to the installation of the XP13 unit. Typically a liquid line used to meter flow is 1/4" in diameter and copper.

INSTALLING LINE SET

Line Set Isolation—This reference illustrates procedures, which ensure proper refrigerant line set isolation:

- Installation of **line set on horizontal runs** is illustrated in figure 15.
- Installation of **line set on vertical runs** is illustrated in figure 16.
- Installation of a **transition from horizontal to vertica**l is illustrated in figure 17.

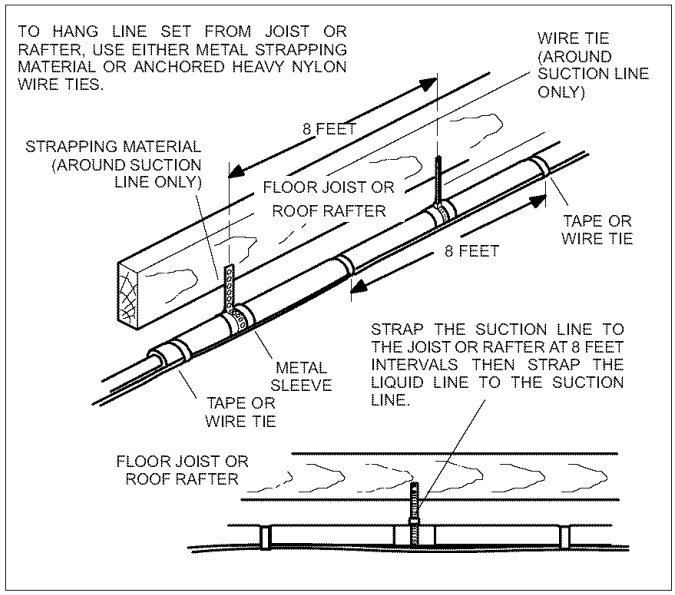


Figure 15. Refrigerant Line Set: Installing Horizontal Runs

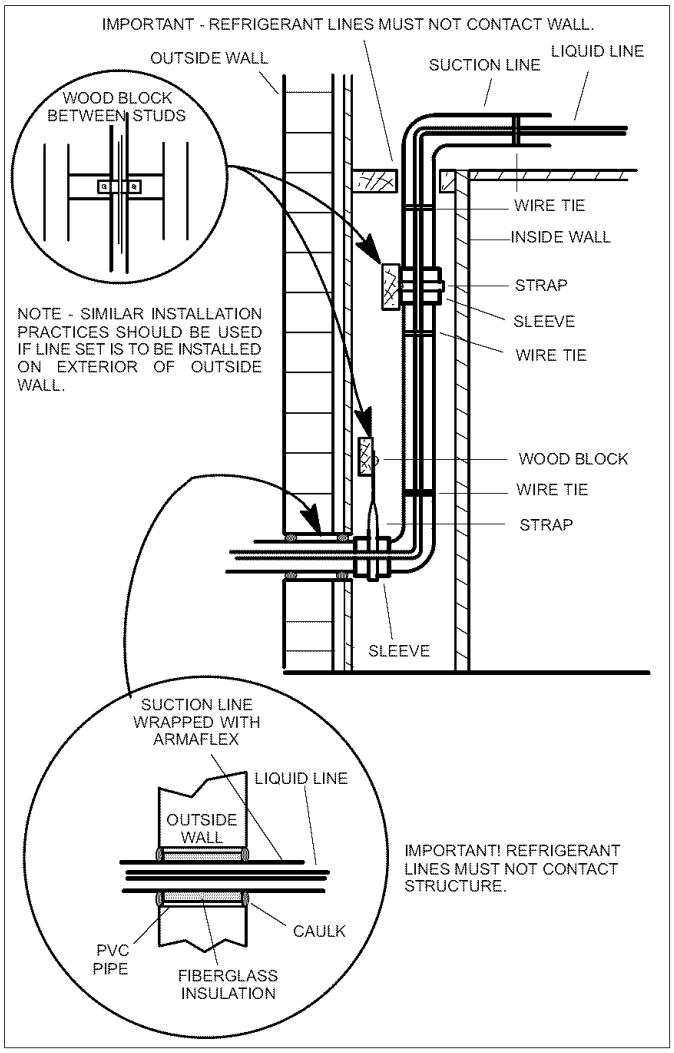


Figure 16. Refrigerant Line Set: Installing Vertical Runs (New Construction Shown)

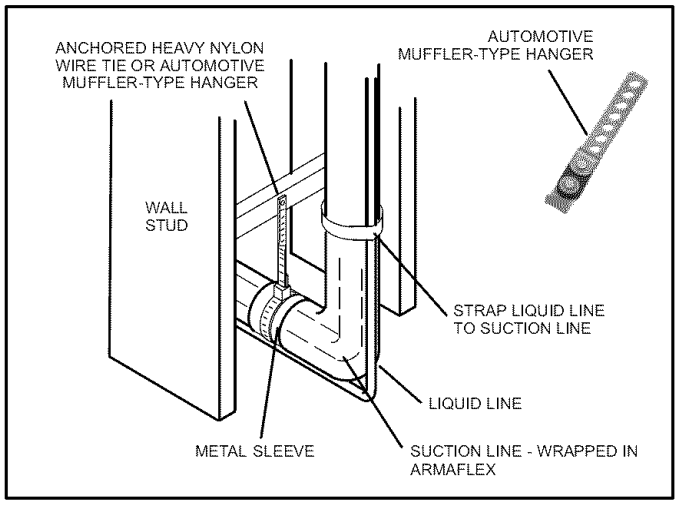


Figure 17. Refrigerant Line Set: Transition from Vertical to Horizontal

Brazing Connections

Use the following procedure to braze the line set to the new air conditioner unit. Figure 18 is provided as a general guide for preparing to braze the line set to the air conditioner unit.

⚠ WARNING

Danger of fire. Bleeding the refrigerant charge from only the high side may result in the low side shell and suction tubing being pressurized. Application of a brazing torch while pressurized may result in ignition of the refrigerant and oil mixture - check the high and low pressures before unbrazing.

⚠ WARNING

When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

1. Cut ends of the refrigerant lines square (free from nicks or dents). Debur the ends. The pipe must remain round, do not pinch end of the line.
2. Remove service cap and core from both the suction and liquid line service ports.
3. Connect gauge low pressure side to liquid line service valve.
4. To protect components during brazing, wrap a wet cloth around the liquid line service valve body and copper tube stub and use another wet cloth underneath the valve body to protect the base paint. Also, shield the light maroon R-410A sticker.

⚠ WARNING

Polyol ester (POE) oils used with HFC-410A refrigerant absorb moisture very quickly. It is very important that the refrigerant system be kept closed as much as possible. DO NOT remove line set caps or service valve stub caps until you are ready to make connections.

5. Flow regulated nitrogen (at 1 to 2 psig) through the refrigeration gauge set into the valve stem port connection on the liquid line service valve and out of the valve stem port connection on the suction service valve.

NOTE - The RFCIV or TXV metering device at the indoor unit will allow low pressure nitrogen to flow through the system.)

NOTE - Use silver alloy brazing rods with five or six percent minimum silver alloy for copper-to-copper brazing or 45 percent silver alloy for copper-to-brass or copper-to-steel brazing.

6. Braze the liquid line to the liquid line service valve. Turn off nitrogen flow. Repeat procedure starting at paragraph 4 for brazing the suction line to the suction service valve.

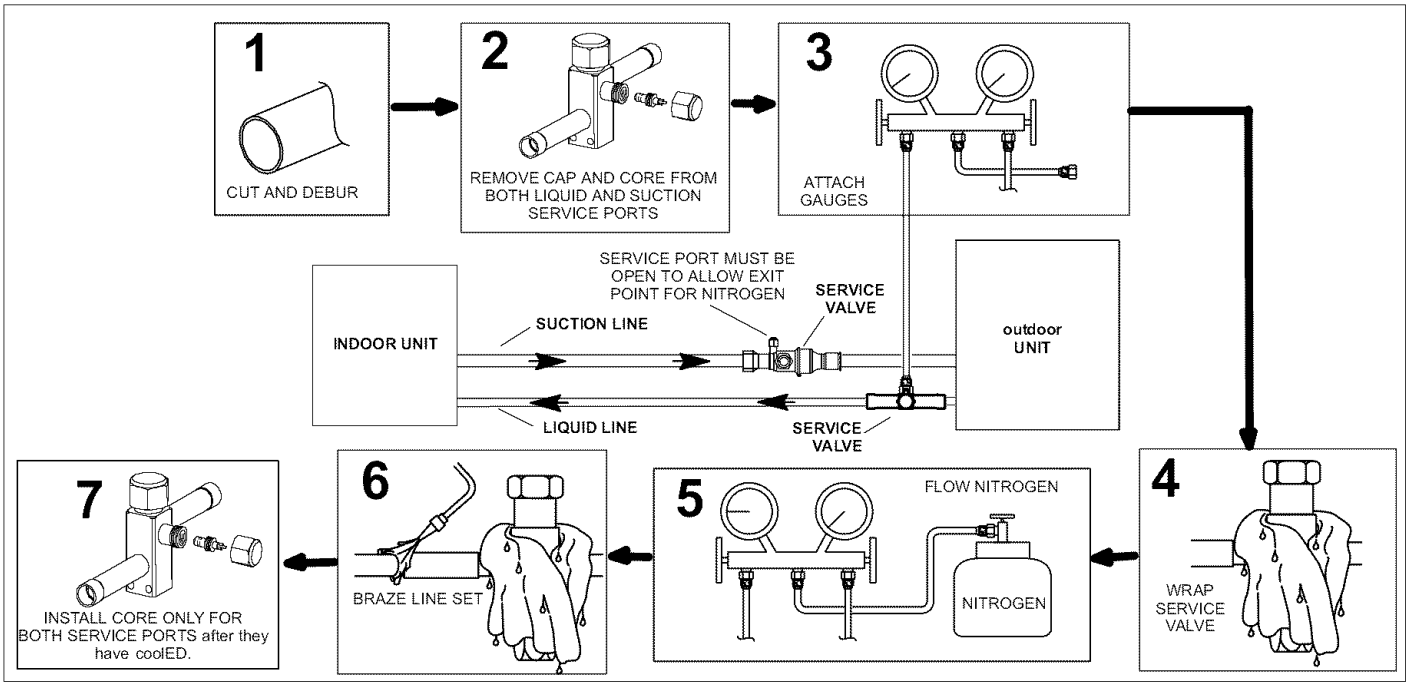


Figure 18. Brazing Connections

7. After all connections have been brazed, disconnect manifold gauge set the from service ports and remove wrapping. Reinstall the service port core for both of the outdoor unit's service valves.

Removing Indoor Unit Metering Device

Remove the existing HCFC-22 refrigerant flow control orifice or thermal expansion valve from the indoor coil. The existing indoor unit HCFC-22 metering device is not approved for use with HFC-410A refrigerant and may prevent proper flushing.

REPLACEMENT PARTS

If replacement parts are necessary for the indoor unit, order kit 69J46. The kit includes:

- 10 — Brass nuts for liquid line assemblies
- 20 — Teflon rings
- 10 — Liquid line orifice housings
- 10 — Liquid line assemblies

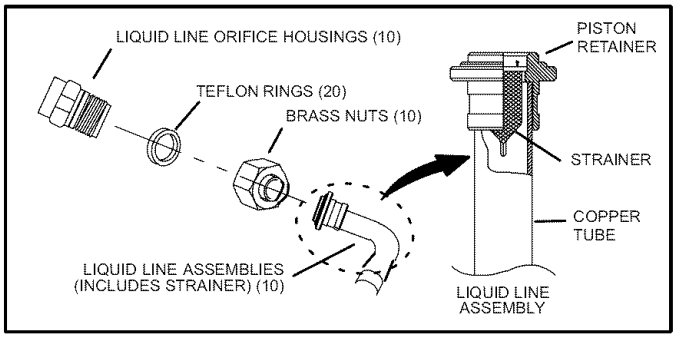


Figure 19. 69J46 Kit Components

TYPICAL FIXED ORIFICE REMOVAL PROCEDURE

1. On fully cased coils, remove the coil access and plumbing panels.
2. Remove any shipping clamps holding the liquid line and distributor assembly.
3. Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.
4. Remove and discard fixed orifice, valve stem assembly if present and Teflon washer as illustrated in figure 20.
5. Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

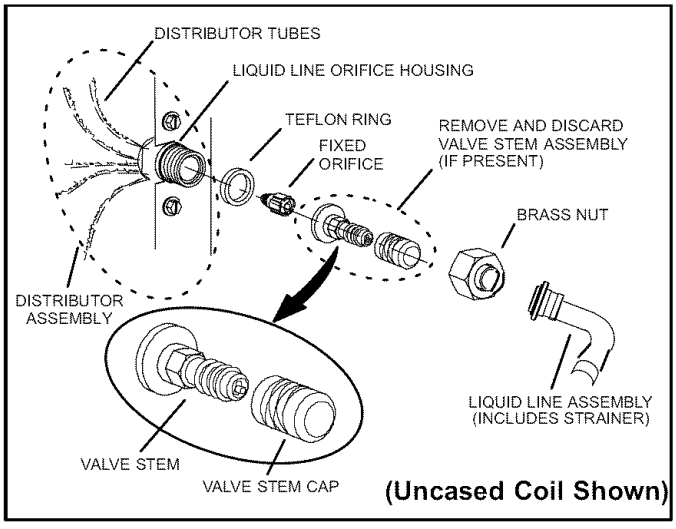


Figure 20. Typical Fixed Orifice Removal

TYPICAL TXV REMOVAL PROCEDURE

1. On fully cased coils, remove the coil access and plumbing panels.
2. Remove any shipping clamps holding the liquid line and distributor assembly.
3. Disconnect the equalizer line from the TXV equalizer line fitting on the suction line.

4. Remove the suction line sensing bulb as illustrated in figure 21.
5. Disconnect the liquid line from the TXV at the liquid line assembly.

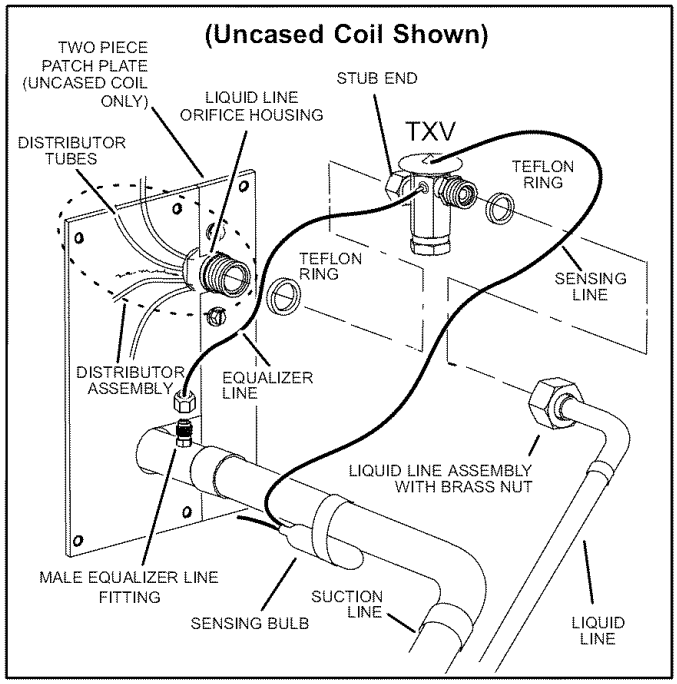


Figure 21. Typical TXV Removal

6. Disconnect the TXV from the liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.
7. Remove and discard TXV and the two Teflon rings as illustrated in figure 21.
8. Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

Flushing the System

⚠ IMPORTANT

The line set and indoor unit coil must be flushed with at least the same amount of clean refrigerant that previously charged the system. Check the charge in the flushing cylinder before proceeding.

⚠ CAUTION

This procedure should not be performed on systems which contain contaminants (Example: compressor burn out).

⚠ IMPORTANT

The Environmental Protection Agency (EPA) prohibits the intentional venting of HFC refrigerants during maintenance, service, repair and disposal of appliance. Approved methods of recovery, recycling or reclaiming must be followed.

⚠ IMPORTANT

If this unit is being matched with an approved line set or indoor unit coil which was previously charged with mineral oil, or if it is being matched with a coil which was manufactured before January of 1999, the coil and line set must be flushed prior to installation. Take care to empty all existing traps. Polyol ester (POE) oils are used in Lennox units charged with HFC-410A refrigerant. Residual mineral oil can act as an insulator, preventing proper heat transfer. It can also clog the expansion device, and reduce the system performance and capacity.
Failure to properly flush the system per the instructions below will void the warranty.

If the original system used:

- HCFC-22 refrigerant, then flush the system using the procedure provided in this section.
- HFC-410A refrigerant, then proceed to *Installing New Refrigerant Metering Device*.

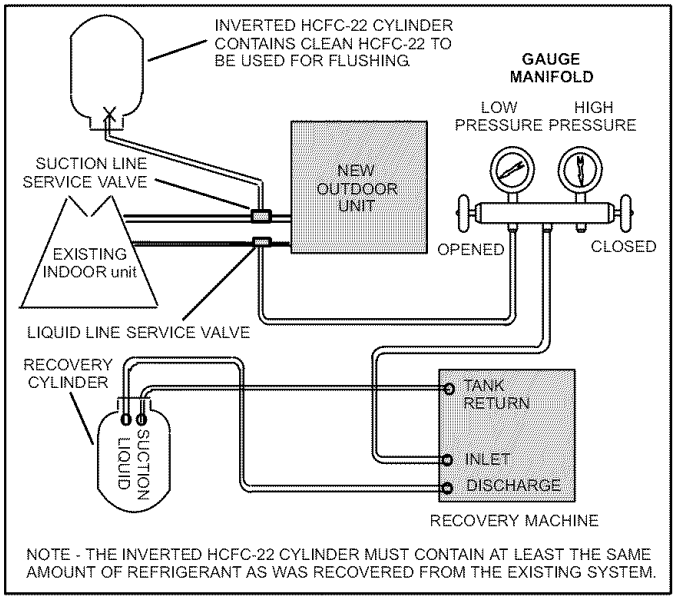


Figure 22. Typical Flushing Connection

REQUIRED EQUIPMENT

Equipment required to flush the existing line set and indoor unit coil:

- Two clean HCFC-22 recovery bottles,
- Oilless recovery machine with pump-down feature,
- Two gauge sets (one for HCFC-22; one for HFC-410A).

FLUSHING PROCEDURE

1. Connect the following:
   - HCFC-22 cylinder with clean refrigerant to the suction service valve,
   - HCFC-22 gauge set to the liquid line valve,
   - Recovery machine with an empty recovery tank to the gauge set.
2. Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to

allow the recovery machine to pull a vacuum on the existing system line set and indoor unit coil.

3. Invert the cylinder of clean HCFC-22 and open its valve to allow liquid refrigerant to flow into the system through the suction line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor unit coil before it enters the recovery machine.
4. After all of the liquid refrigerant has been recovered, switch the recovery machine to suction recovery so that all of the HCFC-22 suction is recovered. Allow the recovery machine to pull a vacuum on the system.
5. Close the valve on the inverted HCFC-22 drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

Installing New Indoor Metering Device

XP13 units use CTXV for metering refrigerant only. This section provides instructions on installing CTXV refrigerant metering device.

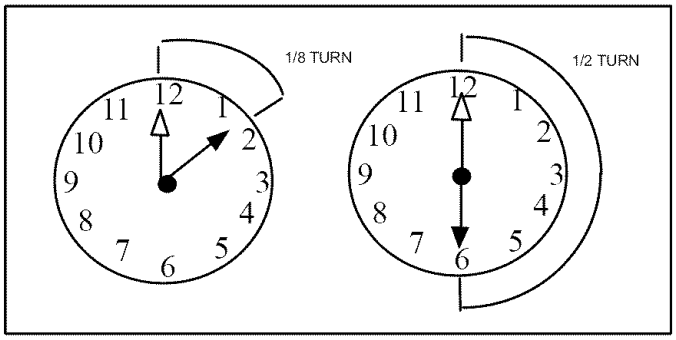


Figure 23. Tightening Distance

TYPICAL CTXV INSTALLATION PROCEDURE

The CTXV unit can be installed internal or external to the indoor coil. In applications where an uncased coil is being installed in a field-provided plenum, install the CTXV in a manner that will provide access for field servicing of the CTXV. Refer to Figure 24 for reference during installation of CTXV unit.

1. Remove the field-provided fitting that temporary reconnected the liquid line to the indoor unit's distributor assembly.
2. Install one of the provided Teflon rings around the stubbed end of the CTXV and lightly lubricate the connector threads and expose surface of the Teflon ring with refrigerant oil.
3. Attach the stubbed end of the CTXV to the liquid line orifice housing. Finger tighten and use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in figure 23, or 20 ft-lb.
4. Place the remaining Teflon washer around the other end of the CTXV. Lightly lubricate connector threads and expose surface of the Teflon ring with refrigerant oil.
5. Attach the liquid line assembly to the CTXV. Finger tighten and use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in figure 23, or 20 ft-lb.
6. Attach the suction line sensing bulb in the proper orientation as illustrated in figure 25 using the clamp and screws provided.

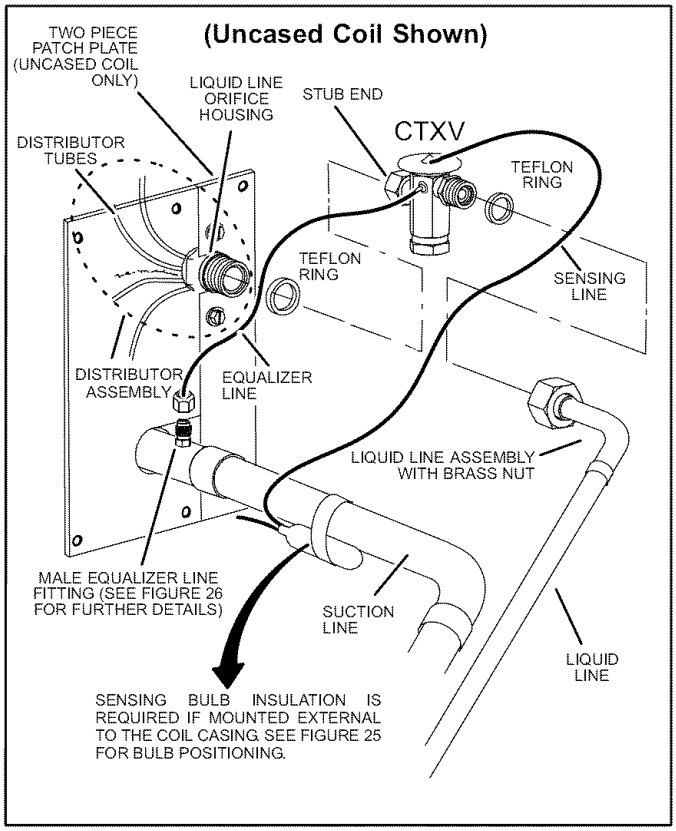


Figure 24. Typical TXV Installation

NOTE - Insulating the sensing bulb once installed may be required when the bulb location is external to the coil casing.

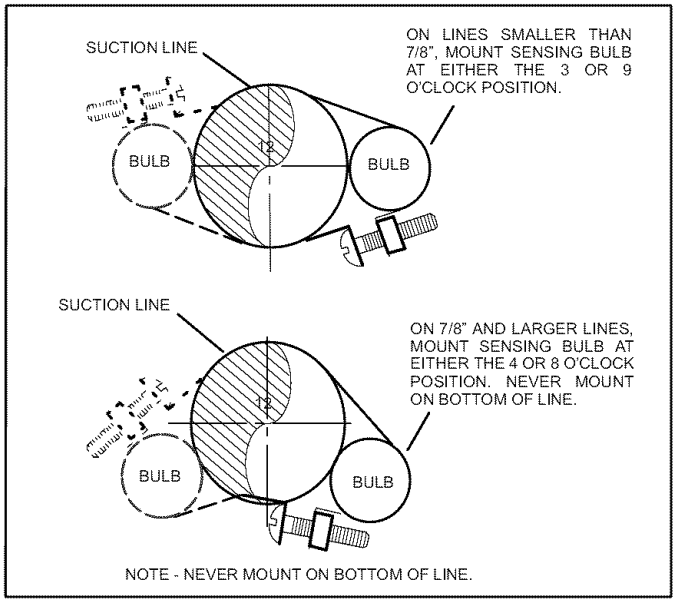


Figure 25. TXV Sensing Bulb Installation

7. Remove and discard either the flare seal cap or flare nut with copper flare seal bonnet from the equalizer line port on the suction line as illustrated in figure 26.

⚠ IMPORTANT

When removing the flare nut, ensure that the copper flare seal bonnet is removed.

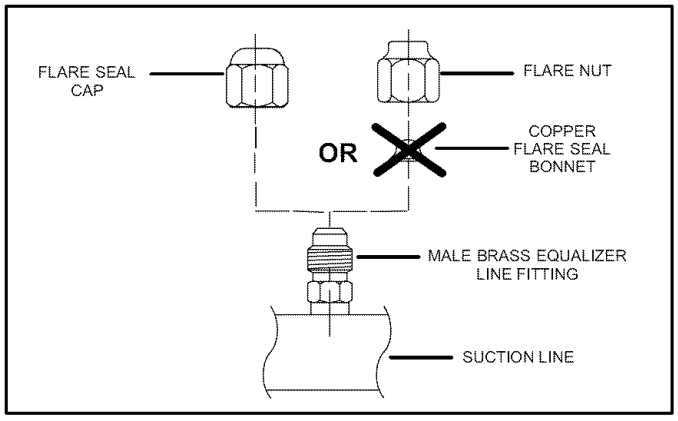


Figure 26. Copper Flare Seal Bonnet Removal

8. Connect the equalizer line from the TXV to the equalizer suction port on the suction line. Finger tighten the flare nut plus 1/8 turn (7 ft-lbs) as illustrated in figure 23.

NOTE - To prevent any possibility of water damage, properly insulate all parts of the TXV assembly that may sweat due to temperature differences between the valve and its surrounding ambient temperatures.

See the XP13 *Engineering Handbook* for approved CTXV kit match-ups and application information.

The reference CTXV kits include:

1 — CTXV

2 — Teflon rings

1 — 1 1/4" wide copper mounting strap for sensing bulb

2 — #10 hex head bolts and nuts for securing sensing bulb

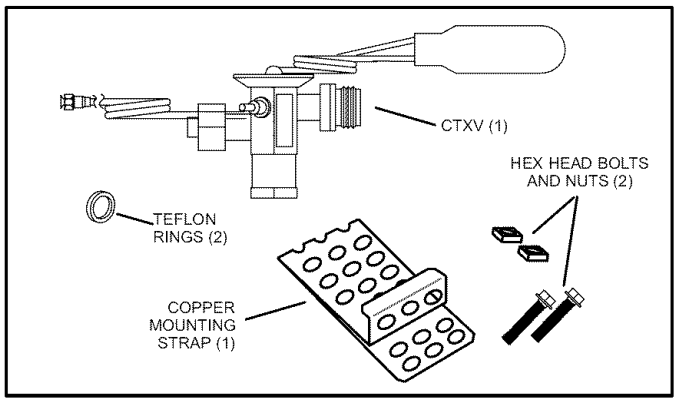


Figure 27. CTXV Kit Components

Testing for Leaks

After the line set has been connected to the indoor unit and air conditioner, check the line set connections and indoor unit for leaks. Use the following procedure to test for leaks:

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

⚠ WARNING

Refrigerant can be harmful if it is inhaled. Refrigerant must be used and recovered responsibly.

Failure to follow this warning may result in personal injury or death.

⚠ WARNING

When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

⚠ WARNING

Fire, Explosion and Personal Safety Hazard.

Failure to follow this warning could result in damage, personal injury or death.

Never use oxygen to pressurize or purge refrigeration lines. Oxygen, when exposed to a spark or open flame, can cause damage by fire and/ or an explosion, that could result in personal injury or death.

1. Connect an HFC-410A manifold gauge set high pressure hose to the suction valve service port. *(Normally, the high pressure hose is connected to the liquid line port; however, connecting it to the suction port better protects the manifold gauge set from high pressure damage.)*
2. With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set. Open the valve on the HFC-410A cylinder (suction only).
3. Open the high pressure side of the manifold to allow HFC-410A into the line set and indoor unit. Weigh in a trace amount of HFC-410A. *[A trace amount is a maximum of two ounces (57 g) refrigerant or three pounds (31 kPa) pressure].* Close the valve on the HFC-410A cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect the HFC-410A cylinder.

4. Connect a cylinder of dry nitrogen with a pressure regulating valve to the center port of the manifold gauge set.
5. Adjust dry nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set in order to pressurize the line set and the indoor unit.
6. After a few minutes, open one of the service valve ports and verify that the refrigerant added to the system earlier is measurable with a leak detector.
7. After leak testing disconnect gauges from service ports.

Evacuating the System

Evacuating the system of non-condensables is critical for proper operation of the unit. Non-condensables are defined as any gas that will not condense under temperatures and pressures present during operation of an air conditioning system. Non-condensables and water suction combine with refrigerant to produce substances that corrode copper piping and compressor parts.

⚠ WARNING

Danger of Equipment Damage. Avoid deep vacuum operation. Do not use compressors to evacuate a system. Extremely low vacuums can cause internal arcing and compressor failure. Damage caused by deep vacuum operation will void warranty.

⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument capable of accurately measuring down to 50 microns.

1. Connect manifold gauge set to the service valve ports as follows:
   - low pressure gauge to *suction* line service valve
   - high pressure gauge to *liquid* line service valve
2. Connect micron gauge.
3. Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set.
4. Open both manifold valves and start the vacuum pump.
5. Evacuate the line set and indoor unit to an **absolute pressure** of 23,000 microns (29.01 inches of mercury).

NOTE - During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once to determine if there is a rapid rise in sure indicates a relatively large leak. If this occurs, ***repeat the leak testing procedure****.*

NOTE - The term ***absolute pressure*** *means the total actual pressure within a given volume or system, above the absolute zero of pressure. Absolute pressure in a vacuum is equal to atmospheric pressure minus vacuum pressure.*

6. When the absolute pressure reaches 23,000 microns (29.01 inches of mercury), close the manifold gauge valves, turn off the vacuum pump and disconnect the manifold gauge center port hose from vacuum pump. Attach the manifold center port hose to a dry nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose. Open the manifold gauge valves to break the vacuum in the line set and indoor unit. Close the manifold gauge valves.
7. Shut off the dry nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the dry nitrogen from the line set and indoor unit.
8. Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.
9. When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright cylinder of HFC-410A refrigerant. Open the manifold gauge valve 1 to 2 psig in order to release the vacuum in the line set and indoor unit.
10. Close manifold gauge valves and shut off the HFC-410A cylinder and remove the manifold gauge set.

Servicing Units Delivered Void of Charge

If the system is void of refrigerant, clean the system using the procedure described below.

1. Use nitrogen to pressurize the system and check for leaks. Repair all leaks.
2. Evacuate the system to remove as much of the moisture as possible.
3. Use nitrogen to break the vacuum and install a new filter drier in the system.
4. Evacuate the system again. Then, weigh the appropriate amount of HFC-410A refrigerant as listed on unit nameplate into the system.
5. Monitor the system to determine the amount of moisture remaining in the oil. It may be necessary to replace the filter drier several times to achieve the required dryness level. **If system dryness is not verified, the compressor will fail in the future.**

Electrical

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC).

Refer to the furnace or blower coil installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

1. Install line voltage power supply to unit from a properly sized unit disconnect switch.
2. Ground the unit at the unit disconnect switch or to earth ground.

NOTE - To facilitate conduit, a hole is provided in the bottom of the control box. Connect conduit to the control box using a proper conduit fitting.

⚠ WARNING

Electric Shock Hazard. Can cause injury or death. Unit must be grounded in accordance with national and local codes.

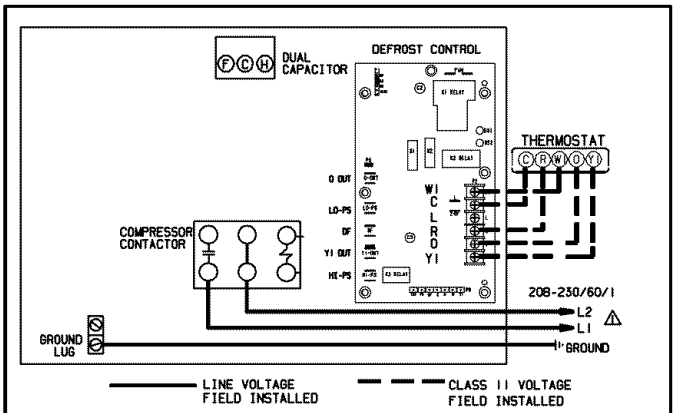
Line voltage is present at all components when unit is not in operation on units with single-pole contactors. Disconnect all remote electric power supplies before opening access panel. Unit may have multiple power supplies.

Wire run length	AWG #	Insulation type
less than 100' (30m)	18	color-coded, temperature rating 35°C minimum
more than 100' (30m)	16	

NOTE - Units are approved for use only with copper conductors. Refer to figure 28 for high voltage field wiring diagram. (A complete unit wiring diagram is located inside the unit control box cover.)

NOTE - For proper voltages, select thermostat wire gauge per the following chart:

3. Install room thermostat (ordered separately) on an inside wall approximately in the center of the conditioned area and 5 feet (1.5 m) from the floor. It should not be installed on an outside wall or where it can be effected by sunlight, drafts or vibrations.
4. Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit. See figures 30 and 31. *(24V, Class II circuit connections are made in the low voltage junction box.)*



WARNING! - ELECTRIC SHOCK HAZARD. Can cause INJURY or DEATH. Unit must be grounded in accordance with national and local codes.

⚠ NOTE - For use with copper conductors only. Refer to unit rating plate for minimum circuit ampacity and maximum overcurrent protection size.

Figure 28. Typical Field Wiring

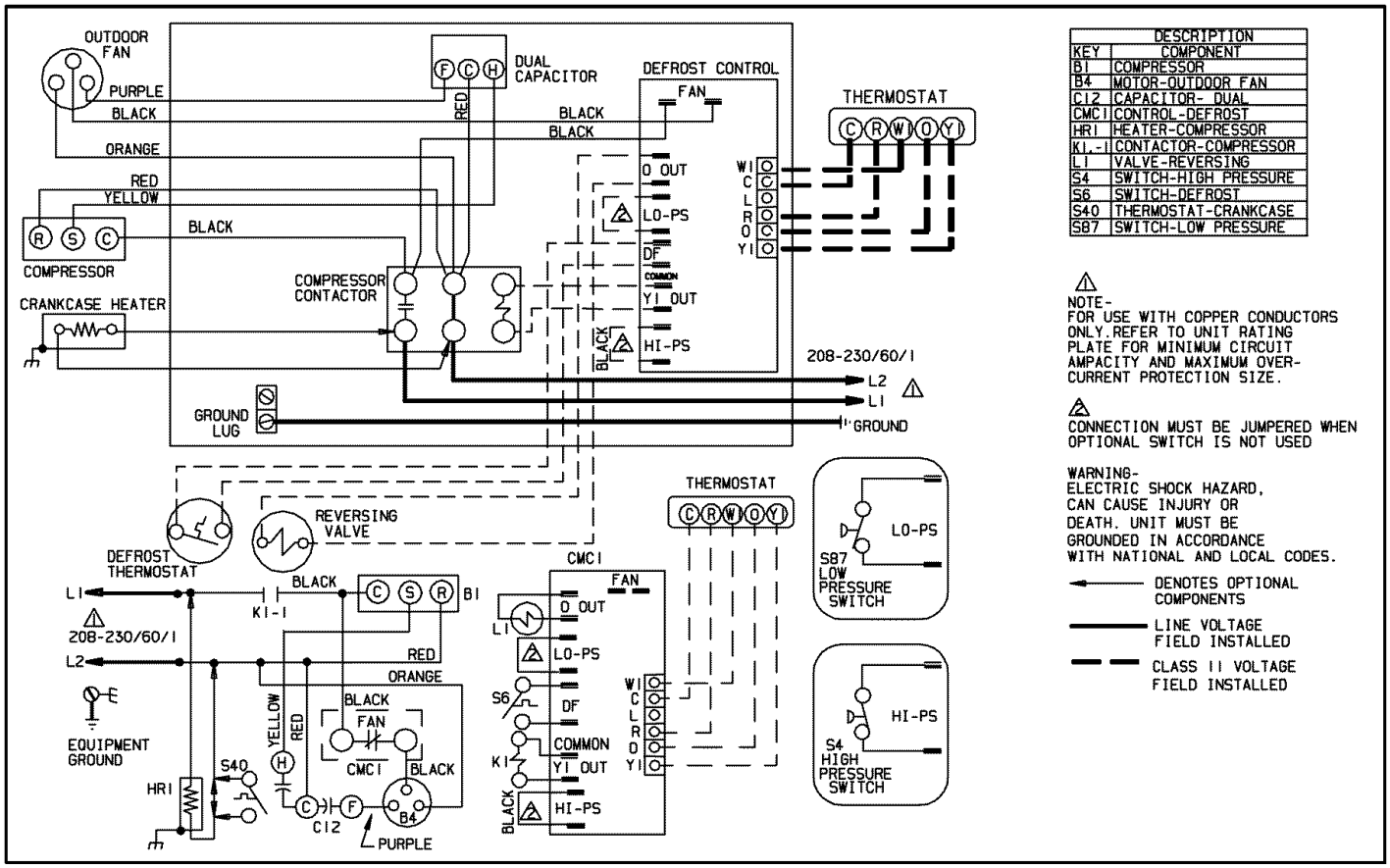


Figure 29. Typical Wiring Diagram

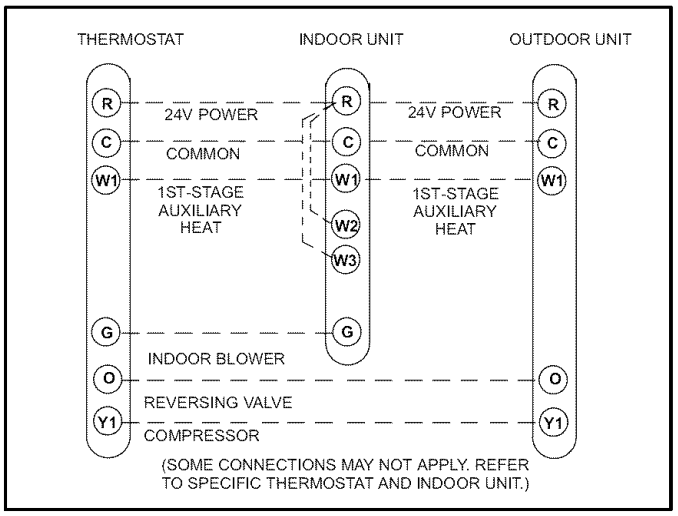


Figure 30. Outdoor and Blower Unit Thermostat Designations

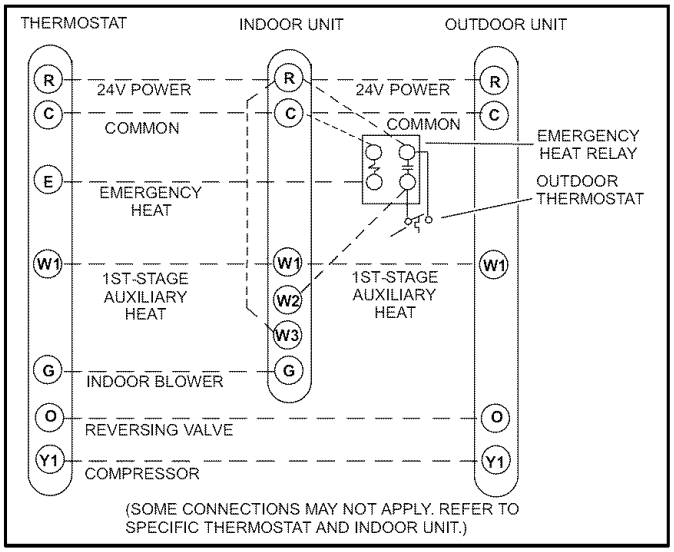


Figure 31. Outdoor and Blower Unit Thermostat Designations (with emergency heat)

Start-Up and Charging Procedures

⚠ IMPORTANT

If unit is equipped with a crankcase heater, it should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

1. Rotate fan to check for binding.
2. Inspect all factory- and field-installed wiring for loose connections.
3. After evacuation is complete, open both the liquid and vapor line service valves to release the refrigerant charge contained in outdoor unit into the system.
4. Replace the stem caps and tighten to the value listed in table 1.
5. Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit's nameplate. If not, do not start the equipment until you have consulted with the power company and the voltage condition has been corrected.
6. Set the thermostat for a cooling demand. Turn on power to the indoor indoor unit and close the outdoor unit disconnect switch to start the unit.
7. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.
8. Check system for sufficient refrigerate by using the procedures listed under *Testing and Charging System.*

TESTING AND CHARGING SYSTEM

This system uses HFC-410A refrigerant which operates at much higher pressures than HCFC-22. The pre-installed liquid line filter drier is approved for use with HFC-410A only. Do not replace it with components designed for use with HCFC-22. This unit is NOT approved for use with coils which use capillary tubes as a refrigerant metering device.

SETTING UP TO CHECK CHARGE

1. Close manifold gauge set valves. Connect the center manifold hose to an upright cylinder of HFC-410A.
2. Connect the manifold gauge set to the unit's service ports as illustrated in figure 2.
   - low pressure gauge to ***vapor service port***
   - high pressure gauge to ***liquid service port***

COOLING MODE INDOOR AIRFLOW CHECK

Check airflow using the Delta-T (DT) process using the illustration in figure 32.

HEATING MODE INDOOR AIRFLOW CHECK

Blower airflow (CFM) may be calculated by energizing electric heat and measuring:

- Temperature rise between the return air and supply air temperatures at the indoor coil blower unit,
- Measuring voltage supplied to the unit,
- Measuring amperage being drawn by the heat unit(s).

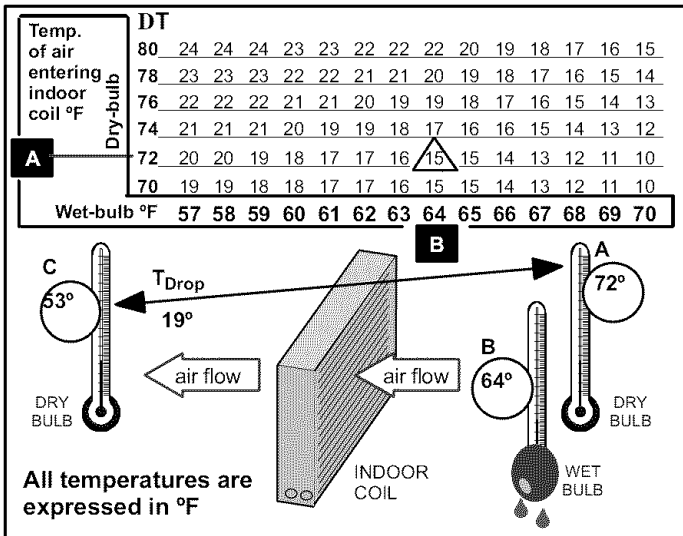
Then, apply the measurements taken in following formula to determine CFM:

$$\text{CFM} = \frac{\text{Amps x Volts x 3.41}}{\text{1.08 x Temperature rise (F)}}$$

CALCULATING CHARGE

If the system is void of refrigerant, first, locate and repair any leaks and then weigh in the refrigerant charge into the unit. To calculate the total refrigerant charge:

Amount specified on nameplate		Adjust amount. for variation in line set length listed on table in figure 33.		Additional charge specified per indoor unit match-up listed in tables 3 through 9.		Total charge
_____	±	_____	+	_____	=	_____



1. Determine the desired DT—Measure entering air temperature using dry bulb (**A**) and wet bulb (**B**). **DT** is the intersecting value of **A** and **B** in the table (see triangle).

2. Find temperature drop across coil—Measure the coil's dry bulb entering and leaving air temperatures (**A** and **C**). Temperature Drop Formula: (T_{Drop}) = **A** minus **C**.

3. Determine if fan needs adjustment—If the difference between the measured T_{Drop} and the desired **DT** (T_{Drop}–**DT**) is within ±3°, no adjustment is needed. See examples: Assume **DT** = 15 and **A** temp. = 72°, these **C** temperatures would necessitate stated actions:

C°	T_{Drop}	–	DT	=	°F	*ACTION*
53°	19	–	15	=	4	*Increase the airflow*
58°	14	–	15	=	-1	*(within ±3° range) no change*
62°	10	–	15	=	-5	*Decrease the airflow*

4. Adjust the fan speed—See indoor unit instructions to increase/ decrease fan speed.

Changing air flow affects all temperatures; recheck temperatures to confirm that the temperature drop and DT are within ±3°.

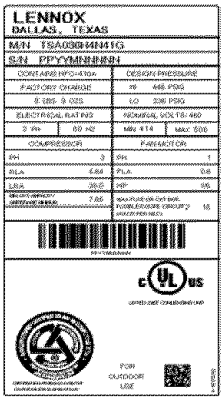
Figure 32. Checking Indoor Coil Airflow Guide

WEIGH IN

Refrigerant Charge per Line Set Length

Liquid Line Set Diameter	Ounces per 5 feet (g per 1.5 m) adjust from 15 feet (4.6 m) line set*
3/8" (9.5 mm)	3 ounce per 5' (85 g per 1.5 m)

*NOTE - *If line length is greater than 15 ft. (4.6 m), add this amount. If line length is less than 15 ft. (4.6 m), subtract this amount.*

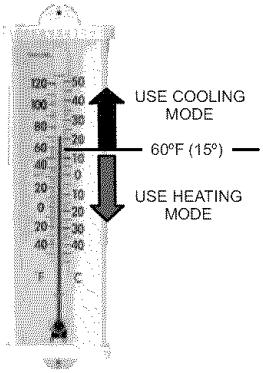


1. Check Liquid and suction line pressures
2. Compare unit pressures with Table 10, *Normal Operating Pressures.*
3. Conduct leak check; evacuate as previously outlined.
4. Weigh in the unit nameplate charge plus any charge required for line set differences over feet.

This nameplate is for illustration purposes only. Go to actual nameplate on outdoor unit for charge information.

Figure 33. Using Weigh In Method

SUBCOOLING



SAT° _____
LIQ° – _____
SC° = _____

1 Check the airflow as illustrated in figure 32 to be sure the indoor airflow is as required. (Make any air flow adjustments before continuing with the following procedure.)

2 Measure outdoor ambient temperature; determine whether to use **cooling mode** or **heating mode** to check charge.

3 Connect gauge set.

4 Check Liquid and Vapor line pressures. Compare pressures with Normal Operating Pressures table 10, (*The reference table is a general guide. Expect minor pressure variations. Significant differences may mean improper charge or other system problem.*)

5 Set thermostat for heat/cool demand, depending on mode being used:

Using cooling mode—When the outdoor ambient temperature is 60°F (15°C) and above. Target subcooling values in table below are based on 70 to 80°F (21-27°C) indoor return air temperature; if necessary, operate heating to reach that temperature range; then set thermostat to cooling mode setpoint to 68°F (20°C). When pressures have stabilized, continue with step 6.

Using heating mode—When the outdoor ambient temperature is below 60°F (15°C). Target subcooling values in table below are based on 65-75°F (18-24°C) indoor return air temperature; if necessary, operate cooling to reach that temperature range; then set thermostat to heating mode setpoint to 77°F (25°C). When pressures have stabilized, continue with step 6.

6 Read the liquid line temperature; record in the LIQ° space.

7 Read the liquid line pressure; then find its corresponding temperature in the temperature/ pressure chart listed in table 11 and record it in the SAT° space.

8 Subtract LIQ° temp. from SAT° temp. to determine subcooling; record it in SC° space.

9 Compare SC° results with table below, being sure to note any additional charge for line set and/or match-up.

10 If subcooling value is greater than shown in tables 3 through 10 for the applicable unit, remove refrigerant; if less than shown, add refrigerant.

11 If refrigerant is added or removed, repeat steps 6 through 10 to verify charge.

Figure 34. Using Subcooling Method

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Table 3. XP13−018

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH−018	25	5	1	1
CBX26UH−024	25	5	0	1
CBX27UH−018/024	15	8	0	2
CBX32MV−018/024	30	3	0	0
CBX32MV−024/030	15	8	1	2

Table 4. XP13−024

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH−024	26	5	0	1
CBX26UH−030	26	3	1	3
CBX27UH−018/024	12	3	0	11
CBX27UH−030	12	3	1	4
CBX32M−030	12	3	0	11
CBX32M−036	12	3	1	4
CBX32MV−018/024	12	6	0	5
CBX32MV−024/030	12	3	0	11
CH33−25A	16	6	0	7
CH33−31A	12	3	0	7
CH33−31B	12	3	0	15
CH33−36A	16	6	0	7
CH33−36B	16	7	0	15
CH33−36C	12	5	0	0
CR33−30, −36	12	4	0	3
CX34−25	12	6	0	5
CX34−31	12	3	0	11
CX34−36	16	7	0	11

Table 5. XP13−030

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH−030, −036	25	4	0	11
CBX27UH-030	15	4	0	11
CBX27UH-036	15	4	0	11
CBX32M−030, −036	15	4	0	11
CBX32M−042	15	4	0	11
CBX32MV−024/030, −036	15	4	0	11
CH33−25A	20	3	0	8
CH33−31A	15	4	0	11
CH33−31B	20	4	0	11
CH33−36A	20	3	0	8
CH33−36C	15	3	0	11
CH33−42B	20	4	0	11
CR33−30, −36	15	4	0	11
CX34−25	15	3	0	12
CX34−31	15	4	0	11
CX34−36	27	2	0	0
CX34−38 SN# 6007K and after	4	4	0	11
CX34−38 before SN# 6007K	20	4	0	11
CX34−42	27	2	0	0

Table 6. XP13−036

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH−036	25	5	2	2
CBX27UH-036	10	5	2	2
CBX27UH-042	10	10	2	8
CBX32M−036, −042	10	5	2	2
CBX32MV−036	10	5	2	2

**Amount of charge required in additional to charge shown on unit nameplate. (Remember to consider line set length difference.)*

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
XP13−036 (Continued)				
CH33−31A	10	5	0	2
CH33−31B	10	5	1	0
CH33−36C	10	4	0	0
CH33−42	10	11	2	3
CH33−44, −48	10	11	2	5
CR33−36	10	4	0	1
CR33−48	30	5	2	3
CR33−50/60	30	11	2	5
CX34−38 SN# 6007K and after	5	5	2	2
CX34−38 before SN# 6007K	10	5	2	2
CX34−44/48	10	5	2	2

Table 7. XP13−042

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CH23−65	32	6	0	12
CBX26UH−042	32	6	1	2
CBX26UH−048	10	12	4	5
CBX27UH-042	15	5	0	0
CBX27UH-048	15	5	0	0
CBX32M−036, −042	15	5	0	0
CBX32MV−036	15	5	0	0
CH33−43B	10	12	4	8
CH33−43C	10	6	1	1
CH33−44	10	6	0	16
CH33−48	10	6	1	1
CH33−49C	10	12	3	12
CR33−48	32	5	0	5
CR33−50/60	32	9	2	6
CX34−43	10	6	1	1
CX34−49	10	12	3	7
CX34−50/60	10	6	1	1
CX34−60	10	9	2	6

Table 8. XP13−048

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH−048	10	11	0	8
CBX26UH−060	5	12	3	8
CBX27UH-048	10	9	0	7
CBX27UH-060	10	9	0	7
CBX32M−048	10	9	0	7
CBX32MV−048	10	9	0	7
C33−43	0	4	0	3
CH33−43C	13	4	0	3
CH33−49C	10	9	0	7
CH33−60	10	7	0	5
CR33−48	36	4	0	0
CR33−50/60, −60	35	7	0	5
CX34−60	10	7	0	5

Table 9. XP13−060

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH−060	10	9	3	3
CBX27UH-060	10	8	1	12
CBX32MV−060	10	8	1	12
CBX32MV−068	10	9	2	5
CH33−62	10	9	2	7
CR33−60	35	4	0	0
CX34−60	15	4	0	0
CX34−62	10	9	2	1

Table 10. Normal Operating Pressures - Liquid ±10 and Vapor ±5 PSIG*

⚠ IMPORTANT

Use table 10 as a general guide when performing maintenance checks. This is not a procedure for charging the unit (Refer to Charging / Checking Charge section). Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system.

Model	-018	-024	-030	-036	-042	-048	-060
°F (°C)**	Liquid Line Pressure / Vapor Line Pressure						
Cooling Operation							
65 (18)	228 / 140	232 / 139	245 / 135	251 / 134	239 / 135	244 / 139	248 / 129
75 (24)	265 / 142	268 / 142	284 / 137	292 / 138	277 / 136	283 / 141	289 / 131
85 (29)	311 / 144	317 / 144	328 / 140	339 / 140	321 / 139	318 / 143	336 / 132
95 (35)	350 / 147	366 / 146	377 / 144	392 / 143	379 / 142	369 / 145	385 / 133
105 (41)	402 / 149	412 / 148	429 / 145	443 / 145	423 / 144	420 / 148	440 / 136
115 (45)	458 / 152	464 / 152	486 / 147	508 / 149	484 / 147	484 / 150	500 / 140
Heating Operation							
60 (16)	350 / 135	331 / 130	341 / 126	361 / 112	376 / 118	350 / 124	370 / 127
50 (10)	328 / 116	315 / 109	324 / 107	331 / 106	355 / 107	323 / 106	348 / 105
40 (4.5)	310 / 96	299 / 89	307 / 88	304 / 96	336 / 89	294 / 92	328 / 85
30 (-1)	294 / 81	283 / 72	294 / 72	295 / 77	325 / 74	291 / 73	317 / 72
20 (-7)	278 / 67	267 / 55	278 / 55	285 / 57	309 / 60	277 / 59	305 / 59

**These are most-popular-match-up pressures. Indoor match up, indoor air quality, and indoor load cause pressures to vary.*

***Temperature of the air entering the outdoor coil.*

Table 11. HFC-410A Temperature (°F) - Pressure (Psig)

°F	Psig	°F	Psig	°F	Psig	°F	Psig	°F	Psig	°F	Psig	°F	Psig	°F	Psig
32	100.8	48	137.1	63	178.5	79	231.6	94	290.8	110	365.0	125	445.9	141	545.6
33	102.9	49	139.6	64	181.6	80	235.3	95	295.1	111	370.0	126	451.8	142	552.3
34	105.0	50	142.2	65	184.3	81	239.0	96	299.4	112	375.1	127	457.6	143	559.1
35	107.1	51	144.8	66	187.7	82	242.7	97	303.8	113	380.2	128	463.5	144	565.9
36	109.2	52	147.4	67	190.9	83	246.5	98	308.2	114	385.4	129	469.5	145	572.8
37	111.4	53	150.1	68	194.1	84	250.3	99	312.7	115	390.7	130	475.6	146	579.8
38	113.6	54	152.8	69	197.3	85	254.1	100	317.2	116	396.0	131	481.6	147	586.8
39	115.8	55	155.5	70	200.6	86	258.0	101	321.8	117	401.3	132	487.8	148	593.8
40	118.0	56	158.2	71	203.9	87	262.0	102	326.4	118	406.7	133	494.0	149	601.0
41	120.3	57	161.0	72	207.2	88	266.0	103	331.0	119	412.2	134	500.2	150	608.1
42	122.6	58	163.9	73	210.6	89	270.0	104	335.7	120	417.7	135	506.5	151	615.4
43	125.0	59	166.7	74	214.0	90	274.1	105	340.5	121	423.2	136	512.9	152	622.7
44	127.3	60	169.6	75	217.4	91	278.2	106	345.3	122	428.8	137	519.3	153	630.1
45	129.7	61	172.6	76	220.9	92	282.3	107	350.1	123	434.5	138	525.8	154	637.5
46	132.2	62	175.4	77	224.4	93	286.5	108	355.0	124	440.2	139	532.4	155	645.0
47	134.6			78	228.0			109	360.0			140	539.0		

INSTALLING SERVICE VALVE CAPS

Disconnect gauge set and re-install both the liquid and suction service valve caps.

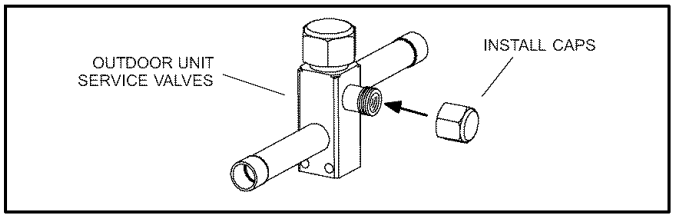

Figure 35. Installing Service Valve Caps

System Operation

The outdoor unit and indoor blower cycle on demand from the room thermostat. When the thermostat blower switch is in the **ON** position, the indoor blower operates continuously.

SERVICE LIGHT OPERATION

The thermostat is not included with the unit and must be purchased separately. Some outdoor thermostats incorporate isolating contacts and an emergency heat function (which includes an amber indicating light). The service light thermostat will enable the emergency heat light function on the room thermostat.

EMERGENCY HEAT (AMBER LIGHT)

An emergency heat function is designed into some room thermostats. This feature is applicable when isolation of the outdoor unit is required, or when auxiliary electric heat is staged by outdoor thermostats. When the room thermostat is placed in the emergency heat position, the outdoor unit control circuit is isolated from power and field-provided relays bypass the outdoor thermostats. An amber indicating light simultaneously comes on to remind the homeowner that he is operating in the emergency heat mode.

Emergency heat is usually used during an outdoor unit shutdown, but it should also be used following a power outage if power has been off for over an hour and the outdoor temperature is below 50°F (10°C). System should be left in the emergency heat mode at least six hours to allow the crankcase heater sufficient time to prevent compressor slugging.

FILTER DRIER

The unit is equipped with a large-capacity biflow filter drier which keeps the system clean and dry. If replacement is necessary, order another of the same design and capacity. The replacement filter drier must be suitable for use with HFC-410A refrigerant.

Defrost System

The XP13 defrost system includes two components: a defrost thermostat and a defrost control board (figure 36).

DEFROST THERMOSTAT

The defrost thermostat is located on the liquid line between the check/expansion valve and the distributor. When defrost thermostat senses 42°F (5.5°C) or cooler, the thermostat contacts close and send a signal to the defrost control board to start the defrost timing. It also terminates defrost when the liquid line warms up to 70°F (21°C).

DEFROST CONTROL

The defrost control board includes the combined functions of a time/temperature defrost control, defrost relay, diagnostic LEDs and terminal strip for field wiring connections.

The control provides automatic switching from normal heating operation to defrost mode and back. During compressor cycle (call for defrost), the control accumulates compressor run times at 30-, 60-, or 90-minute field-adjustable intervals. If the defrost thermostat is closed when the selected compressor run time interval ends, the defrost relay is energized and defrost begins.

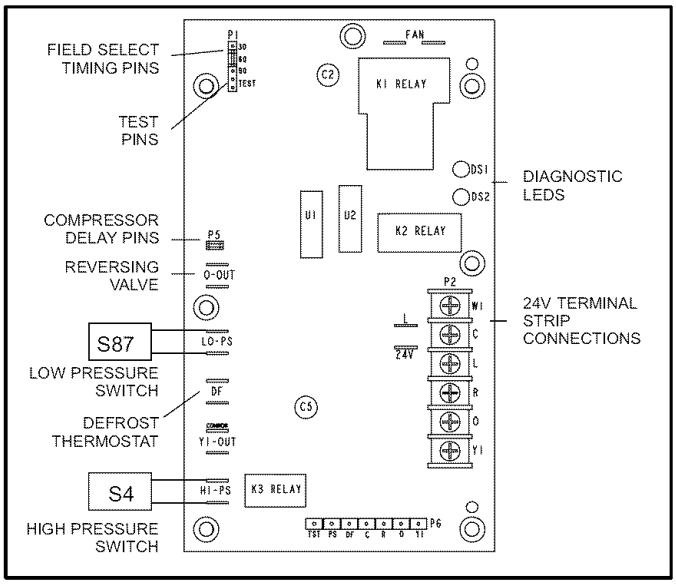

Figure 36. Outdoor Unit Defrost Control Board

DEFROST CONTROL TIMING PINS

Each timing pin selection provides a different accumulated compressor run time period for one defrost cycle. This time period must occur before a defrost cycle is initiated. The defrost interval can be adjusted to 30 (T1), 60 (T2), or 90 (T3) minutes (see figure 36). The defrost timing jumper is factory-installed to provide a 60-minute defrost interval. If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval. The maximum defrost period is 14 minutes and cannot be adjusted.

A TEST option is provided for troubleshooting. **The TEST mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered.** If the jumper is in the TEST position at power-up, the control will ignore the test pins. When the jumper is placed across the TEST pins for two seconds, the control will enter the defrost mode. If the jumper is

removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost thermostat opens or 14 minutes have passed. If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and re-applied.

COMPRESSOR DELAY

The defrost board has a field-selectable function to reduce occasional sounds that may occur while the unit is cycling in and out of the defrost mode. The compressor will be cycled off for 30 seconds going in and out of the defrost mode when the compressor delay jumper is removed.

NOTE - The 30-second compressor feature is ignored when jumpering the TEST pins.

TIME DELAY

The timed-off delay is five minutes long. The delay helps to protect the compressor from short-cycling in case the power to the unit is interrupted or a pressure switch opens. The delay is bypassed by placing the timer select jumper across the TEST pins for 0.5 seconds.

PRESSURE SWITCH CIRCUIT

The defrost control incorporates two pressure switch circuits. The high pressure switch (S4) is factory-connected to the board's HI PS terminals (see figure 36). The board also includes a low pressure, or loss-of-charge-pressure, switch (S87). Switches are shown in wiring diagrams in figures 29 and 36.

During a single demand cycle, the defrost control will lock out the unit after the fifth time that the circuit is interrupted by any pressure switch wired to the control board. In addition, the diagnostic LEDs will indicate a locked-out pressure switch after the fifth occurrence of an open pressure switch as listed in table 12. The unit will remain locked out until power to the board is interrupted, then re-established or until the jumper is applied to the TEST pins for 0.5 seconds.

Table 12. Defrost Control Board Diagnostic LED

Mode	Green LED (DS2)	Red LED (DS1)
No power to control	OFF	OFF
Normal operation / power to control	Simultaneous Slow FLASH	
Anti-short cycle lockout	Alternating Slow FLASH	
Low pressure switch fault	OFF	Slow FLASH
Low pressure switch lockout	OFF	ON
High pressure switch fault	Slow FLASH	OFF
High pressure switch lockout	ON	OFF

NOTE - The defrost control board ignores input from the low-pressure switch terminals as follows:

- *during the TEST mode,*
- *during the defrost cycle,*
- *during the 90-second start-up period,*
- *and for the first 90 seconds each time the reversing valve switches heat/cool modes.*

DIAGNOSTIC LEDS

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the condition.

Maintenance

⚠ WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

Before the start of each heating and cooling season, the following service checks should be performed by a qualified service technician. First, turn off electrical power to the unit prior to performing unit maintenance.

- Inspect and clean the outdoor and indoor coils. The outdoor coil may be flushed with a water hose.

  NOTE - It may be necessary to flush the outdoor coil more frequently if it is exposed to substances which are corrosive or which block airflow across the coil (e.g., pet urine, cottonwood seeds, etc.)
- Visually inspect the refrigerant lines and coils for leaks.
- Check wiring for loose connections.
- Check voltage at the indoor and outdoor units (with units operating).
- Check the amperage draw at the outdoor fan motor, compressor, and indoor blower motor. Values should be compared with those given on unit nameplate.
- Check, clean (or replace) indoor unit filters.
- Check the refrigerant charge and gauge the system pressures.
- Check the condensate drain line for free and unobstructed flow; clean, if necessary.
- Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.
- Check drive belt for wear and proper tension.

  NOTE - If owner reports insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to section on refrigerant charging in this instruction.

Homeowner Information

In order to ensure peak performance, your system must be properly maintained. Clogged filters and blocked airflow prevent your unit from operating at its most efficient level.

1. **Air Filter**—Ask your Lennox dealer to show you where your indoor unit's filter is located. It will be either at the indoor unit (installed internal or external to the cabinet) or behind a return air grille in the wall or ceiling. Check the filter monthly and clean or replace it as needed.
2. **Disposable Filter**—Disposable filters should be replaced with a filter of the same type and size.

   NOTE - If you are unsure about the filter required for your system, call your Lennox dealer for assistance.

⚠ IMPORTANT

Turn off electrical power to the unit at the disconnect switch before performing any maintenance. The unit may have multiple power supplies.

3. **Reusable Filter**—Many indoor units are equipped with reusable foam filters. Clean foam filters with a mild soap and water solution; rinse thoroughly; allow filter to dry completely before returning it to the unit or grille.

   NOTE - The filter and all access panels must be in place any time the unit is in operation.
4. **Electronic Air Cleaner**—Some systems are equipped with an electronic air cleaner, designed to remove airborne particles from the air passing through the cleaner. If your system is so equipped, ask your dealer for maintenance instructions.
5. **Indoor Unit**—The indoor unit's evaporator coil is equipped with a drain pan to collect condensate formed as your system removes humidity from the inside air. Have your dealer show you the location of the drain line and how to check for obstructions. (This would also apply to an auxiliary drain, if installed.)

⚠ IMPORTANT

Sprinklers and soaker hoses should not be installed where they could cause prolonged exposure to the outdoor unit by treated water. Prolonged exposure of the unit to treated water (i.e., sprinkler systems, soakers, waste water, etc.) will corrode the surface of steel and aluminum parts and diminish performance and longevity of the unit.

6. **Outdoor Unit**—Make sure no obstructions restrict airflow to the outdoor unit. Leaves, trash or shrubs crowding the unit cause the outdoor unit to work harder and use more energy. Keep shrubbery trimmed away from the unit and periodically check for debris which collects around the unit.

   When removing debris from around the unit, be aware of metal edges on parts and screws. Although special care has been taken to keep exposed edges to a minimum, physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury.

   Cleaning of the outdoor unit's coil should be performed by a trained service technician. Contact your dealer and set up a schedule (preferably twice a year, but at least once a year) to inspect and service your air conditioning or heat pump system.

HEAT PUMP OPERATION

Your new Lennox heat pump has several characteristics that you should be aware of:

- Heat pumps satisfy heating demand by delivering large amounts of *warm* air into the living space. This is quite different from gas- or oil-fired furnaces or an electric furnace which deliver lower volumes of considerably *hotter* air to heat the space.
- Do not be alarmed if you notice frost on the outdoor coil in the winter months. Frost develops on the outdoor coil during the heating cycle when temperatures are below 45°F (7°C). An electronic control activates a defrost cycle lasting 5 to 15 minutes at preset intervals to clear the outdoor coil of the frost.
- During the defrost cycle, you may notice steam rising from the outdoor unit. This is a normal occurrence. The thermostat may engage auxiliary heat during the defrost cycle to satisfy a heating demand; however, the unit will return to normal operation at the conclusion of the defrost cycle.

EXTENDED POWER OUTAGE

The heat pump is equipped with a compressor crankcase heater which protects the compressor from refrigerant slugging during cold weather operation.

If power to your unit has been interrupted for several hours or more, set the room thermostat selector to the Emergency Heat setting to obtain temporary heat without the risk of serious damage to the heat pump.

In *emergency heat* mode, all heating demand is satisfied by auxiliary heat; heat pump operation is locked out. After a six-hour compressor crankcase warm-up period, the thermostat can be switched to the *heat* setting and normal heat pump operation may resume.

THERMOSTAT OPERATION

Though your thermostat may vary somewhat from the description below, its operation will be similar.

Temperature Setting Levers

Most heat pump thermostats have two temperature selector levers: one for heating and one for cooling. Set the levers or dials to the desired temperature setpoints for both heating and cooling. Avoid frequent temperature adjustment; turning the unit off and back on before pressures equalize puts stress on the unit compressor.

Fan Switch

In AUTO or INT (intermittent) mode, the blower operates only when the thermostat calls for heating or cooling. This mode is generally preferred when humidity control is a priority. The ON or CONT mode provides continuous indoor blower operation, regardless of whether the compressor or auxiliary heat are operating. This mode is required when constant air circulation or filtering is desired.

System Switch

Set the system switch for heating, cooling or auto operation. The auto mode allows the heat pump to automatically switch from heating mode to cooling mode to maintain predetermined comfort settings. Many heat pump thermostats are also equipped with an emergency heat mode which locks out heat pump operation and provides temporary heat supplied by the auxiliary heat.

Indicating Light

Most heat pump thermostats have an amber light which indicates when the heat pump is operating in the emergency heat mode.

Temperature Indicator

The temperature indicator displays the actual room temperature.

Programmable Thermostats

Your Lennox system may be controlled by a programmable thermostat. These thermostats provide the added feature of programmable time-of-day setpoints for both heating and cooling. Refer to the user's information manual provided with your particular thermostat for operation details.

Preservice Check

If your system fails to operate, check the following before calling for service:

- Check to see that all electrical disconnect switches are ON.
- Make sure the room thermostat temperature selector is properly set.
- Make sure the room thermostat system switch is properly set.
- Replace any blown fuses, or reset circuit breakers.
- Make sure unit access panels are in place.
- Make sure air filter is clean.
- Identify the unit model number before calling.

OPTIONAL ACCESSORIES

Refer to the Engineering Handbook for optional accessories that may apply to this unit. The following may or may not apply:

- Compressor crankcase heater
- Mounting bases
- Timed off control
- Stand-off kit
- Sound cover
- Low ambient kit
- Monitor kit
- *SignatureStat*™ room thermostat
- Loss of charge kit
- High pressure switch kit
- Mild weather kit
- Compressor monitor

Start-Up and Performance Checklist

Job Name _____ Job no. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

Unit Model No. _____ Serial No. _____ Service Technician _____

Nameplate Voltage _____

Rated Load Ampacity _____ Compressor Amperage:_____

Maximum Fuse or Circuit Breaker _____

Electrical Connections Tight? ❑ Indoor Filter clean? ❑ Supply Voltage (Unit Off) _____

Indoor Blower RPM _____ S.P. Drop Over Indoor (Dry) _____ Outdoor Coil Entering Air Temp. _____

Vapor Pressure; _____

Refrigerant Lines: - Leak Checked? ❑ Properly Insulated? ❑ Outdoor Fan Checked? ❑

Service Valves: --- Fully Opened? ❑ Caps Tight? ❑ Voltage With Compressor Operating_____

SEQUENCE OF OPERATION

Heating Correct? ❑ Cooling Correct? ❑

THERMOSTAT

Calibrated? ❑ Properly Set? ❑ Level? ❑