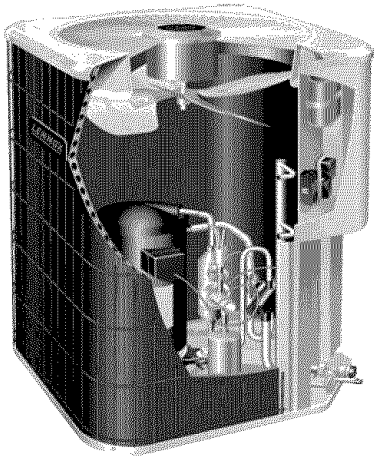


INSTALLATION INSTRUCTIONS

Merit® Series13HPX Units

HEAT PUMP UNITS
505,325M
03/08
Supersedes 07/07

Technical Publications
Litho U.S.A.

Table of Contents

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 qualified installer or 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 (CFC's, HFC's, and HCFC's) 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

13HPX Outdoor Unit

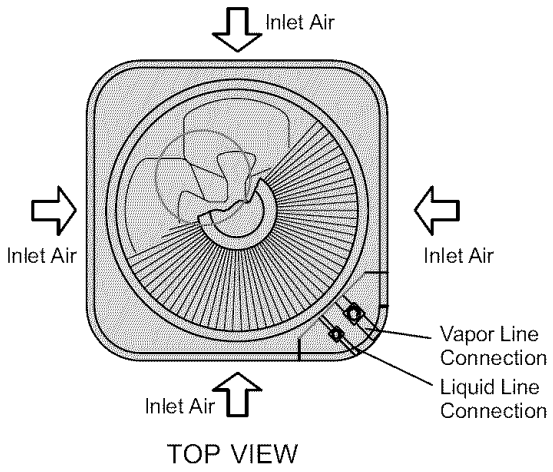
13HPX Merit® outdoor units use HFC-410A refrigerant. This unit must be installed with a matching indoor blower coil and line set as outlined in the Lennox Engineering Handbook. 13HPX outdoor units are designed for use in expansion valve systems only. They are not designed to be used with other refrigerant flow control devices. An expansion valve approved for use with HFC-410A must be ordered separately and must be installed prior to operating the unit.

Shipping and Packing List

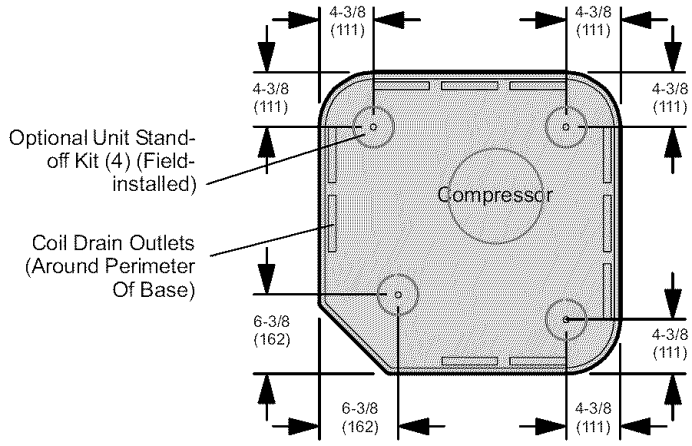
1 - Assembled 13HPX outdoor unit

Check the unit components for shipping damage. If you find any damage, immediately contact the last carrier.

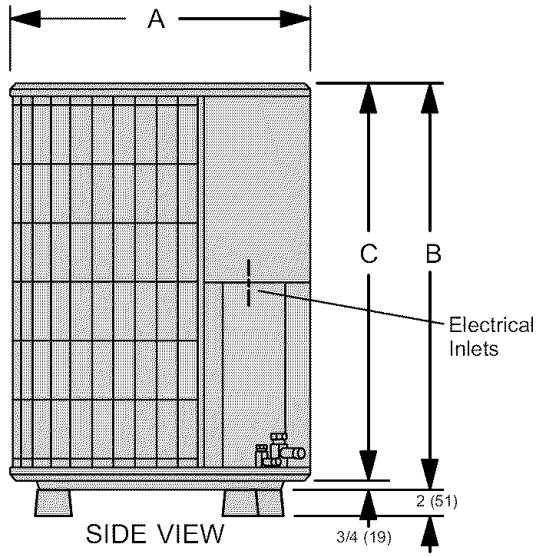
Unit Dimensions - inches (mm)



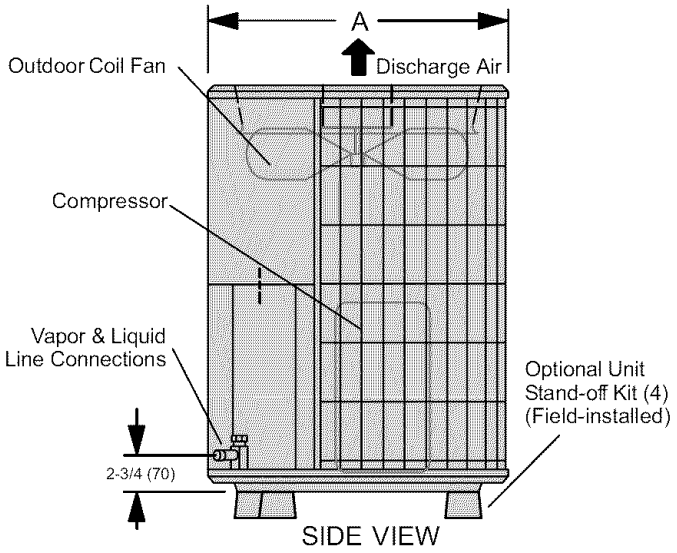
TOP VIEW



TOP VIEW BASE SECTION



SIDE VIEW



SIDE VIEW

Model No.	A	B	C
13HPX-018	24-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-024	24-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-030	24-1/4 (616)	29-1/4 (743)	28-1/2 (724)
13HPX-036	24-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-042	28-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-048	28-1/4 (718)	37-1/4 (946)	36-1/2 (927)
13HPX-060	28-1/4 (718)	43-1/4 (1099)	42-1/4 (1073)

General Information

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

When servicing or repairing HVAC components, ensure caps and fasteners are appropriately tightened. Table 1 lists torque values for typical service/repair items.

Table 1. Torque Requirements

Part	Recommended Torque	
Liquid service valve cap	8 ft.- lb.	11 NM
Suction service valve cap	11 ft.- lb.	15 NM
Sheet metal screws	16 in.- lb.	2 NM
Machine screws #8	28 in.- lb.	3 NM
Compressor bolts	90 in.- lb.	10 NM
Gauge port seal cap	85ft.- lb.	7 NM

⚠ 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

Setting the Unit

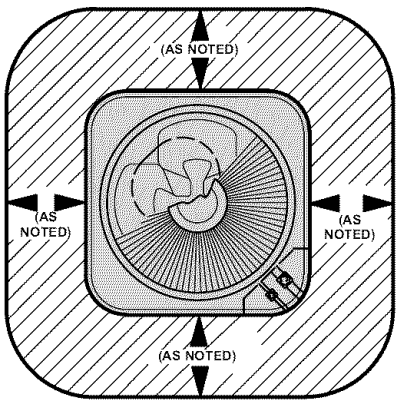
⚠ CAUTION

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

Outdoor units operate under a wide range of weather conditions; therefore, several factors must be considered when positioning the outdoor unit. Unit must be positioned to give adequate clearances for sufficient airflow and servicing. A minimum clearance of 24 inches (610 mm) between multiple units must be maintained. Refer to figure 1 for installation clearances.

1. Place a sound-absorbing material, such as Isomode, under the unit if it will be installed in a location or position that will transmit sound or vibration to the living area or adjacent buildings.
2. Mount unit high enough above ground or roof to allow adequate drainage of defrost water and prevent ice build-up.
3. In heavy snow areas, do not locate unit where drifting will occur. The unit base should be elevated above the depth of average snows.

   NOTE - Elevation of the unit may be accomplished by constructing a frame using suitable materials. If a support frame is constructed, it must not block drain holes in unit base.
4. When installed in areas where low ambient temperatures exist, locate unit so winter prevailing winds do not blow directly into outdoor coil.
5. Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.



*A service clearance of 30" (702 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" (914 mm). Clearance to one of the remaining two sides may be 12" (305 mm) and the final side may be 6" (152 mm).

A clearance of 24" (610 mm) must be maintained between two units. 48" (1219 mm) clearance required on top of unit. Maximum soffit overhang is 36" (914 mm).

Figure 1. Installation Clearances

SLAB MOUNTING

When installing the unit at grade level, the top of the slab should be high enough above the grade so that water from higher ground will not collect around the unit. See figure 2. The slab should have a slope tolerance away from the building of 2 degrees or 2 inches per 5 feet (51 mm per 1524 mm). This will prevent ice build-up under the unit during a defrost cycle. Refer to roof mounting section for barrier construction if the unit must face prevailing winter winds.

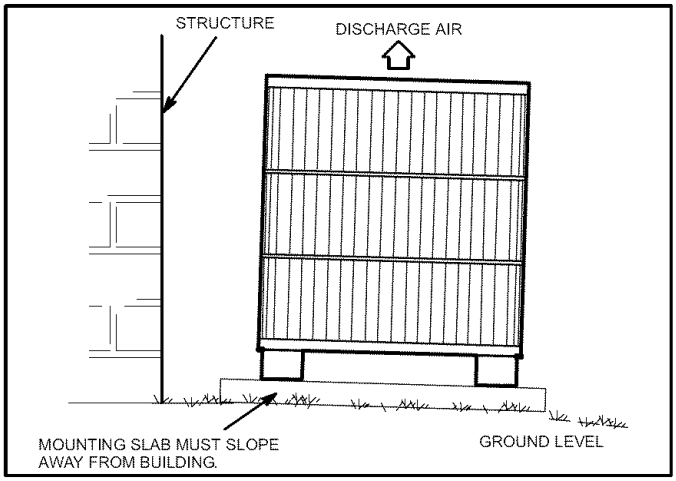


Figure 2. Slab Mounting At Ground Level

ROOF MOUNTING

Install unit a minimum of 6 inches (152 mm) above the roof surface to avoid ice build-up around the unit. Locate the unit above a load bearing wall or area of the roof that can adequately support the unit. Consult local codes for rooftop applications.

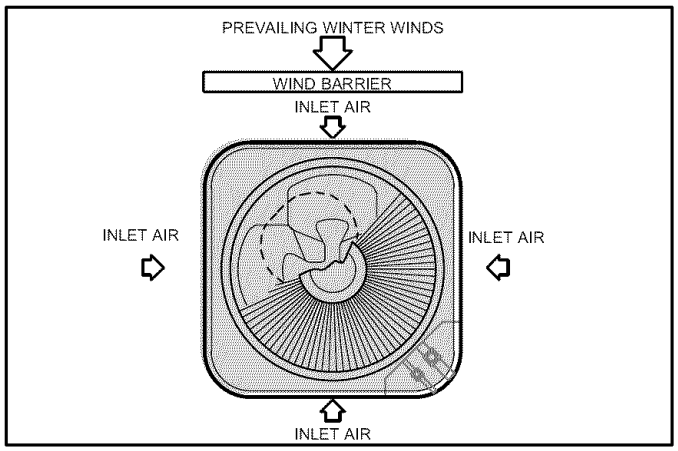


Figure 3. Rooftop Application Wind Barrier Construction

If unit coil cannot be mounted away from prevailing winter winds, construct a wind barrier. Size barrier at least the same height and width as the outdoor unit. Mount barrier 24 inches (610 mm) from the sides of the unit in the direction of prevailing winds.

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).

⚠ WARNING

Electric Shock Hazard. Can cause injury or death.

Line voltage is present at all components on units with single-pole contactors, even when unit is not in operation!

Unit may have multiple power supplies. Disconnect all remote electric power supplies before opening access panel.

Unit must be grounded in accordance with national and local codes.

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 disconnect switch.
2. Ground unit at unit disconnect switch or to an earth ground.

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

   NOTE - Units are approved for use only with copper conductors. 24V, Class II circuit connections are made in the low voltage junction box. Refer to figure 4 for field wiring diagram.

   NOTE - 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:

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

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 6 and 7.

   NOTE - 24V, Class II circuit connections are made in the low voltage junction box.

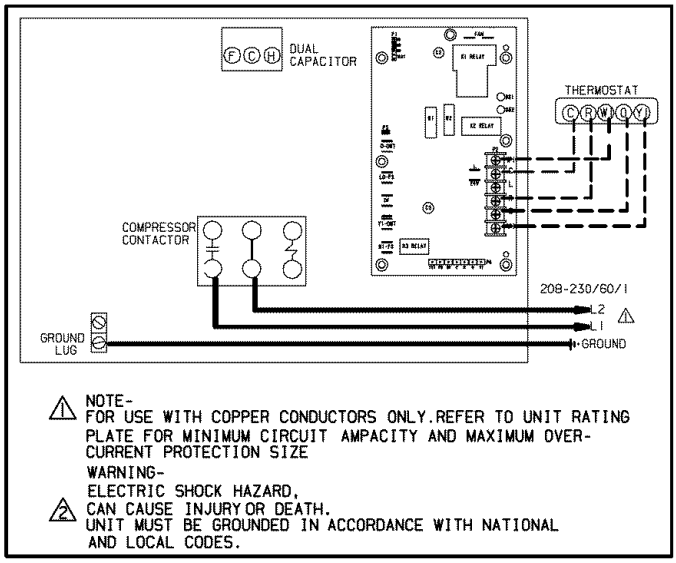
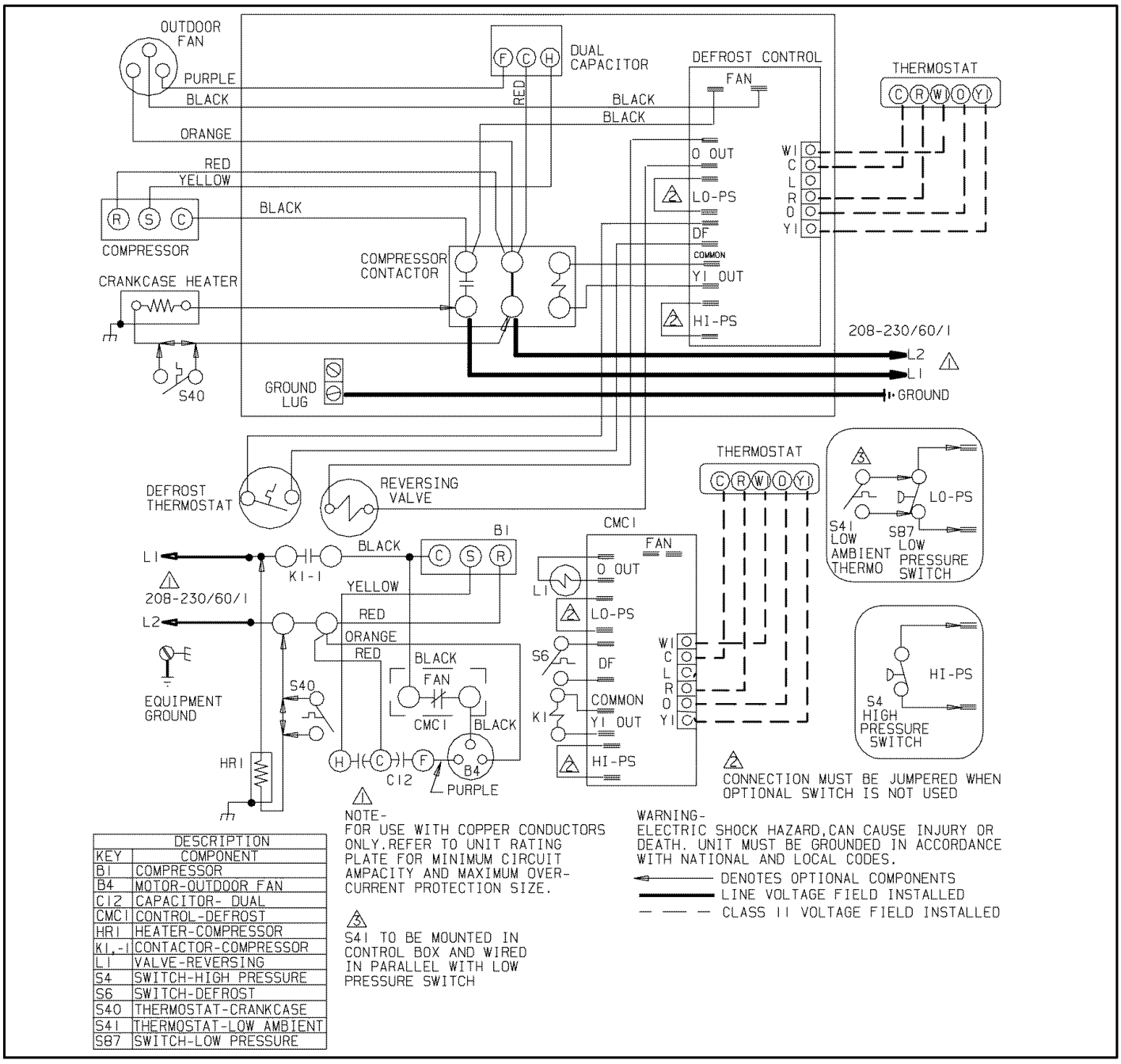


Figure 4. Typical Field Wiring Diagram



DESCRIPTION	
KEY	COMPONENT
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C12	CAPACITOR- DUAL
CMC1	CONTROL-DEFROST
HR1	HEATER-COMPRESSOR
K1,-1	CONTACTOR-COMPRESSOR
L1	VALVE-REVERSING
S4	SWITCH-HIGH PRESSURE
S6	SWITCH-DEFROST
S40	THERMOSTAT-CRANKCASE
S41	THERMOSTAT-LOW AMBIENT
S87	SWITCH-LOW PRESSURE

Figure 5. 13HPX Outdoor Unit Typical Wiring Diagram

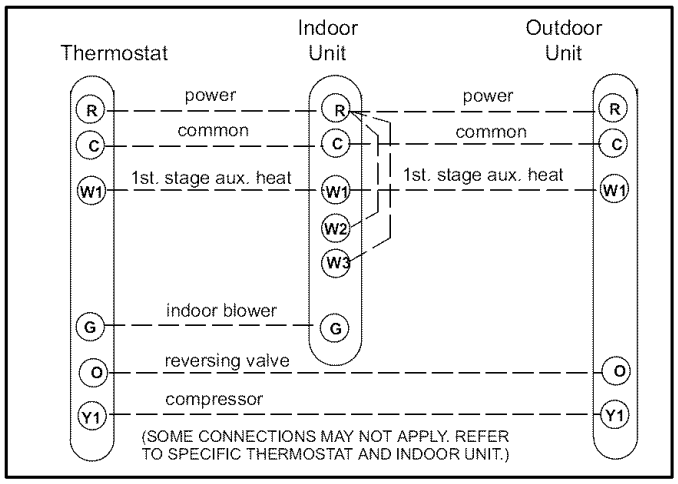


Figure 6. 13HPX and Blower Unit Thermostat Designations

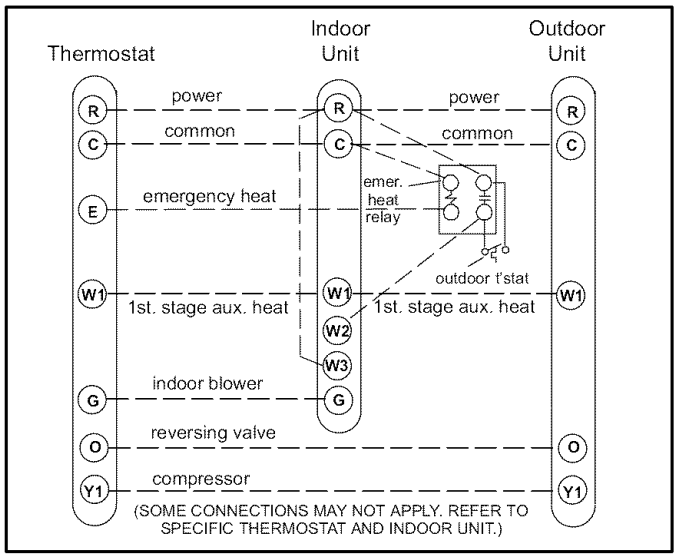


Figure 7. Outdoor Unit and Blower Unit Thermostat Designations (with auxiliary heat)

Refrigerant Piping

If the 13HPX unit is being installed with a new indoor coil and line set, the plumbing connections should be made as outlined in this section. If an existing line set and/or indoor coil is going to be used to complete the 13HPX system, refer to the following section that includes flushing procedures.

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit (sweat connections) to the indoor coil (flare or sweat connections).

Use Lennox L15 (sweat, non-flare) series line sets as shown in table 2 or use field-fabricated refrigerant lines. Refer to Refrigerant Piping Guide (Corp. 9351-L9) for proper size, type, and application of field-fabricated lines. Valve sizes are also listed in table 2.

PLUMBING CONNECTIONS—13HPX MATCHED WITH NEW INDOOR COIL AND LINE SET

If you are replacing an existing coil that is equipped with a liquid line functioning as a metering orifice, replace the liquid line prior to installing the 13HPX unit. See table 2.

Table 2. Refrigerant Line Sets

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

NOTE - Units are designed for line sets of up to fifty feet (15 m); for longer lengths, consult the Lennox Refrigerant Piping Guide (Corp. 9351-L9). Select line set diameters from table 2 to ensure that oil returns to the compressor.

INSTALLING REFRIGERANT LINE

Pay close attention to line set isolation during installation of any heat pump or a/c system. When properly isolated from building structures (walls, ceilings. floors), the refrigerant lines will not create unnecessary vibration and subsequent noises. Also, consider the following when placing and installing a high-efficiency outdoor unit:

1. **Placement**—Some localities are adopting sound ordinances based on the unit's noise level observed 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. Figure 8 shows how to place the outdoor unit and line set.

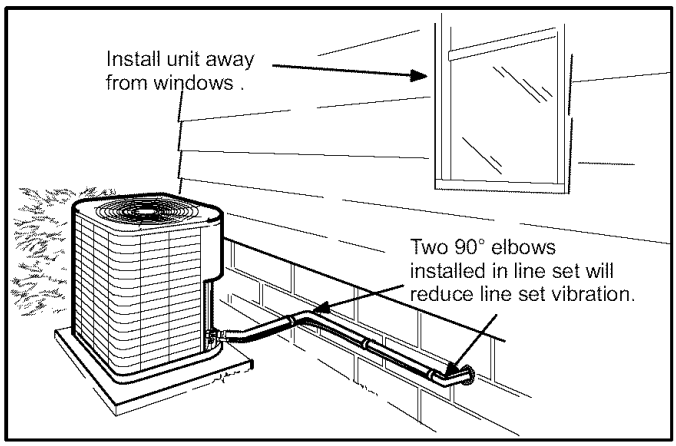


Figure 8. Unit Placement and Installation

2. **Line Set Isolation**—The following illustrations demonstrate procedures which ensure proper refrigerant line set isolation. Figure 9 shows how to install line sets on horizontal runs. Figure 10 shows how to install line sets on vertical runs. Figure 11 shows how to make a transition from horizontal to vertical.

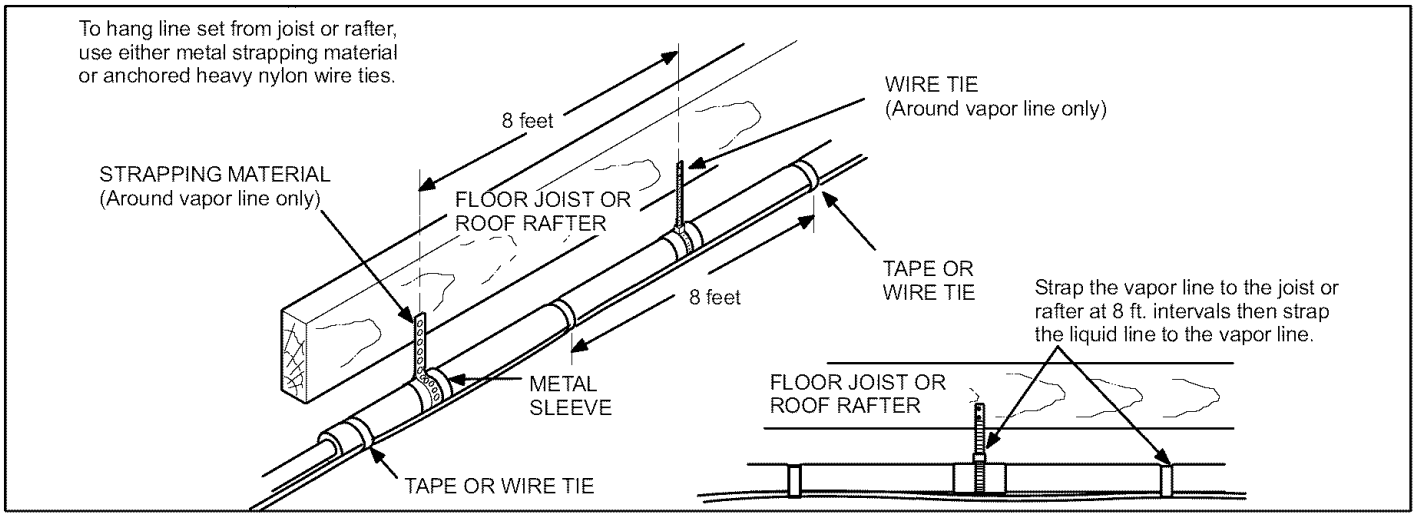


Figure 9. Refrigerant Line Sets: Installing Horizontal Runs

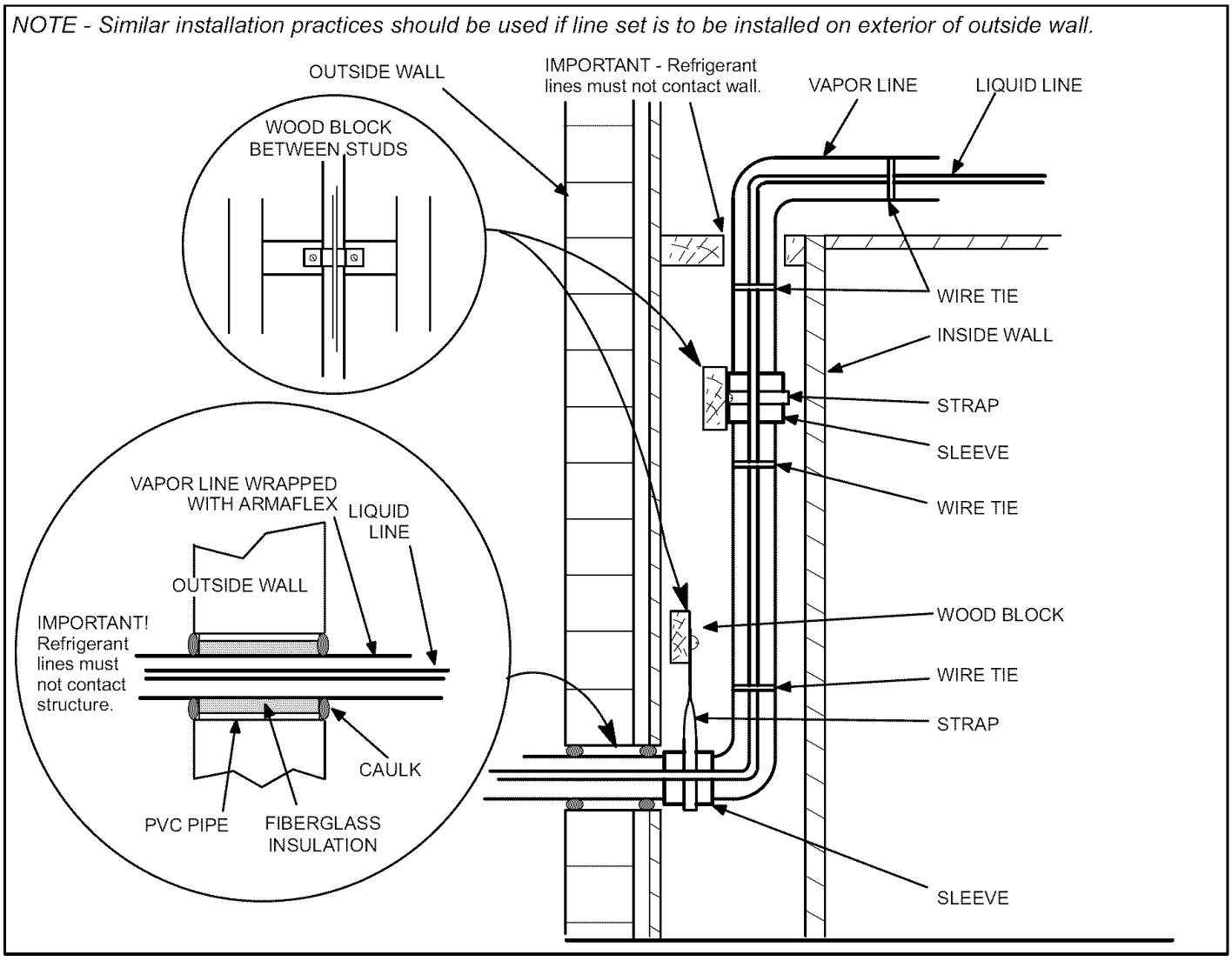


Figure 10. Refrigerant Line Sets: Installing Vertical Runs (new construction shown)

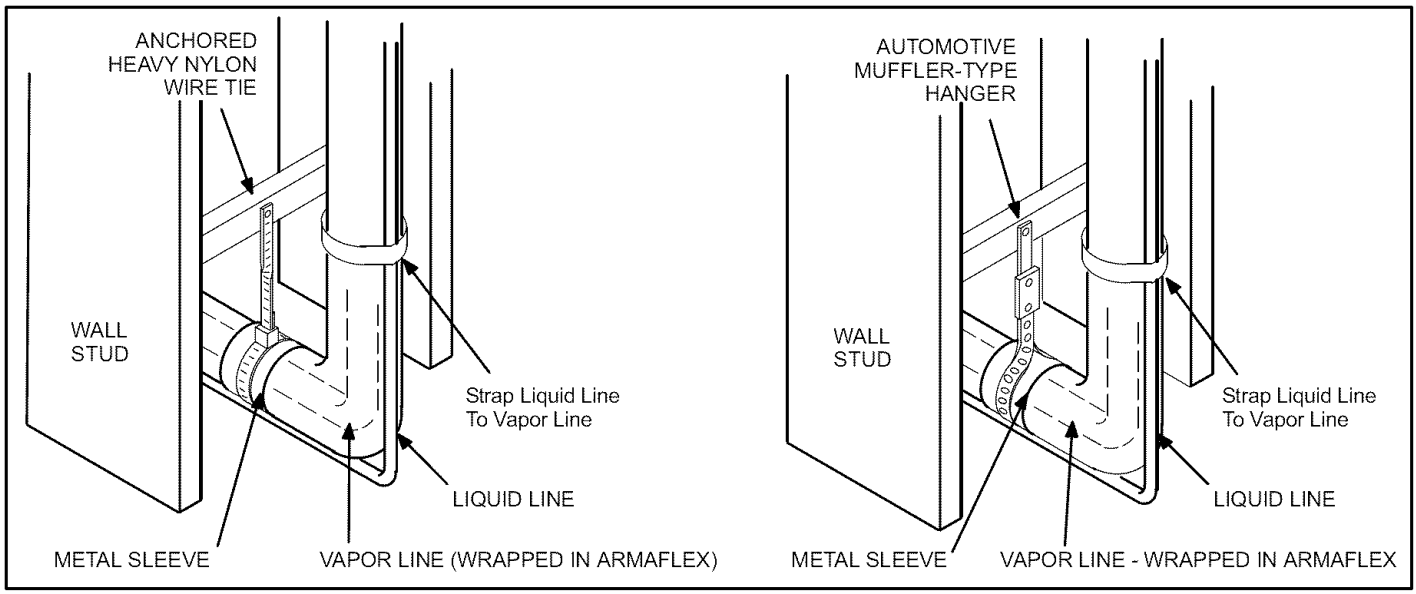


Figure 11. Refrigerant Line Sets: Transition From Vertical To Horizontal

⚠ 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.

BRAZING CONNECTION PROCEDURE

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. Flow dry nitrogen through the refrigerant piping while making line set connections; this prevents carbon deposits (oxidation) buildup on the inside of the joints being brazed. Such buildup may restrict refrigerant flow through screens and metering devices. To do this:
   - Flow regulated nitrogen (at 1 to 2 psig) through the refrigeration gauge set into the Schrader port connection on the vapor service valve and out of the Schrader port connection on the liquid service valve. (Metering device [TXV and RFC] will allow low pressure nitrogen to flow through the system.)
   - While nitrogen is flowing, braze refrigerant line set to the indoor and outdoor units. ***IMPORTANT: The flow of nitrogen must have an escape path other than through the joint to be brazed.***
3. Use silver alloy brazing rods (5 or 6 percent minimum silver alloy for copper-to-copper brazing or 45 percent silver alloy for copper-to-brass or copper-to-steel brazing) which are rated for use with HFC-410A refrigerant.
4. Wrap a wet cloth around the valve body and copper tube stub to protect it from heat damage during brazing. Wrap another wet cloth underneath the valve body to protect the base paint.

   NOTE - The tube end must stay bottomed in the fitting during final assembly to ensure proper seating, sealing and rigidity.
5. Install a field-provided thermal expansion valve (approved for use with HFC-410A refrigerant) in the liquid line at the indoor coil.

Flushing Existing Line Set & Indoor Coil

⚠ 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.

⚠ IMPORTANT

If this unit is being matched with an approved line set or indoor coil which was previously charged with HCFC-22 refrigerant, 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 thermal expansion valve, reducing system performance and capacity.
Failure to properly flush the system per the instructions below will void the warranty.

⚠ CAUTION

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

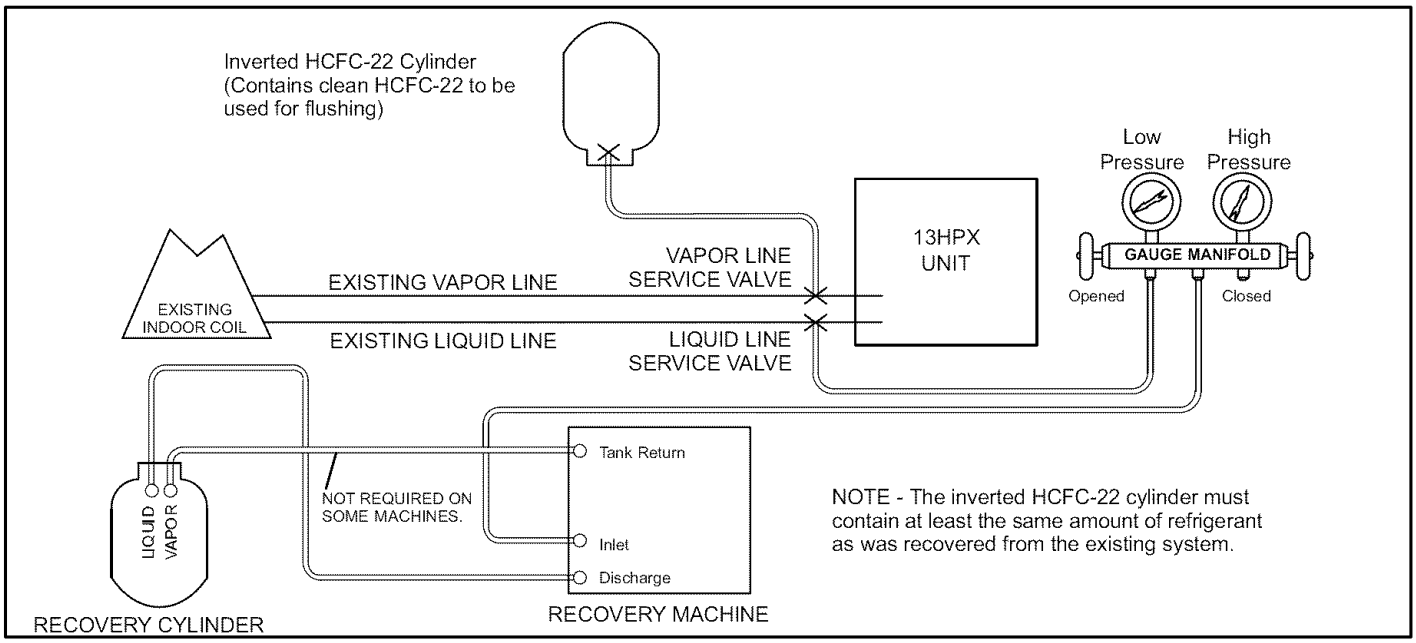


Figure 12. Flushing Connections

REQUIRED EQUIPMENT

You will need the following equipment in order to flush the existing line set and indoor coil: two clean HCFC-22 recovery bottles, an oilless recovery machine with a pump down feature, and two sets of gauges (one for use with HCFC-22 and one for use with the HFC-410A).

FLUSHING PROCEDURE

1. Remove existing HCFC-22 refrigerant using the appropriate procedure below.

   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 refrigerant to flush the system -

   - Disconnect all power to the existing outdoor unit.
   - Connect to the existing unit, a **clean** recovery cylinder and the recovery machine according to the instructions provided with the recovery machine.
   - Remove all HCFC-22 refrigerant from the existing system. Check gauges after shutdown to confirm that the entire system is completely void of refrigerant.
   - Disconnect the liquid and vapor lines from the existing outdoor unit.

   If the existing outdoor unit is equipped with manual shut-off valves AND you plan to use NEW HCFC-22 refrigerant to flush the system -

   - Start the existing HCFC-22 system in the cooling mode and close the liquid line valve.
   - Pump all of the existing HCFC-22 refrigerant back into the outdoor unit. (It may be necessary to bypass the low pressure switches to ensure complete refrigerant evacuation.)
   - When the low side system pressures reach 0 psig, close the vapor line valve.
   - Disconnect all power to the existing outdoor unit. Check gauges after shutdown to confirm that the valves are not allowing refrigerant to flow back into the low side of the system.
   - Disconnect the liquid and vapor lines from the existing outdoor unit.
2. Remove the existing outdoor unit. Set the new HFC-410A unit and follow the brazing connection procedure (see page 8) to make line set connections. DO NOT install metering device at this time.
3. Make low voltage and line voltage connections to the new outdoor unit. **DO NOT turn on power to the unit or open the outdoor unit service valves at this time.**

⚠ IMPORTANT

The line set and indoor 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.

4. Remove the existing refrigerant flow control orifice or thermal expansion/check valve before continuing with flushing procedures. The existing devices are not approved for use with HFC-410A refrigerant and may prevent proper flushing. Use a field-provided fitting to reconnect the lines.
5. Remove the pressure tap valve cores from the 13HPX unit's service valves. Connect an HCFC-22 cylinder with clean refrigerant to the vapor service valve. Connect the HCFC-22 gauge set to the liquid line valve and connect a recovery machine with an empty recovery tank to the gauge set.
6. 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 coil.
7. Invert the cylinder of clean HCFC-22 and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor coil before it enters the recovery machine.

8. After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery so that all of the HCFC-22 vapor is recovered.

   NOTE - A single system flush should remove all of the mineral oil from the existing refrigerant lines and indoor coil. A second flushing may be done (using clean refrigerant) if insufficient amounts of mineral oil were removed during the first flush. ***Each time the system is flushed, you must allow the recovery machine to pull a vacuum on the system at the end of the procedure.***

9. 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.

10. Use dry nitrogen to break the vacuum on the refrigerant lines and indoor coil before removing the recovery machine, gauges and HCFC-22 refrigerant drum. Reinstall pressure tap valve cores into 13HPX service valves.

11. Install the provided check/expansion valve (approved for use with HFC-410A refrigerant) in the liquid line at the indoor coil.

Refrigerant Metering Device

13HPX units are used in check expansion valve (TXV) systems only. See the Lennox Engineering Handbook for approved TXV match-ups and application information.

NOTE - HFC-410A systems will not operate properly with an HCFC-22 valve.

Check expansion valves equipped with Chatleff fittings are available from Lennox. Refer to the Engineering Handbook for applicable check expansion valves for use with specific match-ups. See table 3 for applicable check expansion valve kits.

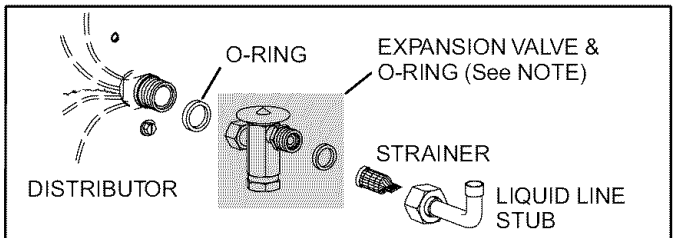
Table 3. Indoor Check Expansion Valve Kits

Model	Kit Number
13HPX-018, -024, -030, -036	49L24
13HPX-042, -048	49L25
13HPX-060	91M02

⚠ IMPORTANT

Failure to remove a fixed orifice when installing an expansion valve on the indoor coil will result in improper operation and damage to the system.

If you install a check expansion valve with an indoor coil that includes a fixed orifice, remove the orifice before the check expansion valve is installed. See figure 13 for installation of the check expansion valve.



NOTE - If necessary, remove HCFC-22 flow control device (fixed orifice/thermal expansion valve) from existing line set before installing HFC-410A approved expansion valve and o-ring.

Figure 13. Metering Device Installation

Manifold Gauge Set

Manifold gauge sets used with systems charged with HFC-410A refrigerant 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.

Service Valves

The service valves (liquid line - figure 14, vapor line - figure 15) and gauge ports are used for leak testing, evacuating, charging and checking charge. Each valve is equipped with a service port which has a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and serves as the primary leak seal.

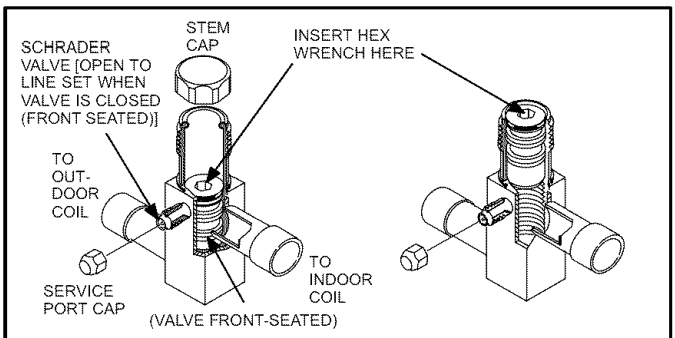


Figure 14. Liquid Line Service Valve

TO ACCESS SCHRADER PORT:

1. Remove service port cap with an adjustable wrench.
2. Connect gauge to the service port.
3. When testing is completed, replace service port cap and tighten finger tight; then tighten per table 1 (on page 2).

TO OPEN FRONT-SEATED SERVICE VALVES:

1. Remove stem cap with an adjustable wrench.
2. Use a service wrench with a hex-head extension (3/16" for liquid-line valve sizes; 5/16" for vapor-line valve sizes) to back the stem out counterclockwise as far as it will go.
3. Replace the stem cap. Tighten finger tight; then tighten per table 1 (on page 2).

TO CLOSE FRONT-SEATED SERVICE VALVES:

1. Remove the stem cap with an adjustable wrench.

2. Use a service wrench with a hex-head extension (3/16" for liquid-line valve sizes; 5/16" for vapor-line valve sizes) to turn the stem clockwise to seat the valve. Tighten it firmly.
3. Replace the stem cap. Tighten finger tight; then tighten per table 1 (on page 2).

Vapor Line Ball Valve

Ball-type service valves (see figure 15) function the same way as the other valves but cannot be rebuilt; if one fails, replace with a new valve. The ball valve is equipped with a service port with a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and assures a leak-free seal.

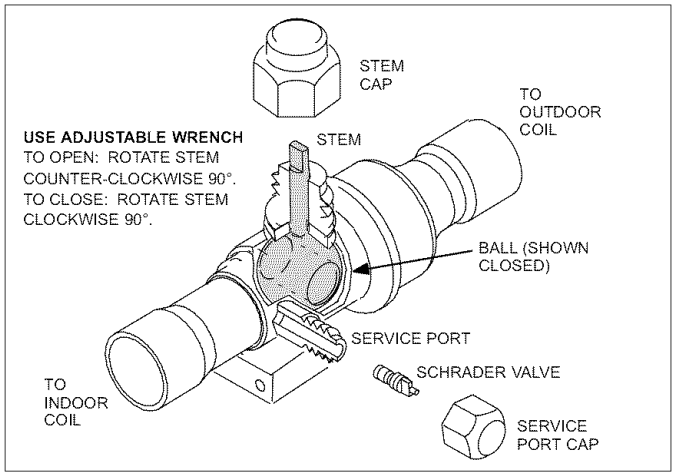


Figure 15. Ball-Type Vapor Valve (Valve Closed)

Leak Testing

After the line set has been connected to the indoor and outdoor units, check the line set connections and indoor unit for leaks.

⚠ WARNING

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

⚠ WARNING

Danger of explosion!

Can cause equipment damage, injury or death. Never use oxygen to pressurize a refrigeration or air conditioning system. Oxygen will explode on contact with oil and could cause personal injury.

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).

USING AN ELECTRONIC LEAK DETECTOR

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

1. Connect a cylinder of HFC-410A to the center port of the manifold gauge set.
2. With both manifold valves closed, open the valve on the HFC-410A cylinder (vapor only).
3. Open the high pressure side of the manifold to allow the HFC-410A into the line set and indoor unit. Weigh in a trace amount of HFC-410A . [A trace amount is a maximum of 2 ounces (57 g) or 3 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 nitrogen with a pressure regulating valve to the center port of the manifold gauge set.
5. Connect the manifold gauge set high pressure hose to the vapor valve service port. *(Normally, the high pressure hose is connected to the liquid line port; however, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.)*
6. Adjust the nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set which will pressurize line set and indoor unit.
7. After a few minutes, open a refrigerant port to ensure the refrigerant you added is adequate to be detected. (Amounts of refrigerant will vary with line lengths.) Check all joints for leaks. Purge nitrogen and HFC-410A mixture. Correct any leaks and recheck.

Evacuation

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

⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument that reads from 50 microns to at least 10,000 microns.

1. Connect manifold gauge set to the service valve ports as follows:
   - low pressure gauge to *vapor* 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). During the early stages of evacuation, it is desir-

able to close the manifold gauge valve at least once to determine if there is a rapid rise in **absolute pressure**. A rapid rise in pressure 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 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.

⚠ 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.

7. Shut off the nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the 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 valves to break the vacuum from 1 to 2 psig positive pressure in the line set and indoor unit. Close manifold gauge valves and shut off the HFC-410A cylinder and remove the manifold gauge set.

Start-Up

⚠ IMPORTANT

Crankcase heater (if applicable) should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

1. Check that fan rotates freely.
2. Inspect all factory and field-installed wiring for loose connections.

NOTE - After the system has been evacuated and before completing all the remaining start-up steps, this is the ideal time to adjust the amount of refrigerant made necessary by line set length difference and by the specific indoor unit matchup. Skip to the paragraph **"Setup for Checking and Adding Charge"** *on Page 13 to setup for charging and for determine if charge is needed; adjust the charge accordingly.*

3. Open the liquid line and vapor line service valves (counterclockwise) to release refrigerant charge (contained in outdoor unit) into the system.
4. Replace stem caps and tighten finger tight; then tighten per table 1 (on page 2).
5. Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit nameplate. If not, do not start the equipment until the power company has been consulted and the voltage condition has been corrected.
6. Set the thermostat for a cooling demand, turn on power to indoor blower unit and close the outdoor unit disconnect to start the unit.
7. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.

Refrigerant Charge

This system is charged with HFC-410A refrigerant which operates at much higher pressures than HCFC-22. The recommended check expansion valve is approved for use with HFC-410A. Do not replace it with a valve that is designed to be used with HCFC-22. This unit is NOT approved for use with coils that include metering orifices or capillary tubes.

The unit is factory-charged with the amount of HFC-410A refrigerant indicated on the unit rating plate. This charge is based on a matching indoor coil and outdoor coil with a 15 foot (4.6 m) line set. A blank space is provided on the unit rating plate to list the actual field charge.

⚠ IMPORTANT

Mineral oils are not compatible with HFC-410A. If oil must be added, it must be a polyol ester oil.

Checking Indoor Airflow

NOTE - Be sure that filters and indoor and outdoor coils are clean before testing.

COOLING MODE INDOOR AIRFLOW CHECK

Check airflow using the Delta-T (DT) process (figure 16).

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:

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

Setup for Checking and Adding Charge

SETUP FOR CHARGING

Connect the manifold gauge set to the unit's service ports (see figure 17):

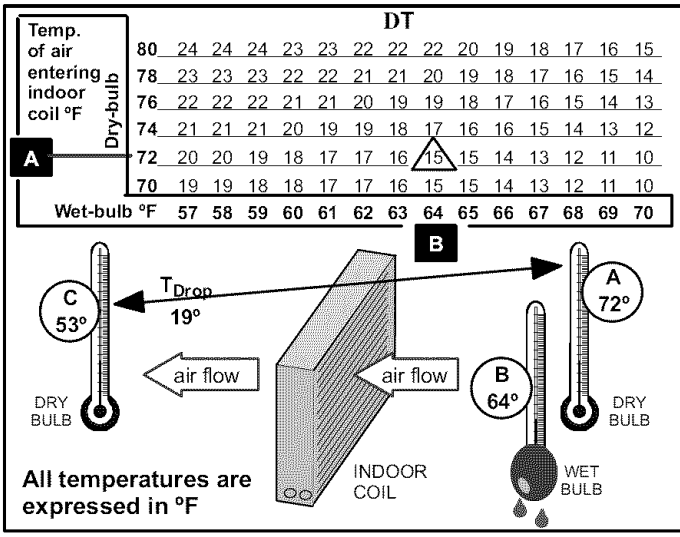
- low pressure gauge to ***vapor service port***
- high pressure gauge to ***liquid service port***

Close manifold gauge set valves. Connect the center manifold hose to an upright cylinder of HFC-410A.

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 amt. for variation in line set length (table in figure 18)		Additional charge specified per indoor unit matchup (tables 4 through 10.		Total charge
_____	±	_____	+	_____	=	_____



Step 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).

Step 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**.

Step 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*

Step 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 16. Checking Indoor Airflow over Evaporator Coil using Delta-T (DT) Chart

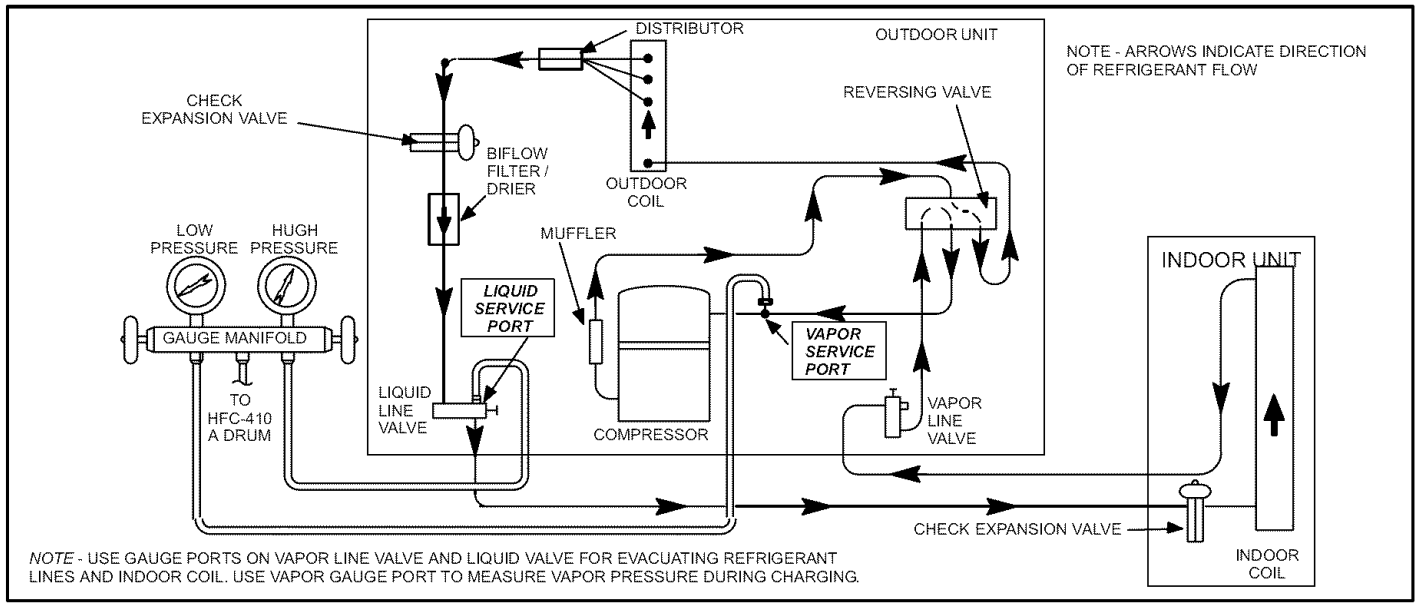


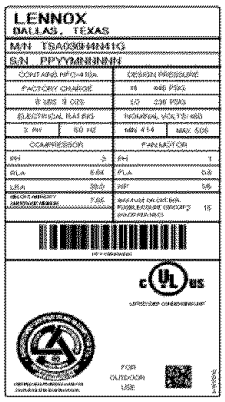
Figure 17. 13HPX Cooling Cycle (Showing Gauge Manifold Connections)

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.*

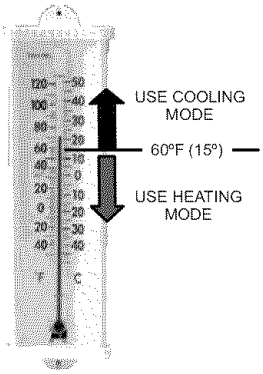


1. Check Liquid and suction line pressures
2. Compare unit pressures with table 12, *Normal Operating Pressures.*
3. Conduct leak check; evacuate as previously outlined.
4. Weigh in the unit nameplate charge plus any charge required for line set differences over feet.

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

Figure 18. Using Weigh In Method

SUBCOOLING



SAT° _____
LIQ° – _____
SC° = _____

1 Check the airflow as illustrated in figure 16 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 11, (*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 12 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 4 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 19. Using Subcooling Method

Table 4. 13HPX-018

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-018	11	9	0	3
CBX32MV-018/024-230	12	12	0	0
CBX32MV-024/030-230	12	19	1	1

Table 5. 13HPX-024

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-024	20	16	1	0
CB30U-31	14	15	1	5
CBX32M-030	14	15	1	5
CBX32MV-018/024	14	15	0	9
CBX32MV-024/030	14	15	1	5
CH33-25B	14	15	0	0
CH33-36A	14	15	0	8
CH33-36B	14	15	0	0
CH33-36C	14	15	0	14
CR33-30/36	20	16	1	0
CX34-25	14	15	0	9
CX34-31	14	15	1	5
CX34-36	14	15	0	4

Table 6. 13HPX-030

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-030	19	6	1	7
CBX26UH-036	25	4	0	11
CBX27UH-030-230	15	4	0	11
CBX27UH-036-230	15	4	0	11
CBX32M-030 -036, -042	15	4	0	11
CBX32MV-024/030, -036	15	4	0	11
CH33-25B	15	4	0	0
CH33-31B	15	4	0	11
CH33-36A	15	4	0	8
CH33-36B	15	4	0	0
CH33-36C	15	4	0	11
CH33-42	15	4	0	11
CR33-30/36	20	4	0	11
CX34-25, -31	15	4	0	11
CX34-36	28	3	0	0
CX34-38 SN# 6007 and after	4	4	0	11
CX34-38 before SN# 6007	20	4	0	11
CX34-42	28	3	0	0

Table 7. 13HPX-036

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-036	14	10	2	7
CBX27UH-036-230	10	5	2	7
CBX27UH-042-230	10	10	2	13
CBX32M-036, -042	10	5	2	7
CBX32MV-036-230	10	5	2	7
CH33-31A, -31B	10	5	2	8
CH33-36B	10	5	0	0
CH33-36C	10	5	0	5
CH33-42	10	5	2	8
CH33-44/48B	10	5	2	10
CH33-48C	10	5	2	10
CR33-30/36	25	5	0	6
CR33-48	25	5	2	8
CR33-50/60	10	5	2	10
CX34-36B	10	5	0	1
CX34-38 SN# 6007 and after	5	5	2	7
CX34-38 before SN# 6007	10	5	2	7
CX34-42B	10	5	0	1
CX34-44/48B	10	5	2	7

Amount of charge required in additional to charge shown on unit name-plate. (Remember to consider lineset length difference.)

Table 8. 13HPX-042

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-042	26	5	1	1
CBX26UH-048	10	12	4	5
CBX27UH-042-230	10	6	4	5
CBX27UH-048-230	10	6	4	5
CBX32M-036, -042	15	5	0	0
CBX32MV-036	15	5	0	0
CBX32MV-048-230	10	6	4	5
CH33-43C, -48C	10	6	1	1
CH33-49C, -50/60C	10	6	4	5
CH33-60D	10	6	2	6
CR33-48	32	5	0	5
CR33-50/60	32	9	2	6
CR33-60	32	9	2	6
CX34-43C	10	6	1	1
CX34-49	10	6	3	7
CX34-50/60C	10	6	1	1

Table 9. 13HPX-048

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-048	11	11	1	7
CBX26UH-060	24	18	2	7
CBX27UH-048-230	11	11	1	3
CBX27UH-060-230	24	18	2	7
CBX32M-048	11	11	1	3
CBX32M-060	11	11	1	3
CBX32MV-048	11	11	1	3
CBX32MV-060-230	11	11	1	3
CH33-43C	18	7	0	0
CH33-49C, -50/60C	11	11	1	3
CH33-60D	11	11	0	9
CH33-62D	11	11	1	10
CR33-50/60	25	7	0	9
CR33-60	25	7	0	9
CX34-49	11	11	1	1
CX34-60D	11	11	0	9

Table 10. 13HPX-060

INDOOR MATCHUPS	Target Subcooling Heat (±5°F)	Target Subcooling Cool (±1°F)	*Add charge lb	*Add charge oz
CBX26UH-060	8	11	1	7
CBX27UH-060-230	10	9	0	13
CBX32MV-060	10	9	0	0
CBX32MV-068	10	9	0	9
CH33-60D	10	9	0	0
CH33-62D	10	9	0	11
CX34-62D	10	9	0	6

Table 11. Normal Operating Pressures - Liquid ±10 & Vapor ±5 PSIG*

⚠ IMPORTANT

Use table 11 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.

	13HPX-018	13HPX-024	13HPX-030	13HPX-036	13HPX-042	13HPX-048	13HPX-060
°F (°C)**	Liq / Vap	Liq / Vap	Liq / Vap	Liq / Vap	Liq / Vap	Liq / Vap	Liq / Vap
Cooling							
65 (18)	234 / 142	258 / 140	238 / 137	260 / 136	231 / 135	246 / 134	256 / 116
75 (24)	273 / 144	299 / 142	278 / 138	303 / 140	267 / 138	286 / 136	298 / 123
85 (29)	316 / 145	347 / 145	322 / 140	348 / 143	314 / 140	330 / 138	345 / 131
95 (35)	365 / 148	399 / 148	369 / 143	398 / 145	367 / 143	379 / 140	395 / 135
105 (41)	421 / 151	460 / 150	425 / 144	452 / 148	414 / 146	432 / 143	450 / 138
115 (45)	492 / 152	534 / 152	487 / 147	512 / 151	473 / 148	492 / 146	512 / 141
Heating							
60 (15)	325 / 130	353 / 130	328 / 127	350 / 131	360 / 135	361 / 130	370 / 127
50(10)	309 / 114	330 / 109	313 / 110	331 / 107	340 / 110	334 / 100	350 / 102
40 (4)	293 / 96	307 / 90	297 / 93	314 / 88	324 / 91	302 / 92	331 / 81
30 (-1)	278 / 79	291 / 75	284 / 77	290 / 74	307 / 73	300 / 73	309 / 62
20 (-7)	264 / 65	276 / 59	271 / 62	283 / 58	298 / 61	286 / 60	300 / 56

**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 outside coil.*

Table 12. HFC-410A Temp. (°F) - Pressure (Psig)

°F	Psig	°F	Psig	°F	Psig	°F	Psig
-40	10.1	21	80.5	56	158.2	91	278.2
-35	13.5	22	82.3	57	161	92	282.3
-30	17.2	23	84.1	58	163.9	93	286.5
-25	21.4	24	85.9	59	166.7	94	290.8
-20	25.9	25	87.8	60	169.6	95	295.1
-18	27.8	26	89.7	61	172.6	96	299.4
-16	29.7	27	91.6	62	175.4	97	303.8
-14	31.8	28	93.5	63	178.5	98	308.2
-12	33.9	29	95.5	64	181.6	99	312.7
-10	36.1	30	97.5	65	184.3	100	317.2
-8	38.4	31	99.5	66	187.7	101	321.8
-6	40.7	32	100.8	67	190.9	102	326.4
-4	43.1	33	102.9	68	194.1	103	331
-2	45.6	34	105	69	197.3	104	335.7
0	48.2	35	107.1	70	200.6	105	340.5
1	49.5	36	109.2	71	203.9	106	345.3
2	50.9	37	111.4	72	207.2	107	350.1
3	52.2	38	113.6	73	210.6	108	355
4	53.6	39	115.8	74	214	109	360
5	55	40	118	75	217.4	110	365
6	56.4	41	120.3	76	220.9	111	370
7	57.9	42	122.6	77	224.4	112	375.1
8	59.3	43	125	78	228	113	380.2
9	60.8	44	127.3	79	231.6	114	385.4
10	62.3	45	129.7	80	235.3	115	390.7
11	63.9	46	132.2	81	239	116	396
12	65.4	47	134.6	82	242.7	117	401.3
13	67	48	137.1	83	246.5	118	406.7
14	68.6	49	139.6	84	250.3	119	412.2
15	70.2	50	142.2	85	254.1	120	417.7
16	71.9	51	144.8	86	258	121	423.2
17	73.5	52	147.4	87	262	122	428.8
18	75.2	53	150.1	88	266	123	434.5
19	77	54	152.8	89	270	124	440.2
20	78.7	55	155.5	90	274.1	125	445.9

System Operation

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

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.

LOW PRESSURE SWITCH

The 13HPX is equipped with an auto-reset low pressure switch which is located on the vapor line. The switch shuts off the compressor when the vapor pressure falls below the factory setting. This switch, which is ignored during defrost operation, closes at pressures at or above 55 psig and opens at 25 psig. It is not adjustable.

HIGH PRESSURE SWITCH

The 13HPX is equipped with an auto-reset high pressure switch (single-pole, single-throw) which is located on the liquid line. The switch shuts off the compressor when discharge pressure rises above the factory setting. The switch is normally closed and is permanently adjusted to trip (open) at 590 ± 10 psig (4412 ± 69 kPa).

NOTE - A Schrader core is under the pressure switches.

Defrost System

The 13HPX defrost system includes two components: a defrost thermostat and a defrost control.

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. See figure 20.

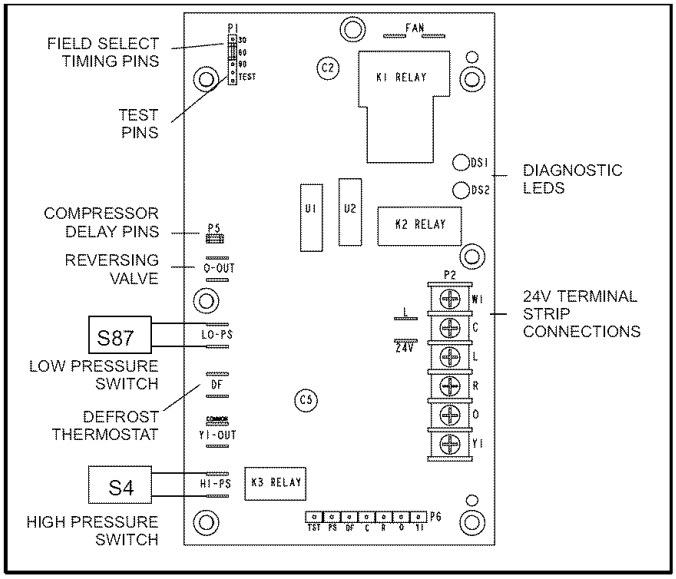


Figure 20. 13HPX Outdoor Unit Defrost Control Board

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.

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 20). 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 20). The board also includes a low pressure, or loss-of-charge-pressure, switch (S87). Switches are shown in wiring diagram (figure 5, page 5) and in figure 20.

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 (see Table 13). 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.

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.

Table 13. 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

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.

Maintenance and service must be performed by a qualified installer or service agency. At the beginning of each cooling season, the system should be checked as follows:

OUTDOOR UNIT

1. Clean and inspect outdoor coil (may be flushed with a water hose). Ensure power is off before cleaning.
2. Outdoor unit fan motor is pre-lubricated and sealed. No further lubrication is needed.
3. Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
4. Check all wiring for loose connections.
5. Check for correct voltage at unit (unit operating).
6. Check amp draw on outdoor fan motor.
   Unit nameplate_____Actual_____.
7. Inspect drain holes in coil compartment base and clean if necessary.

NOTE - If insufficient heating or cooling occurs, the unit should be gauged and refrigerant charge should be checked.

INDOOR COIL

1. Clean coil if necessary.
2. Check connecting lines, joints and coil for evidence of oil leaks.
3. Check condensate line and clean if necessary.

INDOOR UNIT

1. Clean or change filters.
2. Lennox blower motors are prelubricated and permanently sealed. No more lubrication is needed.

3. 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.
4. *Belt Drive Blowers* - Check belt for wear and proper tension.
5. Check all wiring for loose connections.
6. Check for correct voltage at unit. (blower operating)
7. Check amp draw on blower motor.
   Motor nameplate_____Actual_____.

Optional Accessories

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

- Loss of Charge Kit
- Compressor Monitor
- Compressor Crankcase Heater
- Hail Guards
- Mounting Bases
- Stand-off Kit
- Sound Cover
- Low Ambient Kit
- Monitor Kit
- Mild Weather Kit

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. 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. Replace disposable filters with a filter of the same type and size.

   NOTE - If you are unsure about the filter you need 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. Many indoor units are equipped with reusable foam filters. These filters can be cleaned with a mild soap and water solution. Rinse the filter thoroughly and let it dry completely before it is returned to the unit or grille.

   *NOTE - **The filter and all access panels must be in place any time the unit is in operation.***
4. Some systems are equipped with an electronic air cleaner, designed to remove the majority of airborne particles from the air passing through the cleaner. If your system is so equipped, ask your dealer for maintenance instructions.
5. Inspect and clean indoor coil. The indoor 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. Inspect and clean outdoor coil:
   - 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.
   - The outdoor coil may require frequent cleaning (depending on environmental conditions). Clean the outdoor coils with an unpressurized water hose to remove surface contaminants and debris.
   - If necessary, clean the outdoor coil more frequently, especially if it is exposed to substances which are corrosive or which block airflow across the coil (ie, pet urine, cottonwood seeds, etc.).

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.

IN CASE OF EXTENDED POWER OUTAGE...

The heat pump may be 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

Temperature indicator displays 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 thermostat for operation details.

PRESERVICE CHECK

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

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

13HPX Check List

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 _____ Outdoor Fan _____

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. _____

Discharge Pressure _____ Vapor Pressure _____ Refrigerant Charge Checked? ❑

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

Service Valves: --- Fully Opened? ❑ Caps Tight? ❑ **Thermostat**

Voltage With Compressor Operating _____ Calibrated? ❑ Properly Set? ❑ Level? ❑

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