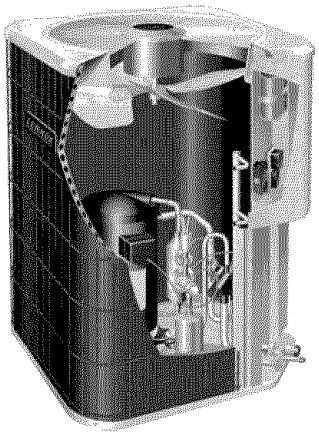


INSTALLATION INSTRUCTIONS

Merit® Series13HPD Units

1-½ to 5 TONS

HEAT PUMP UNITS
505,361M
09/07
Supersedes 504,943M

Technical Publications
Litho U.S.A.

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. 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 (CFCs, HCFCs AND HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

Table of Contents

Shipping and Packing List

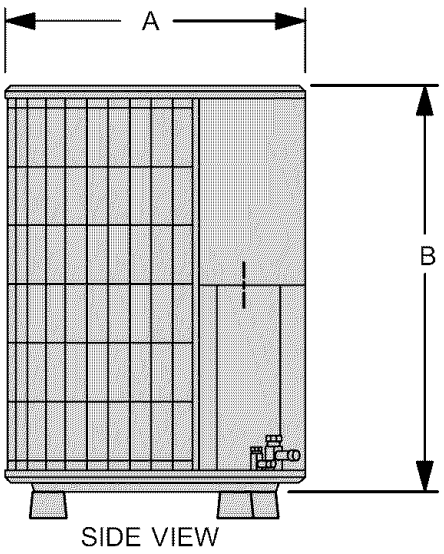
1 - Assembled 13HPD outdoor unit

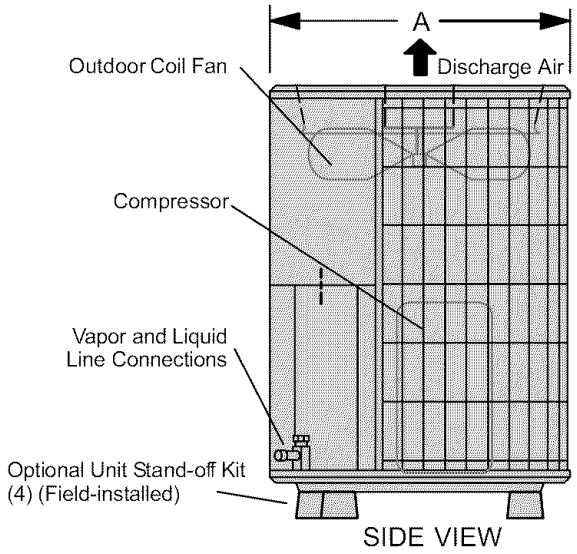
Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

13HPD Outdoor Unit

The Lennox 13HPD Heat Pumps, which will also be referred to in this instruction as the outdoor unit, uses HCFC-22 refrigerant. This unit must be installed with a matching indoor unit and line set as outlined in the Lennox Engineering Handbook. This unit is designed for use in check thermal expansion valve (CTXV) and fixed orifice systems.

Unit Dimensions - inches (mm)





Model Number	A	B
13HPD-018	24-1/4 (616)	33-1/4 (845)
13HPD-024	24-1/4 (616)	33-1/4 (845)
13HPD-030	24-1/4 (616)	29-1/4 (743)
13HPD-036	24-1/4 (616)	33-1/4 (845)
13HPD-042	28-1/4 (616)	33-1/4 (845)
13HPD-048	28-1/4 (718)	37 (940)
13HPD-060	32-1/4 (819)	37 (940)

⚠ 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 caps and fasteners are appropriately tightened. Table 1 lists torque values for typical service and repair items.

Table 1. Torque Requirements

Part	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, use a manifold gauge set that features low-loss anti-blow back fittings. See figure 1 for a typical manifold gauge connection setup.

OPERATING SERVICE VALVES

The liquid and vapor lines service valves are typically 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.

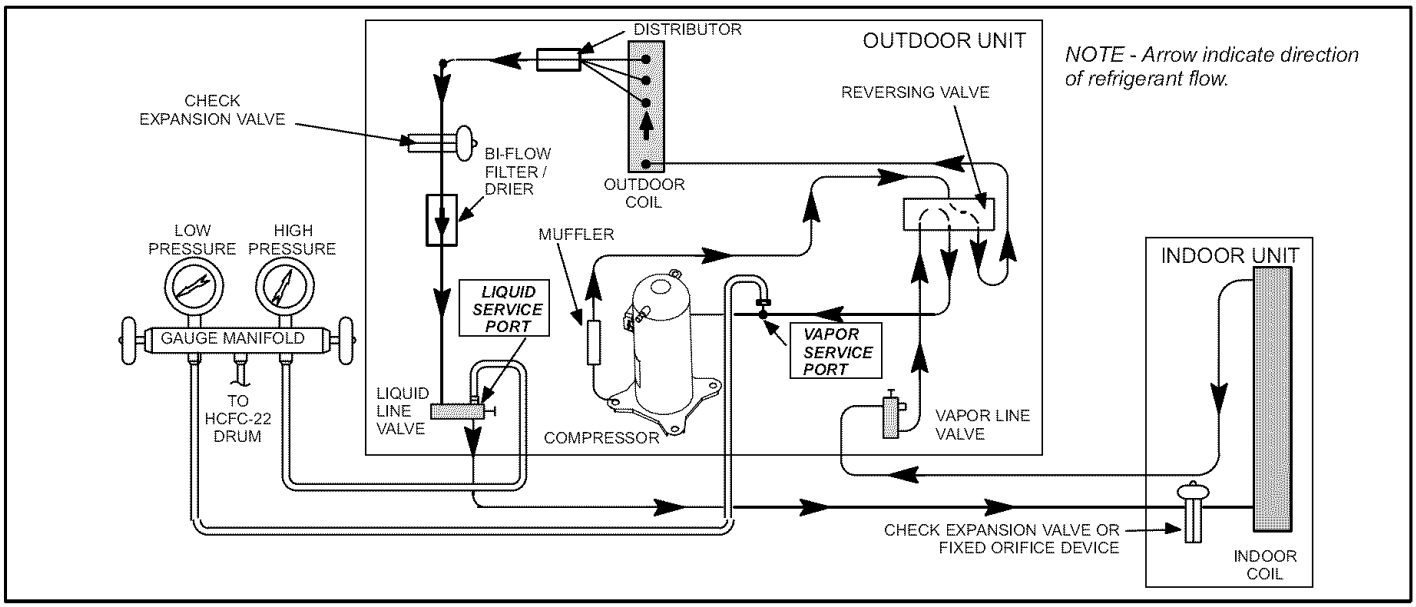
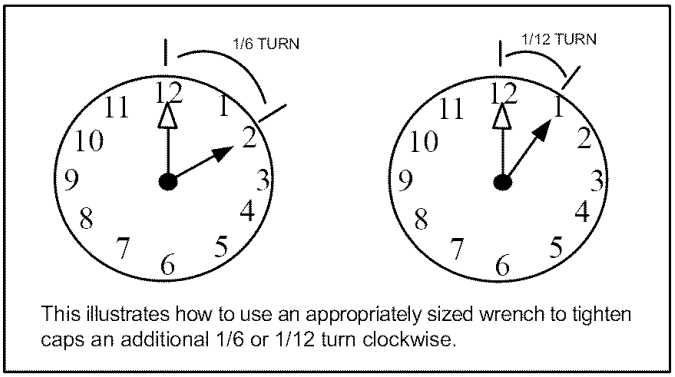


Figure 1. Typical Manifold Gauge Connection Setup

⚠ 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.



This illustrates how to use an appropriately sized wrench to tighten caps an additional 1/6 or 1/12 turn clockwise.

Figure 2. 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.

Operating Angle-Type Service Valve

To Access Angle-Type Service Port:

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

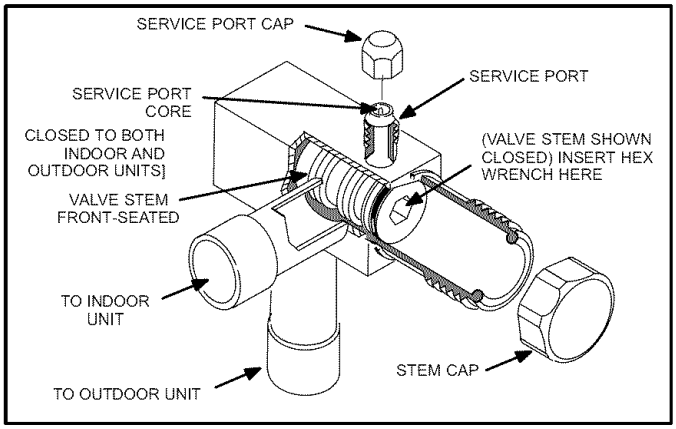


Figure 3. Angle-Type Service Valve (Valve Font-Seated Closed)

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 2.

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 wrench to turn an additional 1/12 turn clockwise as illustrated in figure 2.

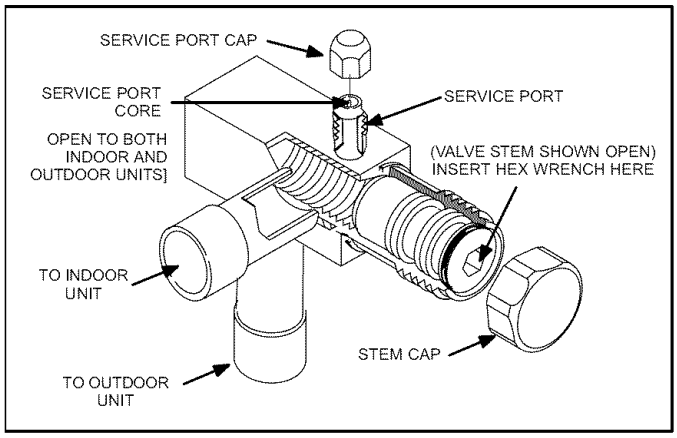


Figure 4. Angle-Type Service Valve (Valve Back-Seated Opened)

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

Operating Ball-Type Service Valve

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 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 2.

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 a wrench.
2. Use an appropriately sized wrench to open. To open valve, rotate 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 2.

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

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

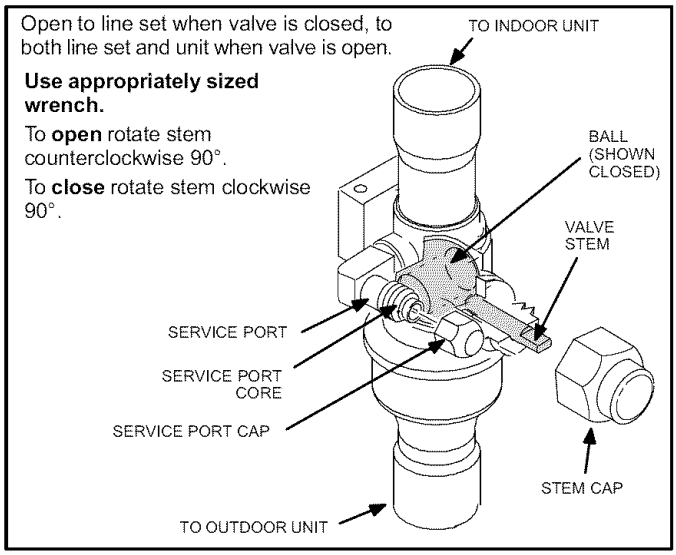


Figure 5. Ball-Type Service Valve

Recovering Refrigerant from Existing HCFC-22 System

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

METHOD 1:

If the existing outdoor unit is not equipped with shut-off valves, or if the unit is not operational, then:

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 recover 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.
4. Disconnect the liquid and vapor lines from the existing outdoor unit.
5. Remove the existing outdoor unit.

NOTE - Use recovery machine instructions for specific setup requirements.

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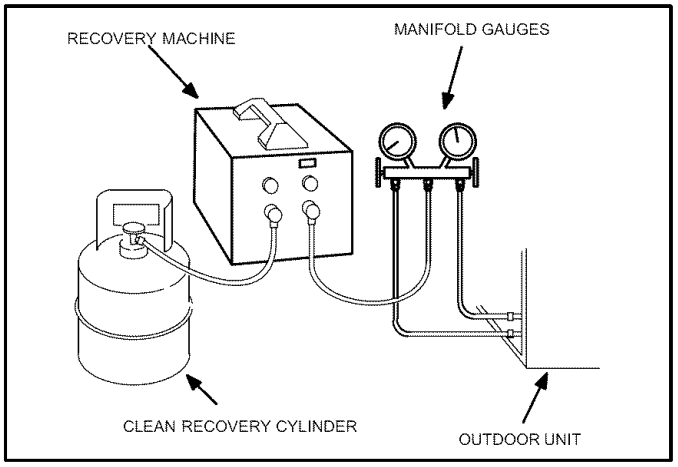

Figure 6. Typical Refrigerant Recovery (Method 1)

METHOD 2:

If the existing outdoor unit is equipped with manual shut-off valves then:

1. Start the existing HCFC-22 system in the cooling mode and close the liquid line valve.
2. Pump all of the existing HCFC-22 refrigerant back into the outdoor unit.

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

3. When the low side system pressures reach 0 psig, close the vapor line valve.
4. 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.
5. Disconnect the liquid and vapor lines from the existing outdoor unit.

Disconnecting and Removing Old 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 2 to determine the correct mounting size slab, platform or support. Refer to figure 7 for mandatory installation clearance requirements

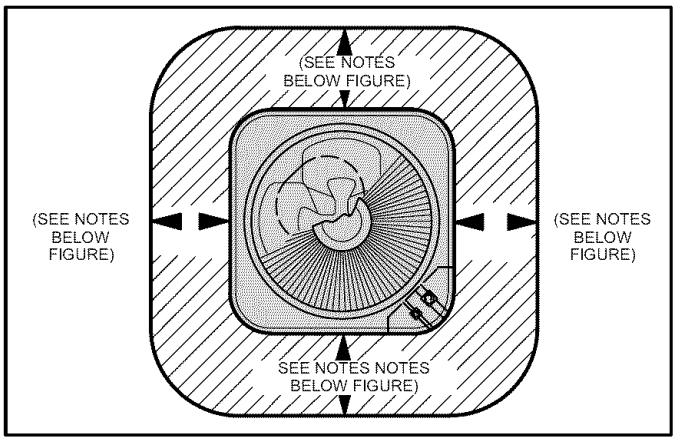

Figure 7. Installation Clearances

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.

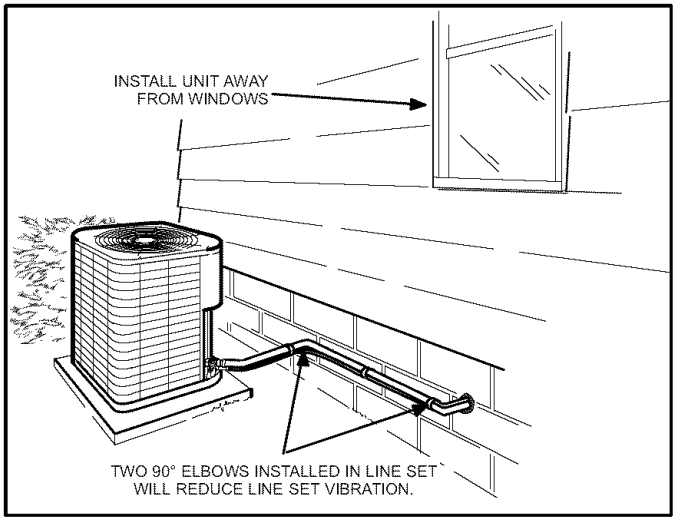

Figure 8. Outside Unit Placement

PLACING OUTDOOR UNIT ON SLAB

Slab may be level or have a slope tolerance away from the building of not more than two degrees, or two inches per five feet (51 mm per 1524 mm).

When installing a unit at grade level, the top of the slab should be high enough above the grade so that water from higher ground would not collect around the unit as illustrated in figure 9.

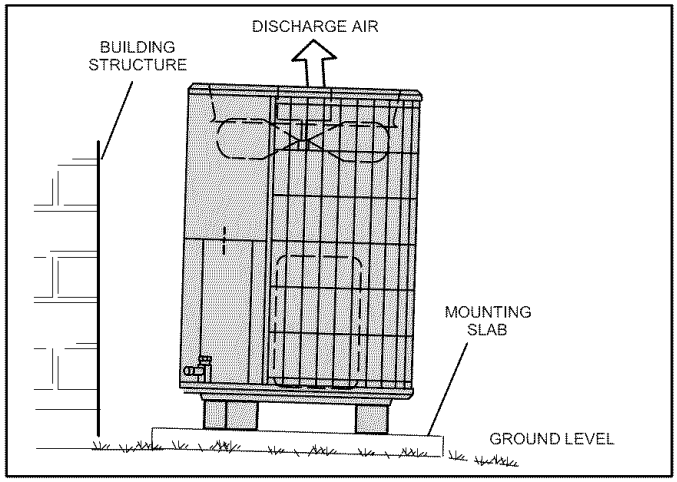

Figure 9. Ground Level Slab Mounting

INSTALLING OUTDOOR UNIT ON ROOF

Install the unit a minimum of six 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.

If unit coil cannot be mounted away from prevailing winter winds, a wind barrier should be constructed as illustrated in figure 10. Size barrier at least the same height and width as outdoor unit. Mount barrier 24 inches (610 mm) from the sides of the unit in the direction of prevailing winds.

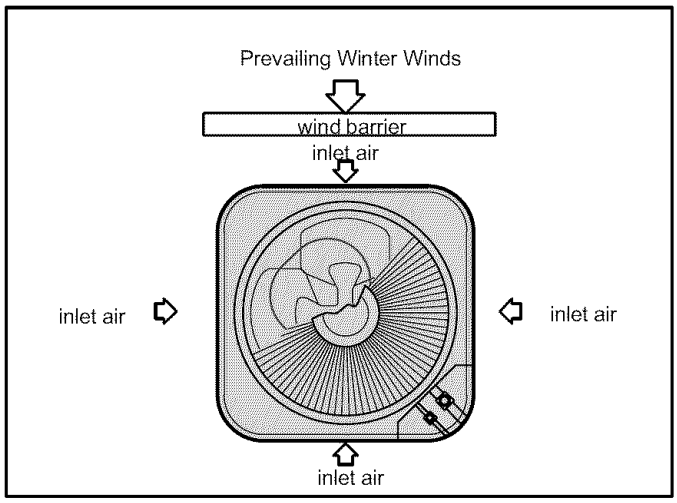

Figure 10. Rooftop Application and Wind Barrier

New or Replacement Refrigerant Line Set

This section provides information on new installation or replacement of existing line set. If a new or replacement line set is not required, then proceed to *Brazing Connections* on page 9.

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.

REFRIGERANT LINE SET

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit (braze connections) to the indoor unit coil (flare or braze connections). Use Lennox L15 (braze, 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	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 - When installing refrigerant lines longer than 50 feet, contact Lennox Technical Support Product Applications for assistance or Lennox piping manual. To obtain the correct information from Lennox, be sure to communicate the following points:

- Model (13HPD) 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 13HPD 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 13HPD 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:

Line set for heat pump applications can not be installed underground. For more information see the *Lennox Refrigerant Piping Design and Fabrication Guidelines*, or contact Lennox Technical Support Product Applications for assistance.

- Installation of **line set on vertical runs** is illustrated in figure 11.
- Installation of a **transition from horizontal to vertical** is illustrated in figure 12.
- Installation of **line set on horizontal runs** is illustrated in figure 13.

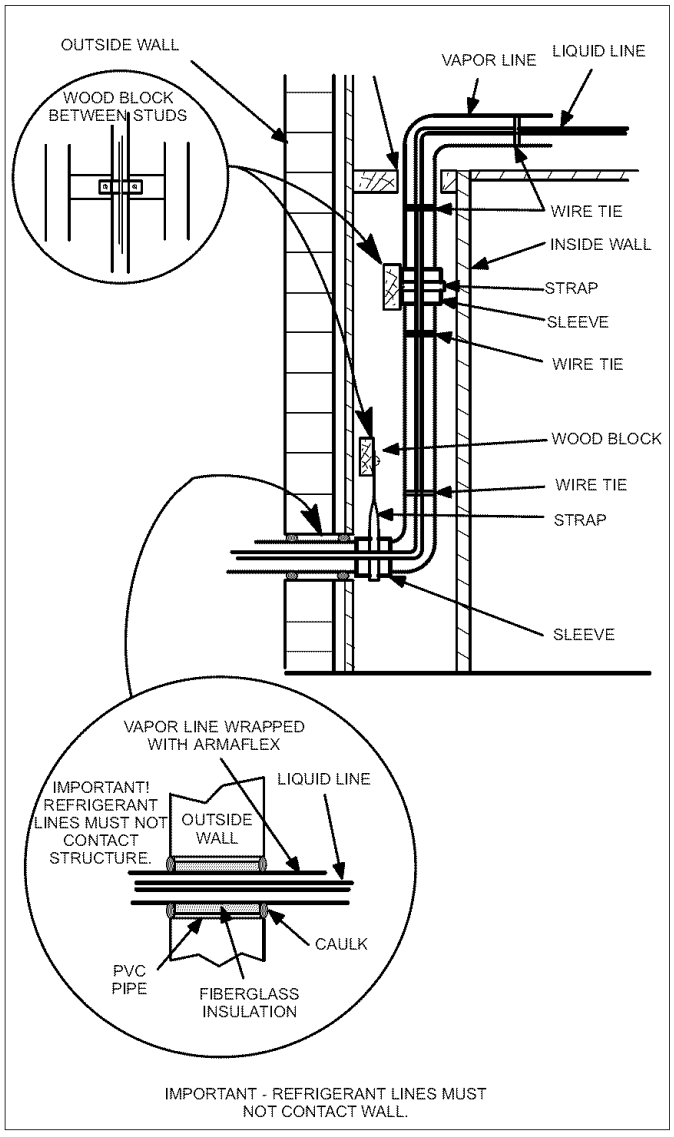

Figure 11. Refrigerant Line Set: Installing Vertical Runs (New Construction Shown)

NOTE - Similar installation practices should be used if line set is to be installed on exterior of outside wall.

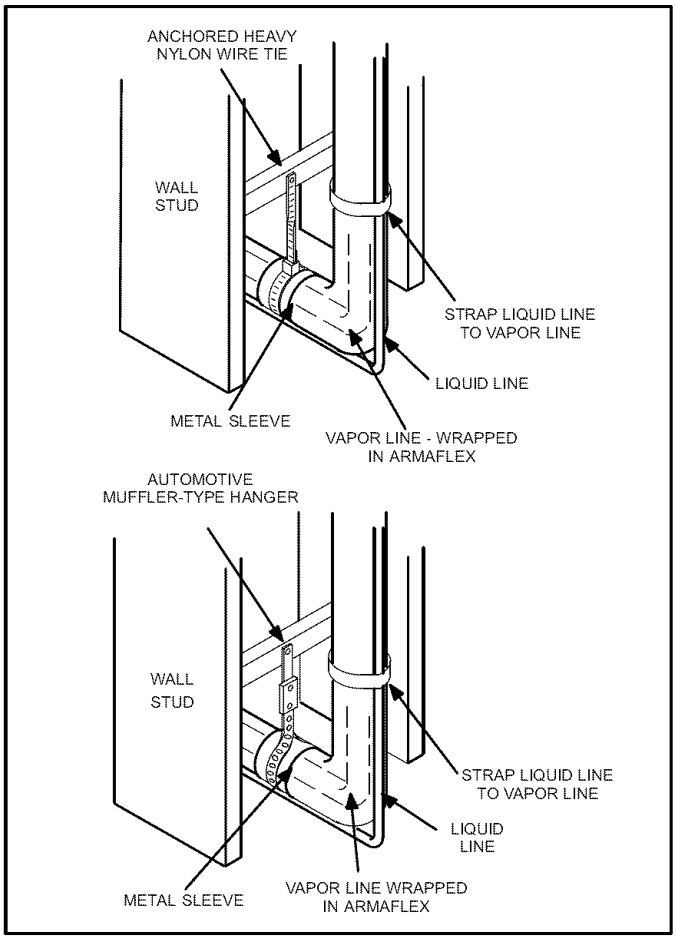

Figure 12. Refrigerant Line Set: Transition from Vertical to Horizontal

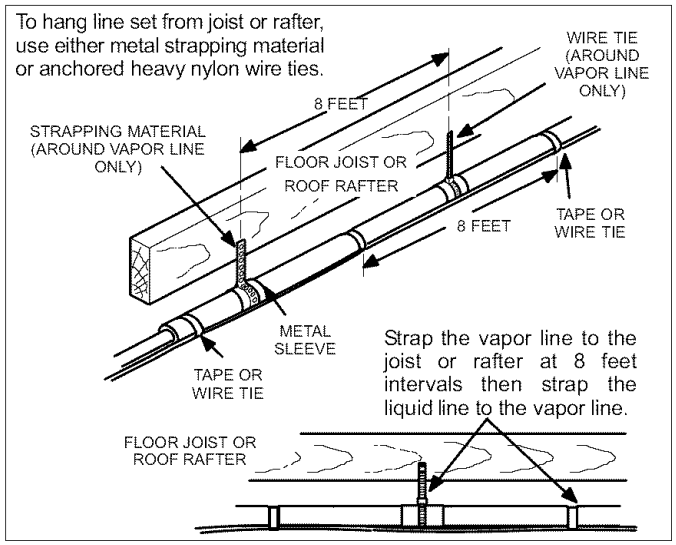

Figure 13. Refrigerant Line Set: Installing Horizontal Runs

Replacing Refrigerant Metering Device

13HPD units are used in check thermal expansion valve (CTXV) and fixed orifice systems. See the indoor unit installation instruction and the Lennox Engineering Handbook for approved metering device and application information. Table 2 lists liquid and vapor connection sizes, line sizes and corresponding line set.

Remove the existing HCFC-22 fixed orifice device or CTXV from the indoor coil if required. See figure 14 for disassembly and typical removal instructions.

The CTXV 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 location that will provide easy access for field servicing. Refer to Figure 15 for reference during installation of CTXV.

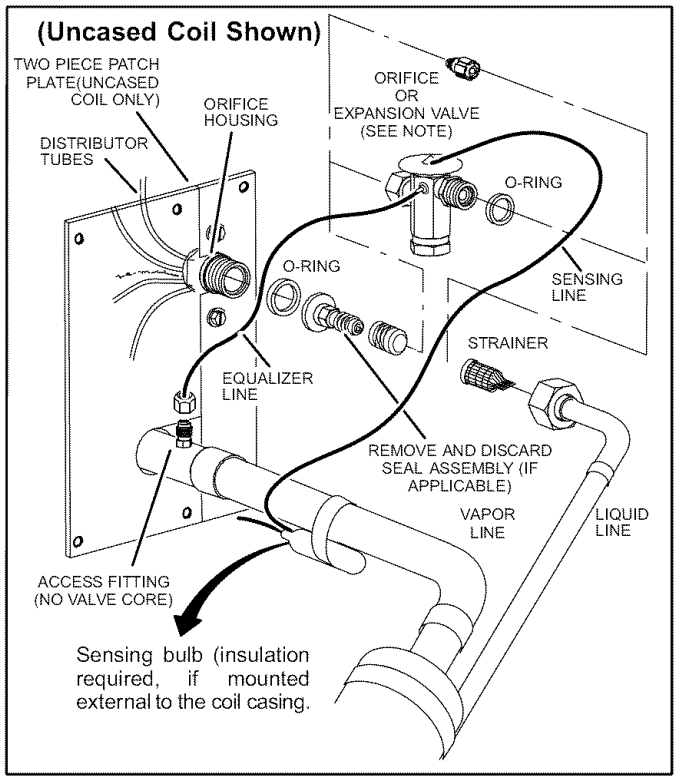

Figure 14. Typical Metering Device Installation

FIXED ORIFICE SYSTEMS

Replace the existing indoor unit fixed orifice with the orifice supplied with the outdoor unit. Place the supplied fixed orifice sticker on the indoor cabinet after installation.

Table 3. Fixed Orifice Part Numbers

Model	HCFC-22 13HPD
018	100484-08 (0.057)
024	100484-11 (0.061)
030	100484-21 (0.072)
036	100484-23 (0.074)
042	100484-30 (0.082)
037 and 048	Not Supported
060	100484-44 (0.098)

See table 3 for the fixed orifice size for each unit. In non-standard applications, the provided fixed orifice may not be appropriate.

CTXV SYSTEMS

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 distributor. Take care not to twist or damage distributor tubes during this process.

NOTE - If necessary, remove existing flow control device (fixed orifice or expansion valve) from existing line set before installing approved metering device.

4. Remove and discard RFC orifice and Teflon washer.
5. Remove and discard cap from the equalizer line port on the vapor line. Check for valve core in port fitting and if installed, remove from port.
6. Install one of the provided Teflon washers around the stubbed end of the CTXV.
7. Attach the stubbed end of the kit valve to the distributor assembly.
8. Place the remaining Teflon washer around the other end of the CTXV.
9. Attach the liquid line to the CTXV.
10. Attach the sensing bulb of the CTXV in the proper orientation as illustrated in figure 15 to the vapor line using the clamp an screws provided with the CTXV.

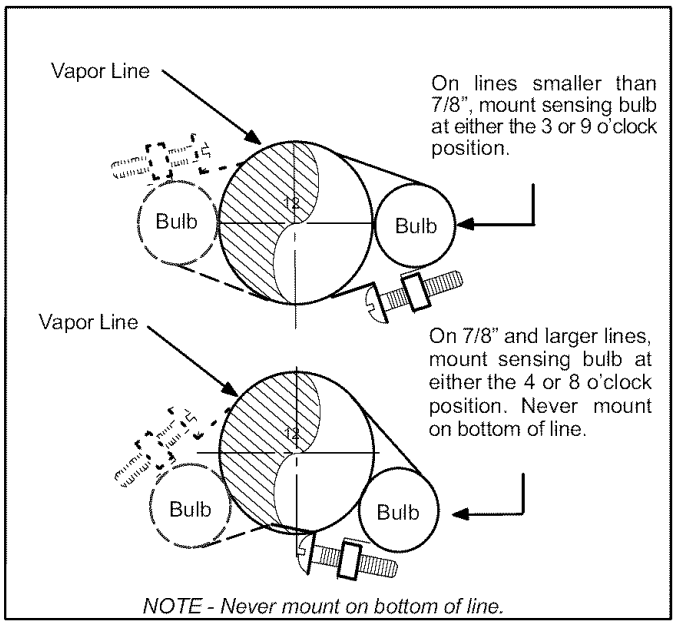

Figure 15. CTXV Sensing Bulb Installation

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

11. Connect the equalizer line port from the CTXV to the equalizer port on the vapor line.
12. To prevent any possibility of water damage, properly insulate all parts of the CTXV assembly that may sweat due to its surrounding ambient

NOTE - The CTXV can be installed internally in coil blowers, or external or internal to indoor coil only applications.

Table 4. CTXV Indoor Kits

Model	Kit Number
13HPD-018, -024, -030, -036	LB-85759F
13HPD-042, -048	LB-85759G
13HPD-060	100188-01

⚠ 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.

Brazing Connections

⚠ 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.

⚠ 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).

Use the following procedure to braze the line set to the new outdoor unit. Figure 17 is provided as a general guide for preparing to braze the line set to the outdoor unit.

Before brazing the line set, remove the service port core from both of the outdoor unit's service valves as illustrated in figure 16.

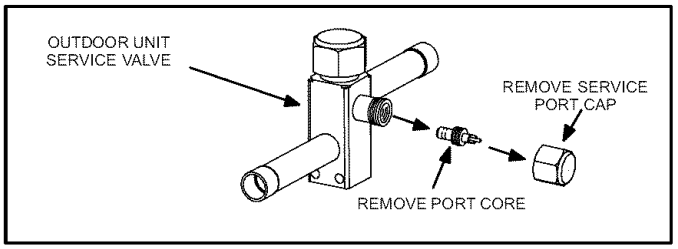

Figure 16. Typical Service Valve Port Core Removal

⚠ 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.

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 vapor 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.
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 vapor service valve. The CTXV metering device at the indoor unit coil will allow low pressure nitrogen to flow through the system.)

NOTE - The TXV metering device at the indoor unit coil 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.

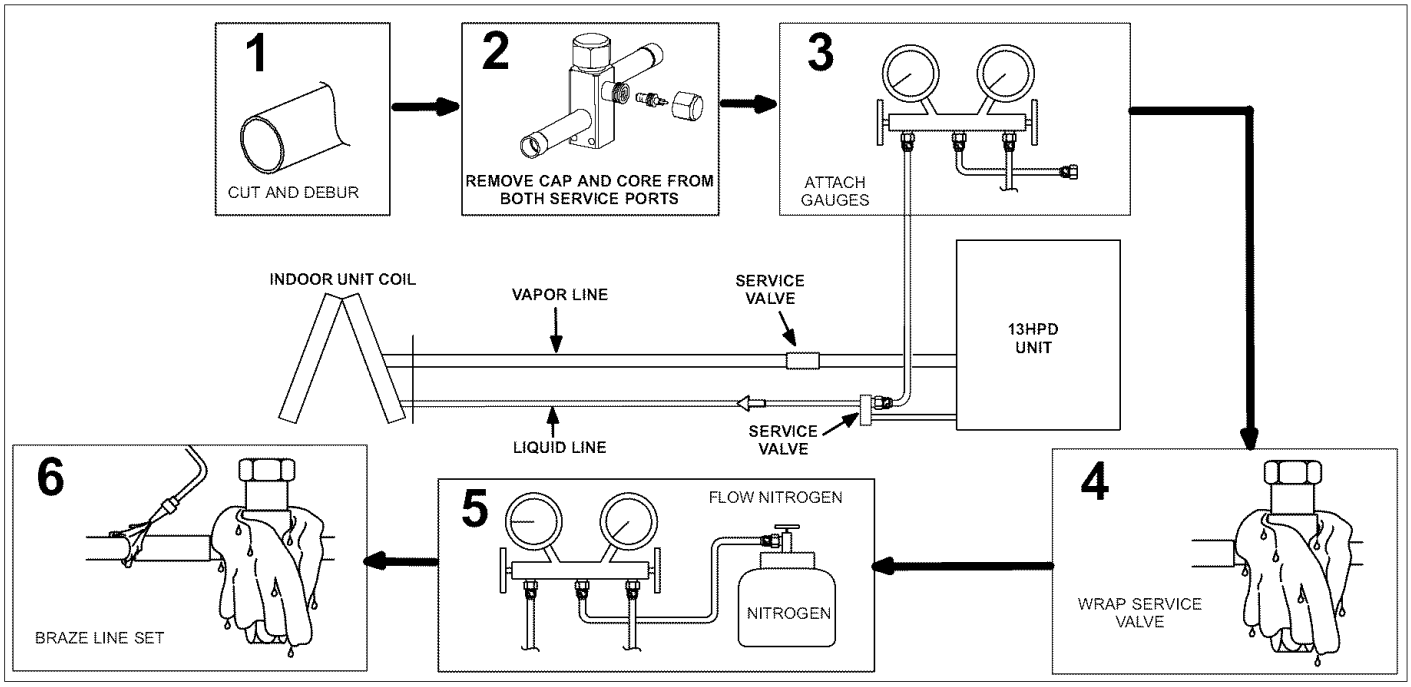

Figure 17. Brazing Connections

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

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 as illustrated in figure 18.

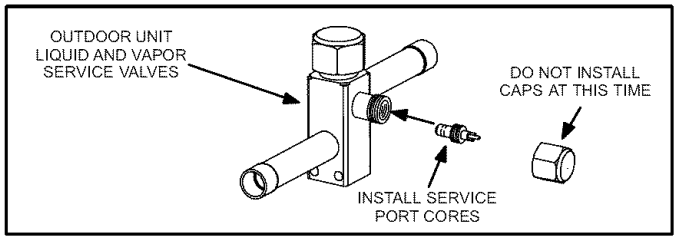

Figure 18. Typical Service Valve Port Core Installation

Testing for Leaks

After the line set has been connected to both the indoor and outdoor units, check the line set connections at both the indoor and outdoor units unit for leaks. Use the following procedure to test for leaks:

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

1. Connect an HCFC-22 manifold gauge set high pressure hose to the vapor valve service port.

NOTE - 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.

⚠ 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

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.

2. With both manifold valves closed, connect the cylinder of HCFC-22 refrigerant to the center port of the manifold gauge set. Open the valve on the HCFC-22 cylinder (vapor only).
3. Open the high pressure side of the manifold to allow HCFC-22 into the line set and indoor unit.
4. Weigh in a trace amount of HCFC-22. *[A trace amount is a maximum of two ounces (57 g) refrigerant or three pounds (31 kPa) pressure].*

5. Close the valve on the HCFC-22 cylinder and the valve on the high pressure side of the manifold gauge set.
6. Disconnect the HCFC-22 cylinder.
7. Connect a cylinder of dry nitrogen with a pressure regulating valve to the center port of the manifold gauge set.

NOTE - Amounts of refrigerant will vary with line lengths.

8. Adjust dry nitrogen pressure to 150 psig (1034 kPa).
9. Open the valve on the high side of the manifold gauge set in order to pressurize the line set and the indoor unit.
10. 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.
11. Check the indoor and outdoor units and line set for leaks using the leak detector mentioned in paragraph 10.
12. Proceed with evacuation as outlined in the *Evacuating the System.*

Evacuating the System

⚠ 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.

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 vapor combine with refrigerant to produce substances that corrode copper piping and compressor parts.

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).

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 HCFC-22 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 HCFC-22 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 HCFC-22 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 Connections

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

NOTE - Units are approved for use only with copper conductors.

NOTE - A complete unit wiring diagram is located inside the unit control box cover.

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.

Refer to the indoor unit installation instruction for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size. Figures 21 and 22 illustrate typical outdoor unit wiring diagrams for the 13HPD series heat pumps.

- 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.

WIRING CONNECTIONS

1. Install line voltage power supply to unit from a properly sized disconnect switch. Any excess high voltage field wiring should be trimmed or secured away from the low voltage field wiring.
2. Ground unit at unit disconnect switch or to an earth ground.

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

Table 5. Wire Run Lengths

Wire run length	AWG #	Insulation type
Less than 100 feet (30 m)	18	Color-coded with a minimum temperature rating of 35°C.
More than 100 feet (30 m)	16	

3. Connect conduit to the unit using provided conduit bushing.
4. Install room thermostat (ordered separately) on an inside wall approximately in the center of the conditioned area and five feet (1.5 m) from the floor. It should not be installed on an outside wall or where it can be affected by sunlight, drafts or vibrations.
5. Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit as illustrated in figures 21 and 22.
6. Do not bundle any excess 24VAC control wire inside control box. Run control wire through installed wire tie and tighten wire tie to provided low voltage strain relief and to maintain separation of field installed low and high voltage circuits.

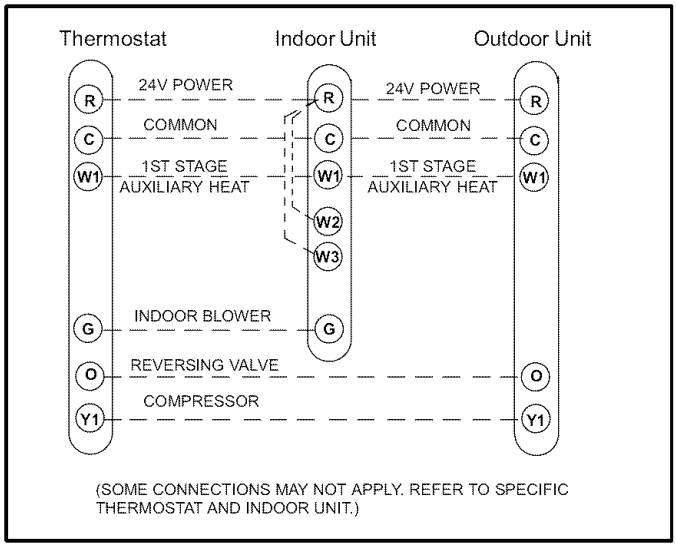

Figure 19. Outdoor Unit and Blower Unit Thermostat Designation

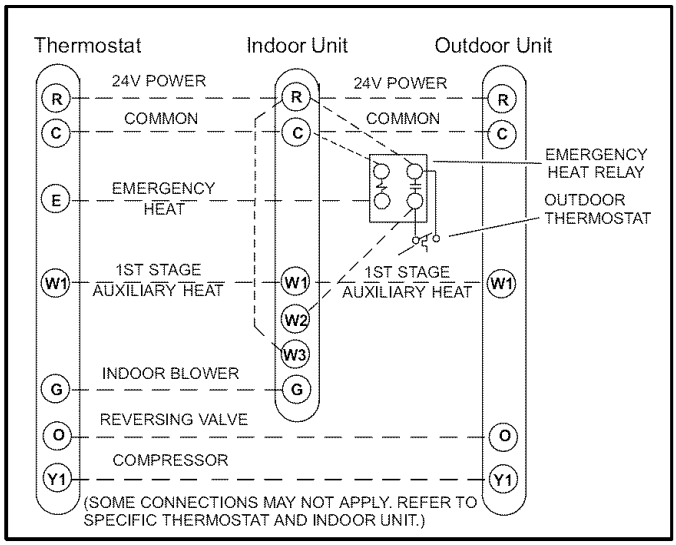

Figure 20. Outdoor Unit and Blower Unit Thermostat Designation (with Emergency Heat)

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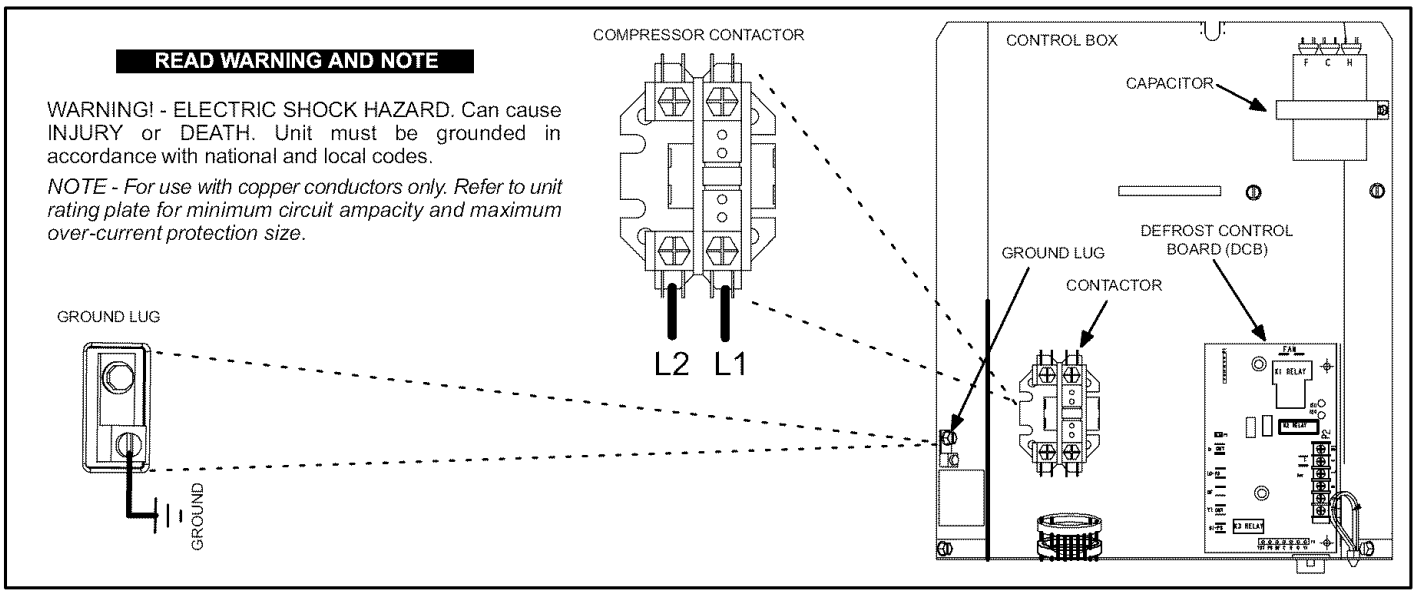
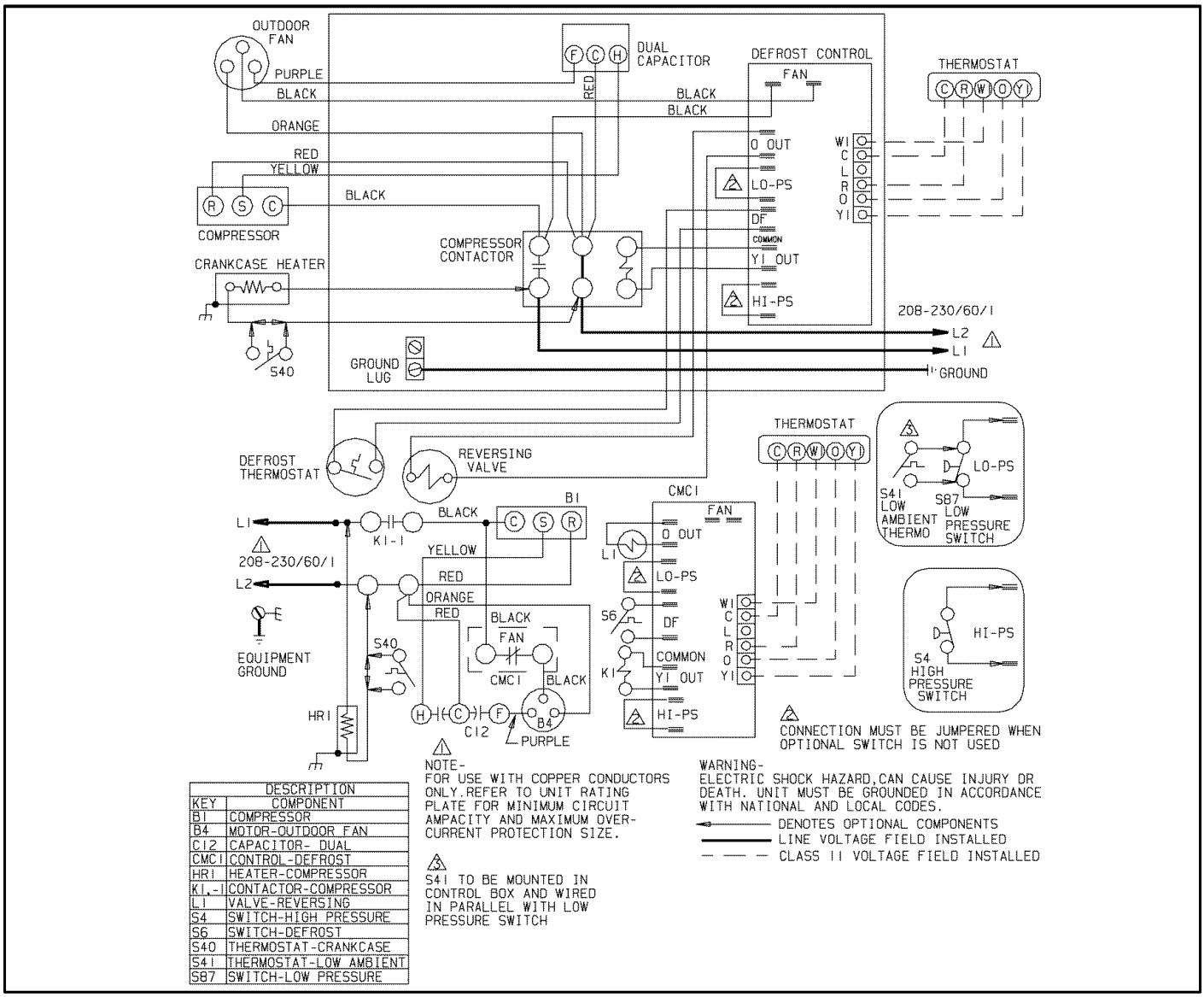
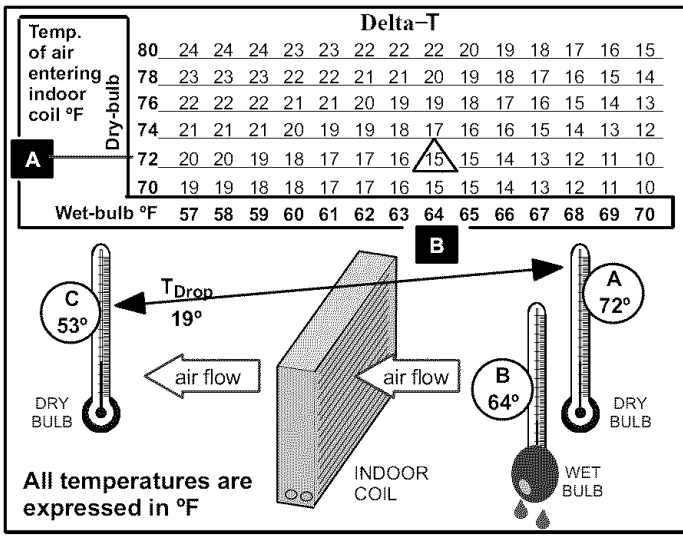


Figure 21. Typical High-Voltage Field Wiring Connection



KEY	DESCRIPTION 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 22. Wiring Diagram



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 23. Checking Indoor Airflow over Evaporator Coil using Delta-T Chart

Start-Up 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 the liquid line and vapor line service valves to release the refrigerant charge (contained in outdoor unit) into the system.
4. Replace the stem caps and tighten as specified in *Operating Service Valves* on page 2.
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*.

SETTING UP TO CHECK CHARGE

1. Close manifold gauge set valves. Connect the center manifold hose to an upright cylinder of HCFC-22.
2. Connect the manifold gauge set to the unit's service ports as illustrated in figure 1.
   - 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 as illustrated in figure 23.

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,
- voltage supplied to the unit,
- amperage being drawn by the heat elements.

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

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

The unit is factory charged with the amount of HCFC-22 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. For varying lengths of line set, refer to table 6 for refrigerant charge adjustment.

Table 6. Refrigerant Charge per Line Set Lengths

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

The outdoor unit should be charged during warm weather. However, applications arise in which charging must occur in the colder months. *The method of charging is determined the* ***outdoor ambient temperature.***

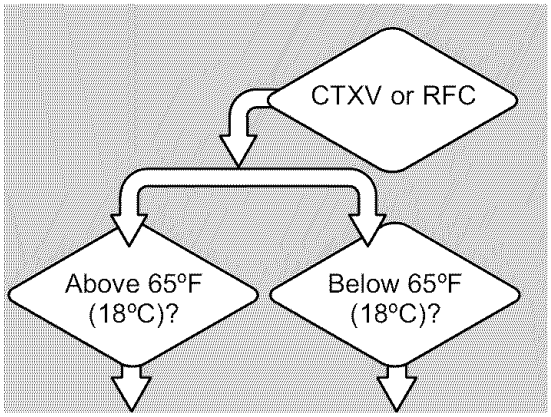
Measure the liquid line temperature and the outdoor ambient temperature as outlined below:

1. Close manifold gauge set valves. Connect the manifold gauge set to the service valves.
   - low pressure gauge to *vapor* valve service port
   - high pressure gauge to *liquid* valve service port
2. Connect the center manifold hose to an upright cylinder of HCFC-22.

3. Set the room thermostat to 75° to 80° and a call for heat. This will create the necessary load for properly charging the system in the cooling cycle.
4. Use a digital thermometer to record the outdoor ambient temperature.
5. When the heating demand has been satisfied, switch the thermostat to cooling mode with a set point of 68°F (20°C). When pressures have stabilized, use a digital thermometer to record the liquid line temperature.
6. The outdoor temperature will determine which charging method to use. Proceed with the appropriate charging procedure.

Determining Charge Method

Use figure 24 to determine the correct charging method.



WHEN TO CHARGE?

- Warm weather best
- Can charge in colder weather

CHARGE METHOD? Determine by:

- Metering device type
- Outdoor ambient temperature

REQUIREMENTS:

- Sufficient heat load in structure
- Indoor temperature between 70-80°F (21-26°C)
- Manifold gauge set connected to unit
- Thermometers:
  - to measure outdoor ambient temperature
  - to measure liquid line temperature
  - to measure vapor line temperature

Figure 24. Determining Correct Charging Method

CHARGE USING THE WEIGH-IN METHOD - OUTDOOR TEMPERATURE < 65°F (18°C)

If the system is void of refrigerant, or if the outdoor ambient temperature is cool, first, locate and repair any leaks and then weigh in the refrigerant charge into the unit.

1. Recover the refrigerant from the unit.
2. Conduct leak check; evacuate as previously outlined.
3. Weigh in the unit nameplate charge. If weighing facilities are not available or if charging the unit during warm weather, use one of the following procedures.

CHARGE USING THE SUBCOOLING METHOD - OUTDOOR TEMPERATURE < 65°F (18°C)

When the outdoor ambient temperature is below 65°F (18°C), use the subcooling method to charge the unit. It may be necessary to restrict the air flow through the outdoor coil to achieve pressures in the 200-250 psig (1379-1724 kPa) range. These higher pressures are necessary for checking the charge. Block equal sections of air intake panels and move obstructions sideways until the liquid pressure is in the 200-250 psig (1379-1724 kPa) range as illustrated in figure 25.

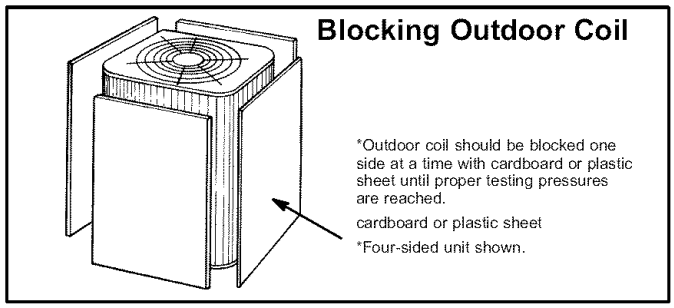


Figure 25. Blocking Outdoor Coil

1. With the manifold gauge hose still on the liquid service port and the unit's pressure stabilized, use a digital thermometer to record the liquid line temperature.
2. At the same time, record the liquid line pressure reading.
3. Use a temperature/pressure chart for HCFC-22 to determine the saturation temperature for the liquid line pressure reading.
4. Subtract the liquid line temperature from the saturation temperature (according to the chart) to determine subcooling.
5. Compare the subcooling value results with those listed in table 7. If subcooling is greater than shown, recover some refrigerant. If subcooling is less than shown, add some refrigerant.

Table 7. Subcooling Values

	___°	Saturation Temperature °F (°C)
—	___°	Liquid Line Temperature °F (°C)
=	___°	Subcooling Value °F (°C)

Model	-018	-024	-030	-036	-042	-048	-060
°F (°C)*	6 (3.3)	11 (6)	8 (4.4)	6 (3.3)	6 (3.3)	4 (2.2)	9 (5)

*NOTE - For best results, use the same electronic thermometer to check both outdoor-ambient and liquid-line temperatures. *F: +/-1.0°; C: +/-0.5°*

CHARGE USING THE APPROACH METHOD - OUTDOOR TEMPERATURE ≥ 65°F (18°C)

The following procedure is intended as a general guide and is for use on expansion valve systems only. For best results, indoor temperature should be 70°F (21°C) to 80°F (26°C). Monitor system pressures while charging.

1. Record outdoor ambient temperature using a digital thermometer.

2. Attach high pressure gauge set and operate unit for several minutes to allow system pressures to stabilize.

3. Compare stabilized pressures with those listed in table 9. 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. Pressures higher than those listed indicate that the system is overcharged. Pressures lower than those listed indicate that the system is undercharged. Verify adjusted charge using the approach method.

4. Use the same digital thermometer used to check outdoor ambient temperature to check liquid line temperature. Verify the unit charge using the approach method.

5. The difference between the ambient and liquid temperatures should match the approach values listed in table 8. If the values do not agree with the those listed in table 8, add refrigerant to lower the approach temperature or recover refrigerant from the system to increase the approach temperature.

Table 8. Approach Values

	___°	Liquid Line Temperature °F (°C)
—	___°	Outdoor Temperature °F (°C)
=	___°	Approach Temperature °F (°C)

Model	-018	-024	-030	-036	-042	-048	-060
°F (°C)*	7 (3.9)	8 (4.4)	9 (5)	13 (7.2)	7 (3.9)	9 (5)	7 (3.9)

*NOTE - For best results, use the same electronic thermometer to check both outdoor-ambient and liquid-line temperatures. *F: + / -1.0°; C: + / -0.5°*

INSTALLING SERVICE VALVE CAPS

Disconnect gauge set and re-install all service valve caps.

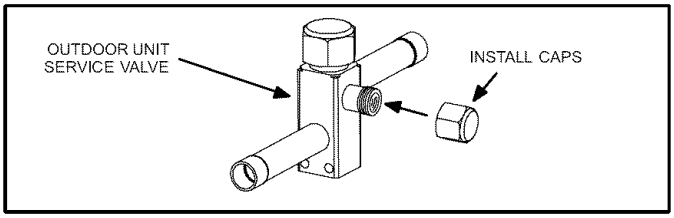


Figure 26. Installing Service Valve Port Caps

Table 9. Normal Operating Pressure - Liquid ±10 and Vapor ±5 PSIG*

⚠ IMPORTANT

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	13HPD-018	13HPD-024	13HPD-030	13HPD-036	13HPD-042	13HPD-048	13HPD-060
Temp. °F (°C)**	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor	Liquid / Vapor
Cooling							
65 (18)	141 / 81	148 / 80	146 / 78	154 / 78	139 / 67	146 / 75	145 / 72
75 (24)	163 / 82	176 / 82	171 / 79	180 / 80	163 / 74	171 / 77	171 / 75
85 (29)	191 / 84	206 / 83	201 / 80	216 / 81	191 / 81	198 / 78	199 / 77
95 (35)	222 / 85	240 / 84	233 / 81	246 / 81	220 / 84	229 / 79	230 / 78
105 (41)	256 / 87	277 / 86	271 / 81	284 / 82	256 / 85	268 / 81	266 / 79
115 (45)	296 / 89	322 / 87	313 / 83	328 / 85	294 / 87	308 / 81	304 / 81
Heating							
50(10)	192 / 64	185 / 60	198 / 58	196 / 58	204 / 59	197 / 39	212 / 57
40 (4)	180 / 53	176 / 50	188 / 47	185 / 47	195 / 49	189 / 31	200 / 47
30 (-1)	172 / 43	165 / 49	175 / 35	176 / 37	184 / 39	181 / 25	187 / 38
20 (-7)	164 / 34	162 / 31	163 / 26	170 / 30	178 / 32	175 / 18	174 / 34

**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.*

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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.

LIQUID LINE BI-FLOW FILTER DRIER

The pre-installed liquid line bi-flow filter drier as illustrated in figure 27 is approved for use with HCFC-22 only. Do not replace liquid line filter drier with component designed for use with HFC-410A.

EMERGENCY HEAT FUNCTION (ROOM THERMOSTAT)

An emergency heat function is designed into some room thermostats. This feature is applicable when isolation of 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 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.

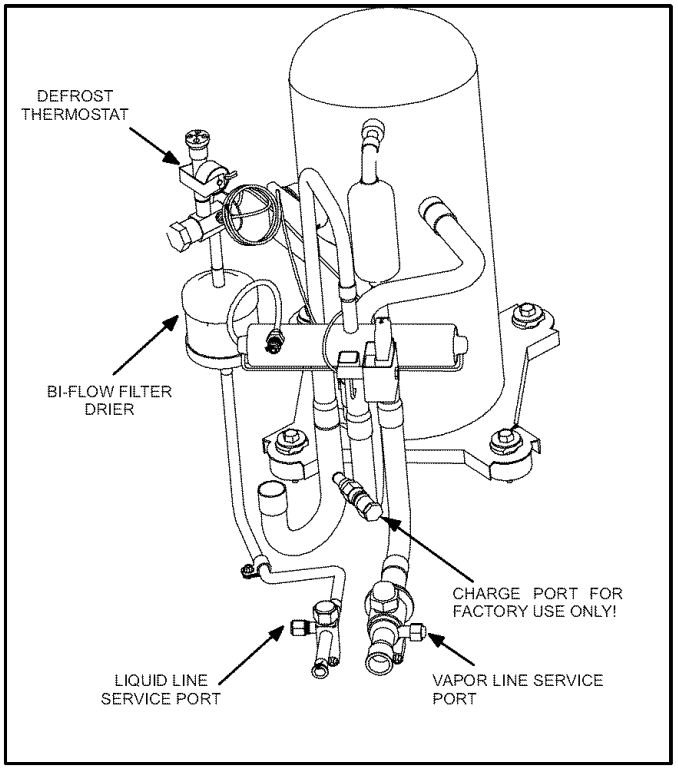

Figure 27. Component Locations

Defrost System

The 13HPD defrost system includes two components: a defrost thermostat and a defrost control board (DCB).

DEFROST THERMOSTAT

The defrost thermostat as illustrated in figure 27 is located on the liquid line between the CTXV and the distributor. When defrost thermostat senses 42°F (5.5°C) or cooler, the thermostat contacts close and send a signal to the DCB to start the defrost timing. It also terminates defrost when the liquid line warms up to 70°F (21°C).

DEFROST CONTROL BOARD (DCB)

The DCB includes the combined functions of a time/temperature defrost control, defrost relay, diagnostic LEDs and terminal strip for field wiring connections as illustrated in figure 28.

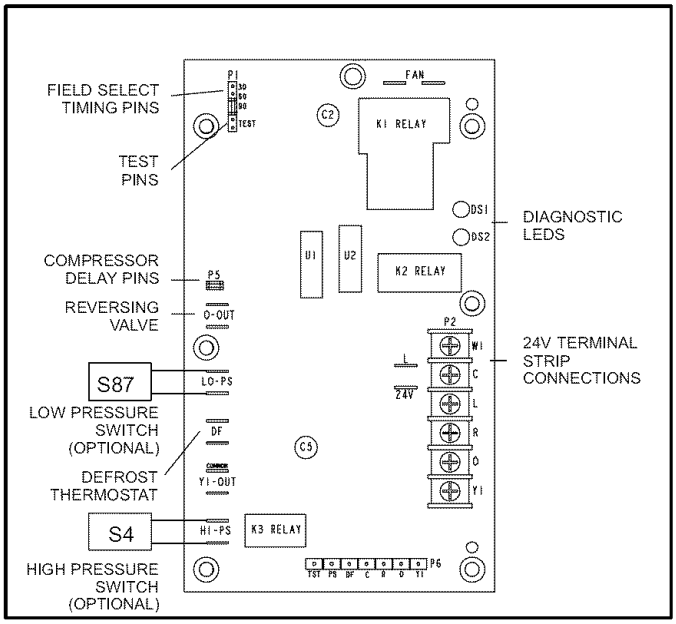

Figure 28. Defrost Control Board (DCB)

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.

P1 — Defrost Temperature Termination and Test Jumper

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 DCB selections are: 30, 60, and 90°F (10, 21, 32 and 38°C). The jumper termination pin is factory set at 90°F (10°C). If the temperature jumper is not installed, the default termination temperature is 90°F (32°C). The maximum defrost period is 14 minutes and cannot be adjusted.

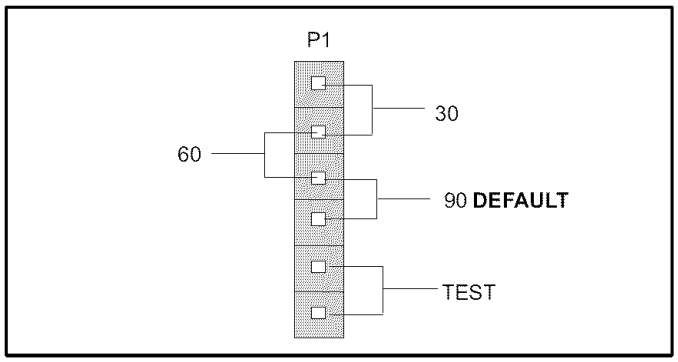

Figure 29. P1 Jumper Configurations

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.

P5 — Compressor 30-Second Delay

The DCB 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 OFF cycle is not functional when jumpering the TEST pins.

Time Delay ByPass

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 P1 TEST pins for 0.5 seconds as illustrated in figure 29.

DS1 and DS2 — Diagnostic LEDs

The DCB uses two LEDs (DS1 and DS2) for diagnostics. The LEDs flash a specific sequence according to the condition.

Table 10. DS1 and DS2 LED Codes

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 lock-out	Alternating Slow FLASH	
Low pressure switch fault (Optional)	OFF	Slow FLASH
Low pressure switch lockout (Optional)	OFF	ON
High pressure switch fault (Optional)	Slow FLASH	OFF
High pressure switch lockout (Optional)	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.

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.

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Table 11. Defrost Control Board (DCB) Inputs, Outputs and Configurable Settings

DCB Location	DCB Label or Description	Purpose	Function
P1	TEST	Test Mode	*See Test Mode on page 22 for further details.*
P1	30, 60, 90	Defrost Temperature Termination (Jumper) Pins	The DCB as illustrated in figure 28 has valid selections which are: 30, 60, and 90°F (-1, 16 and 32°C). The shunt termination pin is factory set at 50°F (10°C). If the temperature shunt is not installed, the default termination temperature is 90°F (32°C).
P2	W1	24VAC Thermostat Input / Output	24VAC input/output from indoor thermostat to indoor unit.
	C	24VAC Common	24VAC common
	L	Thermostat Service Light	Thermostat service light connection.
	R	24VAC	24VAC
	O	Thermostat Input	Reversing valve solenoid.
	Y1	Thermostat Input	Controls the operation of the unit.
P5	DELAY	Delay Mode	The DCB has a field-selectable function to reduce occasional sounds that may occur while the unit is cycling in and out of the defrost mode. When a jumper is installed on the DELAY pins, the compressor will be cycled off for 30 seconds going in and out of the defrost mode. Units are shipped with jumper installed on DELAY pins. *NOTE - The 30 second off cycle is NOT functional when jumpering the TEST pins on P1.*
P6	TST, PS DF, C, R, O, Y1	Factory Test Connectors	Factory Use Only.
DS1	RED LED	Diagnostic LED	Valid states for DCB's two LEDs are OFF, ON and FLASHING which indicate diagnostics conditions that are described in table 10.
DS2	GREEN LED		
FAN	TWO CONNECTORS	Condenser Fan Operation	These two connections provide power for the condenser fan.
O OUT	O OUT	24VAC output	24VAC output connection for reversing valve.
LO-PS	LO-PS	Low-Pressure Switch	Not Used.
DF	DF	Defrost Thermostat	Defrost thermostat connection points.
Y1 OUT	Y1 OUT	24VAC Common Output	24VAC common output, switched for enabling compressor contactor.
HS-PS	HS-PS	High-Pressure Switch (Optional)	Not Used.
L	L	Line output	24VAC service light output.
24V	24V	24VAC output	Not Used.

- 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.

If owner reports insufficient cooling, then:

- Measure the temperature drop over the coil.
- Gauged and check refrigerant charge.
- Refer to section on refrigerant charging in this instruction.

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
- High Pressure Switch Kit
- Mild Weather Kit
- Compressor Monitor
- Compressor Crankcase Heater
- Hail Guards
- Mounting Bases
- Timed Off Control
- Stand-off Kit
- Sound Cover
- Low Ambient Kit
- Monitor Kit
- Dave Lennox *Signature Stat*™ Room Thermostat

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. Unit may delay coming back on from the time delay in the thermostat or the defrost control.

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 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 RESTART PROCEDURE

If the outdoor temperature is below 50°F (10°C) and power to your outdoor unit has been interrupted for six hours or longer, observe the following when restoring power to your heat pump system.

- Set the room thermostat selector to the EMERGENCY HEAT setting to obtain temporary heat for a minimum of six hours. This will allow system refrigerant pressures and temperatures enough time to return to a stabilized condition.
- In Emergency Heat mode, all heating demand is satisfied by auxiliary heat; heat pump operation is locked out. After a six-hour warm-up period, the thermostat can then be switched to the HEAT setting and normal heat pump operation may resume.

NON-PROGRAMMABLE 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 and system switch (HEAT, COOL and AUTO) are properly set.
- Check for any blown fuses or tripped circuit breakers.
- Make sure unit access panels are in place.
- Make sure air filter is clean.
- If service is needed, locate and write down the unit model number and have it handy before calling.

Start-Up and Performance Checklist

Customer _____ Address _____

Indoor Unit Model _____ Serial _____

Outdoor Unit Model _____ Serial _____

Notes: _____

_____

START-UP CHECKS

Refrigerant Type: _

Rated Load Amps Actual Amps _____ Rated Volts _____ Actual Volts _____

Condenser Fan Full Load Amps _____ Actual Amps: _____

COOLING MODE

Vapor Pressure: _ Liquid Pressure: _____

Supply Air Temperature: _____ Ambient Temperature: _____ Return Air Temperature: _____

HEATING MODE

Vapor Pressure: _ Liquid Pressure: _____

Supply Air Temperature: _____ Ambient Temperature: _____ Return Air Temperature: _____

System Refrigerant Charge (Refer to manufacturer's information on unit or installation instructions for required subcooling and approach temperatures.)

Subcooling:	A		B	SUBCOOLING
Saturated Condensing Temperature (A) *minus* Liquid Line Temperature (B)		—		=
Approach:	A		B	APPROACH
Liquid Line Temperature (A) *minus* Outdoor Air Temperature (B)		—		=
Indoor Coil Temp. Drop (18 to 22°F)	A		B	COIL TEMP DROP
Return Air Temperature (A) *minus* Supply Air Temperature (B)		—		=