INSTALLATION INSTRUCTIONS

Merit® Series 13HPX Units

HEAT PUMP UNITS
506376-01
11/09
Supersedes 506269-01

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 licensed professional installer (or equivalent) or a service agency.

⚠ 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.

⚠ 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.

⚠ WARNING

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

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

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.

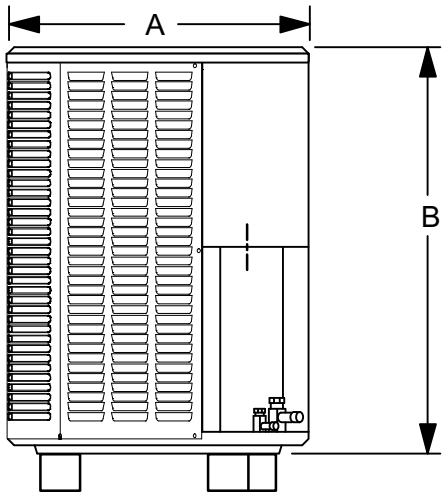
General

The Merit® 13HPX model is designed for use with HFC-410A refrigerant only. This unit must be installed with an approved indoor air handler or coil. See the Lennox 13HPX Engineering Handbook for approved indoor component matchups.

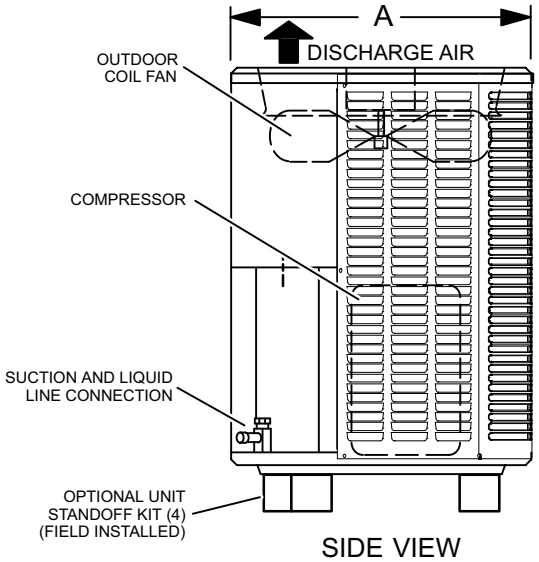
⚠ IMPORTANT

This model is designed for use in expansion valve systems only. An indoor expansion valve approved for use with HFC-410A refrigerant must be ordered separately, and installed prior to operating the system.

Unit Dimensions - inches (mm)



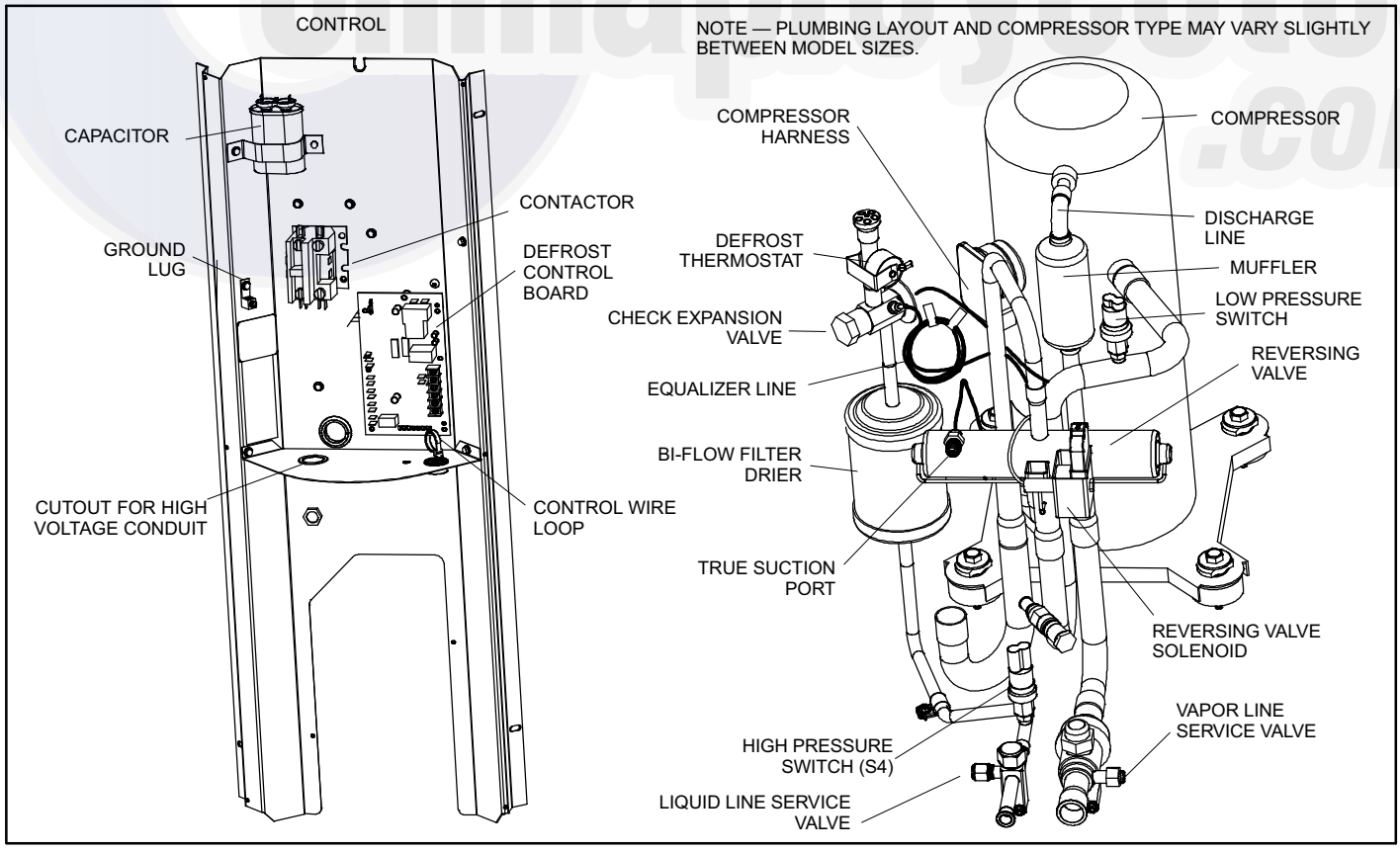
SIDE VIEW



SIDE VIEW

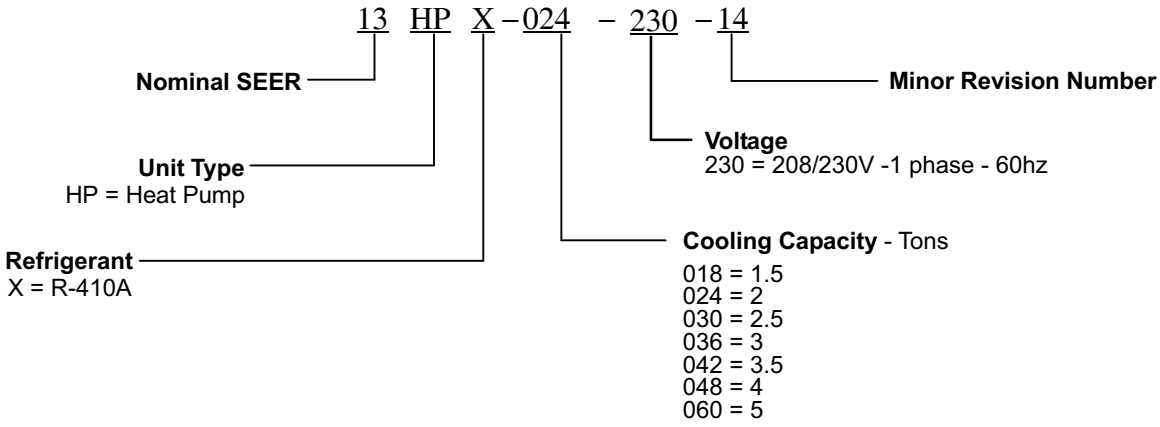
Model No.	A	B	C
13HPX-018	24-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-024	24-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-030	24-1/4 (616)	29-1/4 (743)	28-1/2 (724)
13HPX-036	24-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-042	28-1/4 (616)	33-1/4 (845)	32-1/2 (826)
13HPX-048	28-1/4 (718)	37-1/4 (946)	36-1/2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

Typical Unit Parts Arrangement



506376-01 11/09

Model Number Identification



⚠ 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 national or local codes in any way. Consult authorities having jurisdiction before installation.

Operating Gauge Set and Service Valves

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

⚠ 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.

TORQUE REQUIREMENTS

When servicing or repairing heating, ventilating, and air conditioning components, ensure the fasteners are appropriately tightened. Table 1 lists torque values for fasteners.

⚠ 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.

See the Lennox Service and Application Notes #C-08-1 for further details and information.

⚠ IMPORTANT

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

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

Table 1. Torque Requirements

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

USING MANIFOLD GAUGE SET

When checking the system charge, only use a manifold gauge set that features low loss anti-blow back fittings.

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

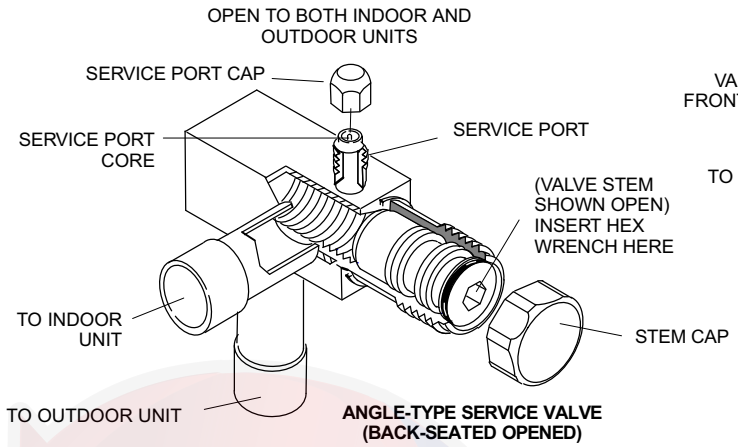
OPERATING SERVICE VALVES

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

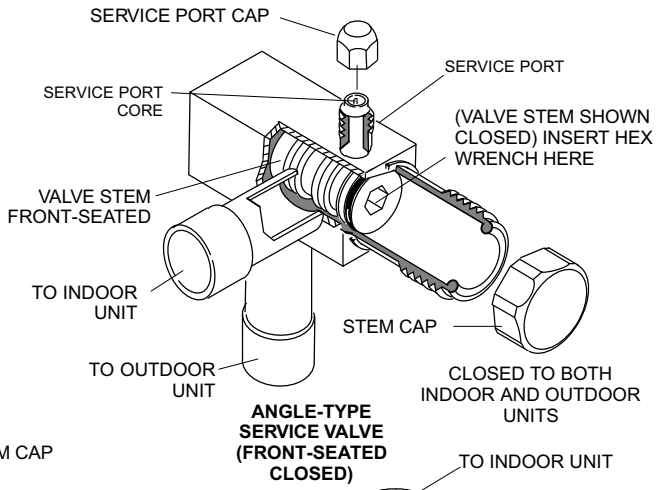
Each valve is equipped with a service port which has a factory-installed valve stem. Figure 1 provides information on how to access and operating both angle and ball service valves.

SERVICE VALVES

VARIOUS TYPES



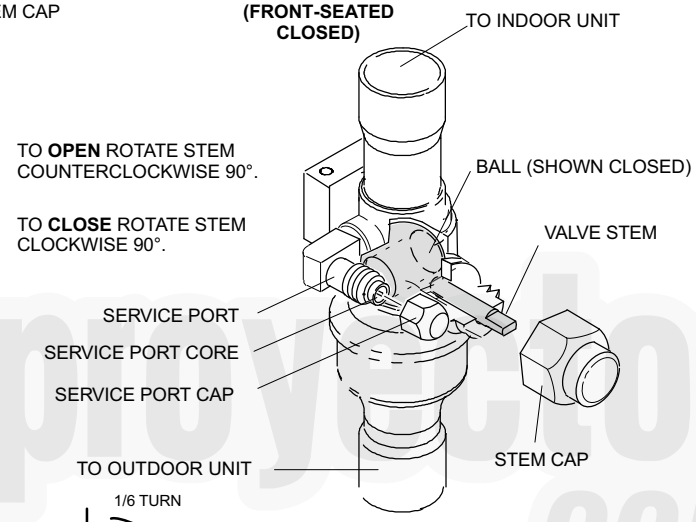
ANGLE-TYPE SERVICE VALVE (BACK-SEATED OPENED)



ANGLE-TYPE SERVICE VALVE (FRONT-SEATED CLOSED)

WHEN SERVICE VALVE IS CLOSED, THE SERVICE PORT IS OPEN TO THE LINE SET AND INDOOR UNIT.

WHEN SERVICE VALVE IS OPEN, THE SERVICE PORT IS OPEN TO LINE SET, INDOOR AND OUTDOOR UNIT.

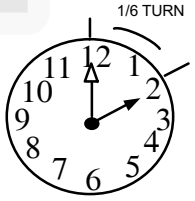


BALL-TYPE SERVICE VALVE

To Access 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 set to service port.
3. When testing is completed, replace service port cap and tighten as follows:
   - With Torque Wrench: Finger tighten and torque cap per Table 1.
   - Without Torque Wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise.



Operating Angle Type Service Valve:

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.

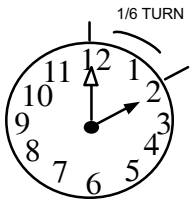
Operating Ball Type Service Valve:

1. Remove stem cap with an appropriately sized wrench.
2. Use an appropriately sized wrenched to open. To open valve, rotate stem counterclockwise 90°. To close rotate stem clockwise 90°.

Reinstall Stem Cap:

Stem cap protects the valve stem from damage and serves as the primary seal. Replace the stem cap and tighten as follows:

- With Torque Wrench: Finger tighten and then torque cap per Table 1.
- Without Torque Wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/12 turn clockwise.



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

Figure 1. Angle and Ball Service Valves

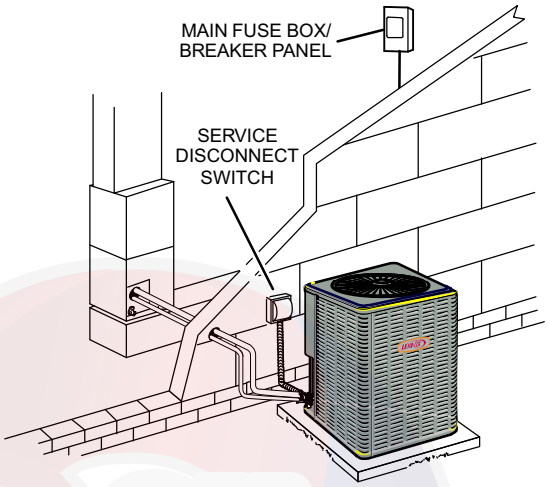
506376-01 11/09

RECOVERING

REFRIGERANT FROM SYSTEM

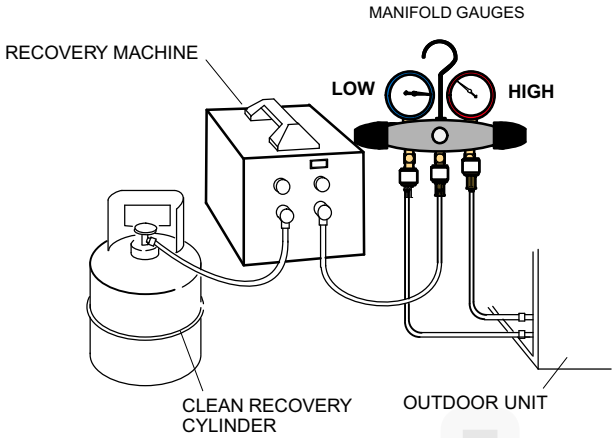
1 DISCONNECT POWER

Disconnect all power to the existing outdoor unit at the service disconnect switch or main fuse box/breaker panel.



2 CONNECT MANIFOLD GAUGE SET

Connect a gauge set, clean recovery cylinder and a recovery machine to the service ports of the existing unit. Use the instructions provided with the recovery machine to make the connections.



3 RECOVERING REFRIGERANT

Remove existing refrigerant using one of the following procedures:

IMPORTANT — Some system configurations may contain higher than normal refrigerant charge due to either large internal coil volumes, and/or long line sets.

METHOD 1:

Us this method 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 to flush the system.

Remove all refrigerant from the existing system. Check gauges after shutdown to confirm that the entire system is completely void of refrigerant.

METHOD 2:

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

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

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

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

Perform the following task:

A Start the existing system in the cooling mode and close the liquid line valve.

B Use the compressor to pump as much of the existing HCFC-22 refrigerant into the outdoor unit until the outdoor system is full. Turn the outdoor unit main power OFF and use a recovery machine to remove the remaining refrigerant from the system.

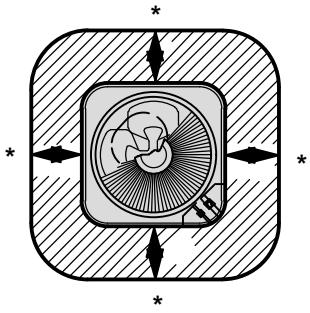
NOTE — It may be necessary to bypass the low pressure switches (if equipped) to ensure complete refrigerant evacuation.

C When the low side system pressures reach 0 psig, close the vapor line valve.

D Check gauges after shutdown to confirm that the valves are not allowing refrigerant to flow back into the low side of the system.

New Outdoor Unit Placement

See *Unit Dimensions* on Page 2 for sizing mounting slab, platforms or supports. Refer to Figure 2 for mandatory installation clearance requirements.



NOTES:

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

Figure 2. Installation Clearances

POSITIONING CONSIDERATIONS

⚠ CAUTION

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

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 3.

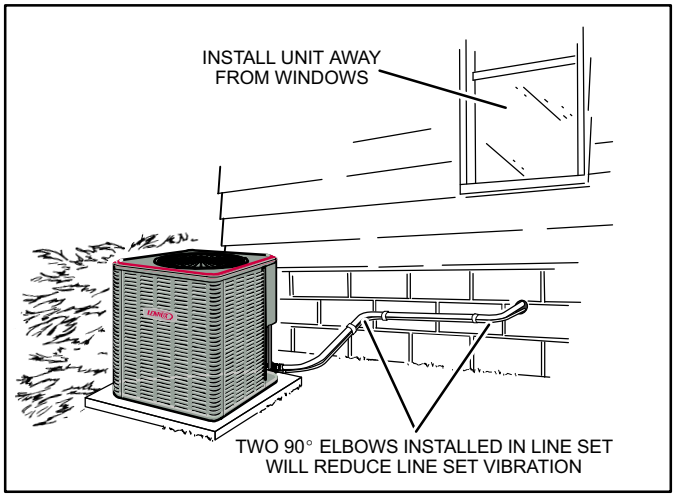


Figure 3. Outside Unit Placement

PLACING OUTDOOR UNIT ON SLAB

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 4.

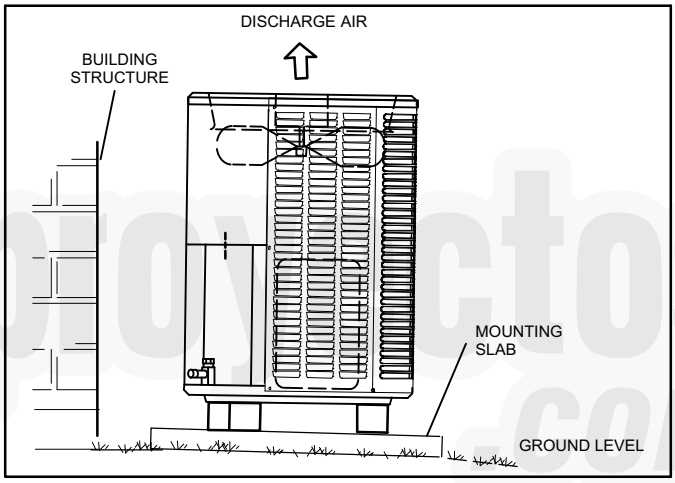


Figure 4. Typical Slab Mounting at Ground Level

Slab may be level or have a slope tolerance away from the building of not more than two degrees, or 2 inches per 5 feet (51 mm per 1524 mm) as illustrated in Figure 4.

INSTALLING OUTDOOR UNIT ON ROOF

Install the unit at a minimum of 4 inches (102 mm) above the surface of the roof. Ensure the weight of the unit is properly distributed over roof joists and rafters. Redwood or steel supports are recommended.

- 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 3.

New or Replacement 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.

Also, consider the following when placing and installing a high-efficiency air conditioner:

REFRIGERANT LINE SET

Field refrigerant piping consists of liquid and suction lines from the outdoor unit (braze connections) to the indoor unit coil (flare or 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 (MM)

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 — Some applications may required a field provided 7/8” to 1-1/8” adapter					

NOTE — When installing refrigerant lines longer than 50 feet, see the Lennox Refrigerant Piping Design and Fabrication Guidelines, CORP. 9351-L9, or contact Lennox Technical Support Product Applications for assistance.

⚠ IMPORTANT

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

The compressor is charged with sufficient Polyol ester oil for line set lengths up to 50 feet. If line set lengths longer than 50 feet will be required, all one (1) ounce of oil for every additional 10 feet of line set. Do not add any more than seven (7) ounces of oil.

Recommended topping-off POE oils are Mobil EAL ARCTIC 22 CC or ICI EMKARATE™ RL32CF.

To obtain the correct information from Lennox, be sure to communicate the following points:

- Model (13HPX) 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 13HPX 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 13HPX unit. Typically a liquid line used to meter flow is 1/4” in diameter and copper.

⚠ CAUTION

Brazing alloys and flux contain materials which are hazardous to your health.

Avoid breathing vapors or fumes from brazing operations. Perform operations only in well ventilated areas.

Wear gloves and protective goggles or face shield to protect against burns.

Wash hands with soap and water after handling brazing alloys and flux.

⚠ IMPORTANT

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

⚠ IMPORTANT

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

Failure to properly flush the system per the instructions below will void the warranty.

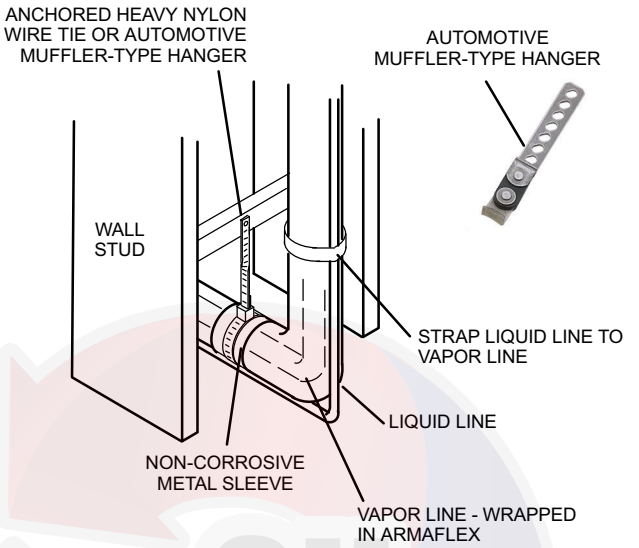
LINE SET

IMPORTANT — Refrigerant lines must not contact structure.

INSTALLATION

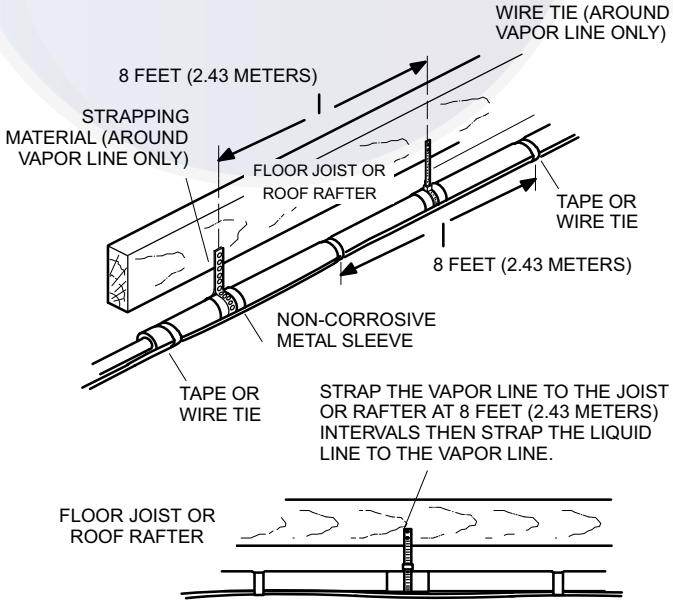
Line Set Isolation — The following illustrations are examples of proper refrigerant line set isolation:

REFRIGERANT LINE SET — TRANSITION FROM VERTICAL TO HORIZONTAL



REFRIGERANT LINE SET — INSTALLING HORIZONTAL RUNS

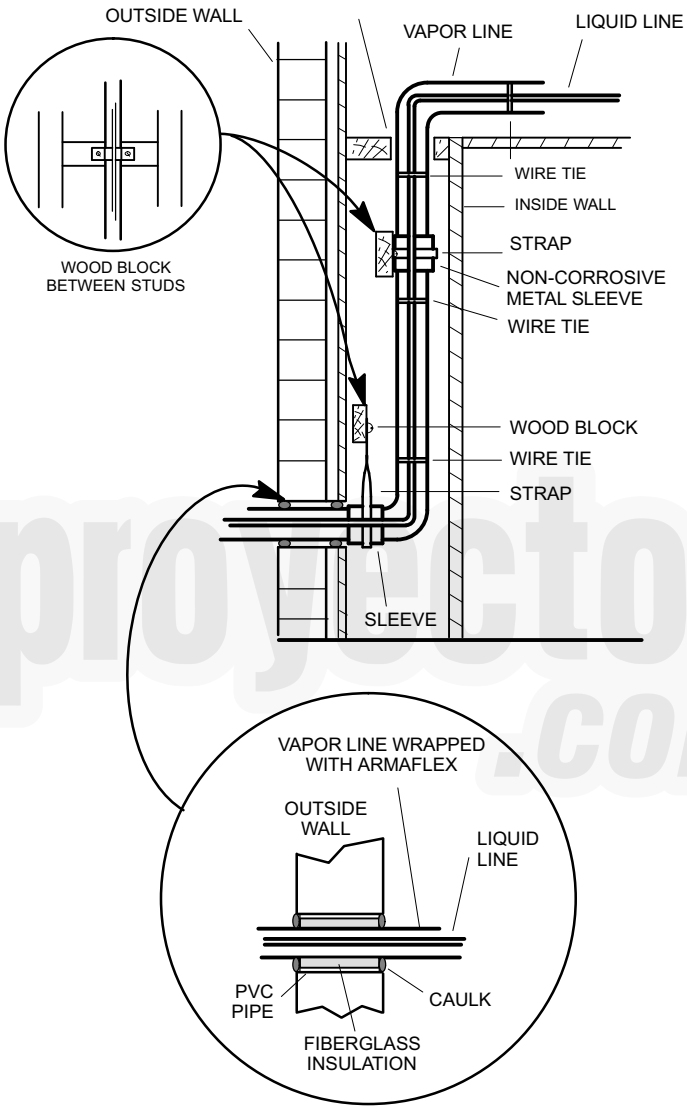
To hang line set from joist or rafter, use either metal strapping material or anchored heavy nylon wire ties.



REFRIGERANT LINE SET — INSTALLING VERTICAL RUNS (NEW CONSTRUCTION SHOWN)

NOTE — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.

IMPORTANT — Refrigerant lines must not contact wall



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

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.

Figure 5. Line Set Installation

506376-01 11/09

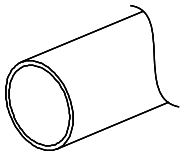
BRAZING

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

CONNECTIONS

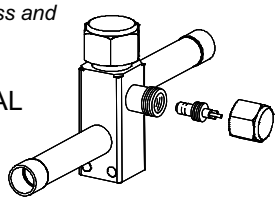
1 CUT AND DEBUR

Cut ends of the refrigerant lines square (free from nicks or dents) and debur the ends. The pipe must remain round and do not pinch end of the line.



2 CAP AND CORE REMOVAL

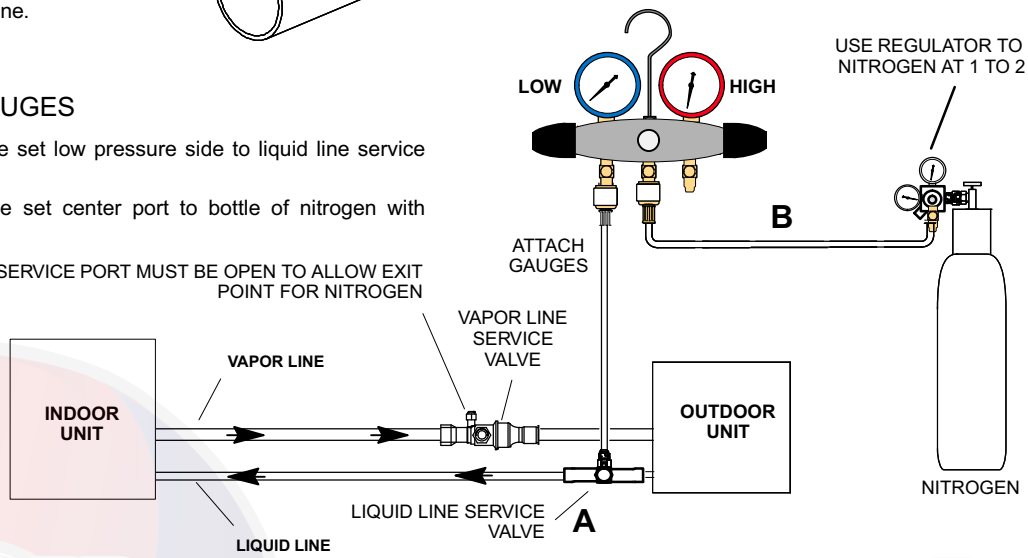
Remove service cap and core from both the vapor and liquid line service ports.



3 ATTACHED GAUGES

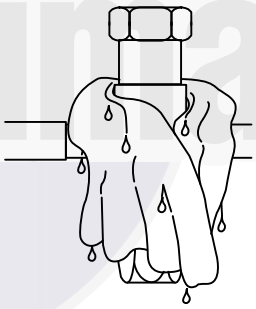
A Connect gauge set low pressure side to liquid line service valve.

B Connect gauge set center port to bottle of nitrogen with regulator.



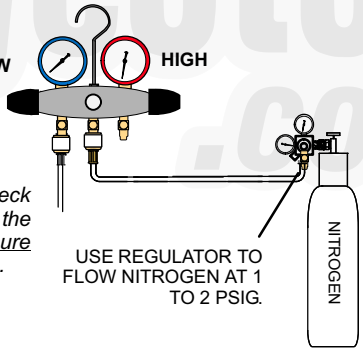
4 WRAP SERVICE VALVE

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 NITROGEN

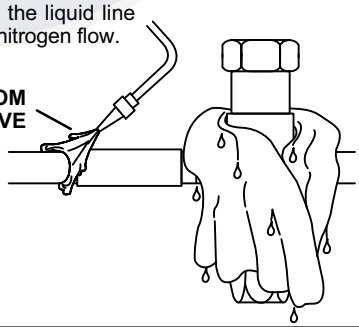
Flow regulated nitrogen (at 1 to 2 psig) through the refrigeration gauge set into the valve stem port connection on the liquid line service valve and out of the valve stem port connection on the vapor service valve.



NOTE — The fixed orifice or check expansion valve metering device at the indoor unit will allow low pressure nitrogen to flow through the system.

6 BRAZE LINE SET

Braze the liquid line to the liquid line service valve. Turn off nitrogen flow.



WARNING — Allow braze joint to cool before removing the wet rag from the service valve. (TEMPERATURES ABOVE 250ºF CAN DAMAGE VALVE SEALS

IMPORTANT — Connect gauge set low pressure side to vapor line service valve and repeat procedure starting at paragraph 4 for brazing the liquid line to service port valve.

7 INSTALL SERVICE PORT CAPS ONLY

After all connections have been brazed, disconnect manifold gauge set from service ports, cool down piping with wet rag and remove all wrappings. Do not reinstall cores until after evacuation procedure. Reinstall service port caps if desired to close off refrigerant ports.

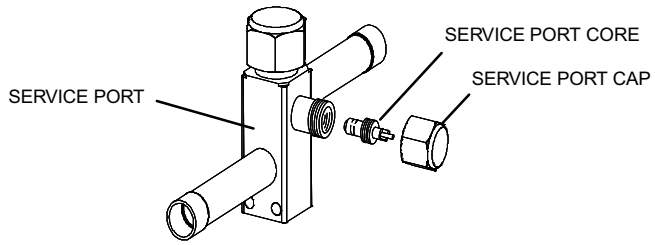
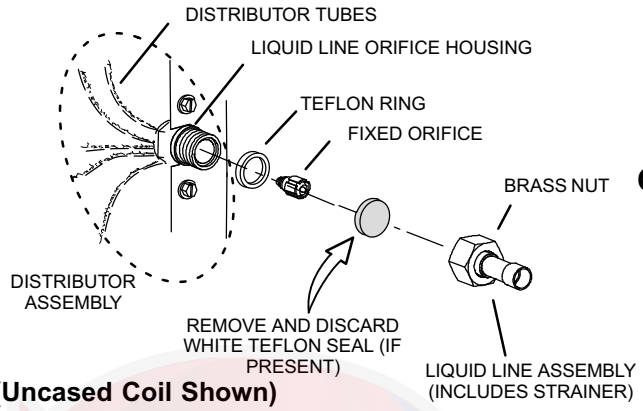


Figure 6. Brazing Connections

FLUSHING

LINE SET AND INDOOR COIL (1 OF 2)

1 TYPICAL FIXED ORIFICE REMOVAL PROCEDURE



(Uncased Coil Shown)

A On fully cased coils, remove the coil access and plumbing panels.

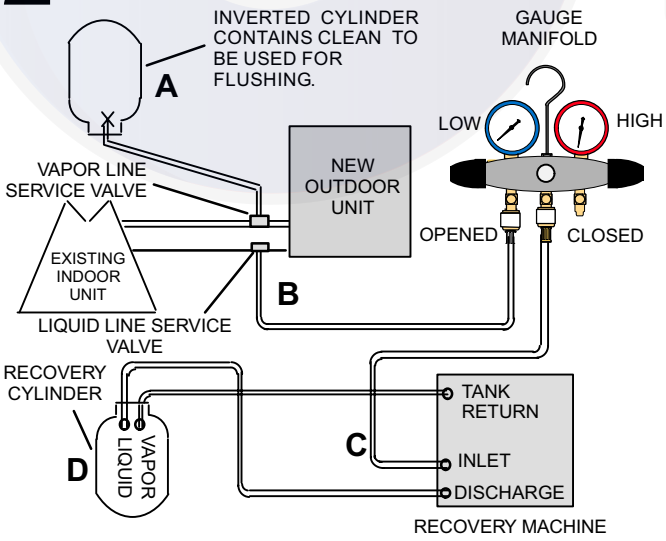
B Remove any shipping clamps holding the liquid line and distributor assembly.

C Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.

D Remove and discard fixed orifice, valve stem assembly if present and Teflon washer as illustrated above.

E Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

2 CONNECT GAUGES AND EQUIPMENT FOR FLUSHING PROCEDURE



A Inverted cylinder with clean refrigerant to the vapor service valve.

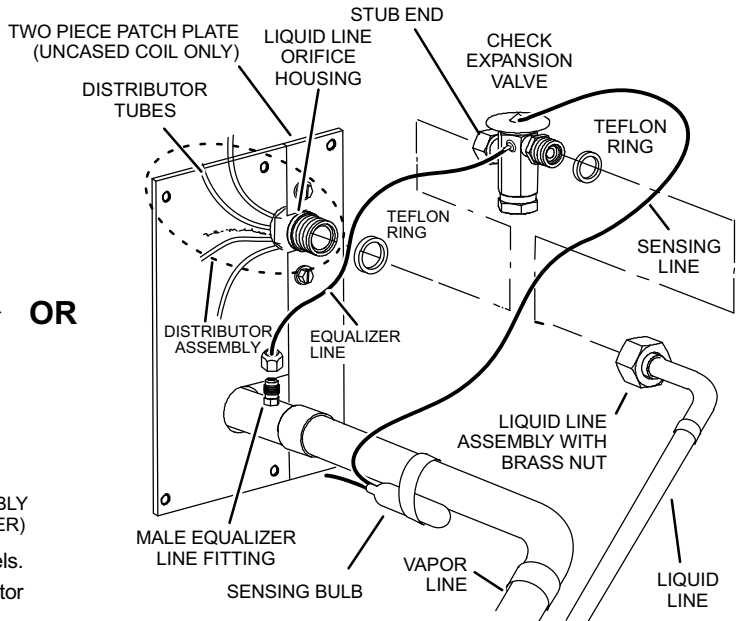
B gauge set (low side) to the liquid line valve.

C gauge set center port to inlet on the recovery machine with an empty recovery tank to the gauge set.

D Connect recovery tank to recovery machines per machine instructions.

OR

TYPICAL CHECK EXPANSION VALVE REMOVAL AND REPLACEMENT PROCEDURE (Uncased Coil Shown)



A On fully cased coils, remove the coil access and plumbing panels.

B Remove any shipping clamps holding the liquid line and distributor assembly.

C Disconnect the equalizer line from the check expansion valve equalizer line fitting on the vapor line.

D Remove the vapor line sensing bulb.

E Disconnect the liquid line from the check expansion valve at the liquid line assembly.

F Disconnect the check expansion valve from the liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.

G Remove and discard check expansion valve and the two Teflon rings.

H Use a field-provided fitting to temporary reconnect the liquid line to the indoor unit's liquid line orifice housing.

I Reverse above order to install.

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

3 FLUSHING LINE SET

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

A Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to allow the recovery machine to pull a vacuum on the existing system line set and indoor unit coil.

B Invert the cylinder of clean 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 unit coil before it enters the recovery machine.

C After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery so that all of the vapor is recovered. Allow the recovery machine to pull down to 0 the system.

D Close the valve on the inverted drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

506376-01 11/09

LEAK TEST

LINE SET AND INDOOR COIL

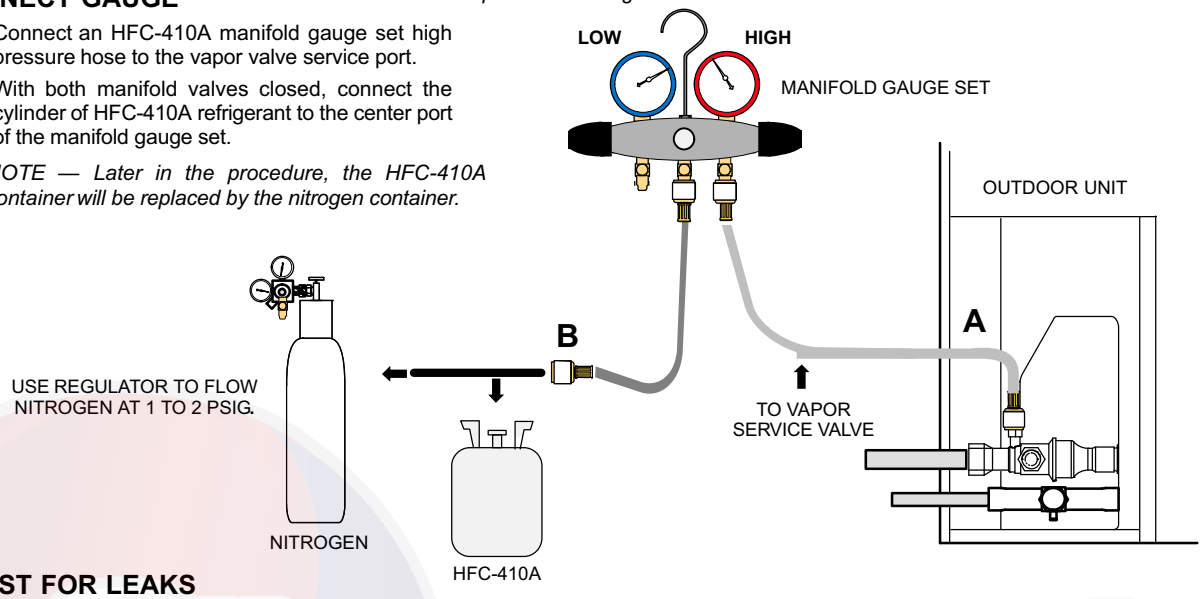
1 CONNECT GAUGE SET

A Connect an HFC-410A manifold gauge set high pressure hose to the vapor valve service port.

B With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set.

NOTE — Later in the procedure, the HFC-410A container will be replaced by the nitrogen container.

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.



2 TEST FOR LEAKS

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

A With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set. Open the valve on the HFC-410A cylinder (vapor only).

B Open the high pressure side of the manifold to allow HFC-410A into the line set and indoor unit. Weigh in a trace amount of HFC-410A. *[A trace amount is a maximum of two ounces (57 g) refrigerant or three pounds (31 kPa) pressure].* Close the valve on the HFC-410A cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect the HFC-410A cylinder.

C Connect a cylinder of dry nitrogen with a pressure regulating valve to the center port of the manifold gauge set.

D Adjust dry nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set in order to pressurize the line set and the indoor unit.

E 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.

F After leak testing disconnect gauges from service ports.

⚠ WARNING

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

⚠ WARNING

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.

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

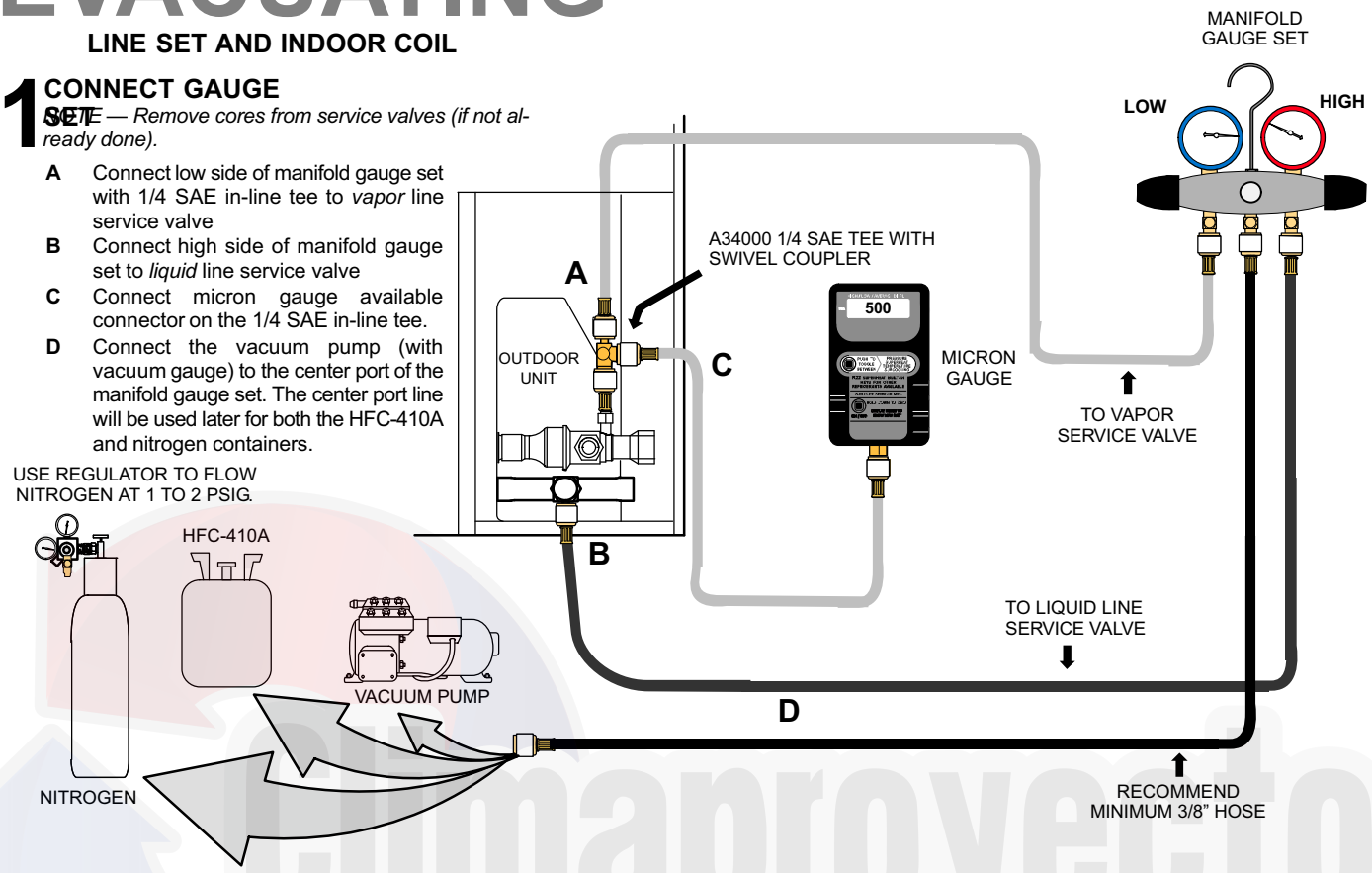
EVACUATING

LINE SET AND INDOOR COIL

1 CONNECT GAUGE SET

NOTE — Remove cores from service valves (if not already done).

- **A** Connect low side of manifold gauge set with 1/4 SAE in-line tee to *vapor* line service valve
- **B** Connect high side of manifold gauge set to *liquid* line service valve
- **C** Connect micron gauge available connector on the 1/4 SAE in-line tee.
- **D** Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set. The center port line will be used later for both the HFC-410A and nitrogen containers.



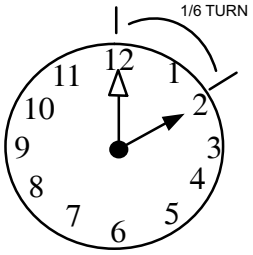
2 EVACUATE THE SYSTEM

- **A** Open both manifold valves and start the vacuum pump.
- **B** 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. 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.*

- **C** 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.
- **D** 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.
- **E** 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.
- **F** When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright cylinder of HFC-410A refrigerant. Open the manifold gauge valve 1 to 2 psig in order to release the vacuum in the line set and indoor unit.
- **G** Perform the following:
  - Close manifold gauge valves.
  - Shut off HFC-410A cylinder.
  - Reinstall service valve cores by removing manifold hose from service valve. Quickly install cores with core tool while maintaining a positive system pressure.
  - Replace the stem caps and secure finger tight, then tighten an additional one-sixth (1/6) of a turn as illustrated.



506376-01 11/09

⚠ 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.

⚠ 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.

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

Electrical

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

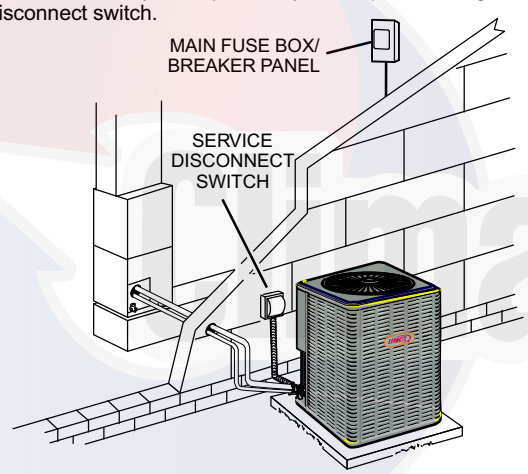
Refer to the furnace or air handler installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

24VAC TRANSFORMER

Use the transformer provided with the furnace or air handler for low-voltage control power (24VAC - 40 VA minimum)

SIZE CIRCUIT AND INSTALL SERVICE DISCONNECT SWITCH

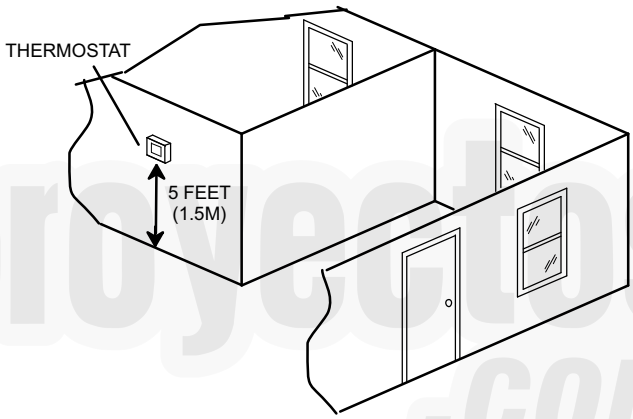
Refer to the unit nameplate for minimum circuit ampacity, and maximum fuse or circuit breaker (HACR per NEC). Install power wiring and properly sized disconnect switch.



NOTE — Units are approved for use only with copper conductors. Ground unit at disconnect switch or to an earth ground.

INSTALL THERMOSTAT

Install room thermostat (ordered separately) on an inside wall approximately in the center of the conditioned area and 5 feet (1.5m) from the floor. It should not be installed on an outside wall or where it can be affected by sunlight or drafts.



NOTE — 24VAC, Class II circuit connections are made in the control panel.

⚠ WARNING

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

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

ROUTING HIGH VOLTAGE/ GROUND AND CONTROL WIRING

HIGH VOLTAGE / GROUND WIRES

Any excess high voltage field wiring should be trimmed and secured away from any low voltage field wiring. To facilitate a conduit, a cutout is located in the bottom of the control panel. Connect conduit to the control panel using a proper conduit fitting.

CONTROL WIRING

Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit as illustrated.

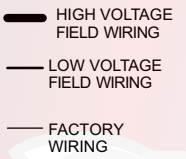
A Run 24VAC control wires through hole with grommet.

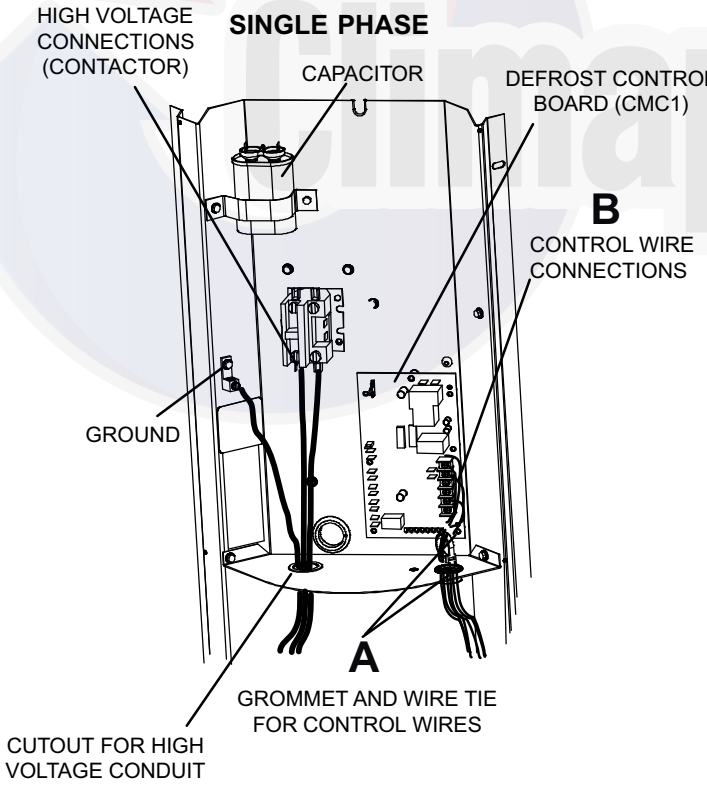
B Make 24VAC thermostat wire connections to CMC1.

NOTE — Do not bundle any excess 24VAC control wires inside control panel.

NOTE — For proper voltages, select thermostat wire (control wires) gauge per Table above.

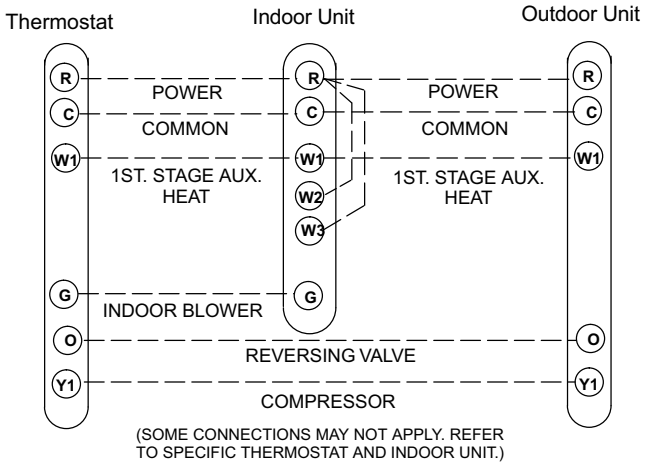
WIRE RUN LENGTH	AWG#	INSULATION TYPE
LESS THAN 100' (30 METERS)	18	TEMPERATURE RATING
MORE THAN 100' (30 METERS)	16	35ºC MINIMUM.





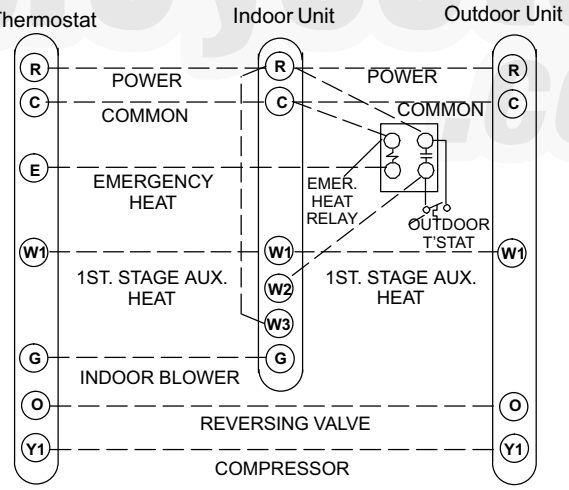
TYPICAL CONTROL WIRING

Low Voltage Wiring



(SOME CONNECTIONS MAY NOT APPLY. REFER TO SPECIFIC THERMOSTAT AND INDOOR UNIT.)

Low Voltage Wiring (with Auxiliary Heat)



(SOME CONNECTIONS MAY NOT APPLY. REFER TO SPECIFIC THERMOSTAT AND INDOOR UNIT.)

NOTE — Wire tie provides low voltage wire strain relief and to maintain separation of field installed low and high voltage circuits.

506376-01 11/09

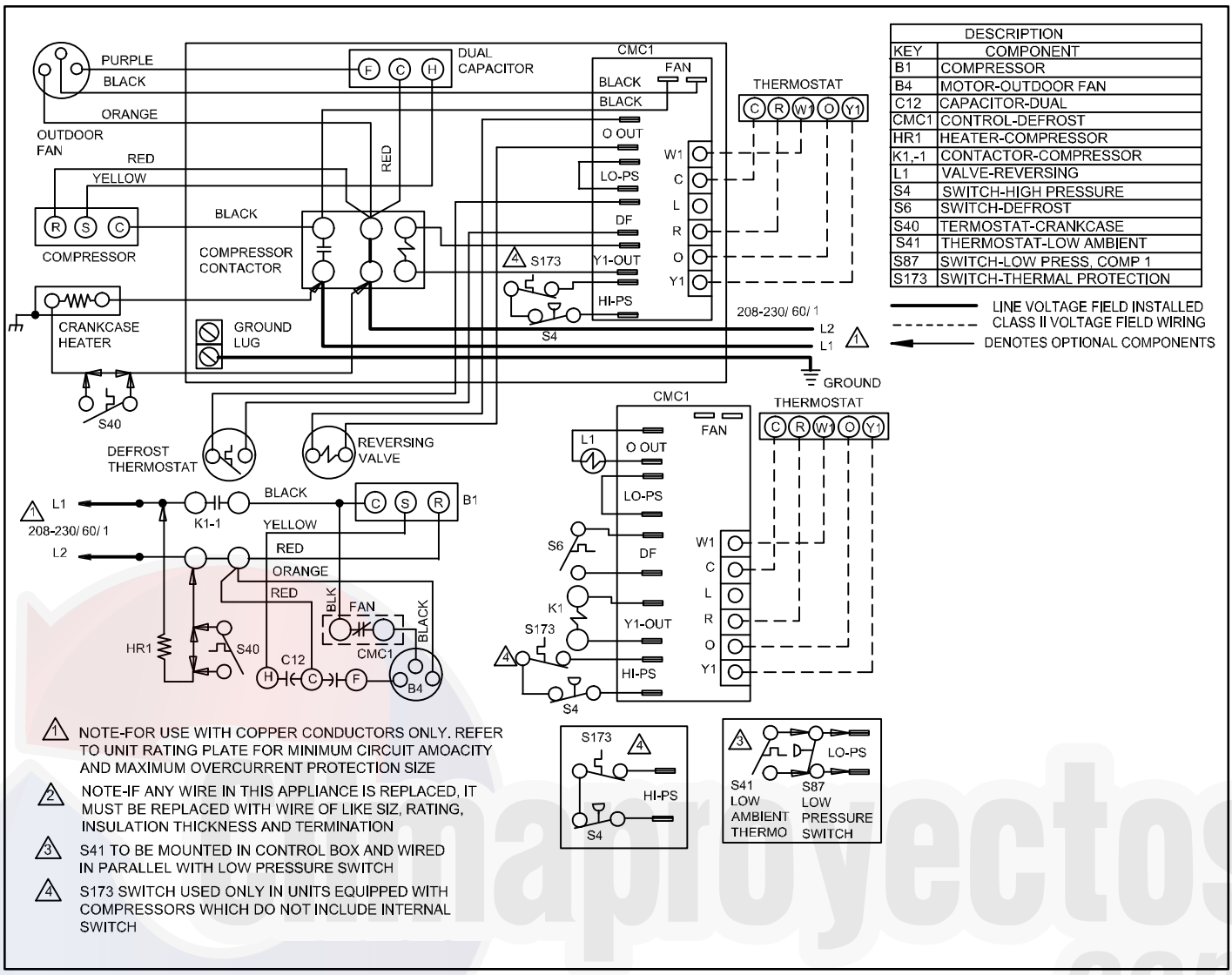
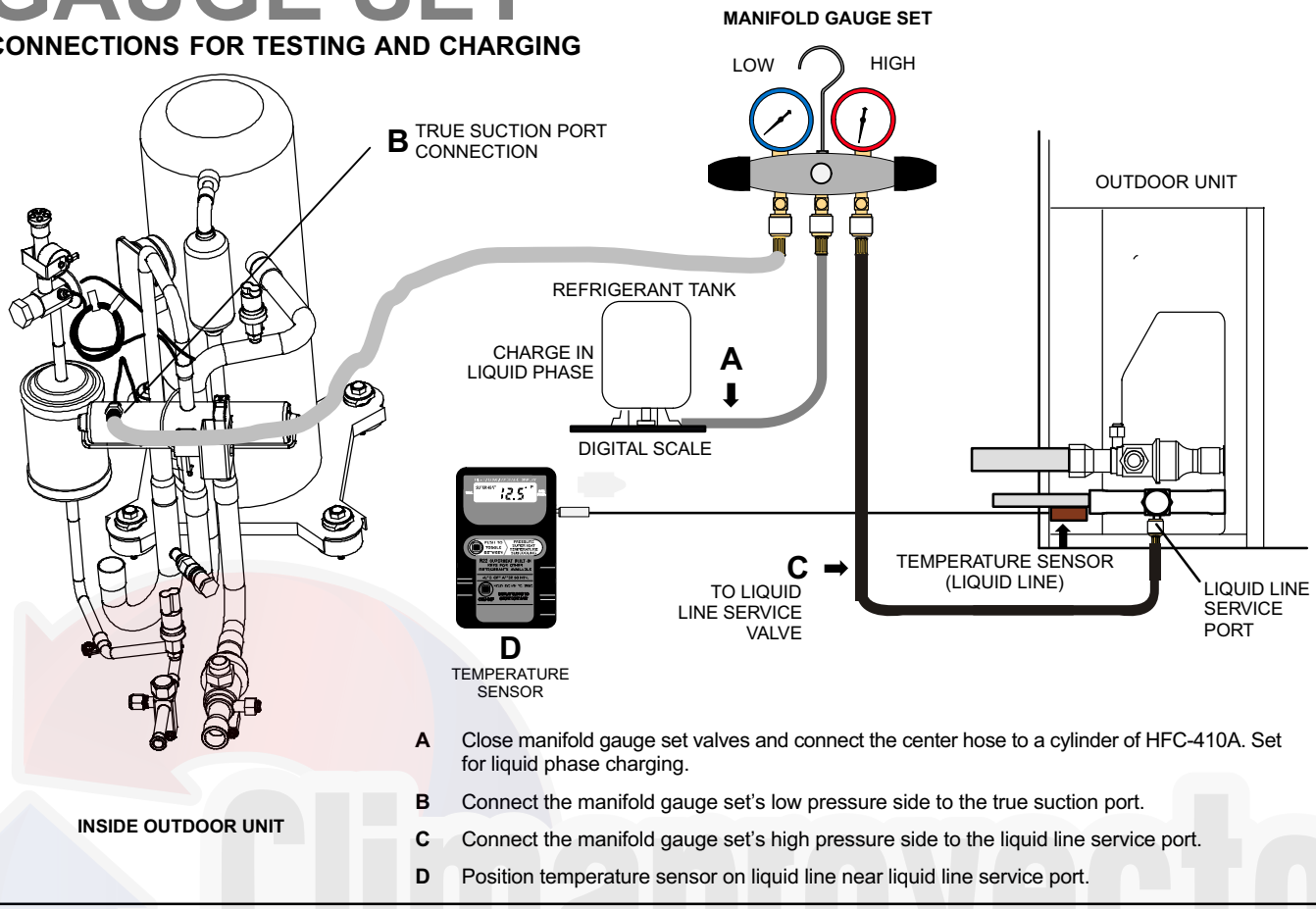


Figure 7. Typical 13HPX Unit Wiring Diagram

GAUGE SET

CONNECTIONS FOR TESTING AND CHARGING



A Close manifold gauge set valves and connect the center hose to a cylinder of HFC-410A. Set for liquid phase charging.

B Connect the manifold gauge set's low pressure side to the true suction port.

C Connect the manifold gauge set's high pressure side to the liquid line service port.

D Position temperature sensor on liquid line near liquid line service port.

Figure 8. Gauge Set Connections

Servicing Units Delivered Void of Charge

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

1. Leak check system using procedure outlined on Page 11.
2. Evacuate the system using procedure outlined on Page 12.
3. Use nitrogen to break the vacuum and install a new filter drier in the system.
4. Evacuate the system again using procedure outlined on Page 12.
5. Weigh in refrigerant using procedure outlined in Figure 10.

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. 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 suction 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 3.
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 *Start-Up and Charging Procedures*.
9. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.

System Refrigerant

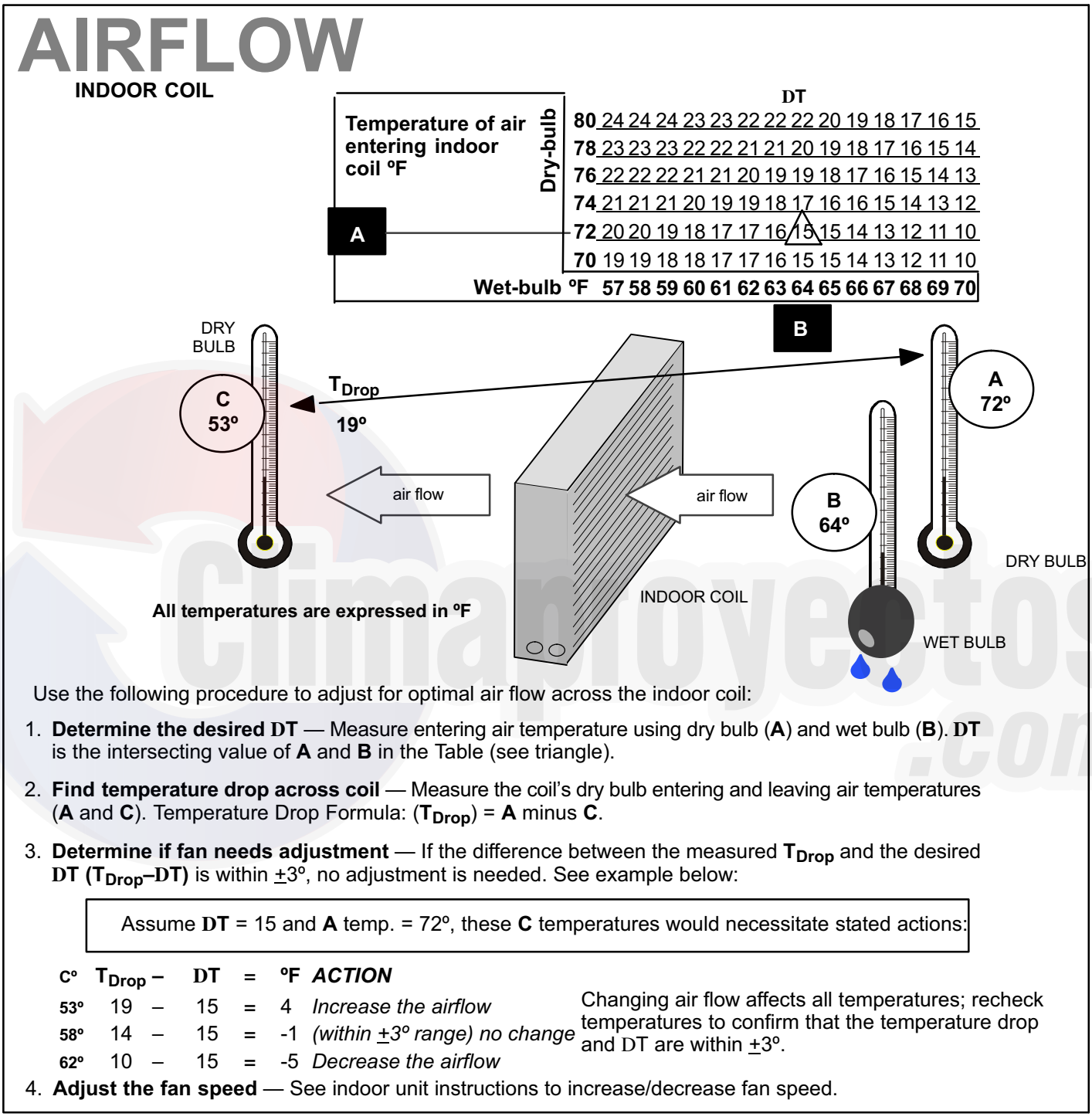
This section outlines procedures for:

1. Connecting gauge set for testing and charging;
2. Checking and adjusting indoor airflow;
3. Adding or removing refrigerant.

ADDING OR REMOVING REFRIGERANT

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

Check airflow using the Delta-T (DT) process using the illustration in Figure 9.



Use the following procedure to adjust for optimal air flow across the indoor coil:

1. **Determine the desired DT** — Measure entering air temperature using dry bulb (**A**) and wet bulb (**B**). **DT** is the intersecting value of **A** and **B** in the Table (see triangle).
2. **Find temperature drop across coil** — Measure the coil's dry bulb entering and leaving air temperatures (**A** and **C**). Temperature Drop Formula: (T_{Drop}) = **A** minus **C**.
3. **Determine if fan needs adjustment** — If the difference between the measured T_{Drop} and the desired **DT** (T_{Drop}–**DT**) is within ±3º, no adjustment is needed. See example below:

   Assume **DT** = 15 and **A** temp. = 72º, these **C** temperatures would necessitate stated actions:

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

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

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

Figure 9. Checking Indoor Airflow over Evaporator Coil using Delta-T Chart

Use **WEIGH IN** method for adding initial refrigerant charge, and then use **SUBCOOLING** method for verifying refrigerant charge**.**

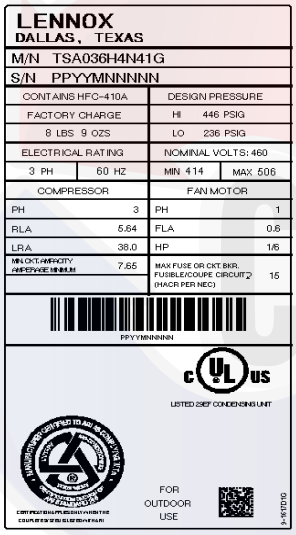
WEIGH IN

CHARGING METHOD

CALCULATING SYSTEM CHARGE FOR OUTDOOR UNIT VOID OF CHARGE

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

Amount specified on nameplate		Adjust amount. for variation in line set length listed on line set length table below.		Additional charge specified per indoor unit match-ups starting on Page 19.		Total charge
_____	±	_____	+	_____	=	_____



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)

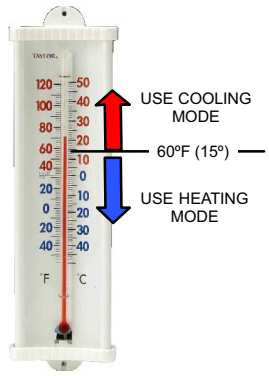
*If line length is greater than 15 ft. (4.6 m), add this amount. If line length is less than 15 ft. (4.6 m), subtract this amount.

NOTE — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.

NOTE — The above nameplate is for illustration purposes only. Go to actual nameplate on outdoor unit for charge information.

Figure 10. Weigh In Method

SUBCOOLING



SATº _____
LIQº – _____
SCº = _____

1 Check the airflow as illustrated in figure 9 to be sure the indoor airflow is as required. (Make any air flow adjustments before continuing with the following procedure.)

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

3 Connect gauge set.

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

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

Using cooling mode—When the outdoor ambient temperature is 60°F (15°C) and above. Target subcooling values in table below are based on 70 to 80°F (21-27°C) indoor return air temperature; if necessary, operate heating to reach that temperature range; then set thermostat to cooling mode setpoint to 68ºF (20ºC). 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 77ºF (25ºC). When pressures have stabilized, continue with step 6.

6 Read the liquid line temperature; record in the LIQº space.

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

8 Subtract LIQº temp. from SATº temp. to determine subcooling; record it in SCº space.

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

10 If subcooling value is greater than shown in tables 3 through 9 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 11. Using Subcooling Method

Table 3. 13HPX-018

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CBX26UH-018	14	9	0	3
CBX32MV-018/024-230	12	12	0	0
CBX32MV-024/030-230	12	19	1	1

Table 4. 13HPX-024

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CBX26UH-024	22	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
CBX40UHV-024	14	15	0	9
CBX40UHV-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 5. 13HPX-030

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CBX26UH-030	22	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
CBX40UHV-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	38	9	0	13
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 6. 13HPX-036

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CBX26UH-036	17	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
CBX40UHV-036	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

Table 7. 13HPX-042

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*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
CBX40UHV-036	15	5	0	0
CBX40UHV-042, -048	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

INDOOR MATCHUPS (Continued)	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CX34-43C	10	6	1	1
CX34-49	10	6	3	7
CX34-50/60C	10	6	1	1

Table 8. 13HPX-048

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CBX26UH-048	9	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
CBX40UHV-048	11	11	1	3
CBX40UHV-060	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 9. 13HPX-060

INDOOR MATCHUPS	Target Subcooling Heat (±5ºF)	Target Subcooling Cool (±1ºF)	*Add charge lb	*Add charge oz
CBX26UH-060	10	11	1	7
CBX27UH-060-230	10	9	0	13
CBX32MV-060	10	9	0	0
CBX32MV-068	10	9	0	9
CBX40UHV-060	10	9	0	0
CH33-60D	10	9	0	0
CH33-62D	10	9	0	11
CX34-62D	10	9	0	6

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

506376-01 11/09

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

⚠ IMPORTANT

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

	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 / 135	353 / 130	337 / 123	350 / 131	366 / 129	348 / 119	379 / 127
50(10)	309 / 114	330 / 109	322 / 110	331 / 111	348 / 110	334 / 105	361 / 109
40 (4)	293 / 96	307 / 90	304 / 90	314 / 91	333 / 91	312 / 84	341 / 89
30 (-1)	278 / 79	291 / 75	284 / 77	303 / 74	317 / 70	300 / 73	323 / 71
20 (-7)	264 / 65	276 / 59	271 / 62	290 / 62	298 / 58	286 / 60	310 / 60

**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 11. HFC-410A Temperature — Pressure (Psig)

°F	°C	Psig	°F	°C	Psig
-40	-40.0	11.6	**60**	15.6	170
-35	-37.2	14.9	**65**	18.3	185
-30	-34.4	18.5	**70**	21.1	201
-25	-31.7	22.5	**75**	23.9	217
-20	-28.9	26.9	**80**	26.7	235
-15	-26.1	31.7	**85**	29.4	254
-10	-23.3	36.8	**90**	32.2	274
-5	-20.6	42.5	**95**	35.0	295
0	-17.8	48.6	**100**	37.8	317
5	-15.0	55.2	**105**	40.6	340
10	-12.2	62.3	**110**	43.3	365
15	-9.4	70.0	**115**	46.1	391
20	-6.7	78.3	**120**	48.9	418
25	-3.9	87.3	**125**	51.7	446
30	-1.1	96.8	**130**	54.4	476
35	1.7	107	**135**	57.2	507
40	4.4	118	**140**	60.0	539
45	7.2	130	**145**	62.8	573
50	10.0	142	**150**	65.6	608
55	12.8	155			

Removing and Installing Louvers

WARNING

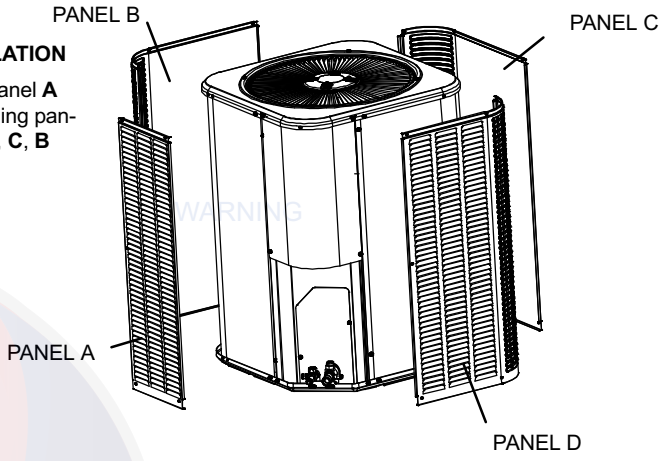
To prevent personal injury, or damage to panels, unit or structure, be sure to observe the following:

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

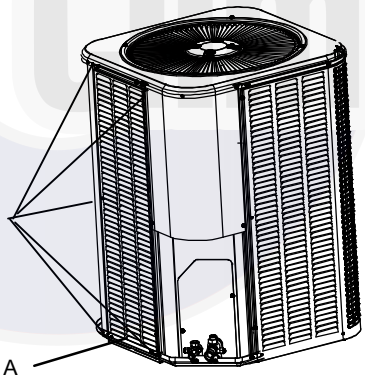
While handling or stowing the panels, consider any weather conditions, especially windy conditions, that may cause panels to be blown around and battered.

ORDER OF REMOVAL AND REINSTALLATION

When removing the unit panels. Remove panel **A** first, then **B**, **C** and finally **D**. When reinstalling panels, reverse that order starting with panel **D**, **C**, **B** and finally **A**.



REMOVAL



STEP 1

TO REMOVE PANEL, REMOVE MOUNTING SCREWS SECURING PANEL TO THE UNIT.

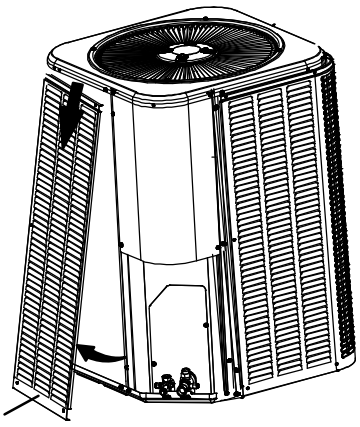
STEP 2

SLIGHTLY LIFT PANEL **A** IN ORDER TO CLEAR SIDE LIPS OF PANEL FROM BASE OF UNIT.

STEP 3

TILT PANEL OUT SLIGHTLY AND PULL DOWNWARD TO REMOVE.

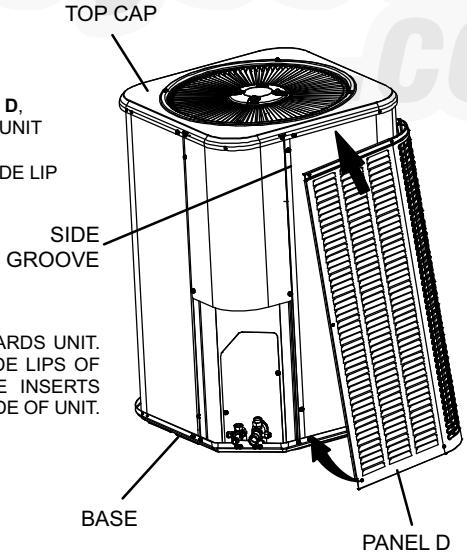
REPEAT STEPS 1, 2 AND 3 TO REMOVE PANELS **B**, **C** AND FINALLY **D**.



INSTALLATION

STEP 1

STARTING WITH PANEL **D**, INSERT PANEL UNDER UNIT TOP CAP LIP AND LIFT SLIGHTLY TO CLEAR SIDE LIP OF PANEL FROM BASE.



STEP 2

MOVE PANEL IN TOWARDS UNIT. ALIGN LEFT/RIGHT SIDE LIPS OF PANEL WITH GROOVE INSERTS ALONG LEFT/RIGHT SIDE OF UNIT.

STEP 3

SECURE PANEL, WITH MOUNTING SCREWS.

REPEAT STEPS 1 AND 2 TO INSTALL PANELS **C**, **B** AND FINALLY **A**.

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 40 psig and opens at 25 psig. It is not adjustable.

HIGH PRESSURE SWITCH

The 13HPX is equipped with a manual-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 defrost system includes 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 the defrost thermostat senses 42°F (5.5°C) or cooler, its 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, time delay, diagnostic LEDs, and a terminal strip for field wiring connections.

The control provides automatic switching from normal heating operation to defrost mode and back. During compressor cycle (defrost thermostat is closed, calling 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 during one thermostat run 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. 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.

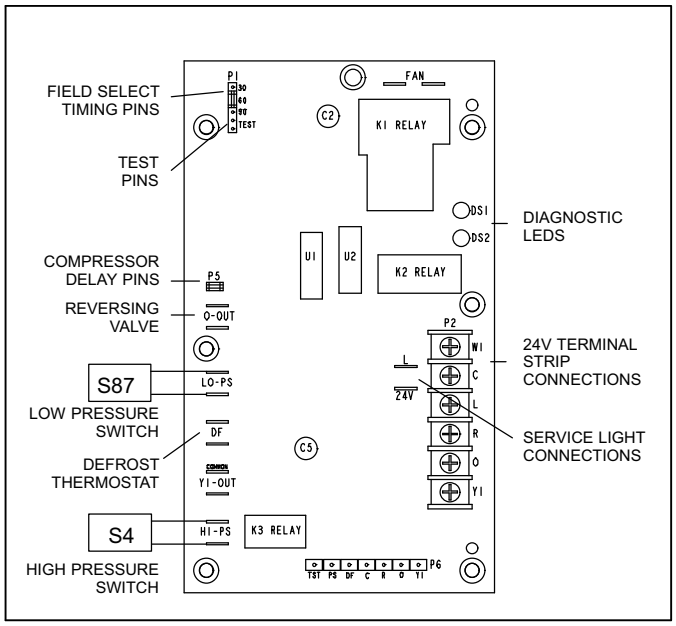


Figure 12. Defrost Control Board

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. When the compressor delay jumper is removed, the compressor will be cycled off for 30 seconds going in and out of the defrost mode.

NOTE — The 30-second compressor feature is ignored when TEST pins are jumped.

TEST MODE

A TEST option is provided for troubleshooting. See Figure 13 for this function.

TIME DELAY

The timed-off delay is five minutes long. The delay helps 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.

NOTE — The board must have a thermostat demand for the bypass function.

PRESSURE SWITCH CIRCUITS

The defrost control includes two pressure switch circuits. The factory-installed high pressure switch (S4) wires are connected to the board's HI PS terminals. The board also includes LO PS terminals to accommodate a field-provided low (or loss-of-charge) pressure switch.

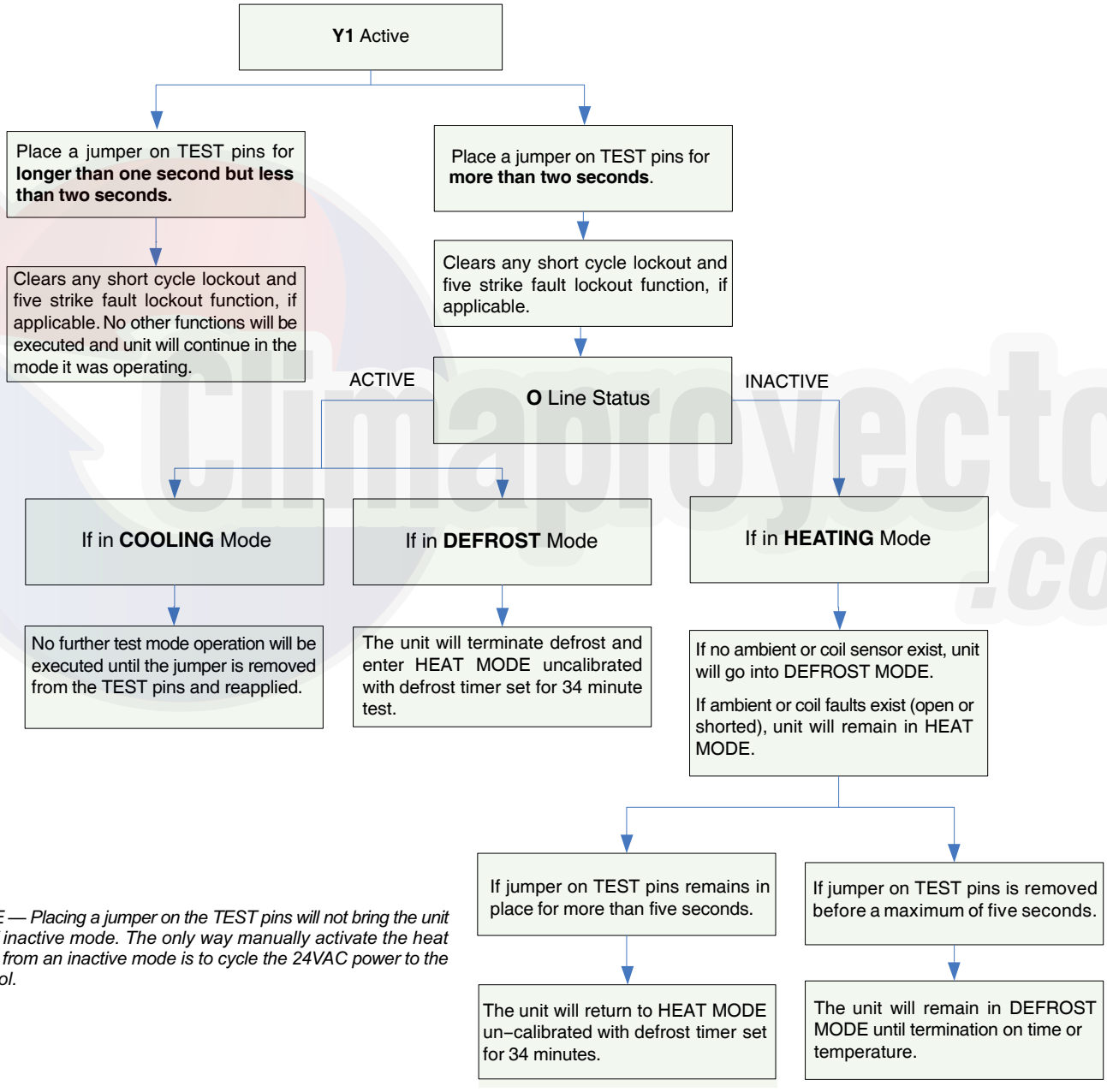
TEST

Placing the jumper on the field test pins allows the technician to:

- Clear short cycle lockout
- Clear five-strike fault lockout
- Cycle the unit in and out of defrost mode
- Place the unit in defrost mode to clear the coil

When **Y1** is energized and 24V power is being applied to the Control, a test cycle can be initiated by placing a jumper on the Control's **TEST** pins for 2 to 5 seconds. If the jumper remains on the **TEST** pins for longer than five seconds, the Control will ignore the jumpered TEST pins and revert to normal operation.

The Control will initiate one test event each time a jumper is placed on the TEST pins. For each TEST the jumper must be removed for at least one second and then reapplied.



NOTE — Placing a jumper on the TEST pins will not bring the unit out of inactive mode. The only way manually activate the heat pump from an inactive mode is to cycle the 24VAC power to the Control.

Figure 13. Test Mode

During a single thermostat cycle, the defrost control will lock out the unit after the fifth time that the circuit is interrupted by any pressure switch that is wired to the control board. In addition, the diagnostic LEDs will indicate a pressure switch lockout after the fifth occurrence of an open pressure switch (see Table 12). The unit will remain locked out until power is broken then remade to the control 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 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. ***If the TEST pins are jumpered and the 5-minute delay is being bypassed, the LO PS terminal signal is not ignored during the 90-second start-up period.***

SERVICE LIGHT CONNECTION

The defrost control board includes terminal connections for a service light which provides a signal that activates the room thermostat service light during periods of inefficient operation.

⚠ IMPORTANT

NOTE - After testing has been completed, properly reposition test jumper across desired timing pins.

DIAGNOSTIC LEDS

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the diagnosis. See Table 12.

Table 12. Defrost Control Board Diagnostic LEDs

DS2 Green	DS1 Red	Condition
OFF	OFF	Power problem
Simultaneous Slow Flash		Normal operation
Alternating Slow Flash		5-minute anti-short cycle delay
Simultaneous Fast Flash		Ambient Sensor Problem
Alternating Fast Flash		Coil Sensor Problem
ON	ON	Circuit Board Failure
Fault and Lockout Codes		
OFF	Slow Flash	Low Pressure Fault
OFF	ON	Low Pressure Lockout
Slow Flash	OFF	High Pressure Fault
ON	OFF	High Pressure Lockout
Slow Flash	ON	Discharge Line Temp. Fault
Fast Flash	ON	Discharge Line Temp. Lockout
OFF	Fast Flash	Discharge Sensor Fault
Fast Flash	OFF	Discharge Sensor Lockout
Shaded entries apply to demand boards only.		

Maintenance

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.

   Motor 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.

Outdoor Coil

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, fertilizers, fluids that may contain high levels of corrosive chemicals such as salts)

- Outdoor Coil — The outdoor coil may be flushed with a water hose.
- Outdoor Coil (Sea Coast) — Moist air in ocean locations can carry salt, which is corrosive to most metal. Units that are located near the ocean require frequent inspections and maintenance. These inspections will determine the necessary need to wash the unit including the outdoor coil. Consult your installing contractor for proper intervals/procedures for your geographic area or service contract.

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**:_____.

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.

HOMEOWNER

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 outdoor unit. The following maintenance may be performed by the homeowner.

⚠ 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

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.

Outdoor Coil

The outdoor unit must be properly maintained to ensure its proper operation.

- Please contact your dealer to schedule proper inspection and maintenance for your equipment.
- Make sure no obstructions restrict airflow to the outdoor unit.
- Grass clippings, leaves, or shrubs crowding the unit can cause the 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.

Routine Maintenance

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.

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.)

Thermostat Operation

See the ComfortSense® 7000 thermostat homeowner manual for instructions on how to operate your thermostat.

Heat Pump Operation

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

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

Extended Power Outage

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

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

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

Preservice Check

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

- Verify room thermostat settings are correct.
- Verify that all electrical disconnect switches are ON.
- Check for any blown fuses or tripped circuit breakers.
- Verify unit access panels are in place.
- Verify air filter is clean.
- If service is needed, locate and write down the unit model number and have it handy before calling.

Accessories

For update-to-date information, see any of the following publications:

- Lennox 13HPX Engineering Handbook
- Lennox Product Catalog
- Lennox Price Book

Start-Up and Performance Checklist

Job Name _____ Job no. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

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

Nameplate Voltage _____

Rated Load Ampacity _____ Compressor _____ 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? ❑

Climaproyectos
.com