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Dallas, Texas, USA



**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**

GENERAL

This 13ACX outdoor unit is designed for use with HFC-410A refrigerant only. This unit must be installed with an approved indoor unit. See the Lennox 13ACX Product Specifications bulletin (EHB) for approved indoor component match ups. These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

NOTICE !

For more in-depth information, consult the **Installation and Service Procedures manual**, available as Corp. 0612-L2 on DaveNet or through the Technical Support department at 800-453-6669.

INSTALLATION INSTRUCTIONS

Merit® Series 13ACX Units

AIR CONDITIONER
506945-01
5/2012
Supersedes 4/2012

TP Technical
Publications
Litho U.S.A.

! WARNING

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

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

! CAUTION

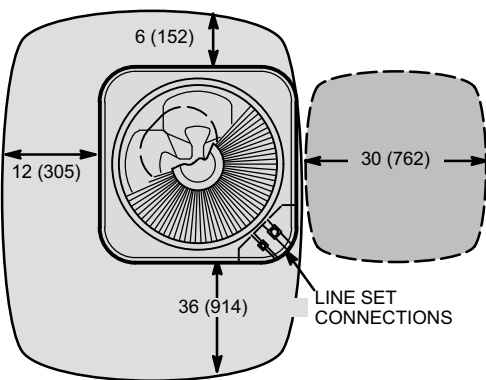
Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

! CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment.

STEP 1 -- SETTING THE UNIT -- Clearances

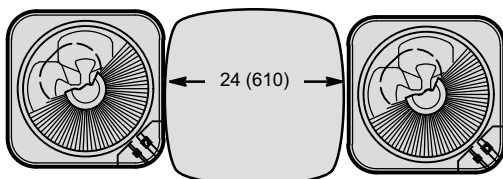
CLEARANCE ON ALL SIDES — INCHES (MILLIMETERS)



NOTES:

- Clearance to one of the other three sides must be 36 inches (914mm).
- Clearance to one of the remaining two sides may be 12 inches (305mm) and the final side may be 6 inches (152mm).

MINIMUM CLEARANCE BETWEEN TWO UNITS



MINIMUM CLEARANCE ABOVE UNIT

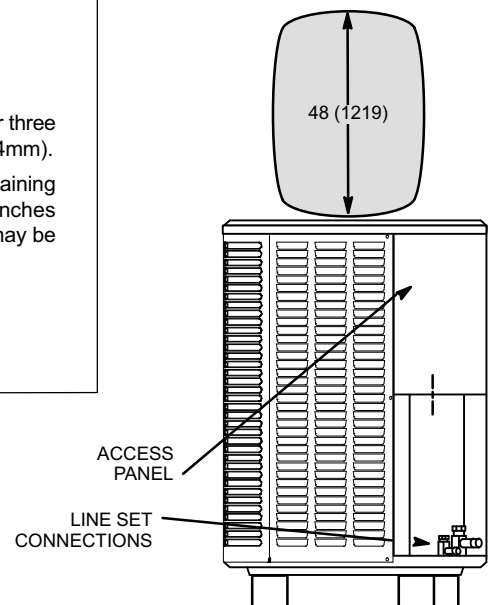


FIGURE 1



UNIT DIMENSIONS - INCHES (MM)

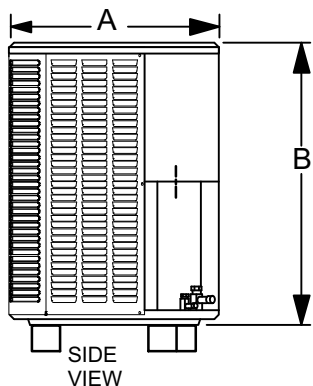


FIGURE 2

**TABLE 1
UNIT DIMENSIONS**

Model Numbers	A	B
13ACX-018-230	24-1/4 (616)	25-1/4 (641)
13ACX-024-230	24-1/4 (616)	25-1/4 (641)
13ACX-030-230	24-1/4 (616)	29-1/4 (743)
13ACX-036-230	24-1/4 (616)	29-1/4 (743)
13ACX-042-230	28-1/4 (718)	29-1/4 (743)
13ACX-048-230	28-1/4 (718)	33-1/4 (845)
13ACX-060-230	28-1/4 (718)	29-1/4 (743)

STEP 1 -- SETTING THE UNIT (CONTINUED) -- Unit Placement

⚠ WARNING

To prevent personal injury, as well as damage to panels, unit or structure, observe the following:

While installing or servicing this unit, carefully stow all removed panels so that the panels will not cause injury to personnel, objects or nearby structures. Also, take care to store panels where they will not be subject to damage (e.g., being bent or scratched).

While handling or stowing the panels, consider any weather conditions (especially wind) that may cause panels to be blown around and damaged.

NOTICE !

Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorb oil, causing the rubber to degrade. Failure to follow this notice could result in damage to roof surface.

IMPORTANT !

This model is designed for use in check / 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.

IMPORTANT !

Exhaust vents from dryers, water heaters and furnaces should be directed away from the outdoor unit. Prolonged exposure to exhaust gases and the chemicals contained within them may cause condensation to form on the steel cabinet and other metal components of the outdoor unit. This will diminish unit performance and longevity.

PLACEMENT

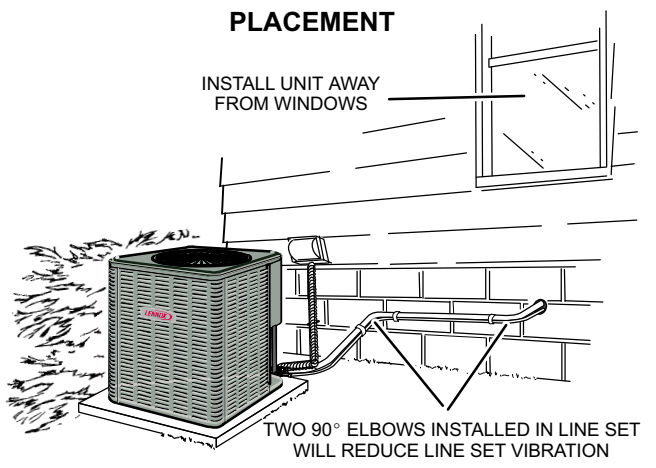


FIGURE 3

SLAB MOUNTING

Install unit level or, if on a slope, maintain slope tolerance of 2 degrees (or 2 inches per 5 feet [50 mm per 1.5 m]) away from building structure.

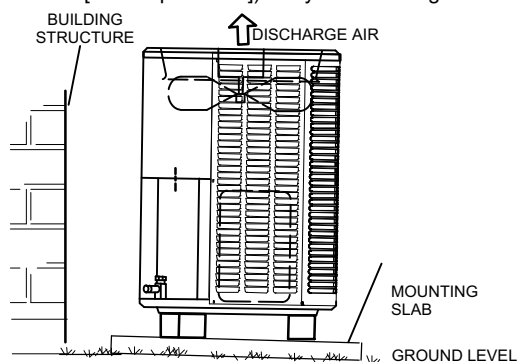


FIGURE 4

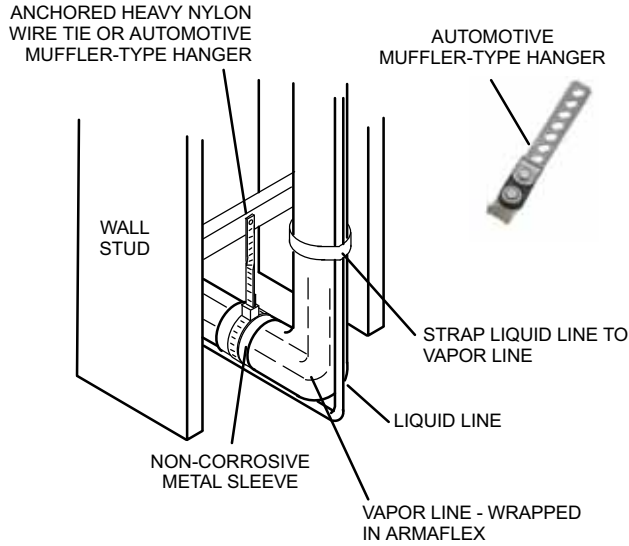
LINE SET

IMPORTANT — Refrigerant lines must not contact structure.

INSTALLATION

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

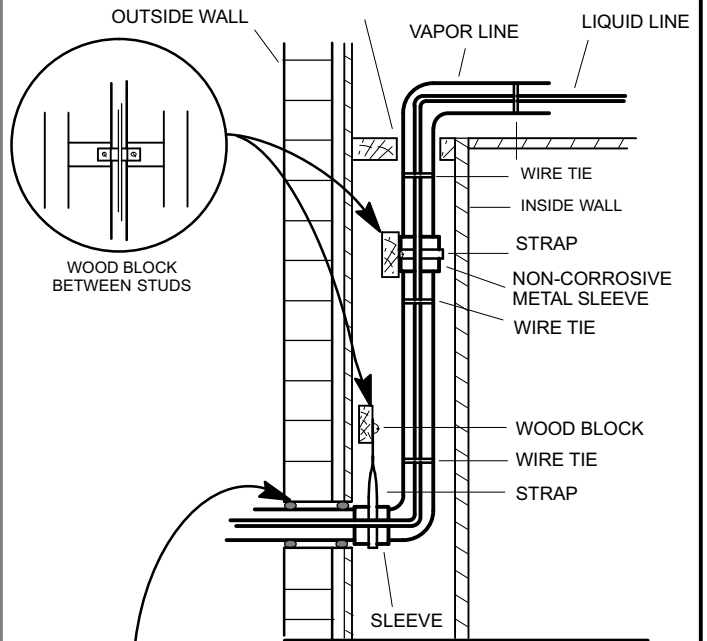
REFRIGERANT LINE SET — TRANSITION FROM VERTICAL TO HORIZONTAL



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

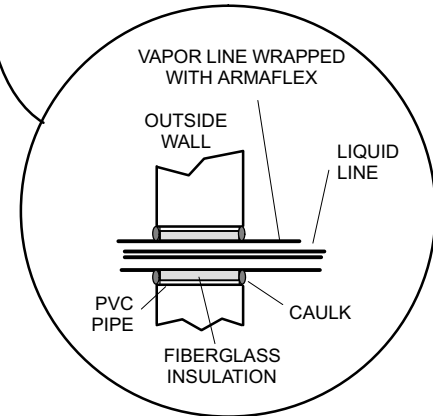
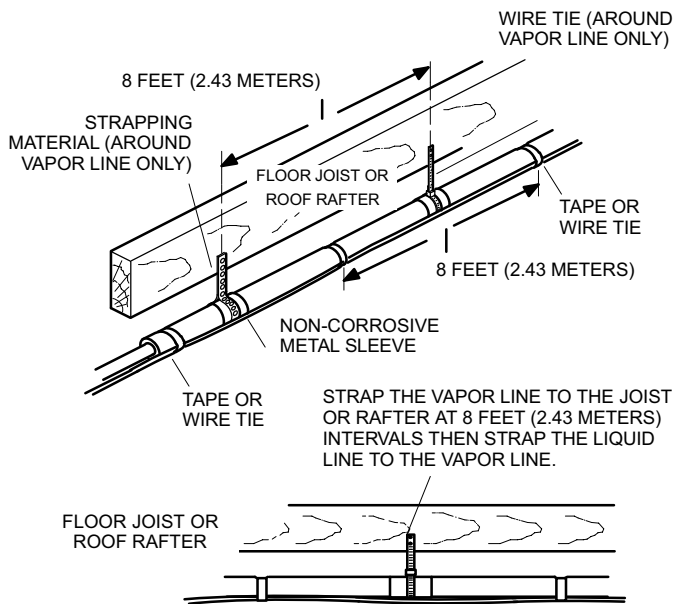
NOTE — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.

IMPORTANT — Refrigerant lines must not contact wall



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.



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

FIGURE 5

STEP 2 -- REFRIGERANT PIPING -- Flushing Existing Line Set and Indoor Coil

Flush the existing line set per the following instructions. For more information, refer to the Installation and Service Procedures manual available on DaveNet. **CAUTION - DO NOT** attempt to flush and re-use existing line sets or indoor coil when the system contains contaminants (i.e., compressor burn out).

NOTE - When installing refrigerant lines longer than 50 feet, refer to the Refrigerant Piping Design and Fabrication Guidelines manual available on DaveNet (Corp. 9351-L9), or contact the Technical Support Department Product Application group for assistance.

IMPORTANT !

If this unit is being matched with an approved line set or indoor unit coil that 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 system performance and capacity.

Failure to properly flush the system per this instruction and the detailed Installation and Service Procedures manual will void the warranty.

! WARNING



When using a high pressure gas such as 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

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.

IMPORTANT !

Some scroll compressors have an internal vacuum protector that will unload scrolls when suction pressure goes below 20 psig. A hissing sound will be heard when the compressor is running unloaded. Protector will reset when low pressure in system is raised above 40 psig. **DO NOT REPLACE COMPRESSOR.**

LIQUID LINE FILTER DRIER INSTALLATION

The filter drier (one is shipped with each 13ACX unit) must be field installed in the liquid line between the outdoor unit's liquid line service valve and the indoor coil's metering device (fixed orifice or TXV) as illustrated in figure 6. This filter drier must be installed to ensure a clean, moisture-free system. Failure to install the filter drier will void the warranty. A replacement filter drier is available from Lennox. See *Brazing Connections* page 7 for special procedures on brazing filter drier connections to the liquid line.

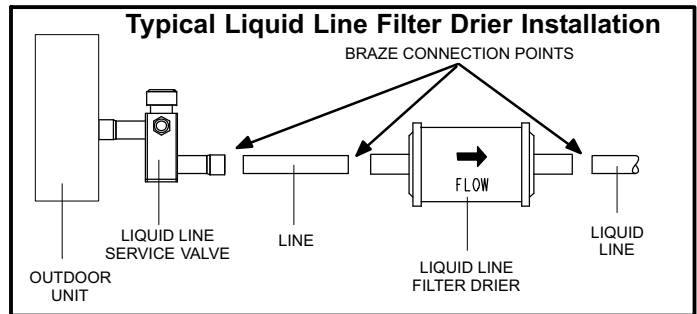


FIGURE 6

TABLE 2
REFRIGERANT LINE SET — INCHES (MM)

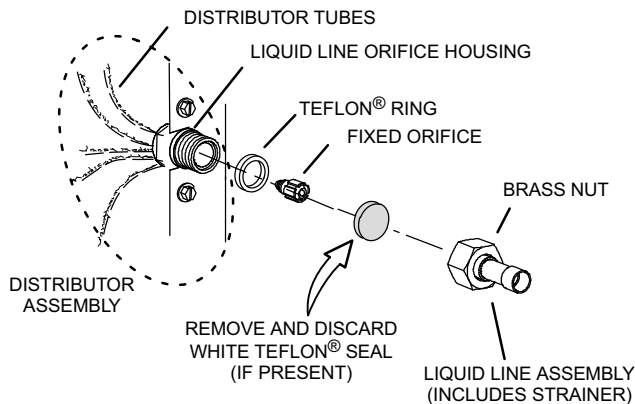
Model Number (-xx*)	Valve Size Connections		Recommended Line Sets		
	Liquid Line	Suction Line	L15 Line Set Model	Line Set Length	Catalog Number
13ACX-018-230 13ACX-024-230	3/8" (10 mm)	5/8" (16 mm)	L15-26-20	20 feet (6.1 m)	89J52
			L15-26-25	25 feet (9.1 m)	89J53
			L15-26-35	35 feet (12.2 m)	89J54
			L15-26-50	50 feet (15.2 m)	89J55
13ACX-030-230 13ACX-036-230 13ACX-042-230	3/8" (10 mm)	3/4" (19 mm)	L15-41-20	20 feet (6.1 m)	89J56
			L15-41-30	30 feet (9.1 m)	89J57
			L15-41-40	40 feet (12.2 m)	89J58
			L15-41-50	50 feet (15.2 m)	89J59
13ACX-048-230 13ACX-060-230	3/8" (10 mm)	7/8" (22 mm)	L15-65-30	30 feet (9.1 m)	89J60
			L15-65-40	40 feet (12.2 m)	89J61
			L15-65-50	50 feet (15.2 m)	89J62

* Applicable to all minor revision numbers unless otherwise specified.

** Some applications may require a field-provided 1-1/8" to 7/8" adapter.

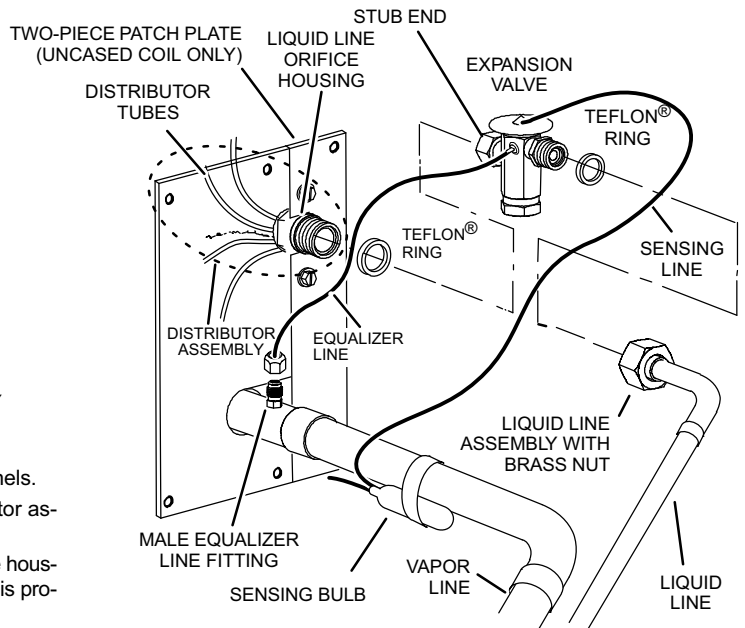
STEP 2 -- REFRIGERANT PIPING -- Removing Existing Indoor Metering Device

1A TYPICAL EXISTING FIXED ORIFICE REMOVAL PROCEDURE (UNCASED COIL SHOWN)



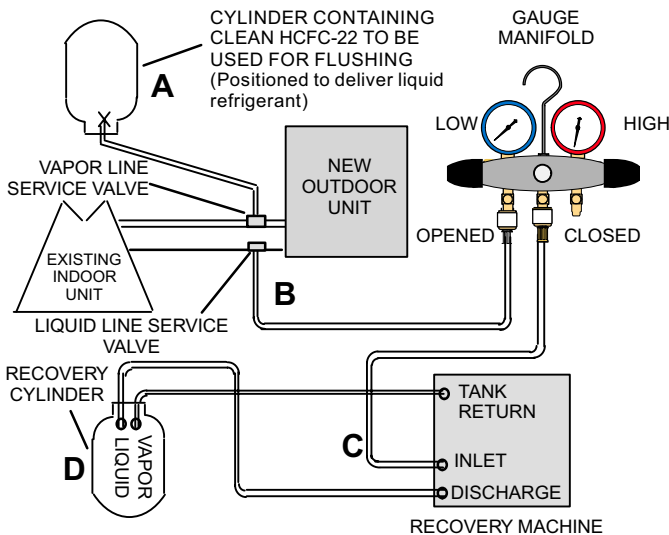
- A** On fully cased coils, remove the coil access and plumbing panels.
- B** Remove any shipping clamps from the liquid line and distributor assembly.
- C** Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.
- D** Remove and discard fixed orifice, valve stem assembly (if present) and Teflon® washer as illustrated above.
- E** Use a field-provided fitting to temporarily reconnect the liquid line to the indoor unit's liquid line orifice housing.

OR 1B TYPICAL EXISTING EXPANSION VALVE REMOVAL PROCEDURE (UNCASED COIL SHOWN)



- A** On fully cased coils, remove the coil access and plumbing panels.
- B** Remove any shipping clamps from the liquid line and distributor assembly.
- C** Disconnect the equalizer line from the expansion valve equalizer line fitting on the vapor line.
- D** Remove the vapor line sensing bulb.
- E** Disconnect the liquid line from the expansion valve at the liquid line assembly.
- F** Disconnect the expansion valve from the liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.
- G** Remove and discard expansion valve and the two Teflon® rings.
- H** Use a field-provided fitting to temporarily reconnect the liquid line to the indoor unit's liquid line orifice housing.

2 CONNECT GAUGES AND EQUIPMENT FOR FLUSHING PROCEDURE



- A** HCFC-22 cylinder with clean refrigerant (positioned to deliver liquid refrigerant) to the vapor service valve.
- B** HCFC-22 gauge set (low side) to the liquid line valve.
- C** HCFC-22 gauge set center port to inlet on the recovery machine with an empty recovery tank connected to the gauge set.
- D** Connect recovery tank to recovery machine per machine instructions.

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.

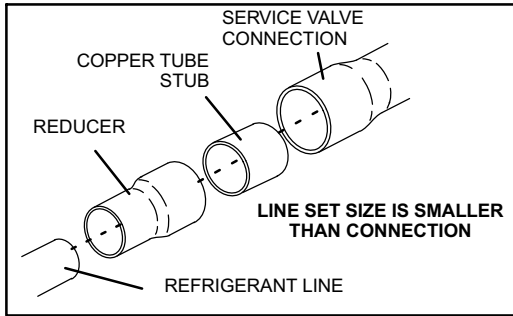
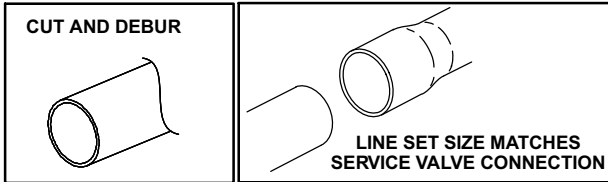
- A** Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to allow the recovery machine to pull a vacuum on the existing system line set and indoor unit coil.
- B** Position the cylinder of clean HCFC-22 for delivery of liquid refrigerant and open its 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 HCFC-22 vapor is recovered. Allow the recovery machine to pull the system down to 0.
- D** Close the valve on the inverted HCFC-22 drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

FIGURE 7

STEP 2 -- REFRIGERANT PIPING -- Brazing Procedures

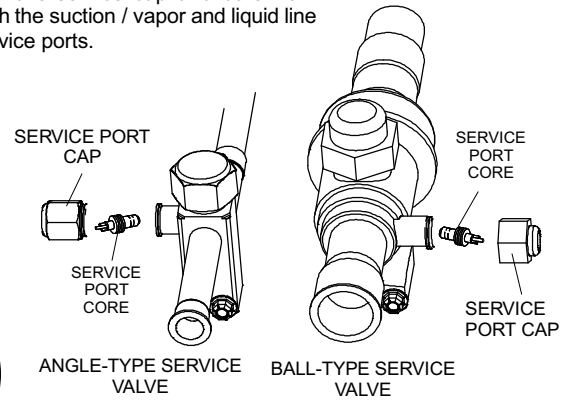
1 CUT AND DEBUR

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



2 CAP AND CORE REMOVAL

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



DO NOT CRIMP SERVICE VALVE CONNECTOR WHEN PIPE IS SMALLER THAN CONNECTION

3 ATTACH THE MANIFOLD GAUGE SET FOR BRAZING LIQUID AND SUCTION / VAPOR LINE SERVICE VALVES

Flow regulated nitrogen (at 1 to 2 psig) through the low-side refrigeration gauge set into the liquid line service port valve, and out of the suction / vapor line service port valve.

- Connect gauge set low pressure side to liquid line service valve (service port).
- Connect gauge set center port to bottle of nitrogen with regulator.
- Remove core from valve in suction / vapor line service port to allow nitrogen to escape.

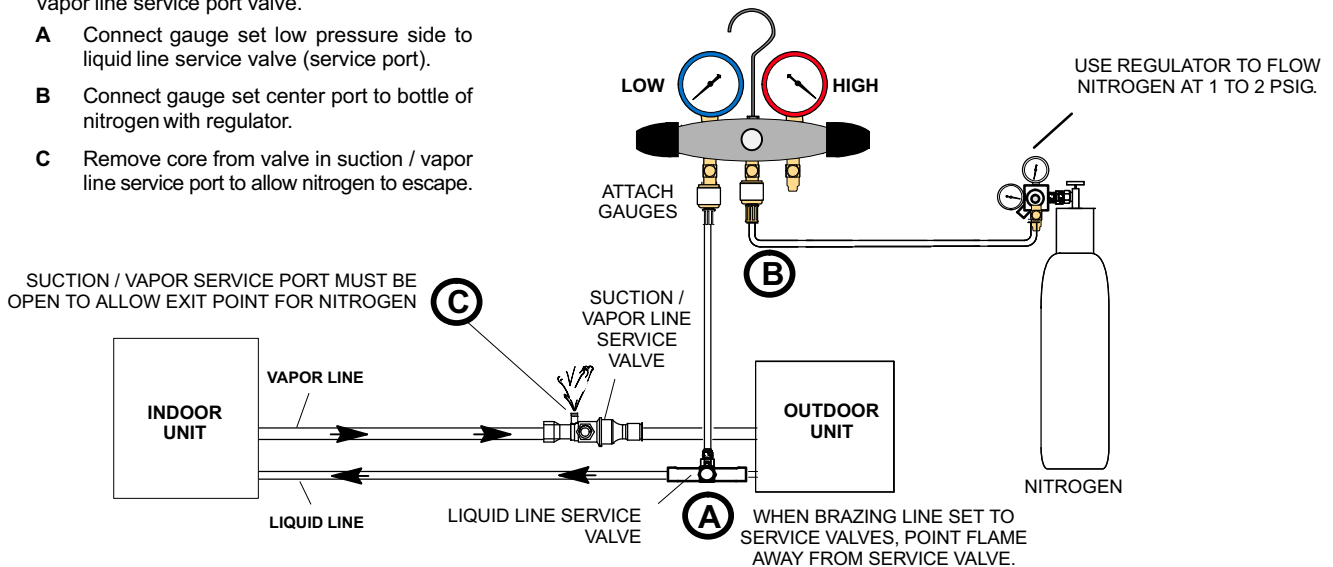


FIGURE 8

⚠ 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.

⚠ WARNING



Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture. Check the high and low pressures before applying heat.

4 WRAP SERVICE VALVES

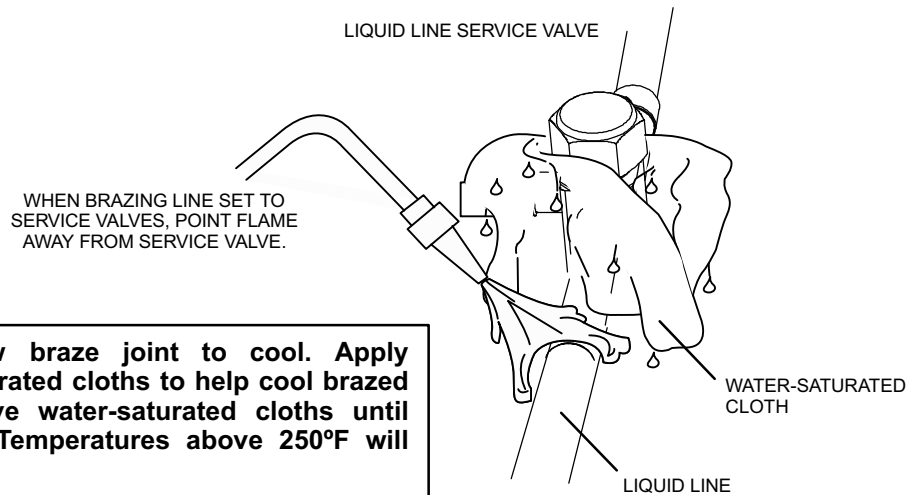
To help protect service valve seals during brazing, wrap water-saturated cloths around service valve bodies and copper tube stubs. Use additional water-saturated cloths underneath the valve body to protect the base paint.

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 service valve and out of the suction / vapor valve stem port. See steps **3A**, **3B** and **3C** on manifold gauge set connections.

6 BRAZE LINE SET

Wrap both service valves with water-saturated cloths as illustrated here and as mentioned in step 4, before brazing to line set. Cloths must remain water-saturated throughout the brazing and cool-down process.

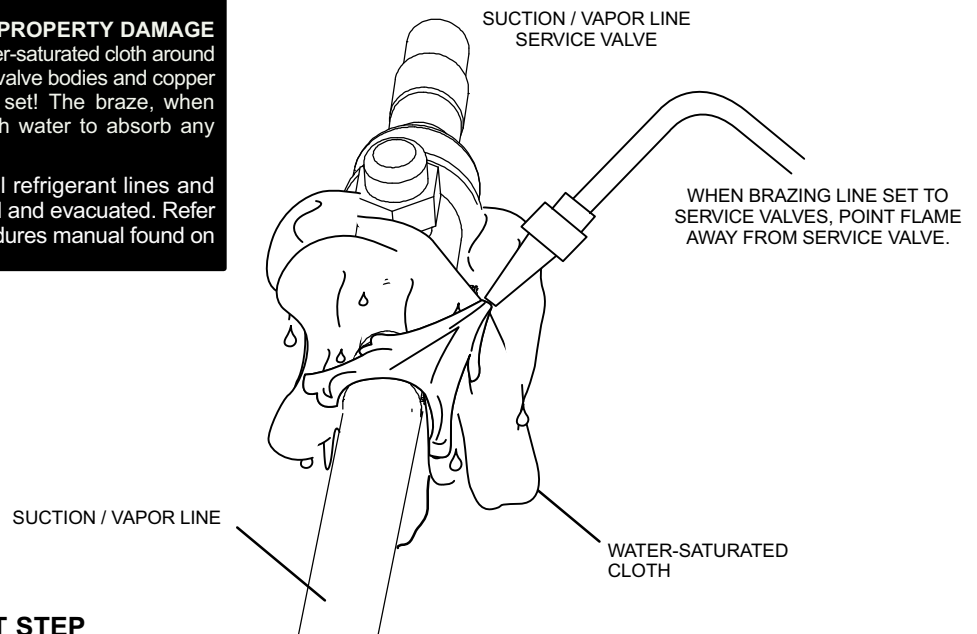


IMPORTANT — Allow braze joint to cool. Apply additional water-saturated cloths to help cool brazed joint. Do not remove water-saturated cloths until piping has cooled. Temperatures above 250°F will damage valve seals.

WARNING

FIRE, PERSONAL INJURY, OR PROPERTY DAMAGE may result if you do not wrap a water-saturated cloth around both liquid and suction line service valve bodies and copper tube stub while brazing the line set! The braze, when complete, must be quenched with water to absorb any residual heat.

Do not open service valves until refrigerant lines and indoor coil have been leak-tested and evacuated. Refer to Installation and Service Procedures manual found on DAVENET.



7 PREPARATION FOR NEXT STEP

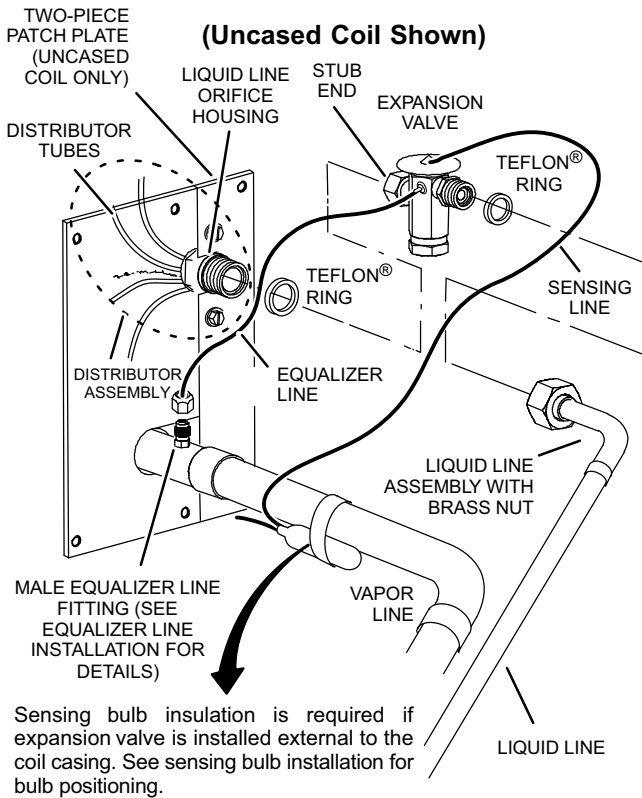
After all connections have been brazed, disconnect manifold gauge set from service ports. Apply additional water-saturated cloths to both services valves to cool piping. Once piping is cool, remove all water-saturated cloths.

FIGURE 9

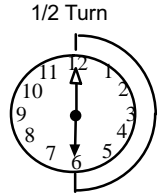
STEP 2 -- REFRIGERANT PIPING -- Installing Indoor Expansion Valve

This outdoor unit is designed for use in systems that use either a fixed orifice (RFC) (included with outdoor unit), or expansion valve metering device (purchased separately) at the indoor coil. See the *13ACX Product Specifications bulletin (EHB)* for approved expansion valve kit match ups. The expansion valve unit can be installed internal or external to the indoor coil. In applications where an uncased coil is being installed in a field-provided plenum, install the expansion valve in a manner that will provide access for field servicing of the expansion valve. Refer to below illustration for reference during installation of expansion valve unit. After installation of the indoor coil metering device, proceed to *Step 5*.

INDOOR EXPANSION VALVE INSTALLATION



- C Install one of the provided Teflon® rings around the stubbed end of the expansion valve and use refrigerant oil to lightly lubricate the connector threads and exposed surface of the Teflon® ring.
- D Attach the stubbed end of the expansion valve to the liquid line orifice housing. Finger tighten, then use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in the figure to the right, or tighten to 20 ft-lb.
- E Place the remaining Teflon® washer around the other end of the expansion valve. Lightly lubricate connector threads and expose surface of the Teflon® ring with refrigerant oil.
- F Attach the liquid line assembly to the expansion valve. Finger tighten, then use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in the figure above or tighten to 20 ft-lb.

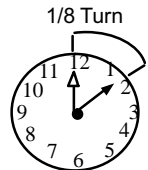


SENSING BULB INSTALLATION

- A Attach the vapor line sensing bulb in the proper orientation as illustrated below using the clamp and screws provided.
- B **NOTE** - Though it is preferred to have the sensing bulb installed on a horizontal run of the vapor line, installation on a vertical run of piping is acceptable if necessary.

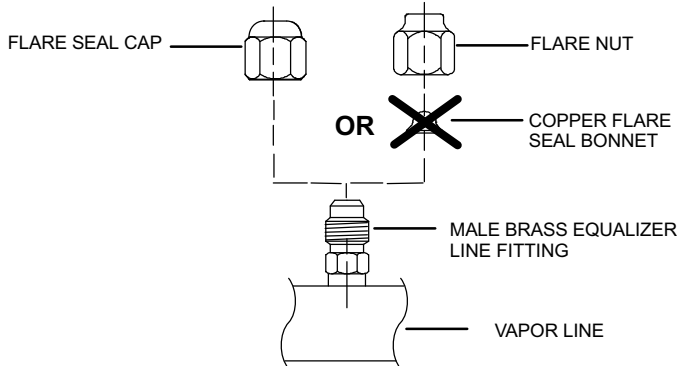
NOTE — Confirm proper thermal contact between vapor line and expansion bulb before insulating the sensing bulb.

- C Connect the equalizer line from the expansion valve to the equalizer vapor port on the vapor line. Finger tighten the flare nut, then tighten an additional 1/8 turn (7 ft-lbs) as illustrated to the right.

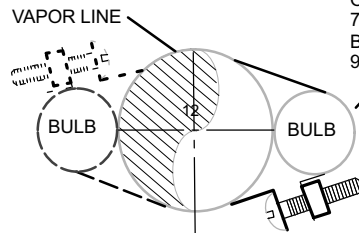


EQUALIZER LINE INSTALLATION

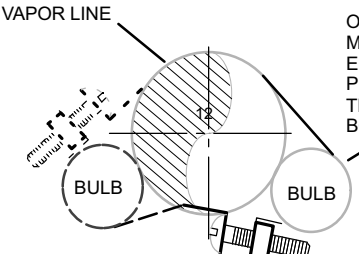
- A Remove and discard either the flare seal cap or flare nut with copper flare seal bonnet from the equalizer line port on the vapor line as illustrated in the figure below.
- B Remove the field-provided fitting that temporarily reconnected the liquid line to the indoor unit's distributor assembly.



ON LINES SMALLER THAN 7/8", MOUNT SENSING BULB AT EITHER THE 3 OR 9 O'CLOCK POSITION.



ON 7/8" AND LARGER LINES, MOUNT SENSING BULB AT EITHER THE 4 OR 8 O'CLOCK POSITION. NEVER MOUNT THE SENSING BULB ON BOTTOM OF LINE.

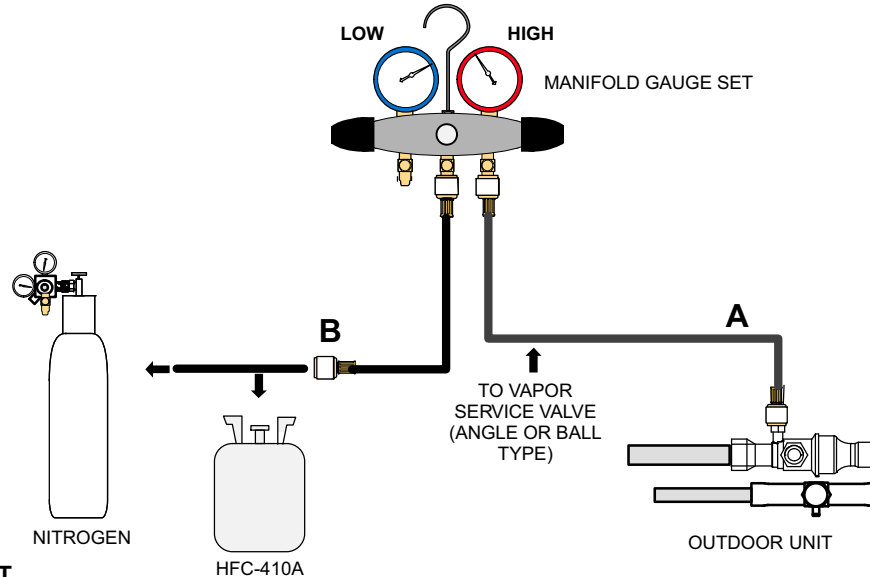


NOTE — NEVER MOUNT THE SENSING BULB ON BOTTOM OF LINE.

FIGURE 10

STEP 3 -- LEAK TEST AND EVACUATION

LEAK TEST



1 CONNECT GAUGE SET

- A Connect the high pressure hose of an HFC-410A manifold gauge set 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.
- 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.

2

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

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 nitrogen with a pressure regulating valve to the center port of the manifold gauge set.
- D Adjust 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.

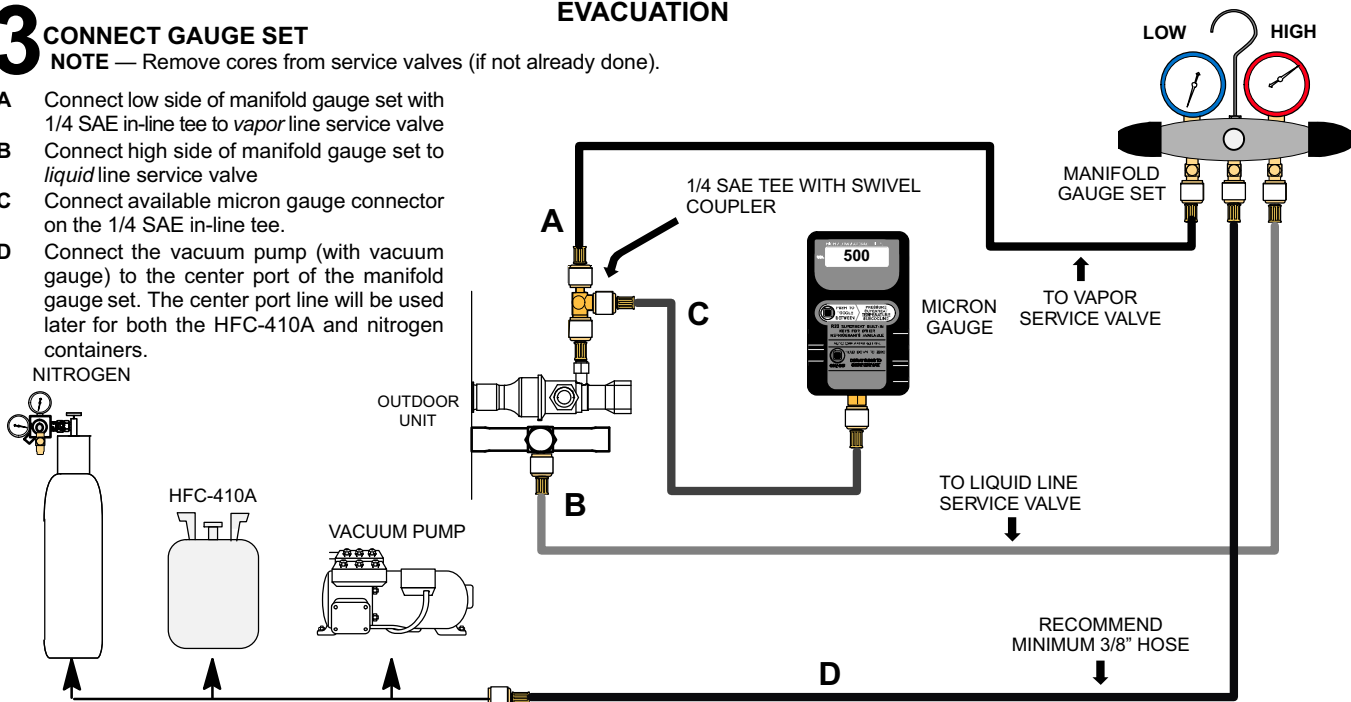
FIGURE 11

STEP 3 -- LEAK TEST AND EVACUATION (CONTINUED)

3 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 available micron gauge 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.



4 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 above absolute zero within a given volume or system. 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), perform the following:
 - Close manifold gauge valves.
 - Close valve on vacuum pump.
 - Turn off vacuum pump.
 - Disconnect manifold gauge center port hose from vacuum pump.
 - Attach manifold center port hose to a nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose.
 - Open manifold gauge valves to break the vacuum in the line set and indoor unit.
 - Close manifold gauge valves.
- D Shut off the nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the nitrogen from the line set and indoor unit.
- 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 a cylinder of HFC-410A positioned to deliver liquid 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 stem caps and finger tighten them, then tighten an additional one-sixth (1/6) of a turn as illustrated.

WARNING !

Possible equipment damage.

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

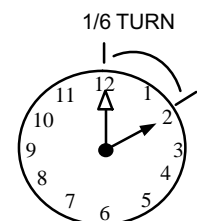


FIGURE 12

STEP 4 -- ELECTRICAL -- Circuit Sizing and Wire Routing

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)

⚠ 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.

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.

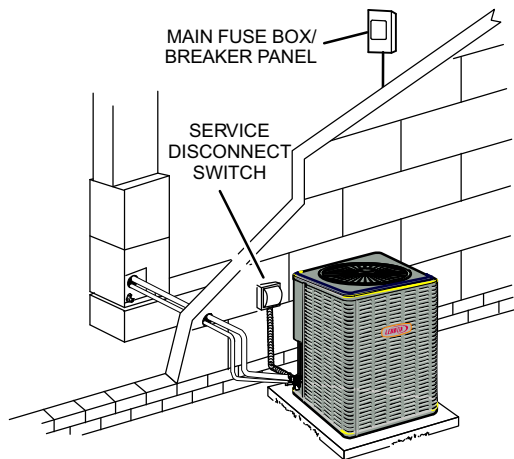
⚠ CAUTION

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

Electrostatic discharge can affect electronic components. Take care during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Touch hand and all tools on an unpainted unit surface before performing any service procedure to neutralize electrostatic charge.

SIZE CIRCUIT AND INSTALL SERVICE DISCONNECT SWITCH

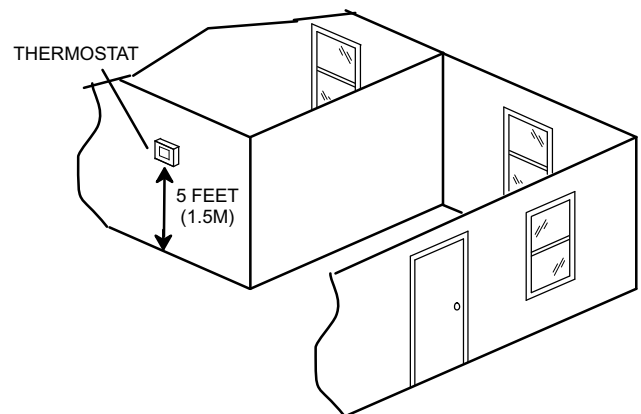
Refer to the unit nameplate for minimum circuit ampacity, and maximum fuse or circuit breaker (HACR per NEC). Install power wiring and properly sized disconnect switch.



NOTE — Units are approved for use only with copper conductors. Ground unit at disconnect switch or connect 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.

FIGURE 13

STEP 4 -- ELECTRICAL (CONTINUED) -- High Voltage and Field Control Wiring

The following illustration provide an example of control wiring connections when using standard thermostat.

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.

NOTE — Wire tie provides low voltage control wire strain relief and maintains separation of field-installed low and high voltage circuits.

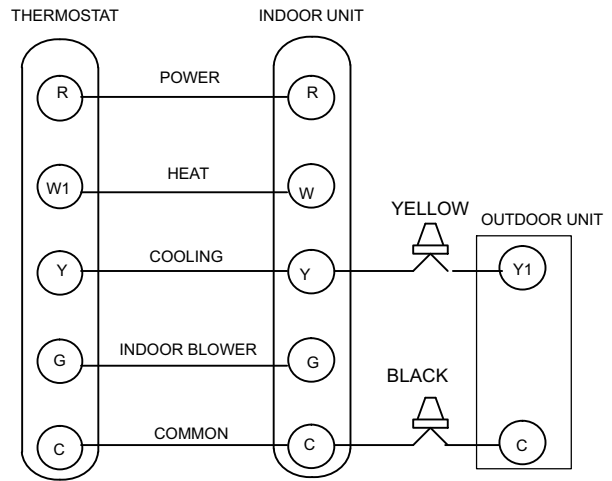
NOTE — For proper voltages, select thermostat wire (control wires) gauge per table above.

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

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 and secure with provided wire tie.
- B** Make 24VAC thermostat wire connections. Locate the two wires from the contactor and make connection using field-provided wire nuts:
 - **Yellow to Y1**
 - **Black to C (common)**

FIELD CONTROL WIRING



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

FIGURE 14

STEP 5 -- UNIT START-UP

⚠ 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 suction line service valve stems to release the refrigerant charge (contained in outdoor unit) into the system.
4. Replace the stem caps and tighten to the value listed in table 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. Connect manifold gauge set for testing and charging using figure 16 as a guideline.
7. 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.

8. Recheck voltage while the unit is running. Power must be within range shown on the unit nameplate.

9. Check system for sufficient refrigerate using the procedures outlined in under *System Refrigerant*.

OPERATING MANIFOLD GAUGE SET AND 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 15 provides information on how to access and operating both angle and ball service valves.

Torque Requirements

When servicing or repairing heating, ventilating, and air conditioning components, ensure the fasteners are appropriately tightened. Table 3 lists torque values for fasteners.

⚠ 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 3 provides torque values for fasteners.

TABLE 3. 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

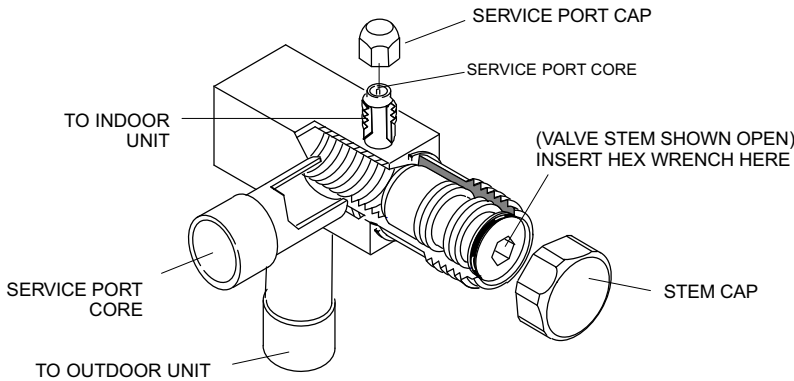
When checking the system charge, only use a manifold

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.

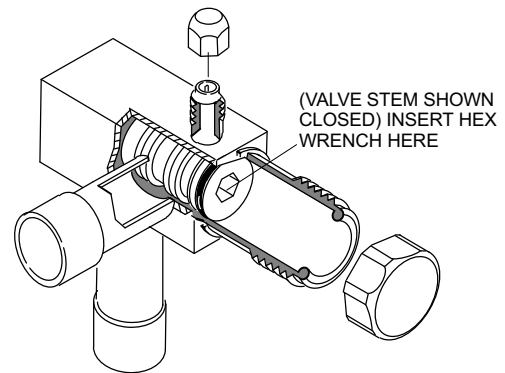
Operating Angle Type Service Valve:

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.



ANGLE-TYPE SERVICE VALVE (BACK-SEATED OPENED)

When service valve is **OPEN**, the service port is open to line set, indoor and outdoor unit.

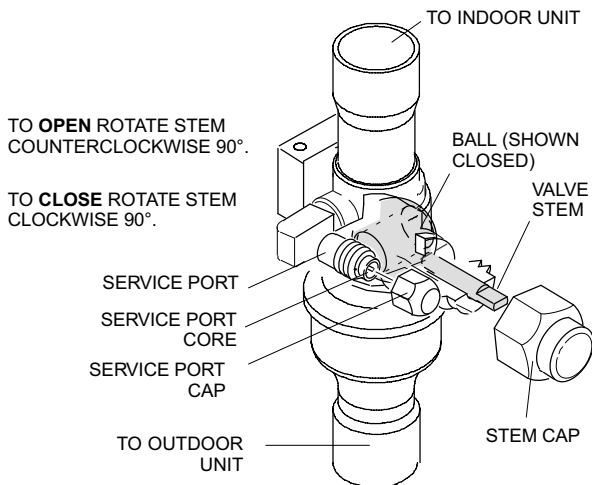


ANGLE-TYPE SERVICE VALVE (FRONT-SEATED CLOSED)

When service valve is **CLOSED**, the service port is open to the line set and indoor unit.

Operating Ball Type Service Valve:

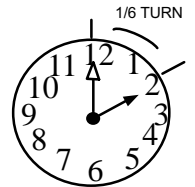
1. Remove stem cap with an appropriately sized wrench.
2. Use an appropriately sized wrench to open. To open valve, rotate stem counterclockwise 90°. To close rotate stem clockwise 90°.



To Access Service Port:

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

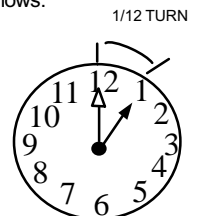
1. Remove service port cap with an appropriately sized wrench.
2. Connect gauge set to service port.
3. When testing is completed, replace service port cap and tighten as follows:
 - With torque wrench: Finger tighten and torque cap per table 3.
 - Without torque wrench: Finger tighten and use an appropriately sized wrench to turn an additional 1/6 turn clockwise.



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 3.
- 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 15

CHECKING AND ADDING 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.

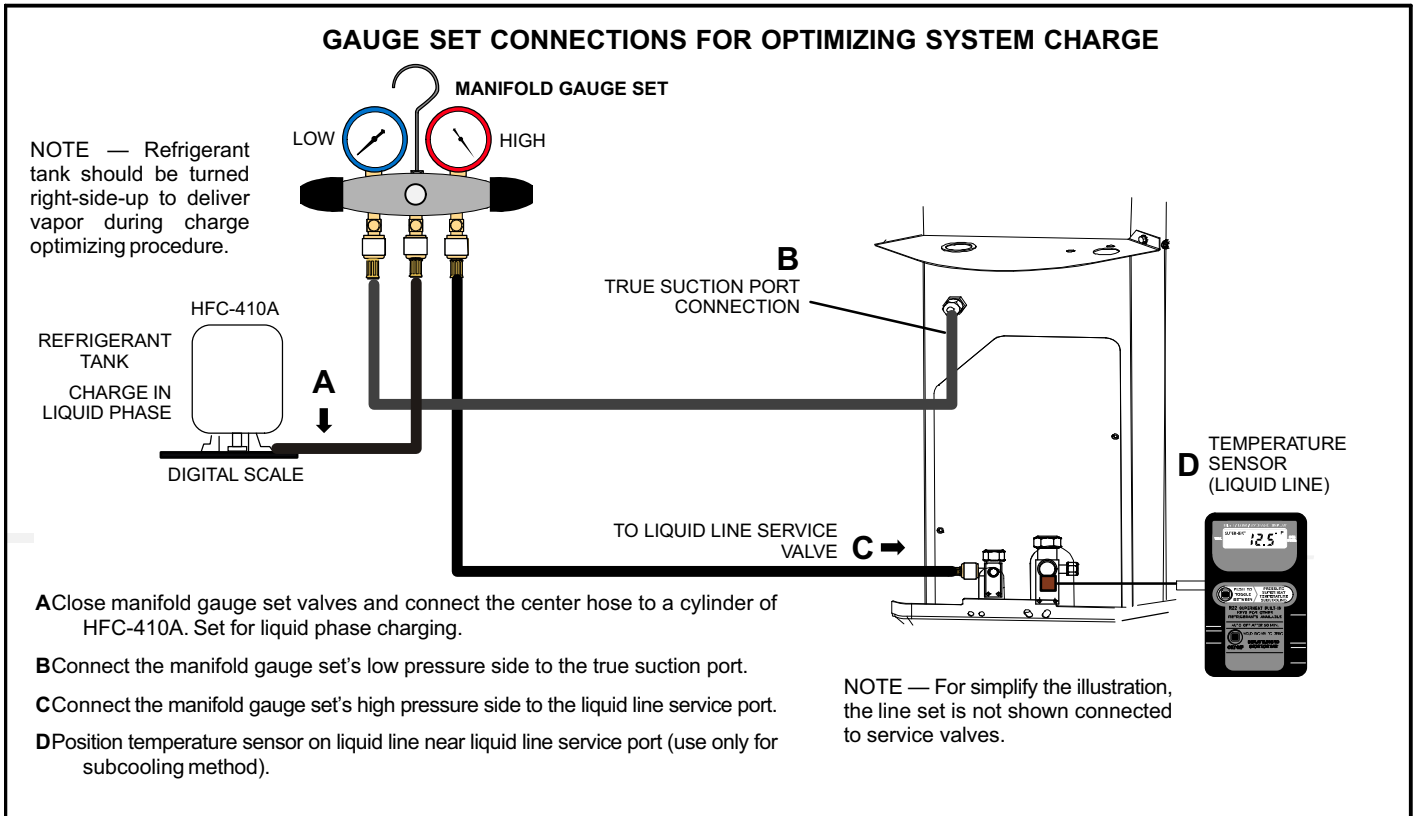


FIGURE 16

CHECKING AIR FLOW AT INDOOR COIL

Check airflow using the Delta-T (DT) process using the illustration in figure 17.

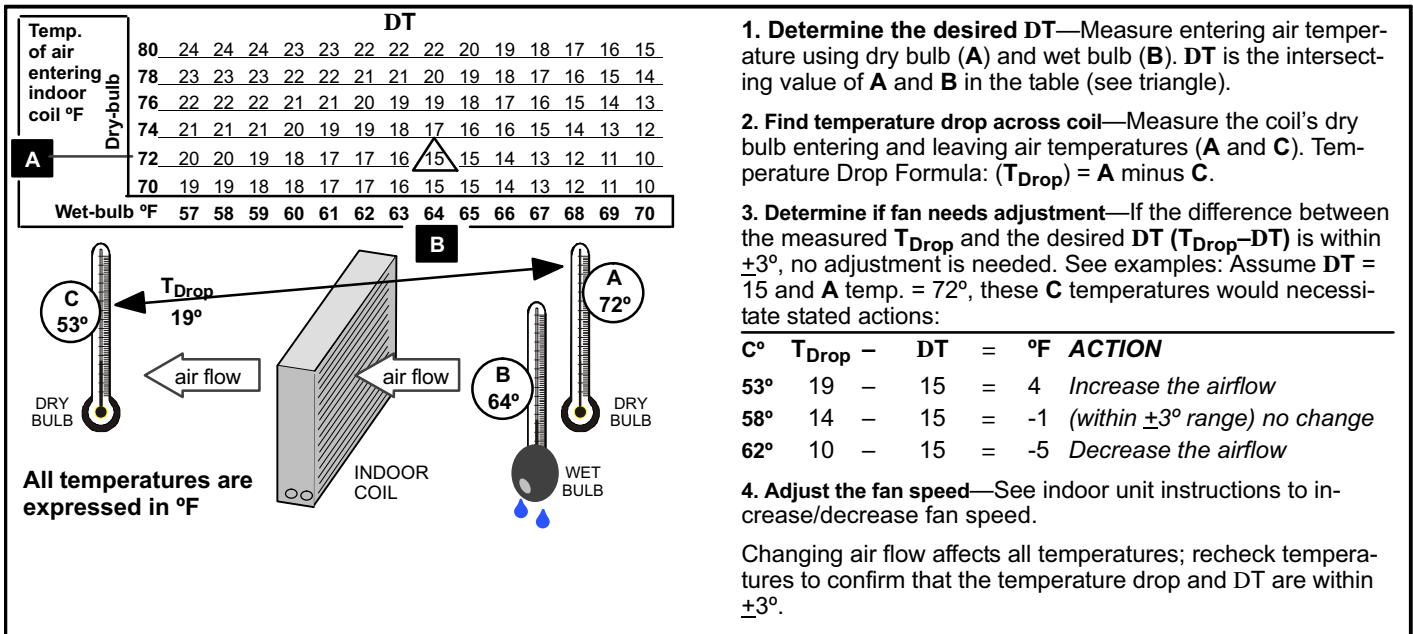


FIGURE 17

START: Determine how refrigerant is metered

WHEN TO CHARGE?

- Best during warm weather
- Can charge in colder weather by determining best charge method? Determine by:
 - A** Metering device type
 - B** 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 suction line temperature

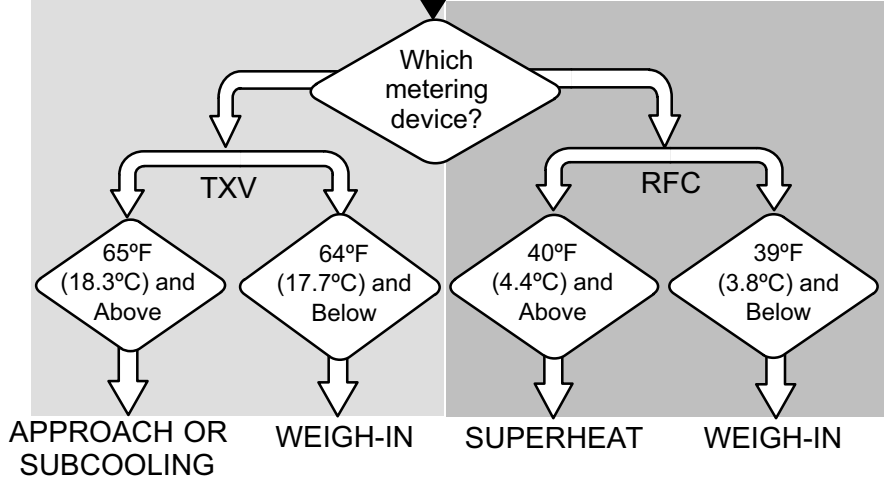


FIGURE 18

WEIGH IN (RFC AND TXV)

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.

+

=

Total charge



Refrigerant Charge per Line Set Length

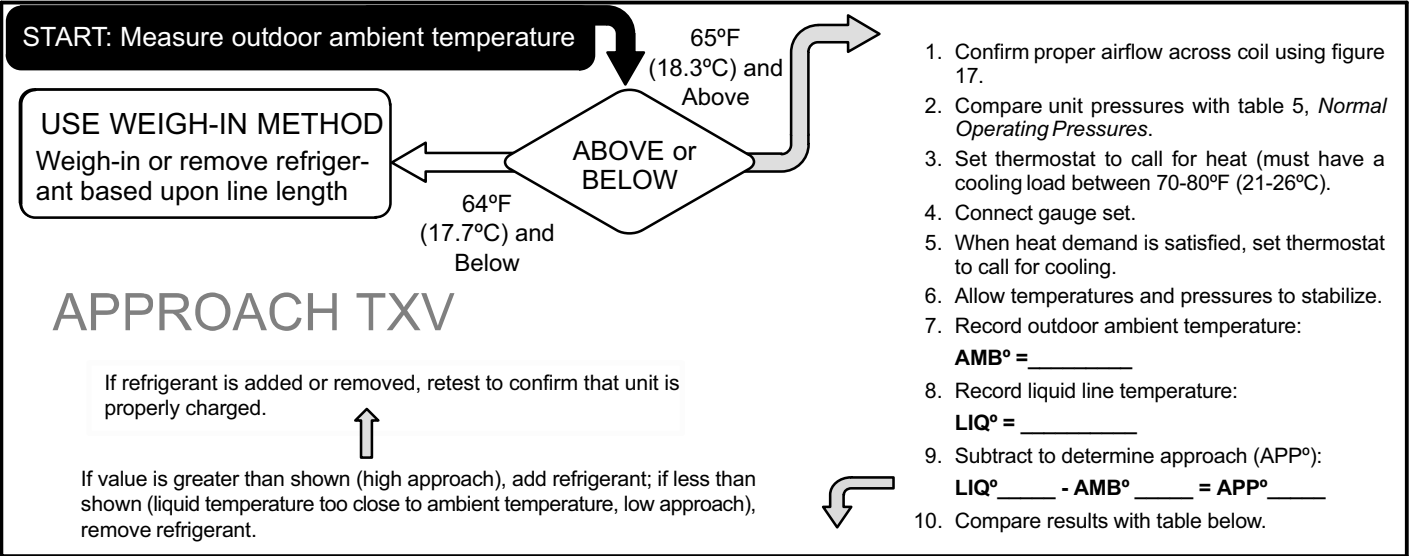
Liquid Line Set Diameter	Ounces per 5 feet (g per 1.5 m) adjust from 15 feet (4.6 m) line set*
3/8" (9.5 mm)	3 ounce per 5' (85 g per 1.5 m)

*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.

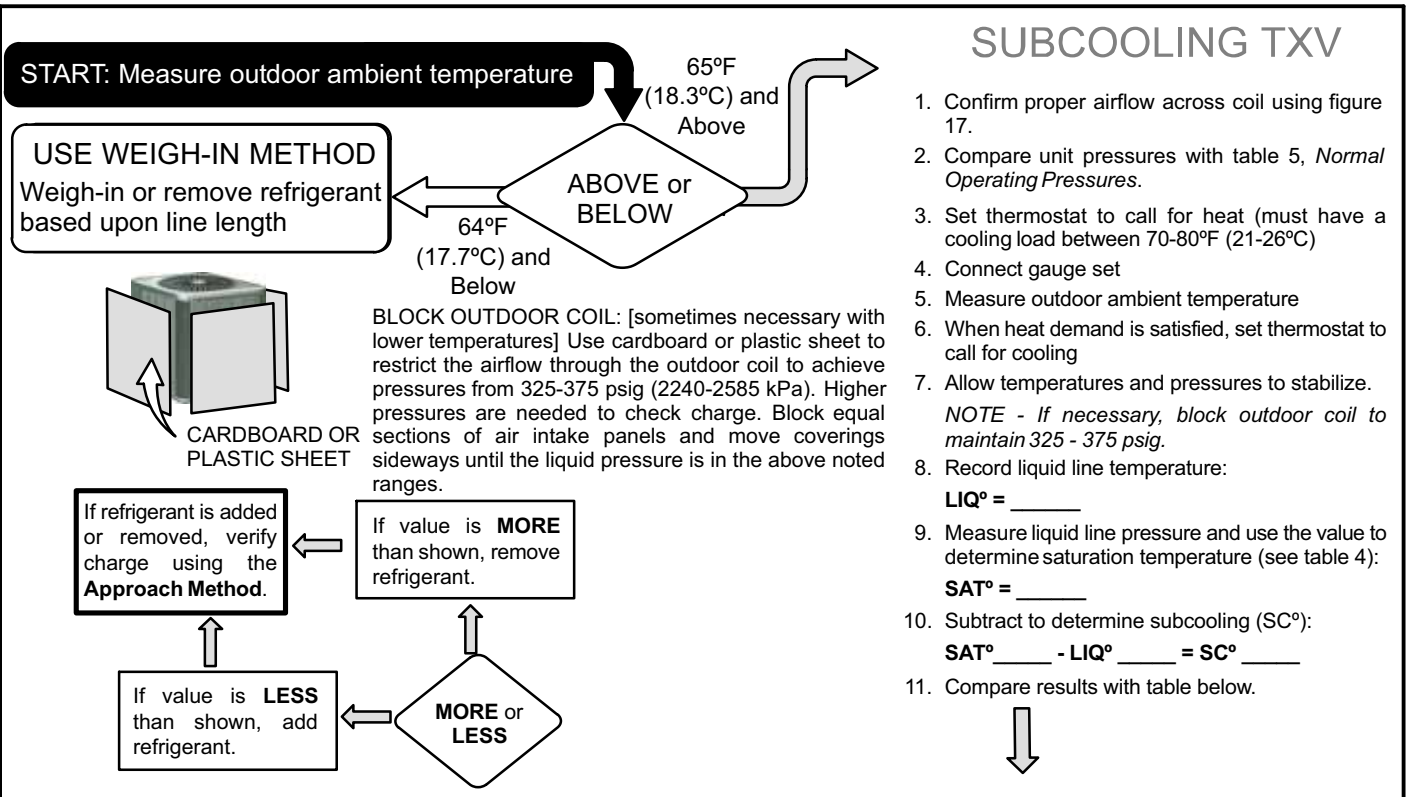
NOTE — The above nameplate is for illustration purposes only. Go to actual nameplate on outdoor unit for charge information.

FIGURE 19



Approach (APP) Values - TXV System - °F (°C) ±1°F (0.5°C)

All Temps	-018	-024	-030	-036	-042	-048	1-060
	8 (4.4)	11 (6.1)	10 (5.5)	13 (7.2)	7 (3.9)	7 (3.9)	13 (7.2)



Subcooling (SC) Values - TXV System - °F (°C) ±1°F (0.5°C)

Temps	-018	-024	-030	-036	-042	-048	1-060
65	5 (2.8)	8 (4.4)	5 (2.8)	3 (1.7)	8 (4.4)	6 (3.3)	4 (2.2)
75	5 (2.8)	8 (4.4)	6 (3.3)	3 (1.7)	9 (5.0)	7 (3.9)	4 (2.2)
85	5 (2.8)	8 (4.4)	6 (3.3)	4 (2.2)	9 (5.0)	7 (3.9)	5 (2.8)
95	6 (3.3)	9 (5.0)	7 (3.9)	4 (2.2)	10 (5.5)	8 (4.4)	5 (2.8)
105	7 (3.9)	9 (5.0)	8 (4.4)	5 (2.8)	11 (6.1)	9 (5.0)	5 (2.8)
115	9 (5.0)	10 (5.5)	8 (4.4)	5 (2.8)	11 (6.1)	9 (5.0)	4 (2.2)

**TABLE 5
HFC-410A NORMAL OPERATING PRESSURES (LIQUID +10 AND SUCTION +5 PSIG)**

IMPORTANT !

Use this table 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.

13ACX	-018	-024	-030	-036	-042	-048	-060
°F (°C)*	Liquid / Suction	Liquid / Suction	Liquid / Suction	Liquid / Suction	Liquid / Suction	Liquid / Suction	Liquid / Suction
Expansion Valve (TXV)							
65 (18)	233 / 132	244 / 137	248 / 127	263 / 135	238 / 132	235 / 132	241 / 130
70 (21)	251 / 133	263 / 138	263 / 131	281 / 138	262 / 133	254 / 132	260 / 130
75 (24)	265 / 133	285 / 139	284 / 132	302 / 140	280 / 134	276 / 134	280 / 132
80 (27)	292 / 135	307 / 140	307 / 134	325 / 142	301 / 136	298 / 134	299 / 134
85 (29)	314 / 136	329 / 141	330 / 135	349 / 142	327 / 137	323 / 135	321 / 135
90 (32)	338 / 137	354 / 142	355 / 136	375 / 143	353 / 138	350 / 137	344 / 134
95 (35)	362 / 138	379 / 143	380 / 137	404 / 144	377 / 140	377 / 138	371 / 135
100 (38)	388 / 140	404 / 144	407 / 138	433 / 145	404 / 141	406 / 140	400 / 137
105 (41)	415 / 141	438 / 145	434 / 139	462 / 147	435 / 142	430 / 141	428 / 139
110 (43)	444 / 142	464 / 147	465 / 141	494 / 149	465 / 143	464 / 142	458 / 141
115 (45)	475 / 143	495 / 148	497 / 142	527 / 150	499 / 144	495 / 143	484 / 142
Fixed Orifice (RFC)							
65 (18)	233 / 121	246 / 126	245 / 123	261 / 134	246 / 126	247 / 125	248 / 124
70 (21)	250 / 124	265 / 129	265 / 126	281 / 136	263 / 128	266 / 128	266 / 126
75 (24)	270 / 128	286 / 132	286 / 129	301 / 138	284 / 131	286 / 131	288 / 130
80 (27)	291 / 131	307 / 135	308 / 132	324 / 140	305 / 133	307 / 133	309 / 133
85 (29)	313 / 134	330 / 137	331 / 135	346 / 142	327 / 135	329 / 135	330 / 135
90 (32)	335 / 136	353 / 140	355 / 138	371 / 144	350 / 138	353 / 138	354 / 138
95 (35)	359 / 138	378 / 142	380 / 140	396 / 146	374 / 140	377 / 140	377 / 140
100 (38)	383 / 140	402 / 143	405 / 142	422 / 148	399 / 142	403 / 142	406 / 142
105 (41)	409 / 142	428 / 145	431 / 144	448 / 150	424 / 144	428 / 144	431 / 144
110 (43)	436 / 145	456 / 147	458 / 146	477 / 151	452 / 146	455 / 146	457 / 146
115 (46)	464 / 147	486 / 149	487 / 148	506 / 153	481 / 148	483 / 147	484 / 148

*Values shown are typical pressures; indoor unit match up, indoor air quality equipment, and indoor load will cause the pressures to vary.

**Temperature of the air entering the outside coil.

13ACX 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

Suction 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) <i>minus</i> Liquid Line Temperature (B)	
Approach:	A — B = APPROACH
Liquid Line Temperature (A) <i>minus</i> Outdoor Air Temperature (B)	
Indoor Coil Temperature Drop (18 to 22°F)	A — B = COIL TEMP DROP
Return Air Temperature (A) <i>minus</i> Supply Air Temperature (B)	

Homeowners Information

⚠ CAUTION

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

Cleaning of the outdoor unit's coil should be performed by a licensed professional service technician (or equivalent). 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.

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.
- Keep snow level below the louvered panels to ensure proper performance.

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, diminish performance and affect longevity of 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.

NOTE — The filter and all access panels must be in place any time the unit is in operation. If you are unsure about the filter required for your system, call your Lennox dealer for assistance.

1. Ask your Lennox dealer to show you where your indoor unit's filter is located. It will be either at the indoor unit (installed internal or external to the cabinet) or behind a return air grille in the wall or ceiling. Check the filter monthly and clean or replace it as needed.
2. Disposable filters should be replaced with a filter of the same type and size.
3. The indoor evaporator coil is equipped with a drain pan to collect condensate formed as your system removes humidity from the inside air. Have your dealer show you the location of the drain line and how to check for obstructions. (This would also apply to an auxiliary drain, if installed.)

Thermostat Operation

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

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.