

**XP16 (HFC-410A) SERIES UNITS**



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**APPENDIX A - UNIT CHARGING STICKERS**

The XP16 is a high efficiency residential split-system two-stage heat pump unit, which features a scroll compressor and HFC-410A refrigerant. XP16 units are available in 2, 3, 4 and 5 tons. XP16 units are rated for 230 volts only. Applications where supply voltage is less requires a hard start kit. The series is designed for use with an indoor unit with an expansion valve approved for HFC-410A.

**⚠ 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**

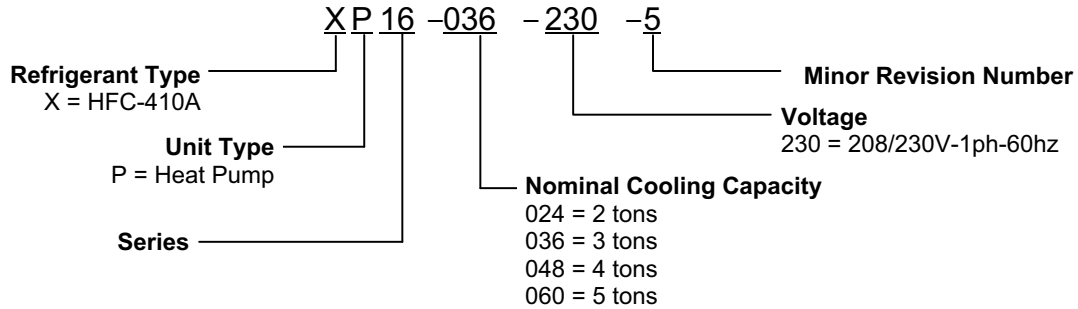
As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

**⚠ IMPORTANT**

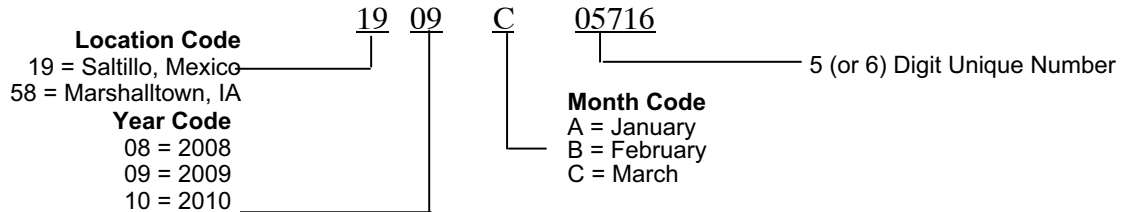
The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFCs, HCFCs and HFCs) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for noncompliance.

# I. OVERVIEW

## Model Number Identification



## Typical Serial Number Identification



## Specifications

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB) <sup>1</sup>	Factory Refrigerant Charge <sup>2</sup>	Number of Blades	Diameter - inches.
XP16-024-230-01	74	9 lbs. 9 oz.	3	18
XP16-024-230-03	74	7 lbs. 13 oz.	3	18
XP16-024-230-04	74	7 lbs. 13 oz.	3	18
XP16-024-230-05, -07	74	8 lbs. 7 oz.	3	18
XP16-024-230-08	74	7 lbs. 14 oz.	3	18

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB) <sup>1</sup>	Factory Refrigerant Charge <sup>2</sup>	Number of Blades	Diameter - inches.
XP16-036-230-01	76	12 lbs. 8 oz.	4	22
XP16-036-230-02	76	12 lbs. 8 oz.	4	22
XP16-036-230-03	76	10 lbs. 4 oz.	4	22
XP16-036-230-04	76	10 lbs. 4 oz.	4	22
XP16-036-230-05	76	10 lbs. 9 oz.	4	22
XP16-036-230-06	76	10 lbs. 3 oz.	4	22
XP16-036-230-07, -08	76	10 lbs. 11 oz.	4	22

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB) <sup>1</sup>	Factory Refrigerant Charge <sup>2</sup>	Number of Blades	Diameter - inches.
XP16-048-230-01	76	15 lbs. 7 oz.	4	22
XP16-048-230-02	76	15 lbs. 7 oz.	4	22
XP16-048-230-03	76	15 lbs. 7 oz.	4	22
XP16-048-230-04	76	15 lbs. 7 oz.	4	22
XP16-048-230-05	76	11 lbs. 12 oz.	3	26
XP16-048-230-06	76	11 lbs. 6 oz.	3	26
XP16-048-230-07	76	9 lbs. 9 oz.	3	26

Model Number	Unit		Outdoor Fan	
	Sound Rating Number (dB) <sup>1</sup>	Factory Refrigerant Charge <sup>2</sup>	Number of Blades	Diameter - inches.
XP16-060-230-01	78	13 lbs. 8 oz.	3	26
XP16-060-230-02	78	13 lbs. 8 oz.	3	26
XP16-060-230-03	78	11 lbs. 7 oz.	3	26
XP16-060-230-04	78	11 lbs. 7 oz.	3	26
XP16-060-230-05, -06	78	12 lbs. 15 oz.	3	26
XP16-060-230-07	78	11 lbs. 8 oz.	3	26

<sup>1</sup> Tested according to AHRI Standard 270-2008 test conditions.

<sup>2</sup> Refrigerant charge sufficient for 15 feet length of refrigerant lines.

## Electrical Data

### 208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan				
	Maximum Over-current Protection (amps) <sup>1</sup>	Minimum Circuitry Ampacity <sup>2</sup>	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Motor Type	Nominal RPM	Full Load Amps (FLA)	Locked Rotor Amps (LRA)
XP16-024-230-01	20	14.0	10.25	52.0	1/10	PSC	1075	0.7	1.4
XP16-024-230-03	20	14.0	10.25	52.0	1/10	PSC	1075	0.7	1.4
XP16-024-230-04	20	14.0	10.25	52.0	1/10	PSC	1075	0.7	1.4
XP16-024-230-05	20	14.0	10.25	52.0	1/10	PSC	1075	0.7	1.4
XP16-024-230-07	20	13.5	10.25	52.0	1/10	PSC	1075	0.7	1.4
XP16-024-230-08	20	15.3	11.7	58.3	1/10	PSC	1075	0.7	1.4

### 208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan				
	Maximum Over-current Protection (amps) <sup>1</sup>	Minimum Circuitry Ampacity <sup>2</sup>	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Motor Type	Nominal RPM	Full Load Amps (FLA)	Locked Rotor Amps (LRA)
XP16-036-230-01	35	22.0	16.67	82.0	1/6	PSC	825	1.1	2.1
XP16-036-230-02	35	22.0	16.67	82.0	1/6	PSC	825	1.1	2.1
XP16-036-230-03	35	22.0	16.67	82.0	1/6	PSC	825	1.1	2.1
XP16-036-230-04	35	22.0	16.67	82.0	1/6	PSC	825	1.1	1.87
XP16-036-230-05, -06	35	22.5	16.67	82.0	1/4	PSC	825	1.7	3.1
XP16-036-230-07, -08	35	20.8	15.3	83.0	1/4	PSC	825	1.7	3.1

### 208/230V-60 Hz-1 Ph

Model Number	Unit		Compressor		Condenser Fan				
	Maximum Over-current Protection (amps) <sup>1</sup>	Minimum Circuitry Ampacity <sup>2</sup>	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Motor Type	Nominal RPM	Full Load Amps (FLA)	Locked Rotor Amps (LRA)
XP16-048-230-01	45	28.2	21.15	96.0	1/4	PSC	825	1.7	3.1
XP16-048-230-02	45	28.2	21.15	96.0	1/4	PSC	825	1.7	3.1
XP16-048-230-03	45	28.2	21.15	96.0	1/4	PSC	825	1.7	3.1
XP16-048-230-04	45	28.2	21.15	96.0	1/4	PSC	825	1.7	3.1
XP16-048-230-05, -06	45	28.2	21.15	96.0	1/3	PSC	825	1.8	2.9
XP16-048-230-07	45	28.3	21.2	104.0	1/3	PSC	825	1.8	2.9

208/230V-60 Hz-1 Ph

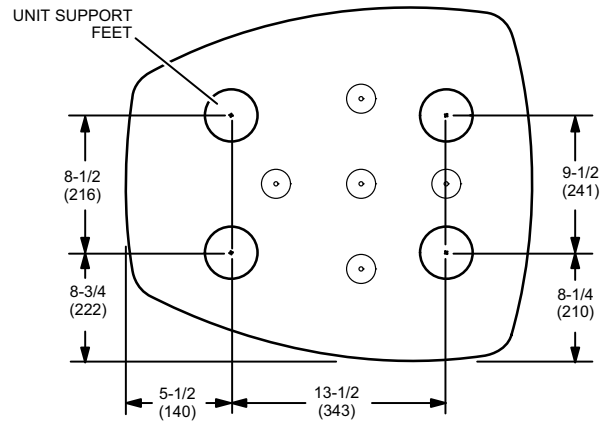
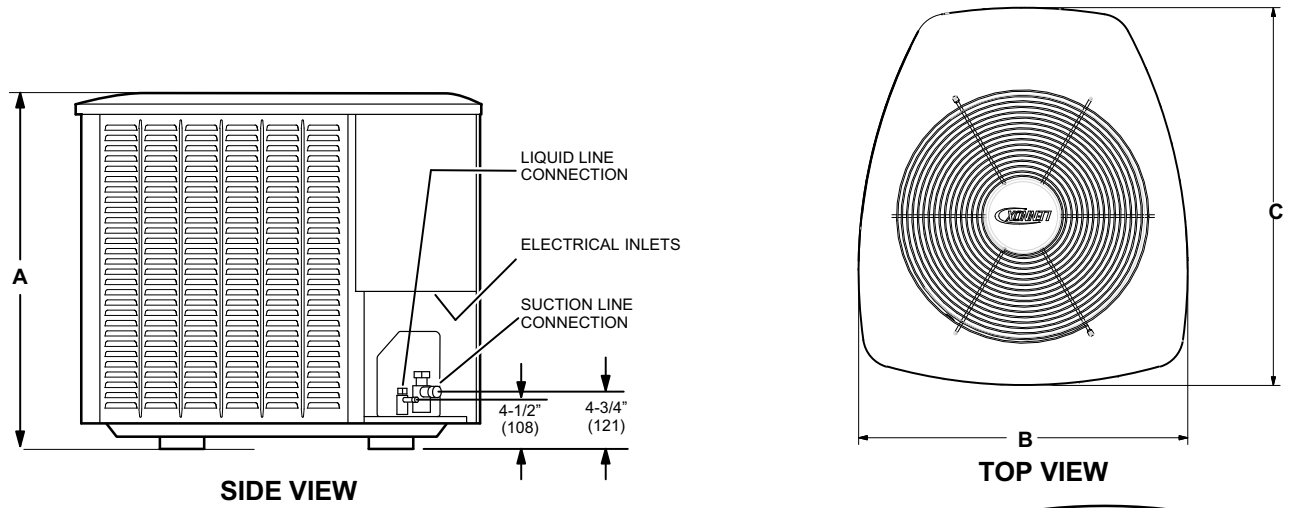
Model Number	Unit		Compressor		Condenser Fan				
	Maximum Over-current Protection (amps) <sup>1</sup>	Minimum Circuitry Ampacity <sup>2</sup>	Rated Load Amps (RLA)	Locked Rotor Amps (LRA)	Motor HP	Motor Type <sup>3</sup>	Nominal RPM	Full Load Amps (FLA)	Locked Rotor Amps (LRA)
XP16-060-230-01	55	33.9	25.64	118.0	1/3	PSC	825	1.8	2.9
XP16-060-230-02	60	33.9	25.87	118.0	1/3	PSC	825	1.8	2.9
XP16-060-230-03	60	33.9	25.87	118.0	1/3	PSC	825	1.8	2.9
XP16-060-230-04	60	33.9	25.87	118.0	1/3	PSC	825	1.8	2.9
XP16-060-230-05, -06	60	35.1	25.87	118.0	1/3	VS	700 (1st Stage)	2.8	N/A
							820 (2nd Stage)		
XP16-060-230-07	60	36.8	27.1	152.9	1/3	VS	700 (1st Stage)	2.8	N/A
							820 (2nd Stage)		

<sup>1</sup> HACR type circuit breaker or fuse.

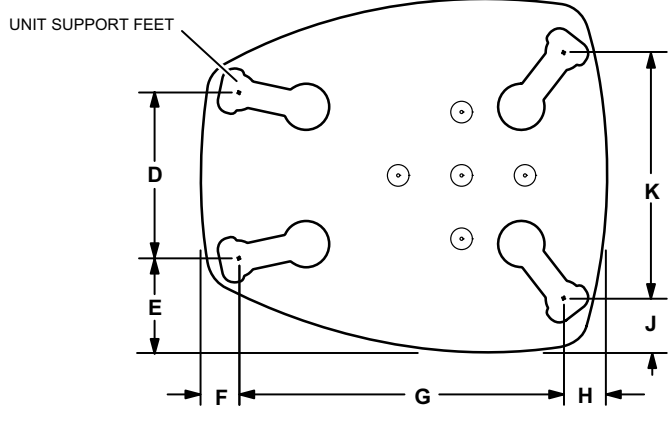
<sup>2</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

<sup>3</sup> PSC = permanent split capacitor motor (single speed); VS = variable speed.

## Unit Dimensions - Inches (mm)



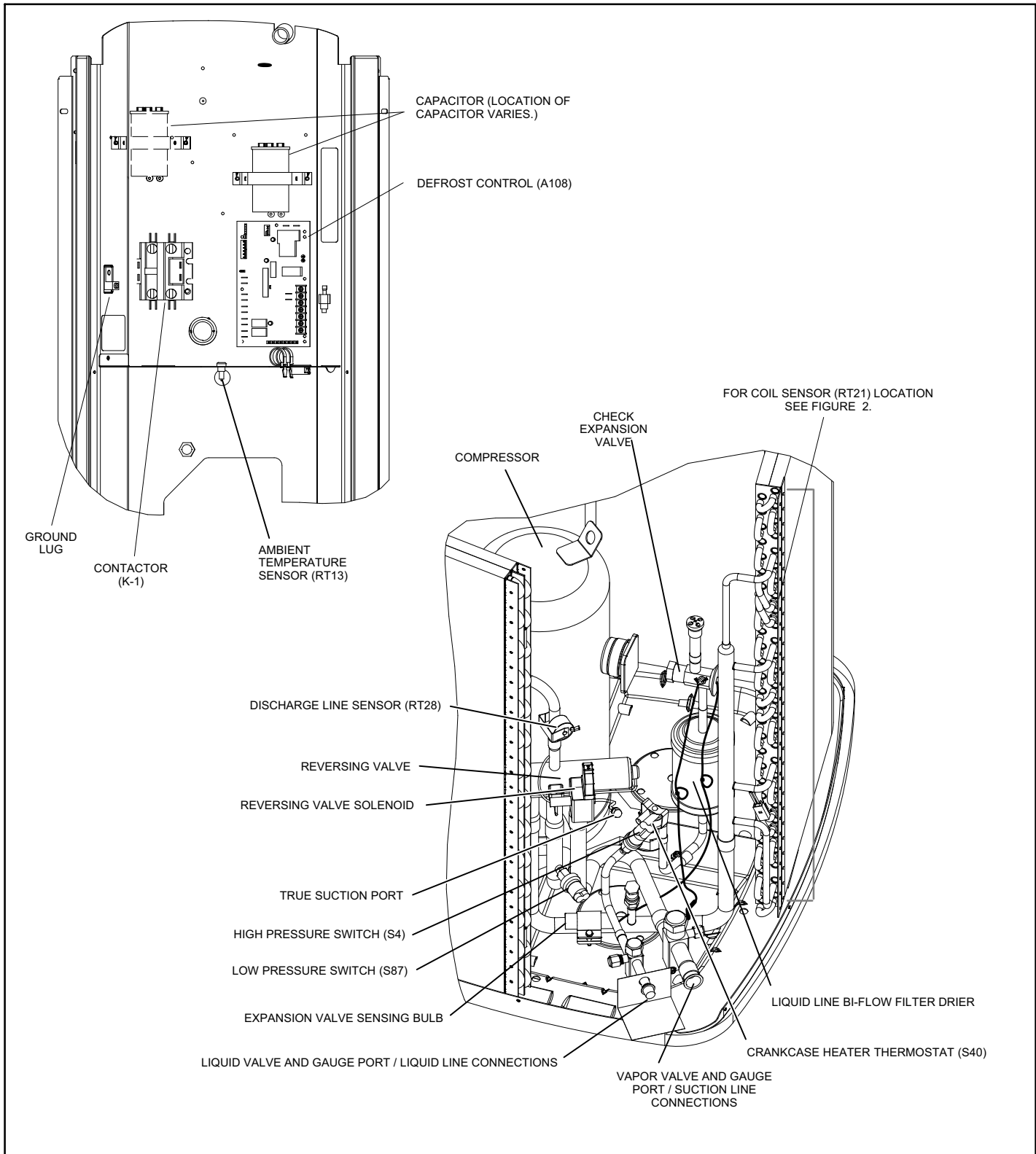
**XP16-024 BASE SECTION**



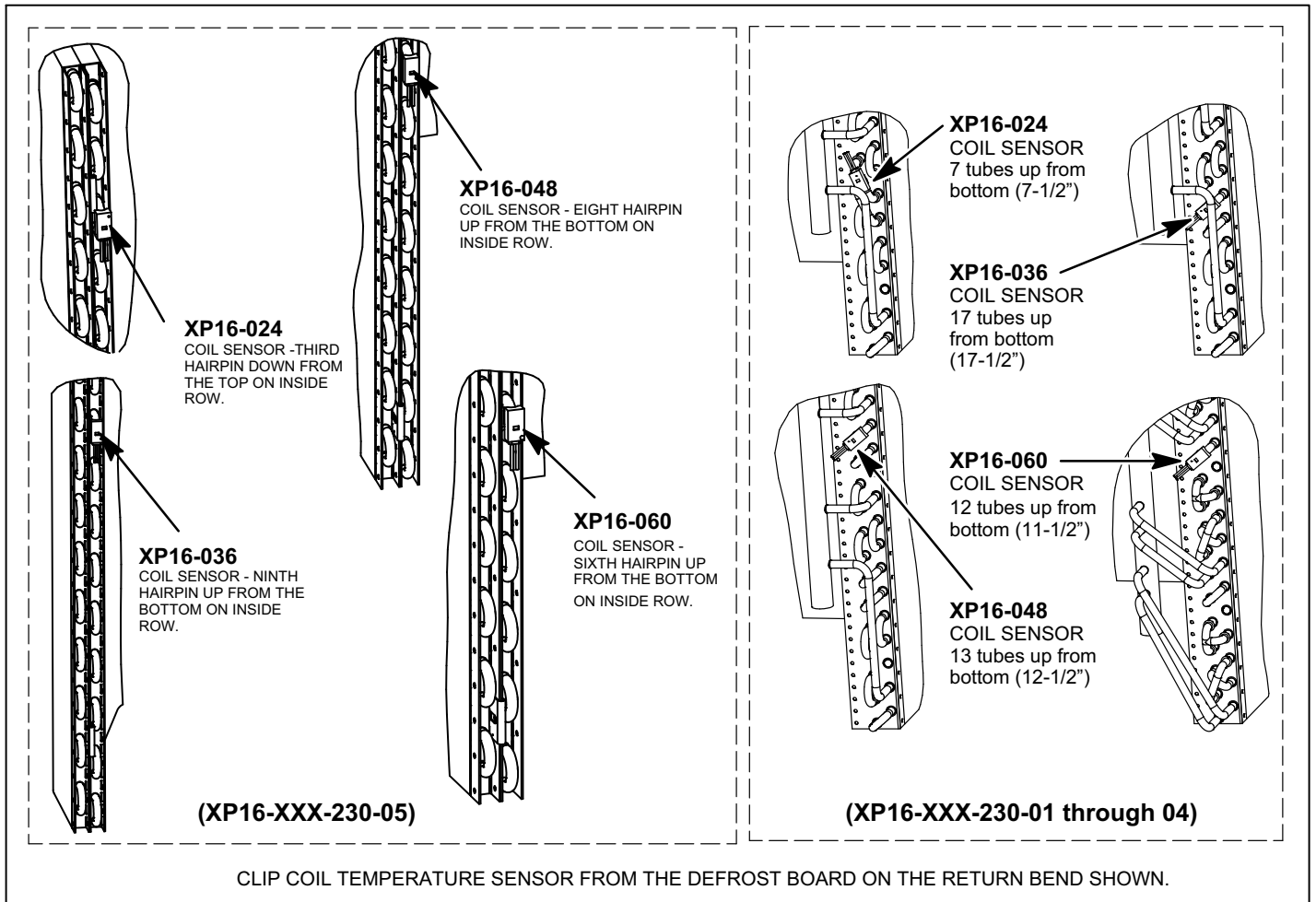
**XP16-036 to -060 BASE WITH LEGS**

Model Number	A	B	C	D	E	F	G	H	J	K
XP16-024-01, -02, -03, -04	31 (889)	27 (686)	28 (711)	-	-	-	-	-	-	-
XP16-024-05 and later.	35 (889)	27 (686)	28 (711)	-	-	-	-	-	-	-
XP16-036-01, -02, -03, -04	35 (889)	30-1/2 (775)	39-1/2 (1003)	13-7/8 (352)	7-3/4 (197)	3-1/4 (83)	27-1/8 (689)	3-5/8 (92)	4-1/2 (114)	20-5/8 (524)
XP16-036-05 and later.	35 (889)	35-1/2 (902)	39-1/2 (1003)	13-7/8 (352)	7-3/4 (197)	3-1/4 (83)	27-1/8 (689)	3-5/8 (92)	4-1/2 (114)	20-5/8 (524)
XP16-048-01, -02, -03, -04	45 (1143)	30-1/2 (775)	39-1/2 (1003)	16-7/8 (429)	8-3/4 (222)	3-1/8 (79)	30-3/4 (781)	4-5/8 (117)	3-3/4 (95)	26-7/8 (683)
XP16-048-05 and later.	35 (889)	35-1/2 (902)	39-1/2 (1003)	16-7/8 (429)	8-3/4 (222)	3-1/8 (79)	30-3/4 (781)	4-5/8 (117)	3-3/4 (95)	26-7/8 (683)
XP16-060-01, -02, -03, -04	39 (991)	35-1/2 (902)	39-1/2 (1003)	16-7/8 (429)	8-3/4 (222)	3-1/8 (79)	30-3/4 (781)	4-5/8 (117)	3-3/4 (95)	26-7/8 (683)
XP16-060-05 and later.	45 (1143)	35-1/2 (902)	39-1/2 (1003)	16-7/8 (429)	8-3/4 (222)	3-1/8 (79)	30-3/4 (781)	4-5/8 (117)	3-3/4 (95)	26-7/8 (683)

# Typical Unit Parts Arrangement



**Figure 1. Typical Parts Arrangements**



**Figure 2. Coil Sensor (RT21) Locations**

## 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.

### 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.

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.

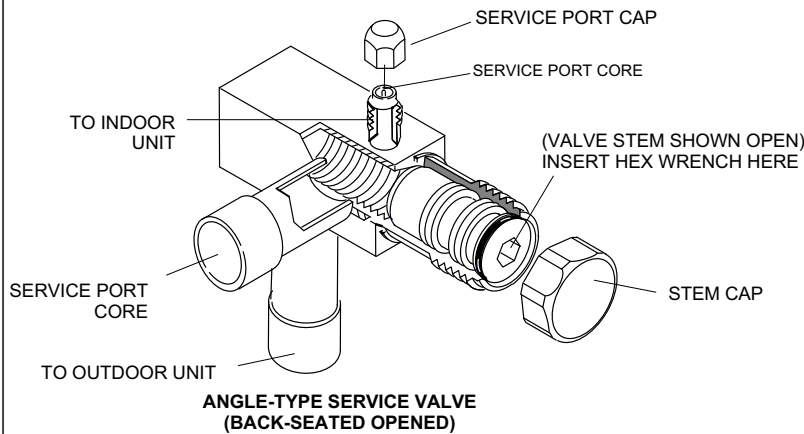
Each valve is equipped with a service port which has a factory-installed valve stem. Figure 3 provides information on how to access and operating both angle and ball service valves.



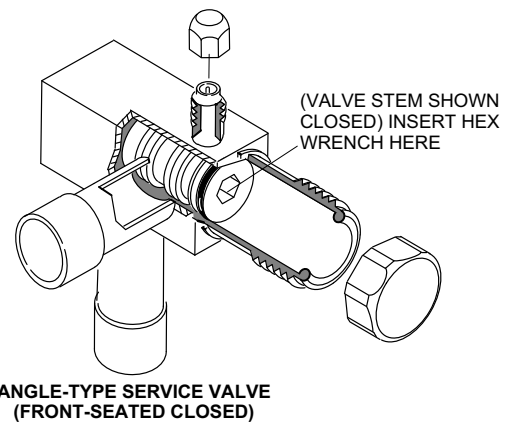
# SERVICE VALVES ANGLE AND BALL

## 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.



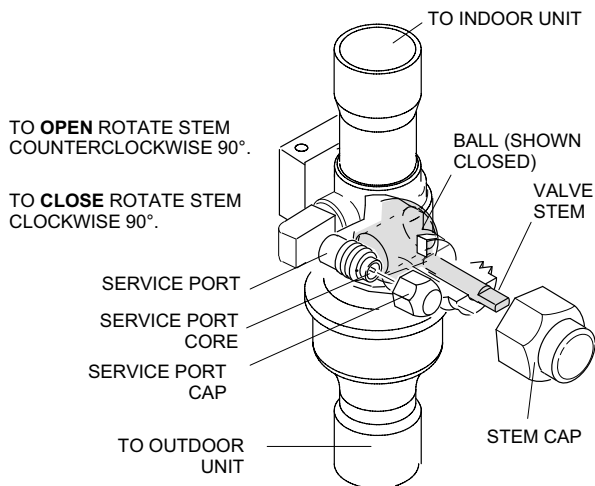
When service valve is **OPEN**, the service port is open to linE set, indoor and outdoor unit.



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

## Operating Ball Type Service Valve:

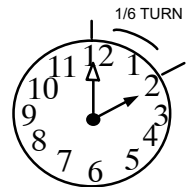
1. Remove stem cap with an appropriately sized wrench.
2. Use an appropriately sized wrench to open. To open valve, rotate stem counterclockwise 90°. To close rotate stem clockwise 90°.



## To Access Service Port:

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

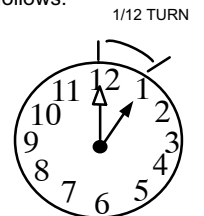
1. Remove service port cap with an appropriately sized wrench.
2. Connect gauge set to service port.
3. When testing is completed, replace service port cap and tighten as follows:
  - With torque wrench: Finger tighten and torque cap per table 1.
  - Without torque wrench: Finger tighten and use an appropriately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

## II. SYSTEM OPERATION AND SERVICE

### System Operation

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

#### SECOND-STAGE OPERATION

If the board receives a call for second-stage compressor operation Y2 in heating or cooling mode and the first-stage compressor output is active, the second-stage compressor solenoid output will be energized.

If first-stage compressor output is active in heating mode and the outdoor ambient temperature is below the selected compressor lock-in temperature, the second-stage compressor solenoid output will be energized without the Y2 input. If the jumper is not connected to one of the temperature selection pins on P3 (40, 45, 50, 55°F), the default lock-in temperature of 40°F (4.5°C) will be used.

The board de-energizes the second-stage compressor solenoid output immediately when the Y2 signal is removed or the outdoor ambient temperature is 5°F above the selected compressor lock-in temperature, or the first-stage compressor output is de-energized for any reason.

#### THERMOSTAT OPERATION

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

#### EMERGENCY HEAT (AMBER LIGHT)

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

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

#### FILTER DRIER

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

### Defrost System

#### DEFROST SYSTEM DESCRIPTION

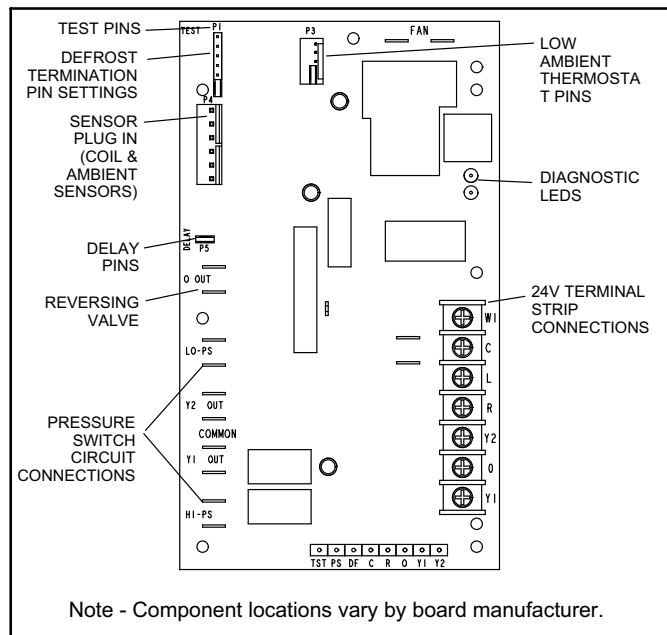


Figure 4. Defrost Control Board

The demand defrost controller measures differential temperatures to detect when the system is performing poorly because of ice build-up on the outdoor coil. The controller *self-calibrates* when the defrost system starts and after each system defrost cycle. The defrost control board components are shown in figure 4.

The control monitors ambient temperature, outdoor coil temperature, and total run time to determine when a defrost cycle is required. The coil temperature probe is designed with a spring clip to allow mounting to the outside coil tubing. The location of the coil sensor is important for proper defrost operation.

*NOTE - The demand defrost board accurately measures the performance of the system as frost accumulates on the outdoor coil. This typically will translate into longer running time between defrost cycles as more frost accumulates on the outdoor coil before the board initiates defrost cycles.*

#### DEFROST BOARD PRESSURE SWITCH CONNECTIONS

The unit's automatic reset pressure switches (LO PS - S87 and HI PS - S4) are factory-wired into the defrost board on the LO-PS and HI-PS terminals, respectively.

**Low Pressure Switch (LO-PS)**—When the low pressure switch trips, the defrost board will cycle off the compressor, and the strike counter in the board will count one strike. The low pressure switch is ignored under the following conditions:

- During the defrost cycle and 90 seconds after the termination of defrost
- When the average ambient sensor temperature is below 15° F (-9°C)
- For 90 seconds following the start up of the compressor
- During *test* mode

**High Pressure Switch (HI-PS)**—When the high pressure switch trips, the defrost board will cycle off the compressor, and the strike counter in the board will count one strike.

**DEFROST BOARD PRESSURE SWITCH SETTINGS**

**High Pressure** (auto reset) - trip at 590 psig, reset at 418.

**Low Pressure** (auto reset) - trip at 25 psig; reset at 40.

**PRESSURE SWITCH 5-STRIKE LOCKOUT**

The internal control logic of the board counts the pressure switch trips only while the Y1 (Input) line is active. If a pressure switch opens and closes four times during a Y1 (Input), the control logic will reset the pressure switch trip counter to zero at the end of the Y1 (Input). If the pressure switch opens for a fifth time during the current Y1 (Input), the control will enter a lockout condition.

The 5-strike pressure switch lockout condition can be reset by cycling OFF the 24-volt power to the control board or by shorting the TEST pins between 1 to 2 seconds. All timer functions (run times) will also be reset.

If a pressure switch opens while the Y1 Out line is engaged, a 5-minute short cycle will occur after the switch closes.

**UNIT TEMPERATURE SENSORS**

Sensors connect to the defrost board through a field-replaceable harness assembly that plugs into the board as illustrated in figure 4. Through the sensors, the board detects outdoor ambient, coil, and discharge temperature fault conditions. As the detected temperature changes, the resistance across the sensor changes. Sensor resistance values can be checked by ohming across pins shown in table 2.

**Table 2. Sensor Temperature /Resistance Range**

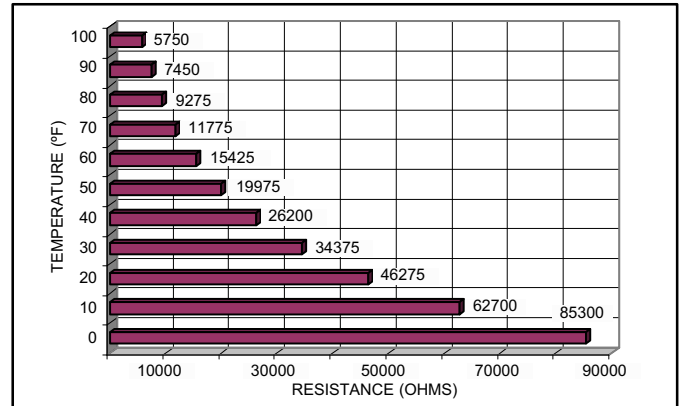
Sensor	Temperature Range °F (°C)	Resistance values range (ohms)	Pins/Wire Color
Outdoor	-35 (-37) to 120 (48)	280,000 to 3750	3 & 4 (Black)
Coil	-35 (-37) to 120 (48)	280,000 to 3750	5 & 6 (Brown)
Discharge (if applicable)	24 (-4) to 350 (176)	41,000 to 103	1 & 2 (Yellow)

Note: Sensor resistance increases as sensed temperature decreases.

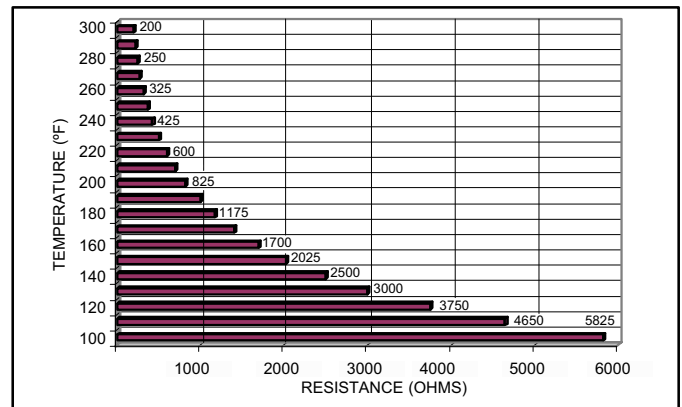
Figure 5 shows how the resistance varies as the temperature changes for both type of sensors.

*NOTE - When checking the ohms across a sensor, be aware that a sensor showing a resistance value that is not within the range shown in table 2, may be performing as designed. However, if a shorted or open circuit is detected, then the sensor may be faulty and the sensor harness will need to be replaced.*

**Ambient Sensor**—The ambient sensor considers outdoor temperatures below -35°F (-37°C) or above 120°F (48°C) as a fault. If the ambient sensor is detected as being open, shorted or out of the temperature range of the sensor, the board will not perform demand defrost operation. The board will revert to time/temperature defrost operation and will display the appropriate fault code. Heating and cooling operation will be allowed in this fault condition.



**Figure 5. Temperature/Resistance Chart (Ambient and Coil Sensors)**



**Figure 6. Temperature/Resistance Chart (Discharge Sensor)**

**Coil Sensor**—The coil temperature sensor considers outdoor temperatures below -35°F (-37°C) or above 120°F (48°C) as a fault. If the coil temperature sensor is detected as being open, shorted or out of the temperature range of the sensor, the board will not perform demand or time/temperature defrost operation and will display the appropriate fault code. Heating and cooling operation will be allowed in this fault condition.

**High Discharge Line Sensor**—If the discharge line temperature exceeds a temperature of 285°F (140°C) during compressor operation, the board will de-energize the compressor contactor output (and the defrost output, if

active). The compressor will remain off until the discharge temperature has dropped below 225°F (107°C) and the 5-minute anti-short cycle delay has been satisfied. This sensor has two fault and lockout codes:

1. If the board recognizes five high discharge line temperature faults during a single (Y1) compressor demand, it reverts to a lockout mode and displays the appropriate code. This code detects shorted sensor or high discharge temperatures. Code on board is *Discharge Line Temperature Fault and Lockout*.
2. If the board recognizes five temperature sensor range faults during a single (Y1) compressor demand, it reverts to a lockout mode and displays the appropriate code. The board detects open sensor or out-of-temperature sensor range. This fault is detected by allowing the unit to run for 90 seconds before checking sensor resistance. If the sensor resistance is not within range after 90 seconds, the board will count one fault. After five faults, the board will lockout. Code on board is *Discharge Sensor Fault and Lockout*.

The discharge line sensor, which covers a range of 150°F (65°C) to 350°F (176°C), is designed to mount on a ½" refrigerant discharge line.

*NOTE - Within a single room thermostat demand, if 5-strikes occur, the board will lockout the unit. Defrost board 24 volt power R must be cycled OFF or the TEST pins on board must be shorted between 1 to 2 seconds to reset the board.*

**Defrost Temperature Termination Shunt (Jumper) Pins**—The defrost board selections are: 50, 70, 90, and 100°F (10, 21, 32 and 38°C). The shunt termination pin is factory set at 50°F (10°C). If temperature shunt is not installed, default termination temperature is 90°F (32°C).

#### **DELAY MODE**

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 a jumper is installed on the DELAY pins, the compressor will be cycled off for 30 seconds going in and out of the defrost mode. Units are shipped with jumper installed on DELAY pins.

*NOTE - The 30 second off cycle is NOT functional when jumpering the TEST pins.*

#### **OPERATIONAL DESCRIPTION**

The defrost control board has three basic operational modes: normal, defrost, and calibration.

- **Normal Mode**—The demand defrost board monitors the O line, to determine the system operating mode (heat/cool), outdoor ambient temperature, coil temperature (outdoor coil) and compressor run time to determine when a defrost cycle is required.
- **Calibration Mode**—The board is considered uncalibrated when power is applied to the board, after cool mode operation, or if the coil temperature exceeds the termination temperature when it is in heat mode.

Calibration of the board occurs after a defrost cycle to ensure that there is no ice on the coil. During calibration, the temperature of both the coil and the ambient sensor are measured to establish the temperature differential which is required to allow a defrost cycle.

- **Defrost Mode**—The following paragraphs provide a detailed description of the defrost system operation.
- **Test Mode**— See Figure 7.

**Each test pin shorting will result in one test event.** For each TEST the shunt (jumper) must be removed for at least one second and reapplied. Refer to flow chart (figure 7) for TEST operation.

*Note: The Y1 input must be active (ON) and the O room thermostat terminal into board must be inactive.*

#### **DETAILED DEFROST SYSTEM OPERATION**

The demand defrost control board initiates a defrost cycle based on either frost detection or time.

**Frost Detection**—If the compressor runs longer than 30 minutes and the actual difference between the clear coil and frosted coil temperatures exceeds the maximum difference allowed by the control, a defrost cycle will be initiated.

*IMPORTANT - The demand defrost control board will allow a greater accumulation of frost and will initiate fewer defrost cycles than a time/temperature defrost system.*

**Time**—If six hours of heating mode compressor run time has elapsed since the last defrost cycle while the coil temperature remains below 35°F (2°C), the demand defrost control will initiate a defrost cycle.

**Actuation**—When the reversing valve is de-energized, the Y1 circuit is energized, and the coil temperature is below 35°F (2°C), the board logs the compressor run time. If the board is not calibrated, a defrost cycle will be initiated after 30 minutes of heating mode compressor run time. The control will attempt to self-calibrate after this (and all other) defrost cycle(s).

Calibration success depends on stable system temperatures during the 20-minute calibration period. If the board fails to calibrate, another defrost cycle will be initiated after 45 minutes of heating mode compressor run time. Once the defrost board is calibrated, it initiates a demand defrost cycle when the difference between the clear coil and frosted coil temperatures exceeds the maximum difference allowed by the control or after six hours of heating mode compressor run time has been logged since the last defrost cycle.

**Termination**—The defrost cycle ends when the coil temperature exceeds the termination temperature or after 14 minutes of defrost operation. If the defrost is terminated by the 14-minute timer, another defrost cycle will be initiated after 30 minutes of run time.

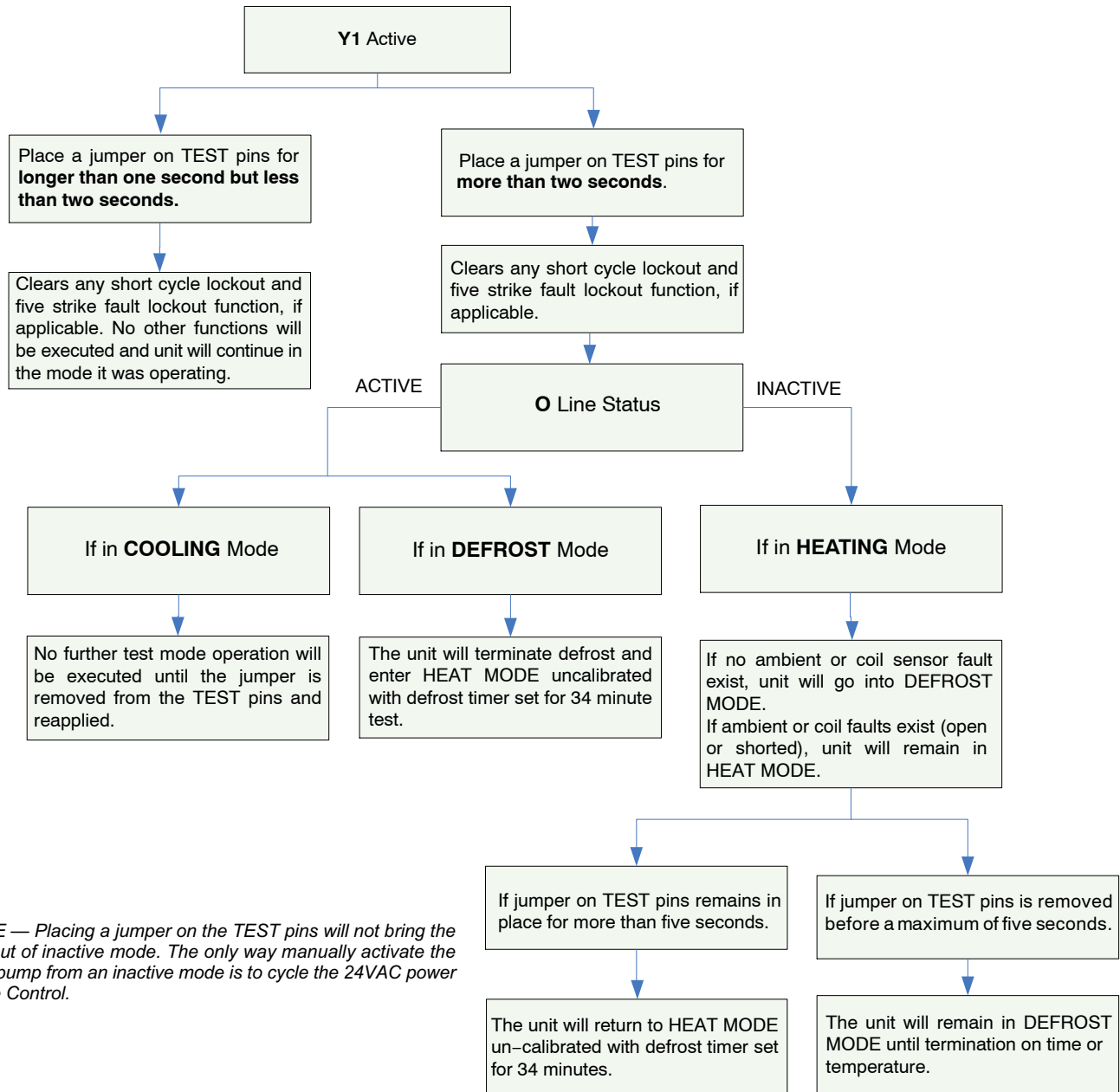
# TEST

Placing the jumper on the field test pins (E33) 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.



**Figure 7. Test Mode**

## DEFROST BOARD DIAGNOSTIC LEDES

The state (Off, On, Flashing) of two LEDs on the defrost board (DS1 [Red] and DS2 [Green]) indicate diagnostics conditions that are described in table 3.

**Table 3. Defrost Control Board Diagnostic LEDs**

DS2 Green	DS1 Red	Condition/Code	Possible Cause(s)	Solution
OFF	OFF	Power problem	No power (24V) to board terminals R and C or board failure.	1 Check control transformer power (24V). 2 If power is available to board and LED(s) do not light, replace board.
Simultaneous SLOW Flash		Normal operation	Unit operating normally or in standby mode.	None required.
Alternating SLOW Flash		5-minute anti-short cycle delay	Initial power up, safety trip, end of room thermostat demand.	None required (Jumper TEST pins to override)
Simultaneous FAST Flash		Ambient Sensor Problem	Sensor being detected open or shorted or out of temperature range. Board will revert to time/temperature defrost operation. (System will still heat or cool).	
Alternating FAST Flash		Coil Sensor Problem	Sensor being detected open or shorted or out of temperature range. Board will not perform demand or time/temperature defrost operation. (System will still heat or cool).	
ON	ON	Circuit Board Failure	Indicates that board has internal component failure. Cycle 24VAC power to board. If code does not clear, replace board.	

**Table 4. Defrost Control Board Diagnostic Fault and Lockout Codes**

DS2 Green	DS1 Red	Condition/Code	Possible Cause(s)	Solution
(Each fault adds 1 strike to that code's counter; 5 strikes per code = LOCKOUT)				
OFF	SLOW Flash	Low Pressure Fault	1 Restricted air flow over indoor or outdoor coil. 2 Improper refrigerant charge in system.	1 Remove any blockages or restrictions from coils and/or fans. Check indoor and outdoor fan motor for proper current draws.
OFF	ON	Low Pressure <b>LOCKOUT</b>	3 Improper metering device installed or incorrect operation of metering device.	2 Check system charge using approach and subcooling temperatures.
SLOW Flash	OFF	High Pressure Fault	4 Incorrect or improper sensor location or connection to system.	3 Check system operating pressures and compare to unit charging charts.
ON	OFF	High Pressure <b>LOCKOUT</b>		4 Make sure all pressure switches and sensors have secure connections to system to prevent refrigerant leaks or errors in pressure and temperature measurements.
SLOW Flash	ON	Discharge Line Temperature Fault	This code detects shorted sensor or high discharge temperatures. If the discharge line temperature exceeds a temperature of 285°F (140°C) during compressor operation, the board will de-energize the compressor contactor output (and the defrost output if active). The compressor will remain off until the discharge temperature has dropped below 225°F (107°C).	
FAST Flash	ON	Discharge Line Temperature <b>LOCKOUT</b>		
OFF	Fast Flash	Discharge Sensor Fault	The board detects open sensor or out of temperature sensor range. This fault is detected by allowing the unit to run for 90 seconds before checking sensor resistance. If the sensor resistance is not within range after 90 seconds, the board will count one fault. After 5 faults, the board will lockout.	
Fast Flash	OFF	Discharge Sensor <b>LOCKOUT</b>		

## OUTDOOR FAN MOTOR

### XP16-XXX-230-01 through 05, except XP16-060-230-05)

All units use single-phase PSC fan motors which require a run capacitor. In all units, the condenser fan is controlled by the compressor contactor.

ELECTRICAL DATA tables in this manual show specifications for condenser fans used in XP16's.

Access to the condenser fan motor on all units is gained by removing the four screws securing the fan assembly. See figure 8. The grill fan assembly can be removed from the cabinet as one piece. The condenser fan motor is removed from the fan guard by removing the four nuts found on top of the grill.

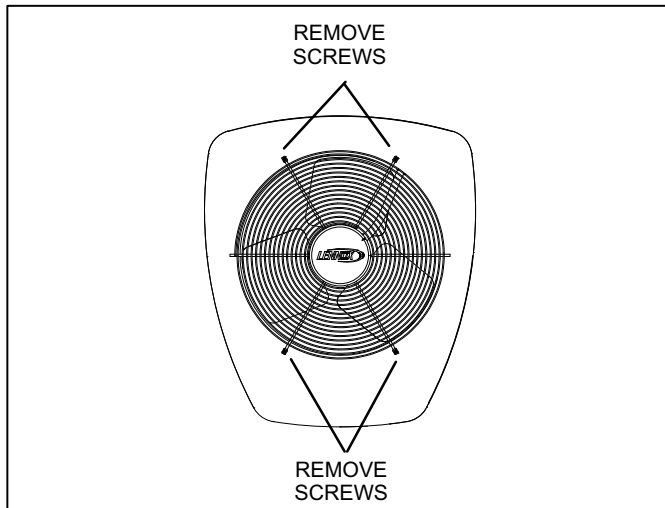


Figure 8. Removing Fan Grille

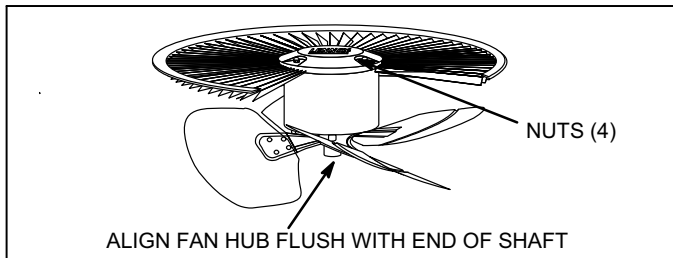


Figure 9. Aligning Fan Hub

### XP16-060-230-05 Only

The variable speed condenser fan motor (figure 10) used in all units is a three-phase, electronically controlled d.c. brushless motor (controller converts single phase a.c. to three phase D.C.), with a permanent-magnet-type rotor, manufactured by GE. Because this motor has a permanent magnet rotor it does not need brushes like conventional D.C. motors. The motors consist of a control module and motor. Internal components are shown in figure 10. The stator windings are split into three poles which are electrically connected to the controller. This arrangement allows motor windings to be turned on and off in sequence by the controller.

The controller is primarily an A. C. to D. C. converter. Converted D. C. power is used to drive the motor. The controller contains a microprocessor which monitors varying conditions inside the motor (such as motor workload).

The controller uses sensing devices to know what position the rotor is in at any given time. By sensing the position of the rotor and then switching the motor windings on and off in sequence, the rotor shaft turns the blower.

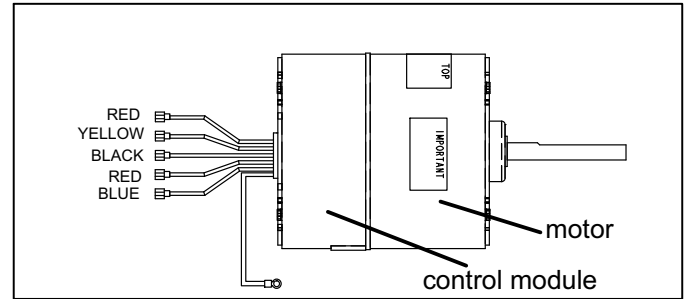


Figure 10. Variable Speed Fan Motor (XP16-060-230-05 only)

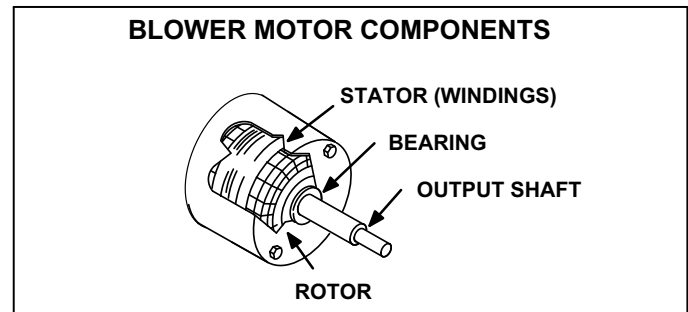


Figure 11. Fan Motor Components

### Internal Operation

The condenser fan motor is a variable speed motor with RPM settings at 700 (Y1) and 820 (Y2). The variation in speed is accomplished each time the controller switches a stator winding (figure 11) on and off, it is called a "pulse." The length of time each pulse stays on is called the "pulse width." By varying the pulse width the controller varies motor speed (called "pulse-width modulation"). This allows for precise control of motor speed and allows the motor to compensate for varying load conditions as sensed by the controller. In this case, the controller monitors the static workload on the motor and varies motor rpm in order to maintain constant airflow (cfm).


Motor rpm is continually adjusted internally to maintain constant static pressure against the fan blade. The controller monitors the static work load on the motor and motor amp-draw to determine the amount of rpm adjustment. Blower rpm is adjusted internally to maintain a constant cfm. The amount of adjustment is determined by the incremental taps which are used and the amount of motor loading sensed internally. The motor constantly adjusts rpm to maintain a specified cfm.

### Initial Power Up

When line voltage is applied to the motor, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce the disconnect switch when applying power to the unit.

The DC filter capacitors inside the controller are connected electrically to the speed tap wires. The capacitors take approximately 5 minutes to discharge when the disconnect is opened. For this reason it is necessary to wait at least 5 minutes after turning off power to the unit before attempting to service motor.

**⚠ DANGER**



**Disconnect power from unit and wait at least five minutes to allow capacitors to discharge before attempting to service motor. Failure to wait may cause personal injury or death.**

### Motor Start-Up

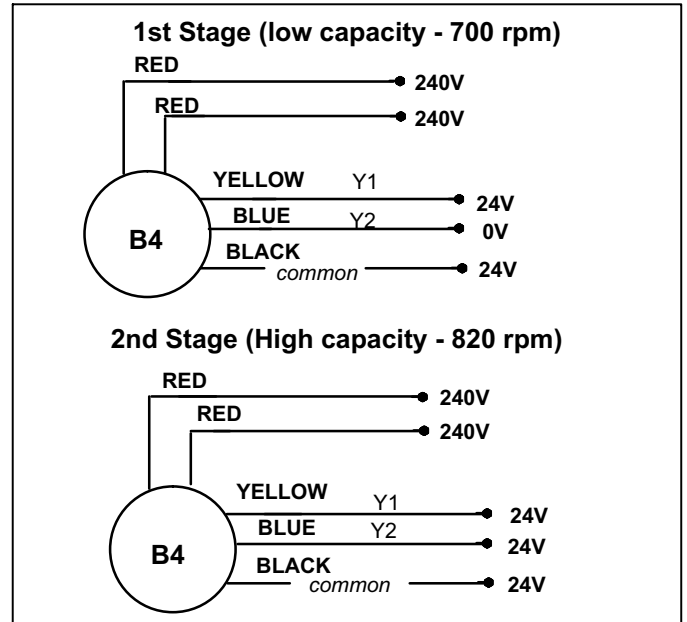
At start-up, the motor may gently rock back and forth for a moment. This is normal. During this time the electronic controller is determining the exact position of the rotor. Once the motor begins turning, the controller slowly eases the motor up to speed (this is called “soft-start”). The motor may take as long as 10-15 seconds to reach full speed. If the motor does not reach 200 rpm within 13 seconds, the motor shuts down. Then the motor will immediately attempt a restart. The shutdown feature provides protection in case of a frozen bearing or blocked fan blade. The motor may attempt to start eight times. If the motor does not start after the eighth try, the controller locks out. Reset controller by momentarily turning off power to unit.

### Troubleshooting

If first or second stage thermostat call for cool is present and the variable speed condenser fan motor does not energize, check voltage at the breaker box. If voltage is present perform the following steps and refer to figure 12.

1. Check for 240 volts between the compressor RED wires.
2. initiate a first stage call for cool. Check for 24 volts between the fan motor YELLOW wire and fan motor BLACK wire.

3. Initiate a second stage call for cool. Check for 24 volts between the fan motor YELLOW wire and fan motor BLACK wire, then check for 24 volts between the fan motor BLUE wire and fan motor BLACK.
4. Repeat steps 1 and 2 with a HEAT call.



**Figure 12. Speed Taps for PSC Fan Motors**

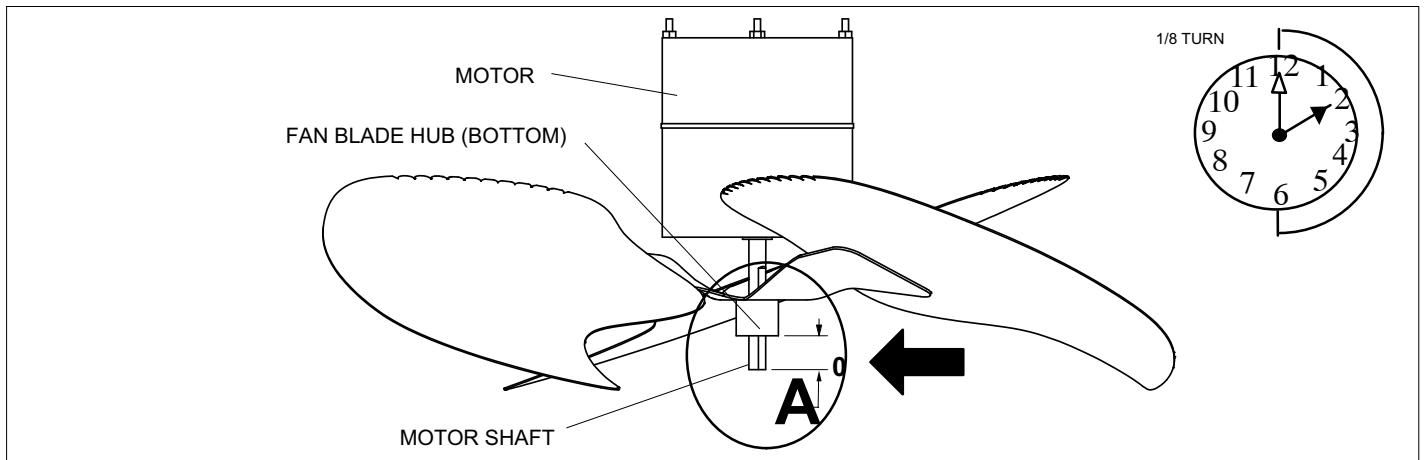
### Replacement

Flush mounting indicates to mount it at the end of the shaft so that the bottom of the fan blade hub is flush with the end of the motor shaft. Dimension A would be 0 (flush). Torque set screw between 137 - 150 in. lbs (approximately 1/8th turn using a standard socket and wrench).

**Table 5. Mounting on Shaft**

XP16 UNIT	"A" DIM. $\pm 1/8"$
-024, -036	3/4" (19mm)
-048, -060	Flush
-060*	1-7/8" (47.5mm)

\*XP16-060-230-05 only



**Figure 13. Fan Blade Mounting Position on Motor Shaft**



## TWO-STAGE MODULATION COMPRESSOR CHECKS

### **IMPORTANT**

This performance check is **ONLY** valid on systems that have clean indoor and outdoor coils, proper airflow over coils, and correct system refrigerant charge. All components in the system must be functioning properly to correctly perform compressor modulation operational check. (Accurate measurements are critical to this test as indoor system loading and outdoor ambient can affect variations between low and high capacity readings).

Use this checklist on page to verify part-load and full-load capacity operation of two-stage modulation compressors.

#### TOOLS REQUIRED

- Refrigeration gauge set
- Digital volt/amp meter
- Electronic temperature thermometer
- On-off toggle switch

#### PROCEDURE

*NOTE - Block outdoor coil to maintain a minimum of 375 psig during testing).*

1. Turn main power OFF to outdoor unit.
2. Adjust room thermostat set point 5°F above the room temperature.
3. Remove control access panel. Install refrigeration gauges on unit. Attach the amp meter to the common (black wire) wire of the compressor harness. Attach thermometer to discharge line as close as possible to the compressor.
4. Turn toggle switch OFF and install switch in series with Y2 wire from room thermostat.
5. Cycle main power ON.
6. Allow pressures and temperatures to stabilize before taking measurements (may take up to 10 minutes).

7. Record all of the readings for the Y1 demand.
8. Close switch to energize Y2 demand. Verify power is going to compressor solenoid.
9. Allow pressures and temperatures to stabilize before taking measurements (may take up to 10 minutes).
10. Record all of the readings with the Y1 and Y2 demand.
11. If temperatures and pressures change in the direction noted in Two-Stage Modulation Compressor Field Operational Checklist on page , the compressor is properly modulating from low to high capacity. (If no amperage, pressures or temperature readings change when this test is performed, the compressor is not modulating between low and high capacity and replacement is necessary).
12. After testing is complete, return unit to original set up.

### **Maintenance**

### **WARNING**



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

### **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.

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

### Outdoor Unit

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

**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:** \_\_\_\_\_.

# Unit Wiring Diagrams and Sequence of Operations

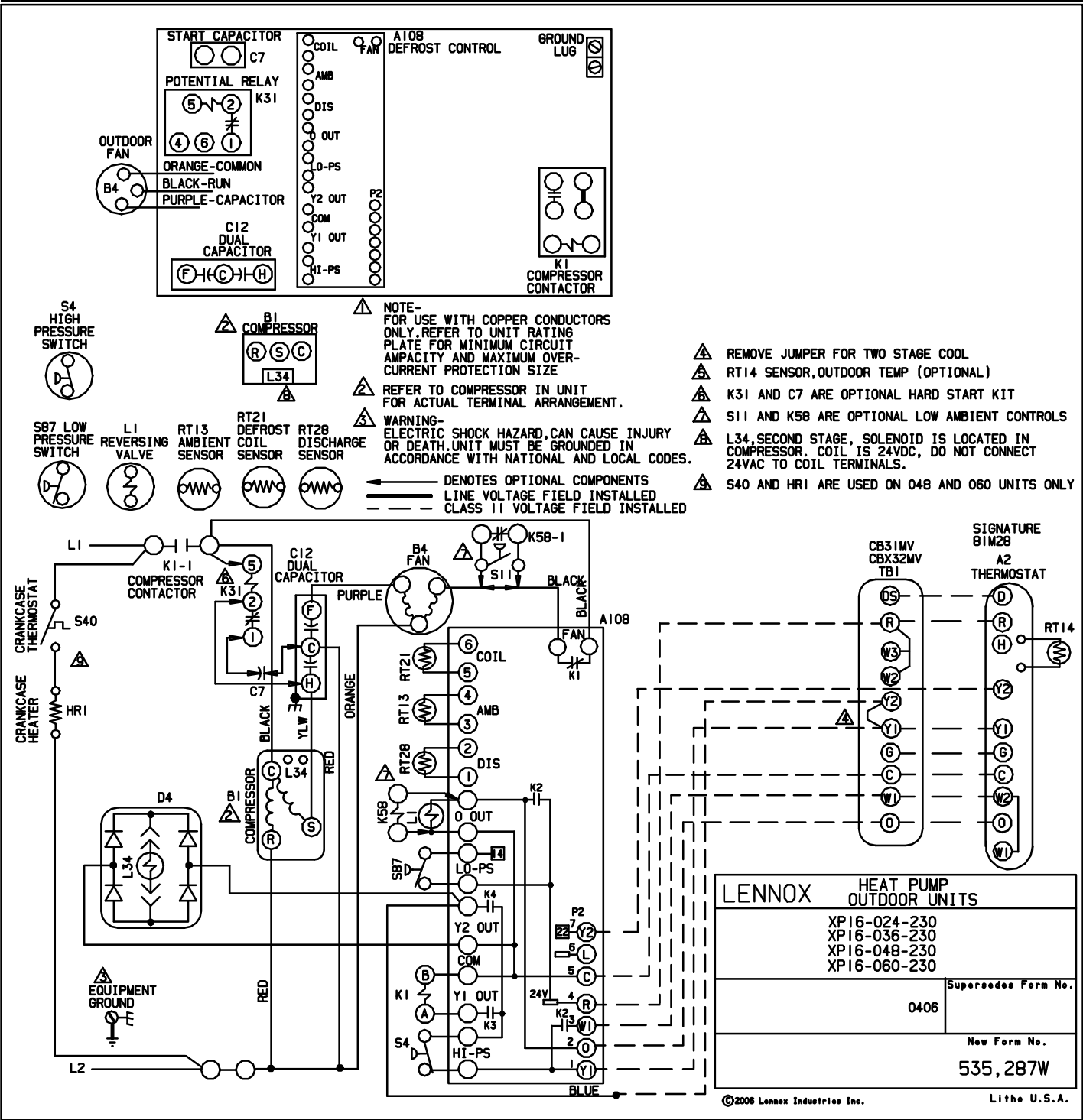


Figure 14. Unit Wiring Diagram (All Sizes) — XP16-XXX-230-01 through 04)

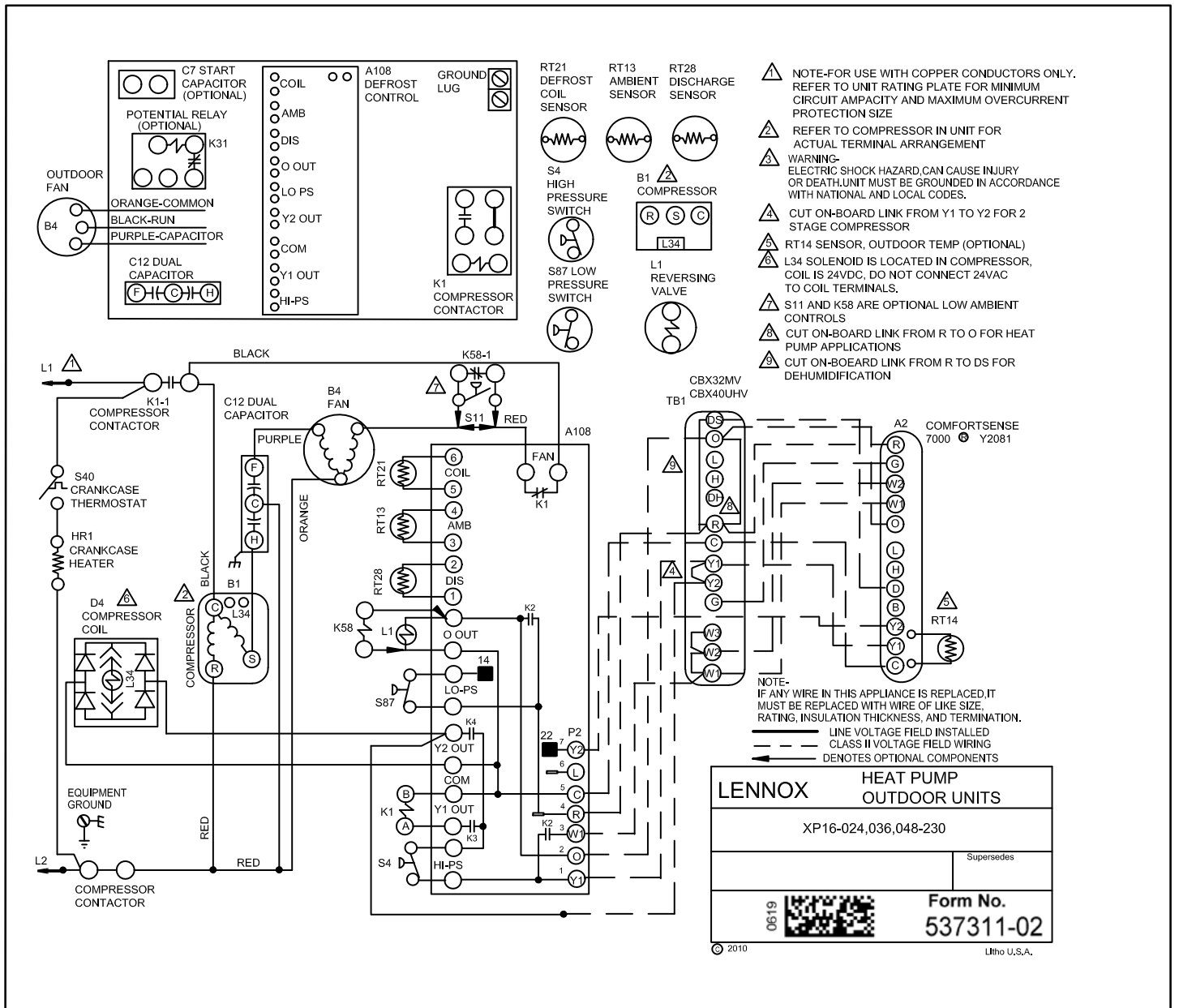


Figure 15. Unit Wiring Diagram (-024, -036 and -048 Sizes) — XP16-XXX-230-05 and later

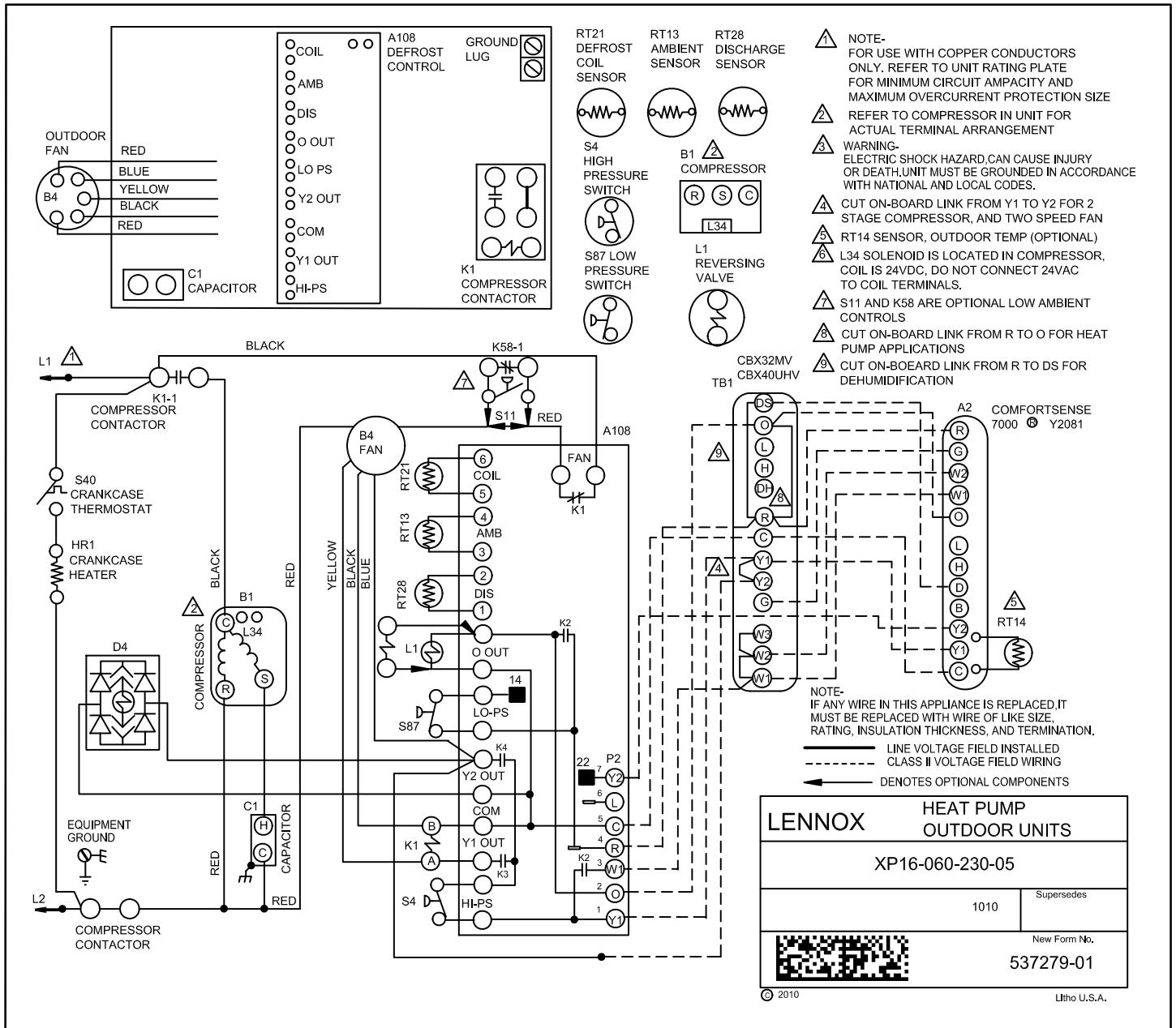


Figure 16. Unit Wiring Diagram (-060 Size Only) — XP16-XXX-230-05 and later

## Sequence of Operation XP16-024/060

### Cooling

#### A – First Stage Low Capacity

Transformer from indoor unit supplies 24VAC power to the thermostat and outdoor unit controls.

- 1- Internal wiring energizes terminal O by cooling mode selection, energizing the reversing valve. Cooling demand initiates at Y1 in the thermostat.
- 2 - The defrost board checks for open low or high-pressure switches and proper coil, ambient and discharge sensor readings.
  - If checks show no issues, the defrost board sends 24 volts through Y1 OUT signal to the K1 compressor contactor coil.
  - **XP16-060-05 only** - defrost board sends 24 volts through Y1 OUT signal to the yellow wire to the outdoor fan motor.

*HARD START KIT IF USED* - Compressor begins start up. Relay K31 remains closed during start up and capacitor C7 remains in the circuit. As compressor speeds up K31 is energized, de-energizing capacitor C7.

- 3- K1-1 N.O. closes energizing compressor B1 and outdoor fan motor B4.
- 4- Solenoid L34 is NOT energized.
  - The slider ring remains open limiting compressor to low capacity.
  - **XP16-060-05 only** - The 24 volt input on the yellow wire to the outdoor fan motor will allow it to run on low speed.

#### B – Second Stage High Capacity

- 5- Second stage thermostat demand goes through Y2 on the defrost board and energizes rectifier plug D4. D4 converts the AC voltage to DC voltage and energizes L34 unloader solenoid.
  - L34 then closes the slider ring, allowing the compressor to operate at high capacity.
  - **XP16-060-05 only** - The 24 volt input to the yellow and blue wires of the outdoor fan will provide high speed operation.

### Heating

#### A – Low Capacity

- 1- Internal wiring de-energizes terminal O by heating mode selection, de-energizing the reversing valve. Heating demand initiates at Y1 in the thermostat.
- 2 - The defrost board checks for open low or high-pressure switches and proper coil, ambient and discharge sensor readings.

- If checks show no issues, the defrost board sends 24 volts through Y1 OUT signal to the K1 compressor contactor coil.
- **XP16-060-05 only** - defrost board sends 24 volts through Y1 OUT signal to the yellow wire to the outdoor fan motor.

*HARD START KIT IF USED* - Compressor begins start up. Relay K31 remains closed during start up and capacitor C7 remains in the circuit. As compressor speeds up K31 is energized, de-energizing capacitor C7.

- 3- K1-1 closes, energizing the compressor and outdoor fan motor.
- 4- Solenoid L34 is NOT energized. The slider ring remains open limiting compressor to low capacity.

#### B – High Capacity (Ambient temperature above defrost board Y2 lock-in temperature)

- 1- Room thermostat in heating mode. Room thermostat outputs Y1 and Y2 (if applicable to that room thermostat) signal to the defrost board in the heat pump and to the indoor unit.
- 2- The defrost board checks for open low or high-pressure switches and proper coil, ambient and discharge sensor readings.
  - If checks show no issues, the defrost board sends 24 volts through Y1 OUT signal to the K1 compressor contactor coil.
  - **XP16-060-05 only** - defrost board sends 24 volts through Y1 OUT signal to the yellow wire to the outdoor fan motor.
- 3 - The defrost board sends:
  - 24 volts through Y2 OUT to the L34 compressor solenoid plug.
  - **XP16-060-05 only** - 24 volts through Y2 OUT to the blue wire to the outdoor fan motor.

The 2- wire compressor solenoid plug converts the 24volt AC outputs to a 24volt DC signal input to the L34 internal high capacity solenoid valve in the compressor.

- 4 - K1-1 closes, energizing the compressor and outdoor fan motor through the normally closed fan relay contacts on the defrost board.
  - The compressor runs high capacity.
  - **XP16-060-05 only** - The 24 volt input to the The compressor runs high capacity yellow and blue wires of the outdoor fan will provide high speed operation.

**B – High Capacity (Ambient temperature below defrost board Y2 lock-in temperature)**

- 1 - Room thermostat in heating mode. Room thermostat outputs Y1 signal to the defrost board in the heat pump and to the indoor unit.
- 2 - The defrost board checks for open low or high-pressure switches and proper coil, ambient and discharge sensor readings.
  - If checks show no issues, the defrost board sends 24 volts through Y1 OUT signal to the K1 compressor contactor coil.
  - **XP16-060-05 only** - defrost board sends 24 volts through Y1 OUT signal to the yellow wire to the outdoor fan motor.
- 3 - The defrost board **Y2 locks in** sends:
  - 24 volts through Y2 OUT to the L34 compressor solenoid plug.
  - **XP16-060-05 only** - 24 volts through Y2 OUT to the blue wire to the outdoor fan motor.

The plug converts the 24volt AC outputs to a 24volt DC signal input to the L34 internal high capacity solenoid valve in the compressor.

- 4 - K1-1 closes, energizing the compressor and outdoor fan motor through the normally closed fan relay contacts on the defrost board.
  - The compressor runs on high capacity.
  - **XP16-060-05 only** - The 24 volt input to the yellow and blue wires of the outdoor fan will provide high speed operation.

**Defrost Mode**

When a defrost cycle is initiated, the control energizes the reversing valve solenoid and turns off the condenser fan. The control will also put 24VAC on the “W1” (auxiliary heat) line. The unit will stay in this mode until either the coil sensor temperature is above the selected termination temperature, the defrost time of 14 minutes has been completed, or the room thermostat demand cycle has been satisfied. (If the temperature select shunt is not installed, the default termination temperature will be 90°F.) If the room thermostat demand cycle terminates the cycle, the defrost cycle will be held until the next room thermostat demand cycle. If the coil sensor temperature is still below the selected termination temperature, the control will continue the defrost cycle until the cycle is terminated in one of the methods mentioned above. If a defrost is terminated by time and the coil temperature did not remain above 35°F (2°C) for 4 minutes the control will go to the 30-minute Time/Temperature mode.

## Checklists

### Two-Stage Modulation Compressors Field Operational Checklist

Unit Readings	Y1 - First-Stage	Expected results during Y2 demand (Toggle switch On)	Y2 - Second-Stage
<b>COMPRESSOR</b>			
Voltage		Same	
Amperage		Higher	
<b>OUTDOOR UNIT FAN MOTOR</b>			
Amperage		Same or Higher	
<b>TEMPERATURE</b>			
Ambient		Same	
Outdoor Coil Discharge Air		Higher	
Compressor Discharge Line		Higher	
Indoor Return Air		Same	
Indoor Coil Discharge Air		Lower	
<b>PRESSURES</b>			
Suction (Vapor)		Lower	
Liquid		Higher	

### XP16 Start-Up and Performance

Customer \_\_\_\_\_ Address \_\_\_\_\_  
 Indoor Unit Model \_\_\_\_\_ Serial \_\_\_\_\_  
 Outdoor Unit Model \_\_\_\_\_ Serial \_\_\_\_\_  
 Notes: \_\_\_\_\_

#### START UP CHECKS

Refrigerant Type: \_\_\_\_\_  
 1st Stage: Rated Load Amps \_\_\_\_\_ Actual Amps \_\_\_\_\_ Rated Volts \_\_\_\_\_ Actual Volts \_\_\_\_\_  
 2nd Stage: Rated Load Amps \_\_\_\_\_ Actual Amps \_\_\_\_\_ Rated Volts \_\_\_\_\_ Actual Volts \_\_\_\_\_  
 Outdoor Unit Fan Full Load Amps \_\_\_\_\_ Actual Amps: 1st Stage \_\_\_\_\_ 2nd Stage \_\_\_\_\_

#### COOLING MODE

**Suction Pressure:** 1st Stage: \_\_\_\_\_ 2nd Stage: \_\_\_\_\_  
**Liquid Pressure:** 1st Stage: \_\_\_\_\_ 2nd Stage: \_\_\_\_\_  
**Supply Air Temperature:** 1st Stage: \_\_\_\_\_ 2nd Stage: \_\_\_\_\_  
**Temperature:** Ambient: \_\_\_\_\_ Return Air: \_\_\_\_\_

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

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



### III. INSTALLATION

#### Unit Placement

#### CAUTION

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

See *Unit Dimensions* on page 3 for sizing mounting slab, platforms or supports. Refer to figure 17 for mandatory installation clearance requirements.

#### POSITIONING CONSIDERATIONS

Consider the following when positioning the unit:

- Some localities are adopting sound ordinances based on the unit's sound level registered from the adjacent property, not from the installation property. Install the unit as far as possible from the property line.
- When possible, do not install the unit directly outside a window. Glass has a very high level of sound transmission. For proper placement of unit in relation to a window see the provided illustration in figure 18, detail A.

#### PLACING UNIT ON SLAB

When installing unit at grade level, the top of the slab should be high enough above grade so that water from higher ground will not collect around the unit. The slab should have a slope tolerance as described in figure 18, detail B.

*NOTE* — If necessary for stability, anchor unit to slab as described in figure 18, detail D.

#### ELEVATING THE UNIT

Units are outfitted with elongated support feet as illustrated in figure 18, detail C.

If additional elevation is necessary, raise the unit by extending the height of the unit support feet. This may be achieved by using a 2 inch (50.8mm) Schedule 40 female threaded adapter.

The specified coupling will fit snugly into the recessed portion of the feet. Use additional 2 inch (50.8mm) Schedule 40 male threaded adaptors which can be threaded into the female threaded adaptors to make additional adjustments to the level of the unit.

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

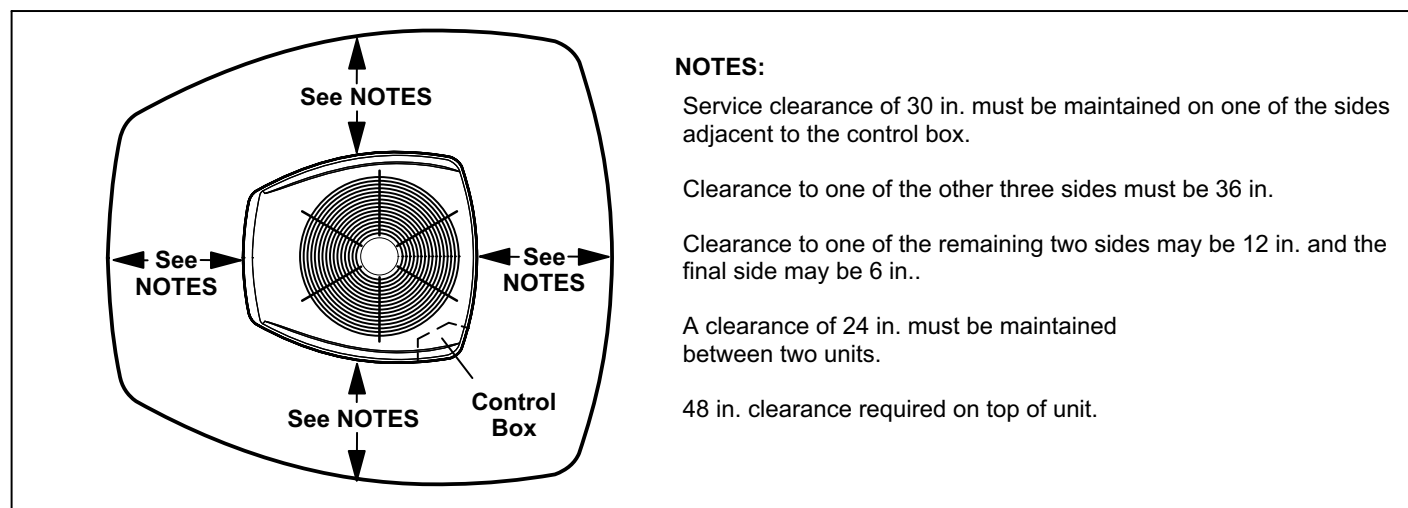
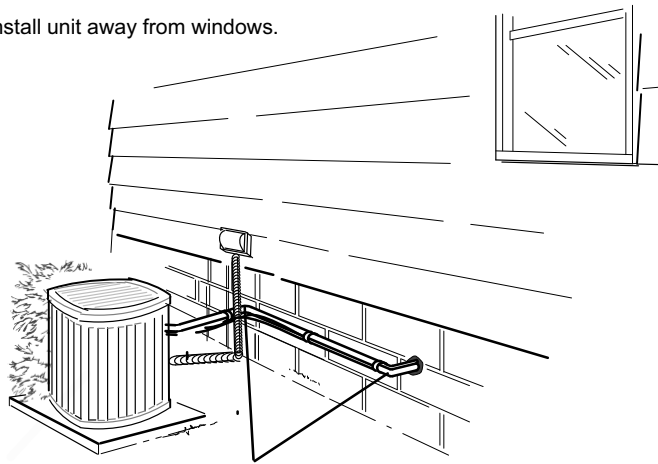


Figure 17. Installation Clearances

### DETAIL A— Outside Unit Placement

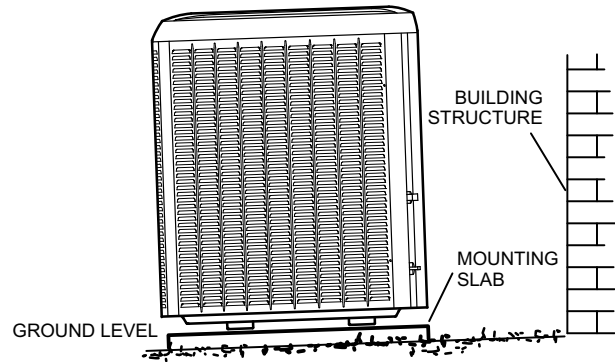
Install unit away from windows.



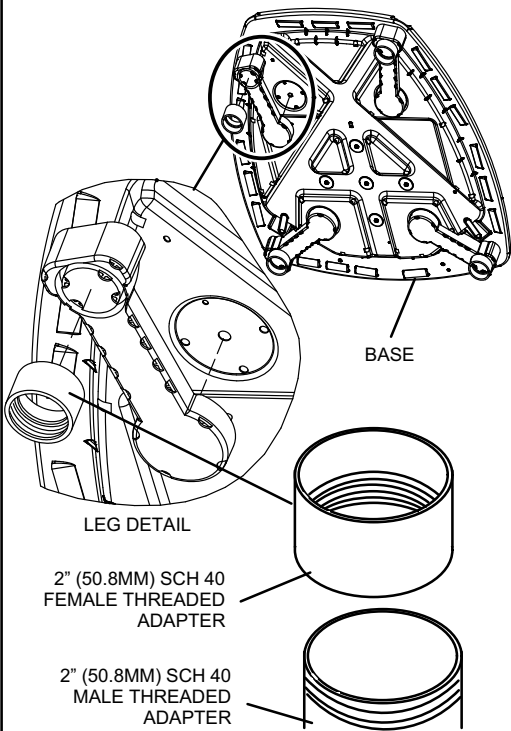
TWO 90° ELBOWS INSTALLED IN LINE SET WILL REDUCE LINE SET VIBRATION.

### DETAIL B— Slab Mounting at Ground Level

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



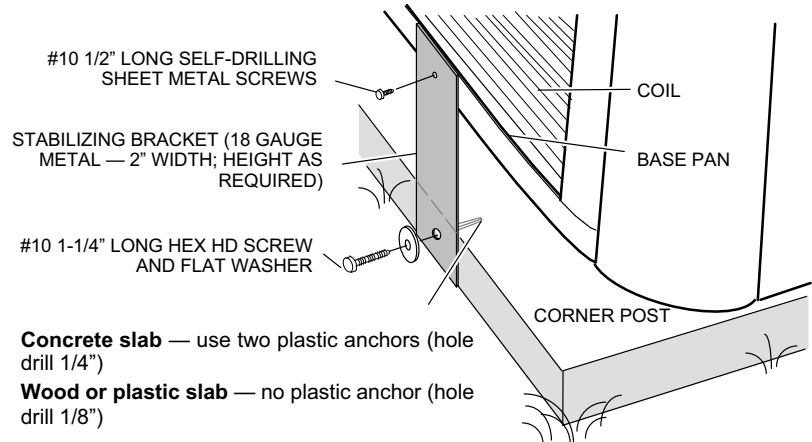
### DETAIL C— Elevated Slab Mounting using Feet Extenders



Use additional 2" SCH 40 male threaded adapters which can be threaded into the female threaded adapters to make additional adjustments to the level of the unit.

### STABILIZING UNIT ON UNEVEN SURFACES

#### DETAIL D— Slab Side Mounting

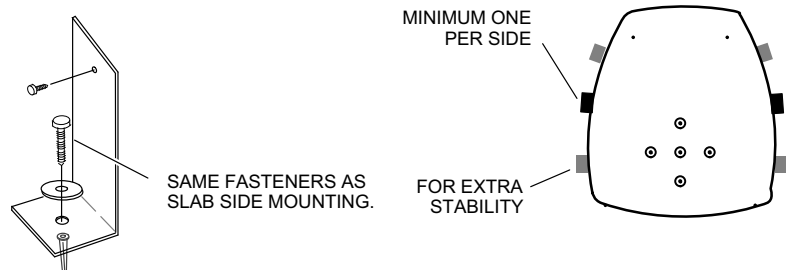


**Concrete slab** — use two plastic anchors (hole drill 1/4")

**Wood or plastic slab** — no plastic anchor (hole drill 1/8")

#### DETAIL E — Deck Top Mounting

Stabilizing bracket (18 gauge metal — 2" (50.8mm) width; height as required); bend to form right angle as exemplified below.



One bracket per side (minimum). For extra stability, two brackets per side, two inches (51mm) from each corner.

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

Figure 18. Placement, Slab Mounting and Stabilizing Unit

## STABILIZING UNIT ON UNEVEN SURFACES

### **IMPORTANT**

#### Unit Stabilizer Bracket Use (field-provided):

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

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

With unit positioned at installation site, perform the following:

1. Remove two side louvered panels to expose the unit base.
2. Install the brackets as illustrated in figure 18, detail D or E using conventional practices.
3. Replace the panels after installation is complete.

### **ROOF MOUNTING**

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

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

### **NOTICE**

#### Roof Damage!

This system contains both refrigerant and oil. Some rubber roofing material may absorb oil and cause the rubber to swell when it comes into contact with oil. The rubber will then bubble and could cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation. Failure to follow this notice could result in damage to roof surface.

## Removing and Installing Panels

### **IMPORTANT**

Do not allow panels to hang on unit by top tab. Tab is for alignment and not designed to support weight of panel.

### **IMPORTANT**

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

### **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.

## LOUVERED PANEL REMOVAL

Remove the louvered panels as follows:

1. Remove two screws, allowing the panel to swing open slightly.
2. Hold the panel firmly throughout this procedure. Rotate bottom corner of panel away from hinged corner post until lower three tabs clear the slots as illustrated in **detail B**.
3. Move panel down until lip of upper tab clears the top slot in corner post as illustrated in **detail A**.

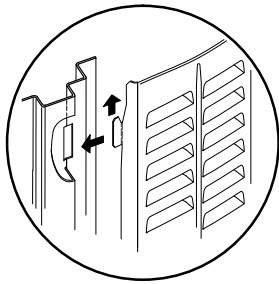
## LOUVERED PANEL INSTALLATION

Position the panel almost parallel with the unit as illustrated in **detail D** with the screw side as close to the unit as possible. Then, in a continuous motion:

1. Slightly rotate and guide the lip of top tab inward as illustrated in **detail A** and **C**; then upward into the top slot of the hinge corner post.
2. Rotate panel to vertical to fully engage all tabs.
3. Holding the panel's hinged side firmly in place, close the right-hand side of the panel, aligning the screw holes.
4. When panel is correctly positioned and aligned, insert the screws and tighten.

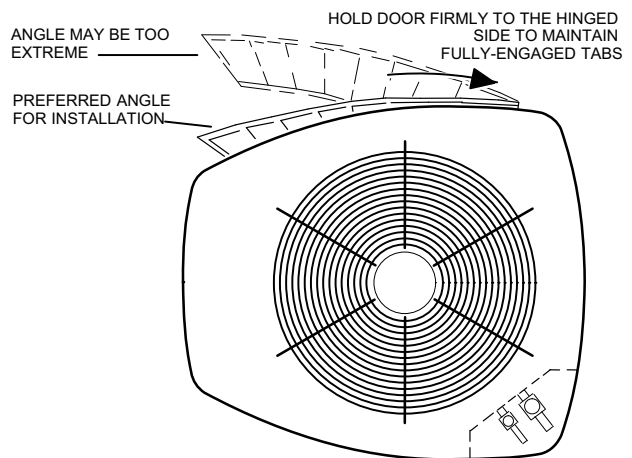
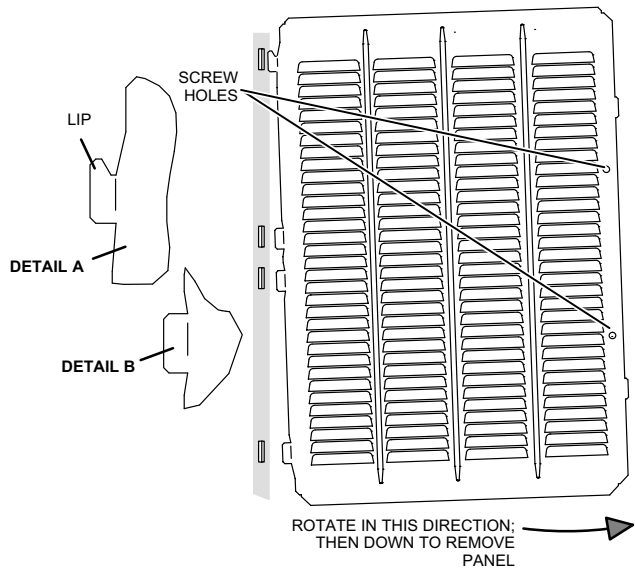
### Detail C

MAINTAIN MINIMUM PANEL ANGLE (AS CLOSE TO PARALLEL WITH THE UNIT AS POSSIBLE) WHILE INSTALLING PANEL.



**IMPORTANT!** DO NOT ALLOW PANELS TO HANG ON UNIT BY TOP TAB. TAB IS FOR ALIGNMENT AND NOT DESIGNED TO SUPPORT WEIGHT OF PANEL.

PANEL SHOWN SLIGHTLY ROTATED TO ALLOW TOP TAB TO EXIT (OR ENTER) TOP SLOT FOR REMOVING (OR INSTALLING) PANEL.



**Figure 19. Removing and Installing Panels**

## 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

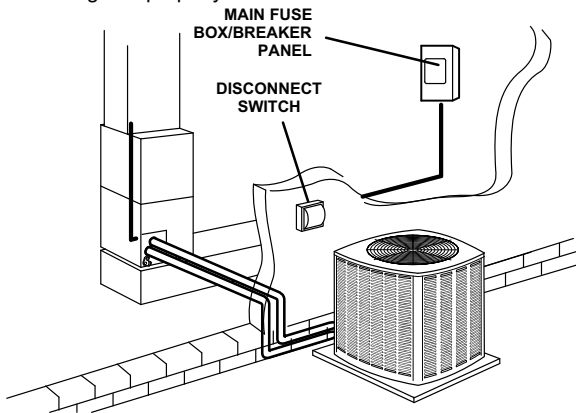
additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

### 24VAC TRANSFORMER

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

# 1 SIZE CIRCUIT AND INSTALL DISCONNECT SWITCH

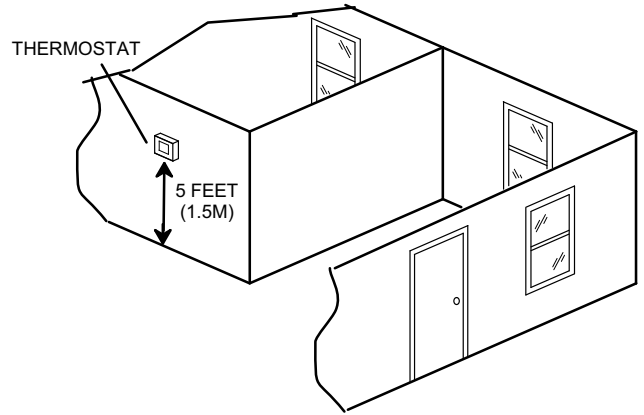
Refer to the unit nameplate for minimum circuit ampacity, and maximum fuse or circuit breaker (HACR per NEC). Install power wiring and properly sized disconnect switch.



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

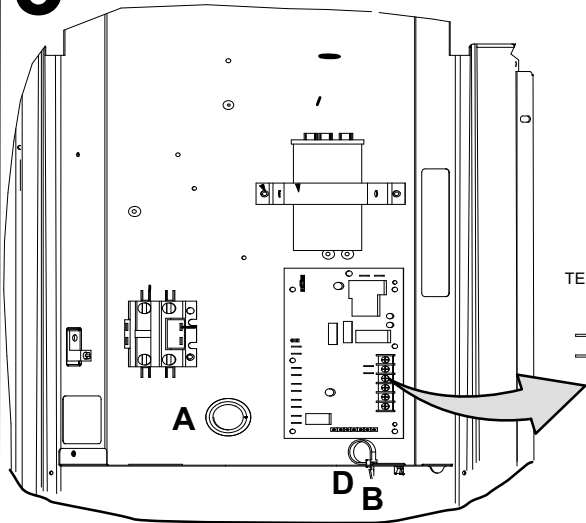
# 2 INSTALL THERMOSTAT

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.

# 3 UNIT LOW VOLTAGE CONNECTIONS



- HIGH VOLTAGE FIELD WIRING
- FACTORY WIRING
- LOW VOLTAGE (24V) FIELD WIRING

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

- A** Run 24VAC control wires through cutout with grommet.
- B** Run 24VAC control wires through wire tie.
- C** Make 24VAC control wire connections defrost control terminal strip.
- D** Tighten wire tie to security 24V control wiring.

**NOTE** - FOR PROPER VOLTAGES, SELECT THERMOSTAT WIRE (CONTROL WIRES) GAUGE PER TABLE ABOVE.

**NOTE** - WIRE TIE PROVIDES LOW VOLTAGE WIRE STRAIN RELIEF AND TO MAINTAIN SEPARATION OF FIELD INSTALLED LOW AND HIGH VOLTAGE CIRCUITS.

**NOTE** - DO NOT BUNDLE ANY EXCESS 24VAC CONTROL WIRES INSIDE CONTROL BOX.

## New or Replacement Line Set

### REFRIGERANT LINE SET

This section provides information on installation or replacement of existing line set. If new or replacement line set is not being installed then proceed to *Brazing Connections* on page 32.

**⚠ IMPORTANT**

Lennox highly recommends changing line set when converting the existing system from HCFC-22 to HFC-410A. If that is not possible and the line set is the proper size as reference in table 2, use the procedure outlined under Flushing the System on page 13.

If refrigerant lines are routed through a wall, then 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. See figure 20 for recommended installation practices. Also, consider the following when placing and installing a high-efficiency outdoor unit.

Liquid lines that meter the refrigerant, such as RFC1 liquid lines, must not be used in this application. Existing line set of proper size as listed in table 6 may be reused. If system was previously charged with HCFC-22 refrigerant, then existing line set must be flushed (see *Flushing the System* on page 35).

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit to the indoor unit coil (brazed connections). Use Lennox L15 (sweat, non-flare) series line set, or field-fabricated refrigerant line sizes as listed in table 6.

**Table 6. Refrigerant Line Set — Inches (mm)**

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

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

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

- Model (XP16) and size of unit (e.g. -036).
- Line set diameters for the unit being installed as listed in table 6 and total length of installation.
- Number of elbows vertical rise or drop in the piping.

The compressor is charged with sufficient Polyol ester oil for line set lengths up to 50 feet. Recommend adding oil to system based on the amount of refrigerant charge in the system. No need to add oil in system with 20 pounds of refrigerant or less. For systems over 20 pounds - add one ounce of every five pounds of refrigerant.

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

**⚠ WARNING**

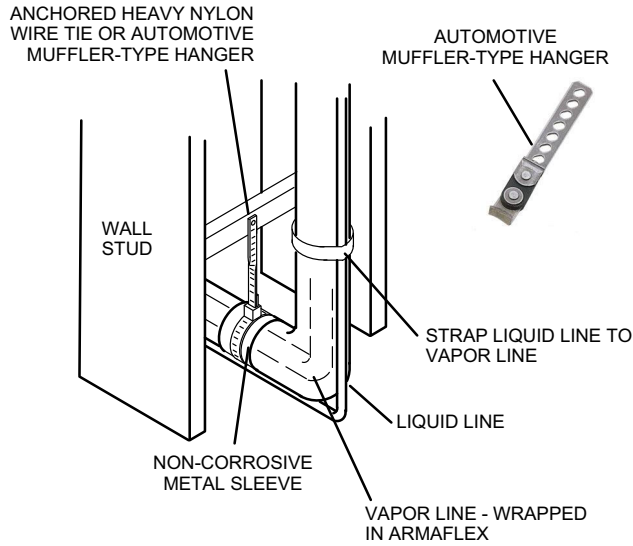
Polyol Ester (POE) oils used with HFC-410A refrigerant absorb moisture very quickly. It is very important that the refrigerant system be kept closed as much as possible. DO NOT remove line set caps or service valve stub caps until you are ready to make connections.

**⚠ IMPORTANT**

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

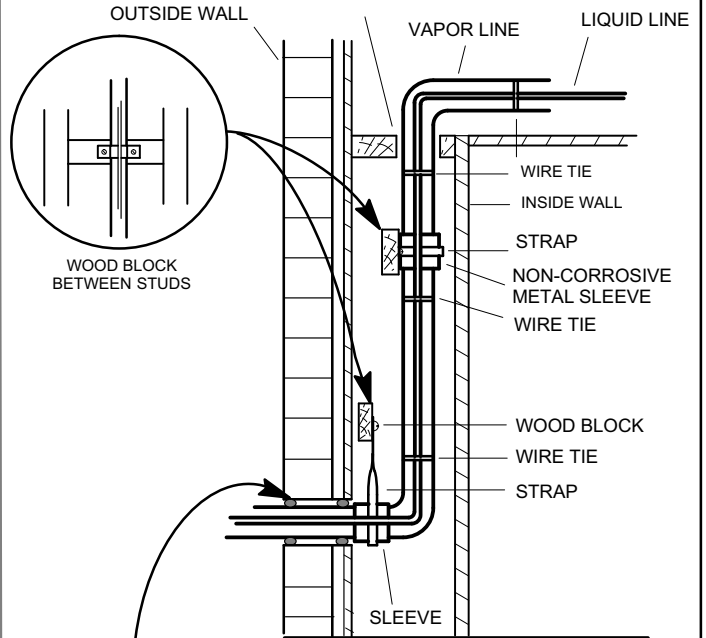
**Line Set Isolation** — The following illustrations are examples of proper refrigerant line set isolation:

### REFRIGERANT LINE SET — TRANSITION FROM VERTICAL TO HORIZONTAL



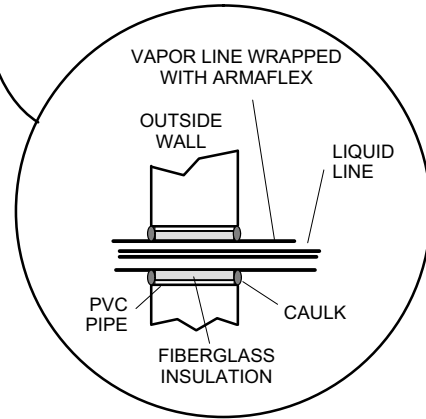
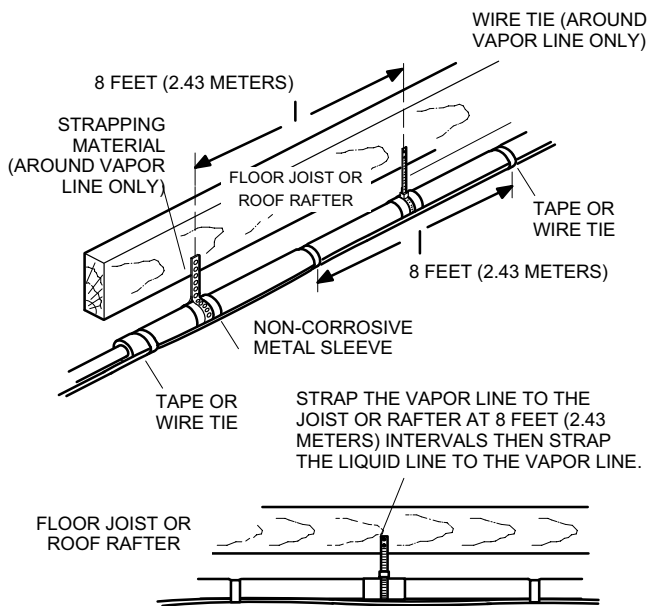
### REFRIGERANT LINE SET — INSTALLING VERTICAL RUNS (NEW CONSTRUCTION SHOWN)

**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.



### 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 20. Line Set Installation**

## Brazing Connections

Use the procedures outline in figures 21 and 22 for brazing line set connections to service valves.

### 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.

### 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).

### 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

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.

### IMPORTANT

Allow braze joint to cool before removing the wet rag from the service valve. Temperatures above 250°F can damage valve seals.

### IMPORTANT

Use silver alloy brazing rods with 5% minimum silver alloy for copper-to-copper brazing. Use 45% minimum alloy for copper-to-brass and copper-to-steel brazing.

### WARNING



Fire, Explosion and Personal Safety Hazard.

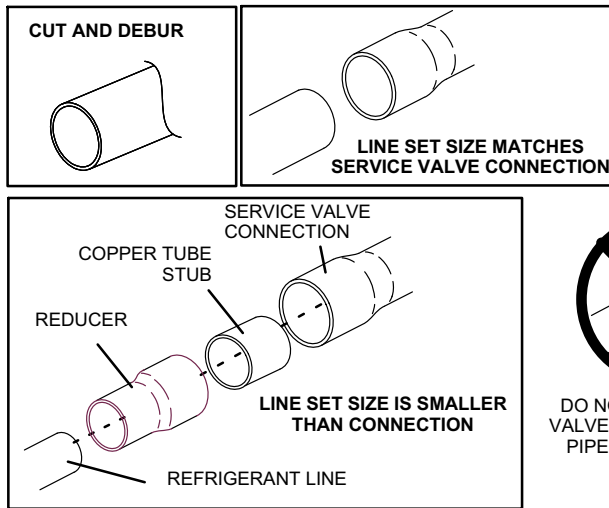
Failure to follow this warning could result in damage, personal injury or death.

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



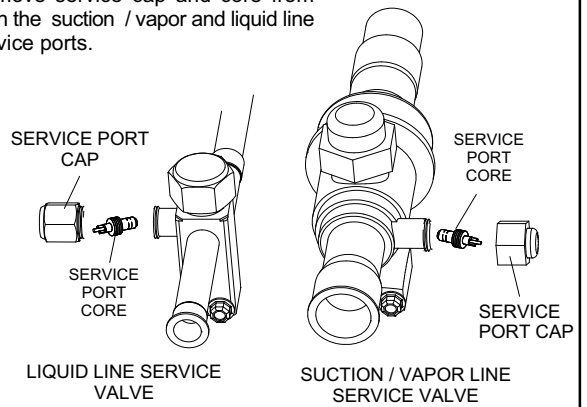
# 1 CUT AND DEBUR

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.

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

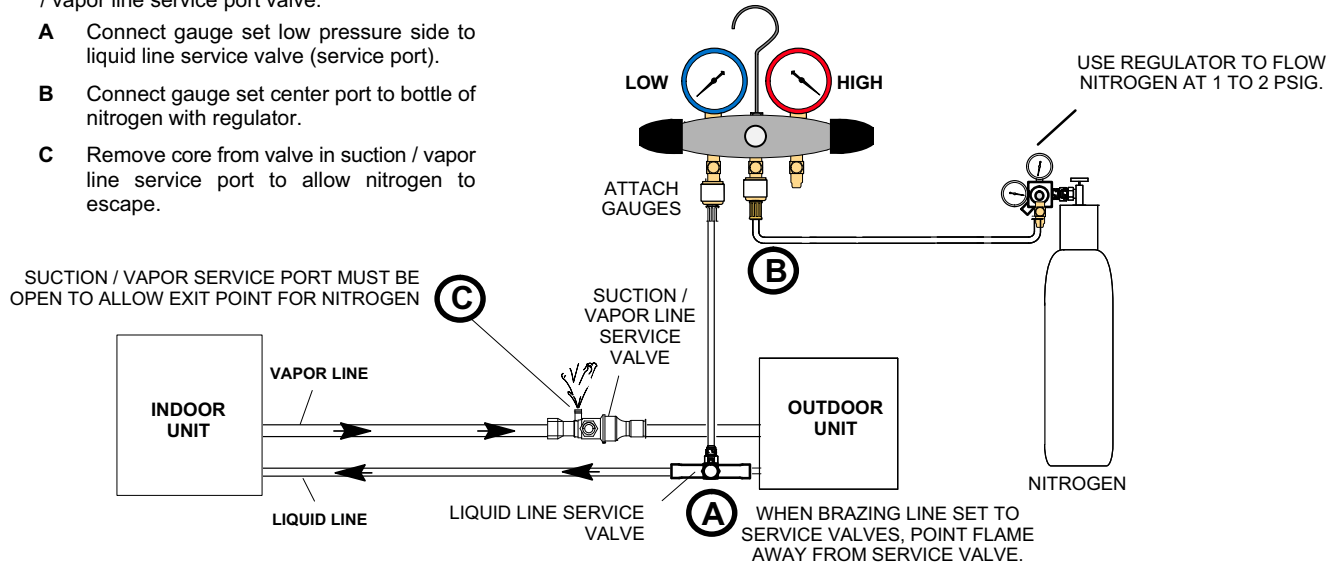


Figure 21. Brazing Procedures

## 4 WRAP SERVICE VALVES

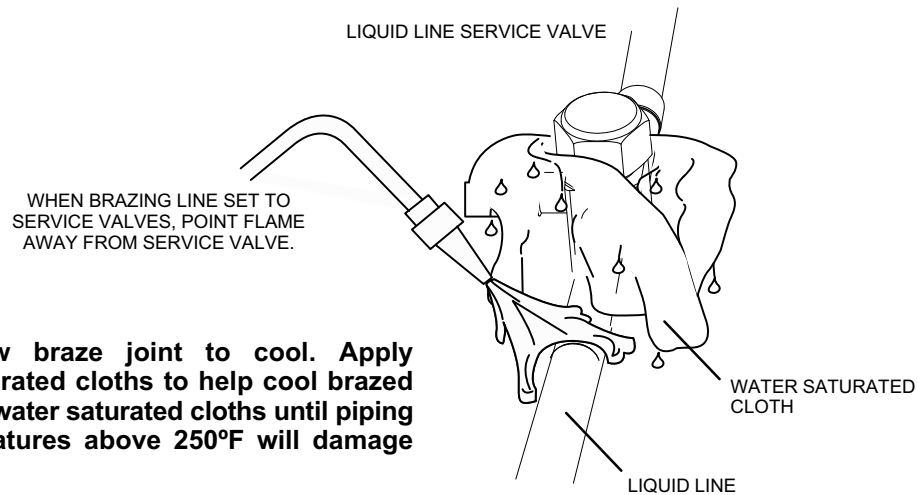
To help protect service valve seals during brazing, wrap water saturated cloths around service valve bodies and copper tube stubs. Use additional water saturated cloths underneath the valve body to protect the base paint.

## 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

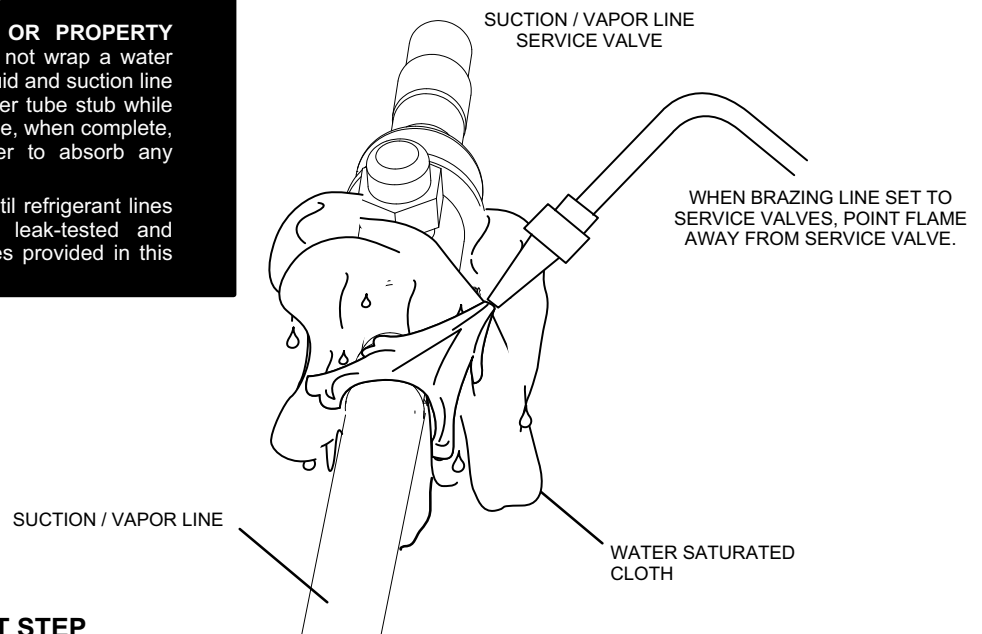
Wrap both service valves with water saturated cloths as illustrated here and as mentioned in step 4, before brazing to line set. Water saturated cloths must remain water saturated throughout the brazing and cool-down process.



**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

1. **FIRE, PERSONAL INJURY, OR PROPERTY DAMAGE** will 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 in the line set! The braze, when complete, must be quenched with water to absorb any residual heat.
2. Do not open service valves until refrigerant lines and indoor coil have been leak-tested and evacuated. Refer to procedures provided in this supplement.



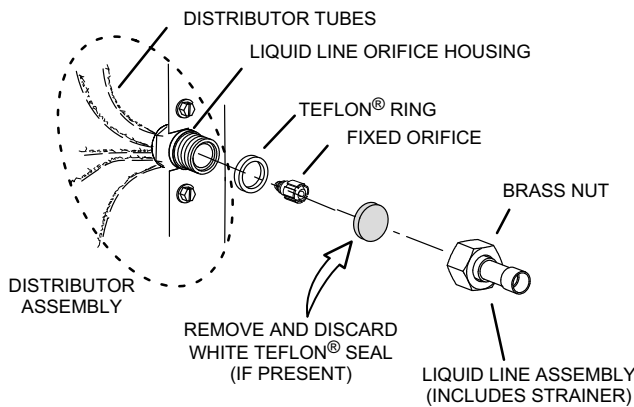
## 7 PREPARATION FOR NEXT STEP

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. Refer to the unit installation instructions for the next step in preparing the unit.

Figure 22. Brazing Procedures (continued)

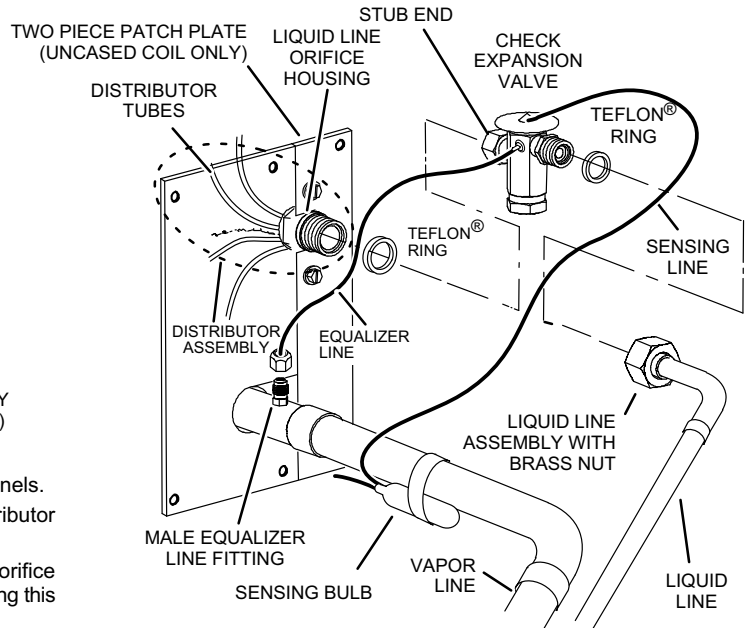
## Flushing the System

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



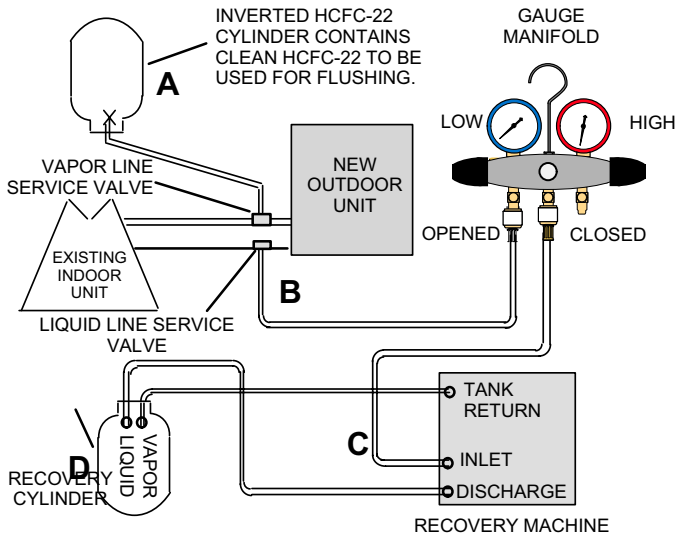
- A On fully cased coils, remove the coil access and plumbing panels.
- B Remove any shipping clamps holding the liquid line and distributor assembly.
- C Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.
- 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.

### 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 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.

### 2 CONNECT GAUGES AND EQUIPMENT FOR FLUSHING PROCEDURE



- A Inverted HCFC-22 cylinder with clean 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 to the gauge set.
- D Connect recovery tank to recovery machines 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 Invert the cylinder of clean HCFC-22 and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor 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 down to 0 the system.
- 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.

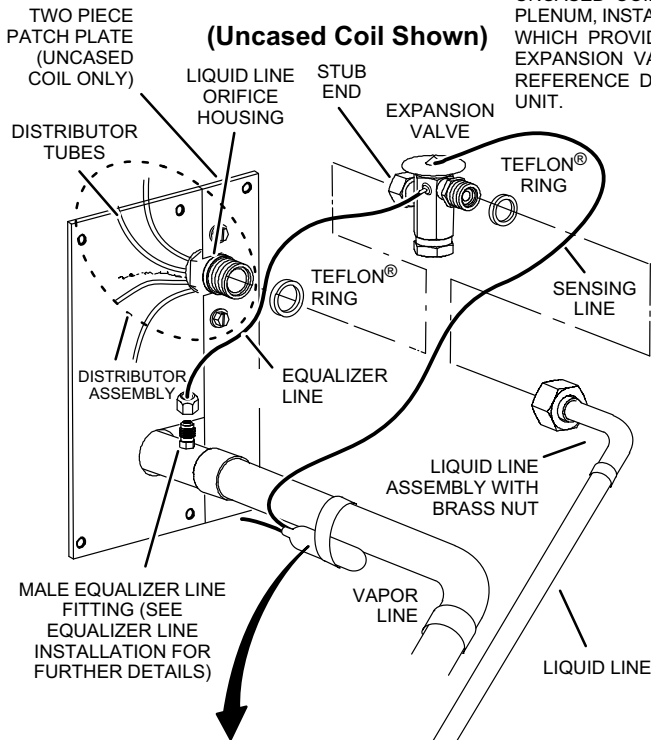
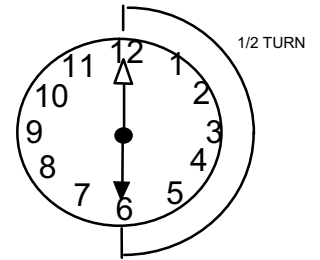
Figure 23. Installing Indoor Expansion Valve

## FLUSHING LINE SET AND INDOOR COIL (2 OF 2)

### 4 TYPICAL NEW CHECK EXPANSION VALVE INSTALLATION PROCEDURE

THIS OUTDOOR UNIT IS DESIGNED FOR USE IN SYSTEMS THAT USE A CHECK EXPANSION VALVE METERING DEVICE. SEE THE *LENNOX XP16 PRODUCT SPECIFICATION* FOR APPROVED EXPANSION VALVE KIT MATCH-UPS AND APPLICATION INFORMATION.

THE EXPANSION VALVE UNIT CAN BE INSTALLED INTERNAL OR EXTERNAL TO THE INDOOR COIL. IN APPLICATIONS WHERE AN UNCASSED COIL IS BEING INSTALLED IN A FIELD-PROVIDED PLENUM, INSTALL THE CHECK EXPANSION VALVE IN A MANNER WHICH PROVIDES ACCESS FOR FIELD SERVICING OF THE EXPANSION VALVE. REFER TO BELOW ILLUSTRATION FOR REFERENCE DURING INSTALLATION OF EXPANSION VALVE UNIT.



- REMOVE THE FIELD-PROVIDED FITTING THAT TEMPORARILY RECONNECTED THE LIQUID LINE TO THE INDOOR UNIT'S DISTRIBUTOR ASSEMBLY.
- INSTALL ONE OF THE PROVIDED TEFLON® RINGS AROUND THE STUBBED END OF THE EXPANSION VALVE AND LIGHTLY LUBRICATE THE CONNECTOR THREADS AND EXPOSE SURFACE OF THE TEFLON® RING WITH REFRIGERANT OIL.
- ATTACH THE STUBBED END OF THE EXPANSION VALVE TO THE LIQUID LINE ORIFICE HOUSING. FINGER TIGHTEN AND USE AN APPROPRIATELY SIZED WRENCH TO TURN AN ADDITIONAL 1/2 TURN COUNTERCLOCKWISE AS ILLUSTRATED IN THE FIGURE ABOVE, OR 20 FT-LB.
- 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.
- ATTACH THE LIQUID LINE ASSEMBLY TO THE EXPANSION VALVE. FINGER TIGHTEN AND USE AN APPROPRIATELY SIZED WRENCH TO TURN AN ADDITIONAL 1/2 TURN COUNTERCLOCKWISE AS ILLUSTRATED IN THE FIGURE ABOVE OR 20 FT-LB.

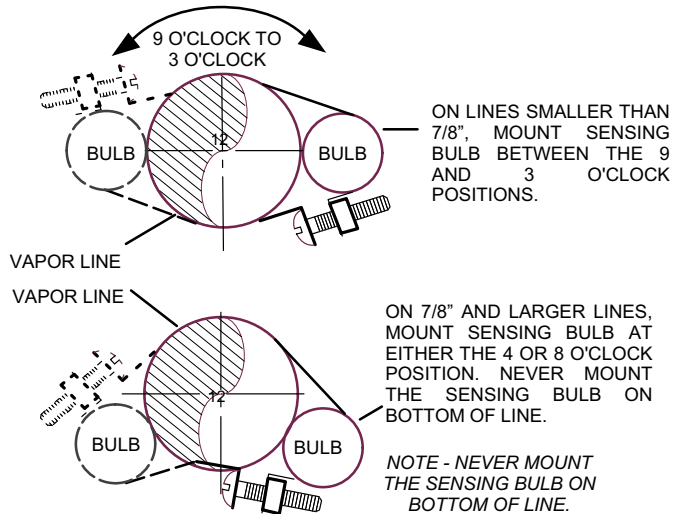
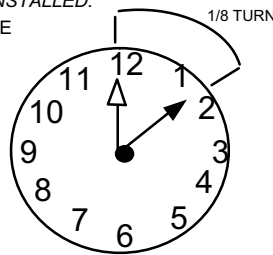
SENSING BULB INSULATION IS REQUIRED IF MOUNTED EXTERNAL TO THE COIL CASING. SEE SENSING BULB INSTALLATION FOR BULB POSITIONING.

### SENSING BULB INSTALLATION

- ATTACH THE VAPOR LINE SENSING BULB IN THE PROPER ORIENTATION AS ILLUSTRATED TO THE RIGHT USING THE CLAMP AND SCREWS PROVIDED.

*NOTE - CONFIRM PROPER THERMAL CONTACT BETWEEN VAPOR LINE AND CHECK EXPANSION BULB BEFORE INSULATING THE SENSING BULB ONCE INSTALLED.*

- CONNECT THE EQUALIZER LINE FROM THE EXPANSION VALVE TO THE EQUALIZER VAPOR PORT ON THE VAPOR LINE. FINGER TIGHTEN THE FLARE NUT PLUS 1/8 TURN (7 FT-LBS) AS ILLUSTRATED BELOW.



### EQUALIZER LINE INSTALLATION

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 TO THE RIGHT.

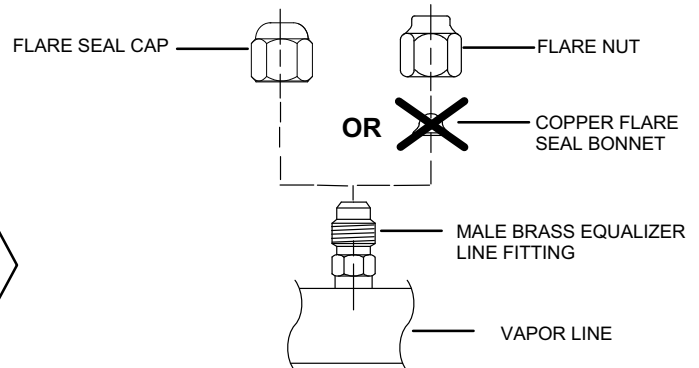


Figure 24. Installing Indoor Expansion Valve

## ⚠ 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.

## Leak Test Line Set and Indoor Coil

## ⚠ 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).

## ⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

## ⚠ WARNING

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

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

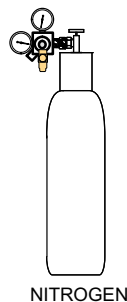
### 1 CONNECT GAUGE SET

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

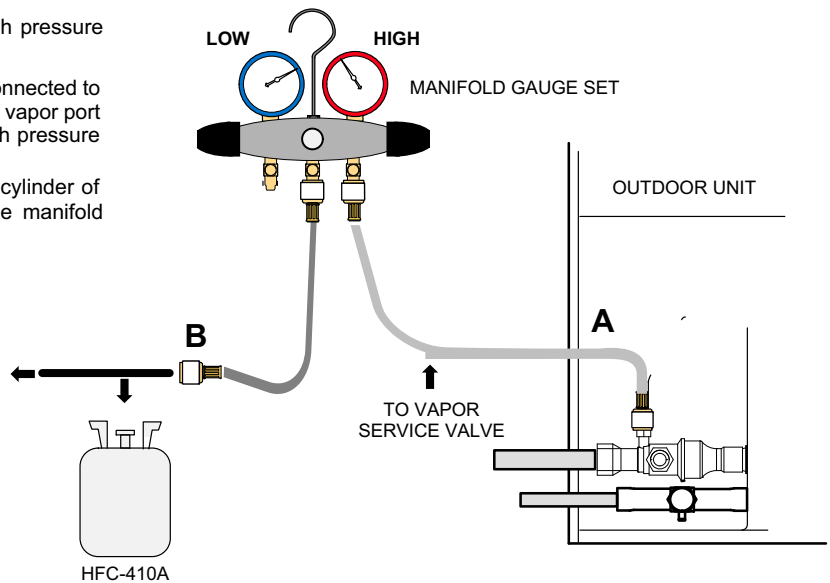
**NOTE** — Normally, the high pressure hose is connected to the liquid line port. However, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.

- 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.



NITROGEN



### 2 TEST FOR LEAKS

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:

- 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.

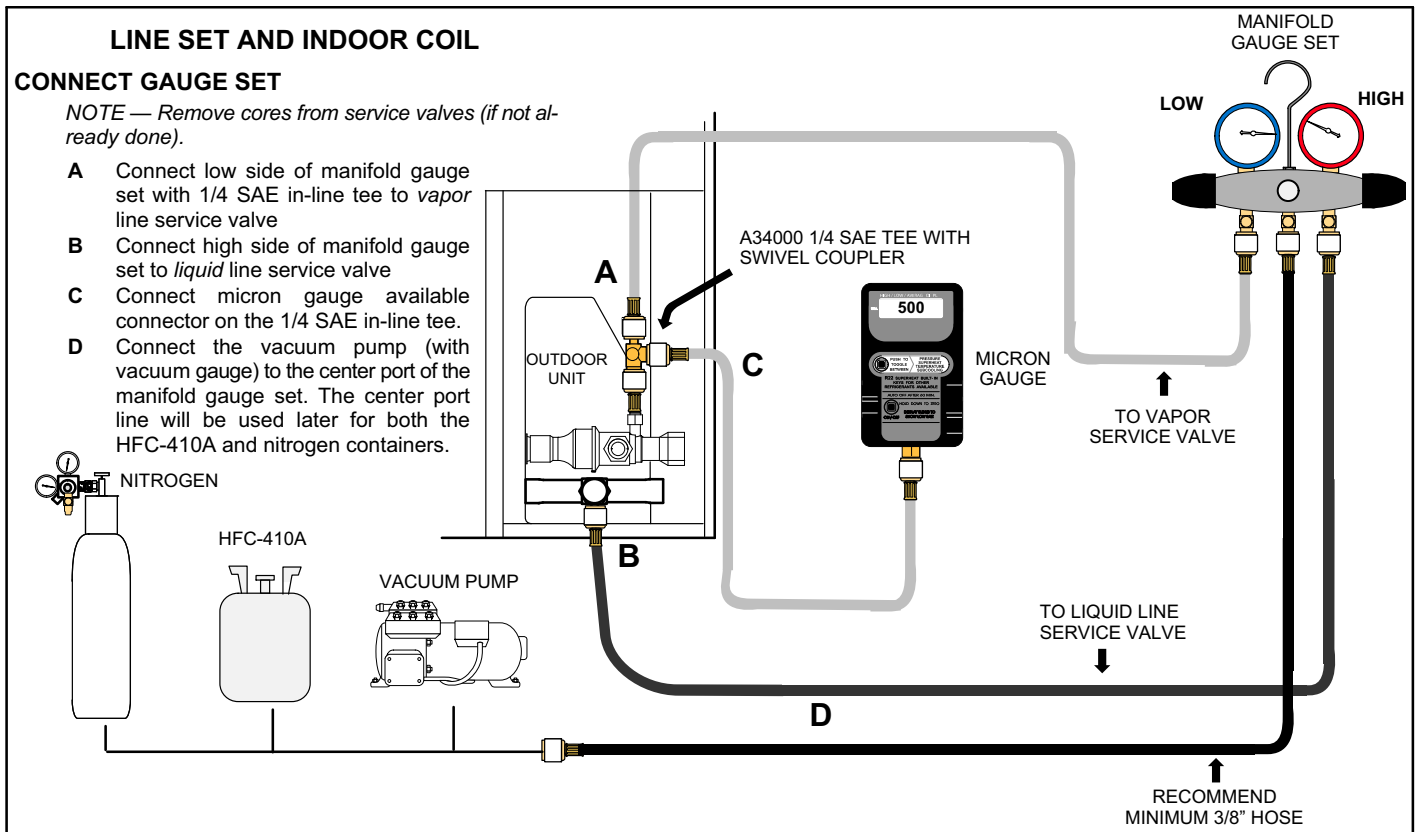
Figure 25. Leak Test

## Evacuating the System

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

### **⚠ WARNING**

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



**Figure 26. Connecting Gauge Set**

### EVACUATE LINE SET AND INDOOR COIL

The unit is shipped with a factory refrigerant charge. The liquid and suction line valves were closed after final testing at the factory. Do not operate these valves until the line set and indoor coil have been evacuated and leak checked, or the charge is lost.

*Note: Do not use any portion of the factory charge for purging or leak testing. The factory charge is for filling the system only after a complete evacuation and leak check has been performed.*

Line set and indoor coil should be evacuated using the recommend deep vacuum method of 500 microns. If deep vacuum equipment is not available, the alternate triple evacuation method may be used by following the specified procedure.

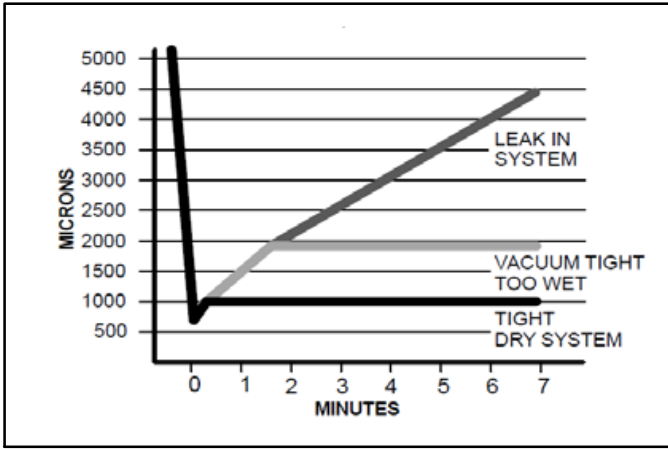
If vacuum must be interrupted during the evacuation procedure, always break vacuum with dry nitrogen.

#### Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum to 500 microns and a vacuum gauge capable of accurately measuring this vacuum level. The deep vacuum method is the most positive way of assuring a system is free of air and water.

Watch the vacuum gauge as the system is pulling down. The response of the gauge is an indicator of the condition of the system (refer to figure 27).

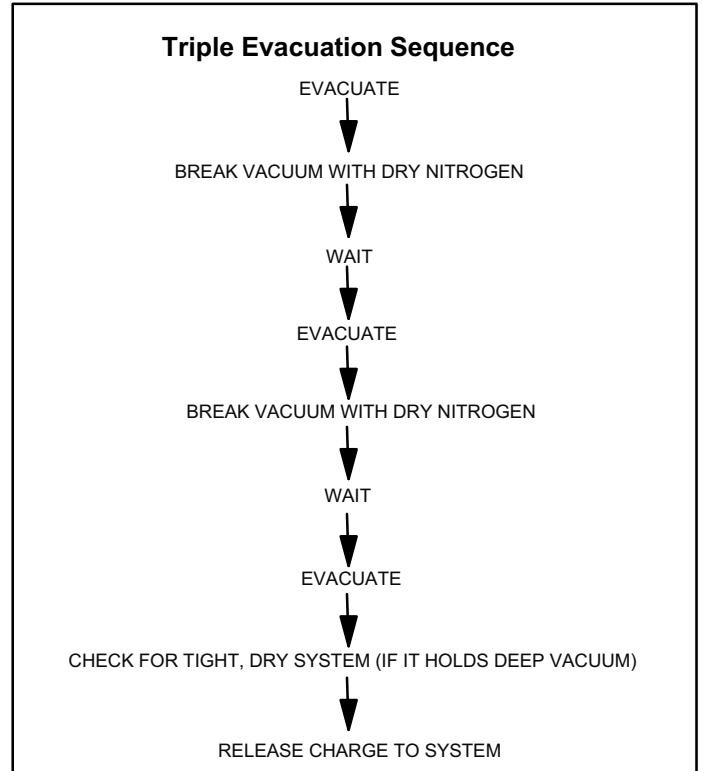
With no leaks in the system, allow the vacuum pump to run for 30 minutes minimum at the deep vacuum level.



**Figure 27. Deep Vacuum Gauge Response and System Conditions**

**Triple Evacuation Method**

The triple evacuation method should only be used when system does not contain any water in liquid form and vacuum pump is only capable of pulling down to 28 inches of mercury (711mm Hg). Refer to figure 28 and proceed as follows:



**Figure 28. Triple Evacuation Sequence**

## IV. SYSTEM CHARGE

### Servicing Units 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 37.
2. Evacuate the system using procedure outlined on Page 38.
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 38.
5. Weigh in refrigerant using procedure outlined in figure 31.
6. Monitor the system to determine the amount of moisture remaining in the oil. It may be necessary to replace the filter drier several times to achieve the required dryness level. **If system dryness is not verified, the compressor will fail in the future.**

### 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 both the liquid and vapor line service valves to release the refrigerant charge contained in outdoor unit into the system.
4. Replace the stem caps and tighten to the value listed in table 1.
5. Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit's nameplate. If not, do not start the equipment until you have consulted with the power company and the voltage condition has been corrected.
6. Set the thermostat for a cooling demand. Turn on power to the indoor indoor unit and close the outdoor unit disconnect switch to start the unit.
7. Recheck voltage while the unit is running. Power must be within range shown on the nameplate.
8. Check system for sufficient refrigerant by using the procedures listed under *System Charge*.

### 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.

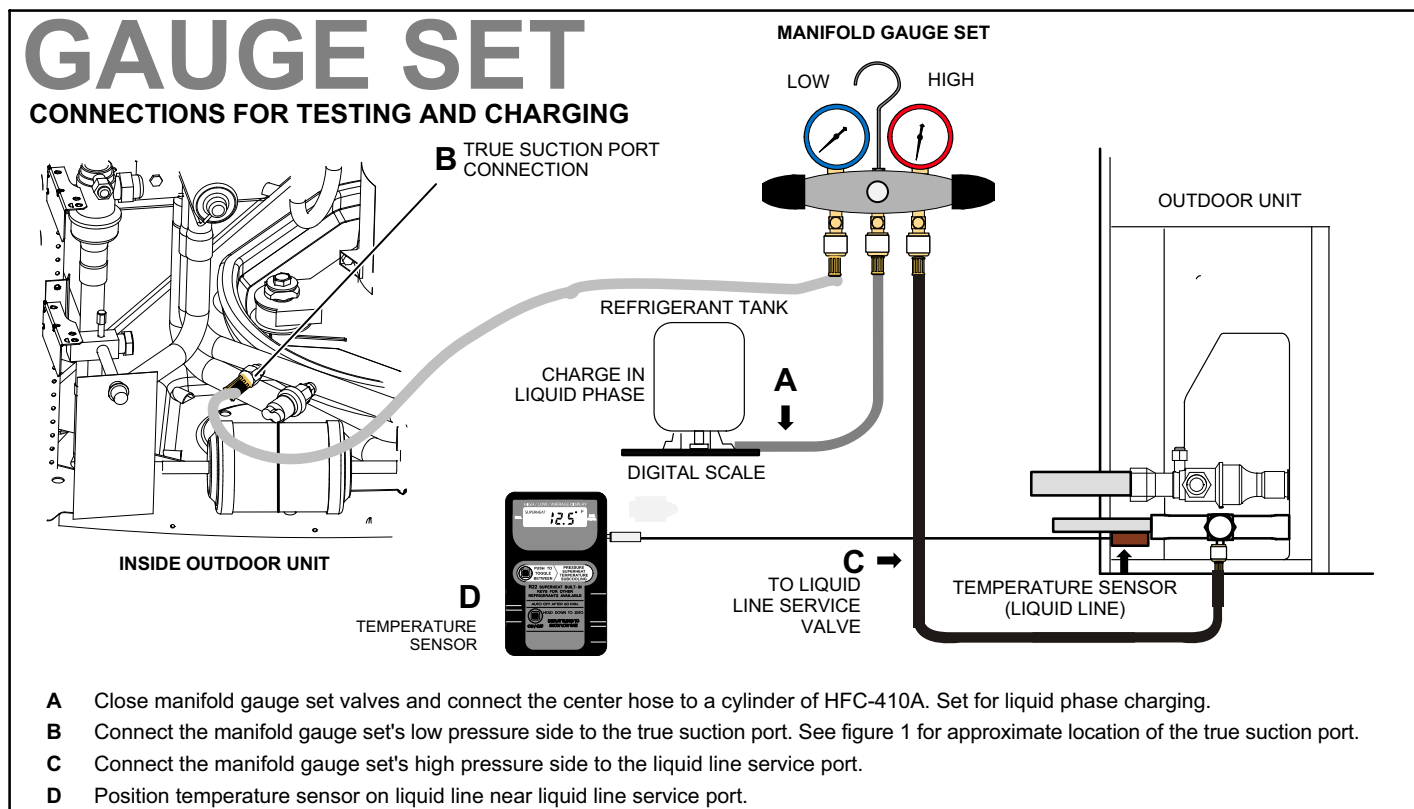


Figure 29. Gauge Set Setup and Connections



**ADDING OR REMOVING REFRIGERANT**

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

**COOLING MODE INDOOR AIRFLOW CHECK**

Check airflow using the Delta-T (DT) process using the illustration in Figure 30.

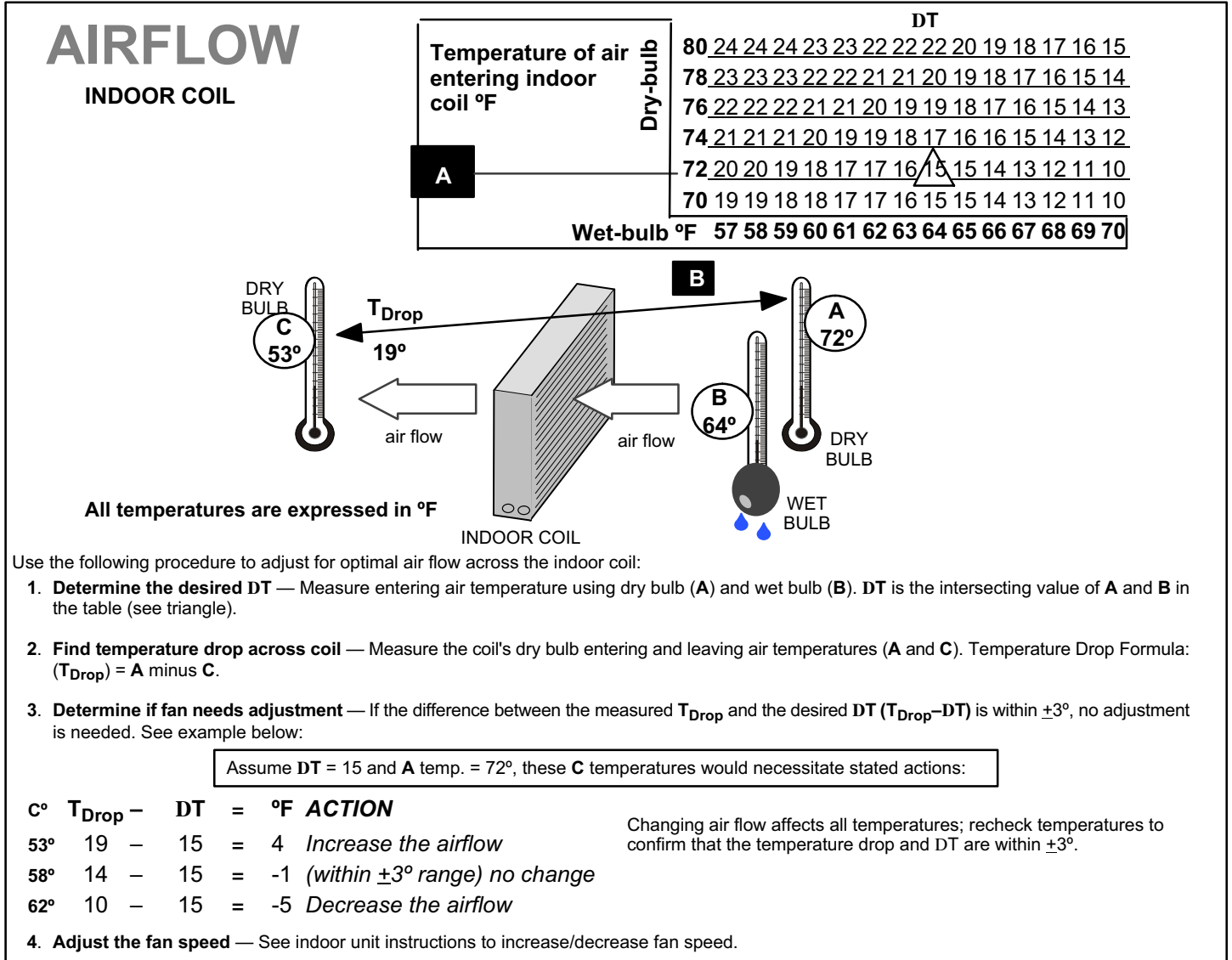
**HEATING MODE INDOOR AIRFLOW CHECK**

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

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

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

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



**Figure 30. Checking Indoor Airflow over Evaporator Coil using Delta-T Chart Formula**

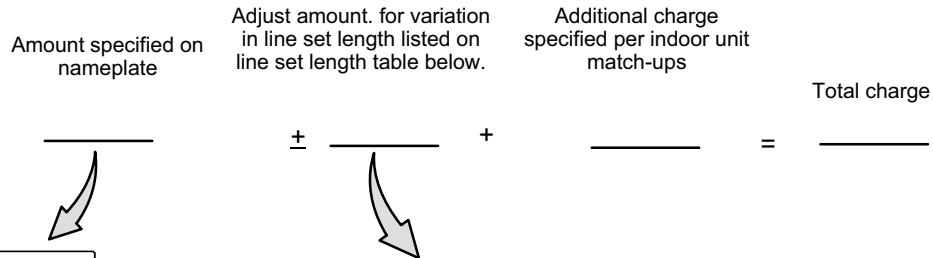
Use **WEIGH IN** method for adding initial refrigerant charge, and then use **SUBCOOLING** method for verifying refrigerant charge.

# 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:



<b>LENNOX</b>	
DALLAS, TEXAS	
M/N TSA036H4N41G	
S/N PPYYMNNNNN	
CONTAINS HFC-410A	DESIGN PRESSURE
FACTORY CHARGE	HI 446 PSIG
8 LBS 9 OZS	LO 236 PSIG
ELECTRICAL RATING	
NOMINAL VOLTS: 460	
3 PH	60 HZ
MIN 414	MAX 506
COMPRESSOR	
FAN MOTOR	
PH	3
PH	1
RLA	5.64
FLA	0.6
LRA	38.0
HP	1/6
WELDED CAPACITY	7.65
WELDED CAPACITY	MAX FUSE OR CIR BRK
WELDED CAPACITY	FUSIBLE/COURE CIRCUIT <sup>2</sup>
WELDED CAPACITY	(RATED/RECOMM)
WELDED CAPACITY	15
PPYYMNNNNN	
LISTED 2SEF CONDENSING UNIT	
FOR OUTDOOR USE	
P-401010	

**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.

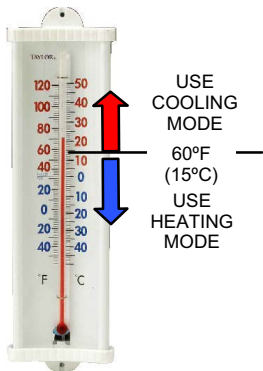
*NOTE — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.*

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

**Figure 31. Using HFC-410A Weigh In Method**

# SUBCOOLING

## CHARGING METHOD



SAT° \_\_\_\_\_  
 LIQ° - \_\_\_\_\_  
 SC° = \_\_\_\_\_

1. Check the airflow as illustrated in figure 30 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 either heat or cooling mode normal operating pressures in the Normal Operating Pressures Tables, Second Stage — High Capacity.

*NOTE — 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 (second stage - high capacity) in the Normal Operating Pressures Tables are based on 70 to 80°F (21-27°C) indoor return air temperature; if necessary, operate heating to reach that temperature range; then set thermostat to cooling mode setpoint to 68°F (20°C) which should call for second-stage (high capacity) cooling. 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 (second-stage - high capacity) in the Normal Operating Pressures Tables are based on 65-75°F (18-24°C) indoor return air temperature; if necessary, operate cooling to reach that temperature range; then set thermostat to heating mode setpoint to 77°F (25°C) which should call for second-stage (high capacity) heating. When pressures have stabilized, continue with Step 6.

6. Read the liquid line temperature; record in the LIQ° space.
7. Read the liquid line pressure; then find its corresponding temperature in the temperature/ pressure chart listed in table 7 and record it in the SAT° space.
8. Subtract LIQ° temperature from SAT° temperature to determine subcooling; record it in SC° space.
9. Compare SC° results with tables under Indoor unit match ups, being sure to note any additional charge for line set and/or match-up.
10. If subcooling value is greater than shown in tables under indoor unit matchups for the applicable unit, remove refrigerant; if less than shown, add refrigerant.
11. If refrigerant is added or removed, repeat steps 5 through 6 to verify charge.
12. Disconnect gauge set and re-install both the liquid and suction service valve caps.

**Figure 32. Using HFC-410A Subcooling Method — Second Stage (High Capacity)**

**Table 7. HFC-410A Temperature (°F) - Pressure (Psig)**

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

## APPENDIX A - UNIT CHARGING STICKERS

This section contains all published charging stickers for the various versions of this model. Below is a table listing the applicable sticker to unit model number.

**Table 8. Applicable Charging Sticker by Unit Model Number**

Unit Model Number	Unit Charging Sticker Numbers					
	401193S	401233S	580094-01	580275-01	580523-01	580655-01
<b>Reference charging stickers above are located at the end of this manual.</b>						
XP16-024-230-XX	-01	-03	-04	-05, -06, -07	-08	
XP16-036-230-XX	-01, -02	-03	-04	-05, -06	-07	-08
XP16-048-230-XX	-01, -02	-03	-04	-05, -06	-07	
XP16-060-230-XX	-01, -02	-03	-04	-05, -06	-07	

# XP16 CHARGING PROCEDURE

If the system is low on charge, follow the appropriate procedure outlined below. Charging should be done with unit operating in the cooling mode, if possible.

## Charge Using The Weigh-in Method—Outdoor Temperature < 65°F (18°C)

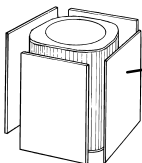
If the system is void of refrigerant, or if the outdoor ambient temperature is cool, the refrigerant charge should be weighed into the unit. Do this after any leaks have been repaired.

1. - Recover the refrigerant from the unit.
2. - Conduct a leak check, then evacuate as previously outlined.
3. - Weigh in the unit nameplate charge. If weighing facilities are not available or if you are charging the unit during warm weather, follow one of the other procedures outlined below.

## Charge Using The Subcooling Method—Outdoor Temperature < 65°F (18°C)

When the outdoor ambient temperature is below 65°F (18°C), use the subcooling method to charge the unit. It may be necessary to restrict the air flow through the outdoor coil to achieve pressures in the 325-375 psig (2240-2585 kPa) range. These higher pressures are necessary for checking the charge. Block equal sections of air intake panels and move obstructions sideways until the liquid pressure is in the 325-375 psig (2240-2585 kPa) range. See figure 1.

Block coil one side at a time with cardboard/plastic until proper testing pressures are reached.



CARDBOARD OR PLASTIC SHEET

Figure 1. Blocking Outdoor Coil

1. - With manifold gauge hose still on the liquid service port and unit operating stably, use a digital thermometer to record the liquid line temperature. At the same time, record the liquid line pressure reading.
2. - Use a temperature/pressure chart for R-410A to determine the saturation temperature for the liquid line pressure reading.
3. - Subtract the liquid line temperature from the saturation temperature (according to the chart) to determine subcooling. (**Saturation temperature - Liquid line temperature = Subcooling**)
4. - Compare subcooling values with those in table 1; if subcooling is greater than shown, recover some refrigerant. If subcooling is less than shown, add some refrigerant.

## Charge Using Normal Operating Pressures/Approach Method—Outdoor Temperature ≥65°F (18°C)

When outdoor ambient temperature is above 65°F (18°C), use approach charge method. For best results, indoor temperature should be 70°F (21°C) to 80°F (26°C). Monitor system pressures while charging.

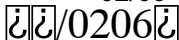
1. - Record outdoor ambient temperature using a digital thermometer.
2. - Attach high pressure gauge set; operate unit for several minutes; allow system pressures to stabilize.
3. - Compare stabilized pressures with those provided in table 3. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. Pressures higher than those listed indicate that the system is overcharged. Pressures lower than those listed indicate that the system is undercharged. Verify adjusted charge using the approach method.
4. - Use the same digital thermometer to check both outdoor ambient temperature and liquid line temperature. Verify the unit charge using the approach method.
5. - The difference between the ambient and liquid temperatures should match values given in table 2. If values do not agree with the those in table 2, add refrigerant to lower the approach temperature or recover refrigerant from the system to increase the approach temperature.

## Using the Normal Operating Pressures Table

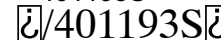
Use table 3 as a general guide when performing maintenance checks. This is not a procedure for charging the unit (see Charging/Checking Charge section). Minor variations in normal operating pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system.

Charging Temperatures and Pressures								
XP16 Model	-024	-036	-048	-060				
<b>Table 1 - Subcooling Values</b>								
Saturation Temperature minus Liquid Line Temperature °F (°C) ± 1°F (0.5°C)								
Temp. °F (°C)	8 (4.4)	7 (3.9)	9 (5)	8 (4.4)				
<b>Table 2 - Approach Values</b>								
Liquid Line Temperature minus Outdoor Ambient Temperature °F (°C) ± 1°F (0.5°C)								
Temp. °F (°C)	8 (4.4)	9 (5)	8 (4.4)	8 (4.4)				
<b>Table 3 - Normal Operating Pressures (Liq. ±10 &amp; Vap. ±5 psig) **</b>								
Temp. °F (°C)*	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
<b>Cooling - First Stage (Low Capacity)</b>								
65 (18.3)	232	146	225	144	235	144	225	138
75 (23.9)	264	148	261	147	268	145	264	141
85 (29.4)	307	149	302	149	310	147	305	142
95 (35.0)	353	151	349	151	356	148	352	146
105 (40.6)	403	153	397	153	407	150	405	148
115 (46.1)	460	155	461	157	466	152	459	150
<b>Cooling - Second Stage (High Capacity)</b>								
65 (18.3)	240	143	239	139	244	140	241	134
75 (23.9)	279	145	278	141	283	141	280	136
85 (29.4)	322	147	322	143	326	144	324	137
95 (35.0)	371	149	367	146	374	147	373	138
105 (40.6)	423	151	426	148	427	148	425	142
115 (46.1)	485	154	489	151	491	151	486	146
<b>Heating - First Stage (Low Capacity)</b>								
40 (4.4)	337	93	328	98	369	75	351	63
50 (10)	322	117	333	118	366	114	335	92
<b>Heating - Second Stage (High Capacity)</b>								
20 (-7.0)	279	62	296	62	311	58	308	59
30 (-1.0)	288	76	309	75	334	72	323	70
40 (4.4)	302	93	322	92	354	89	318	69
50 (10)	306	112	336	113	381	108	329	82
* Outdoor Coil Entering Air Temp. °F (°C)								
** These are most-popular-match-up pressures. Indoor match up, indoor air quality, and indoor load cause pressures to vary.								

02/06



401193S



# HEAT PUMP CHARGING PROCEDURE

**FOR COMPLETE CHARGING DETAILS, REFER TO THE OUTDOOR UNIT INSTALLATION INSTRUCTION.**

**Table 1 - Normal Operating Pressures (Liquid  $\pm 10$  & Suction  $\pm 5$  psig)**

## Maintenance checks using the Normal Operating Pressures table

Table 1 may be used to help perform maintenance checks. This table is not a procedure for charging the system and any minor variations in the pressures may be expected due to differences in installations. However, significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system. The values in this Table 2 are "most-popular-match-up" pressures; indoor match up, indoor air quantity, and indoor load will cause the pressures to vary.

## Match-ups/Charge Levels and Lineset Lengths

Table 2 lists all the Lennox recommended indoor unit match-ups along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) linesets; be sure to consider any difference in lineset length (see Installation Instructions for more details).

## Charge Using the Weigh-in Method

If the system is void of refrigerant, locate and repair any leaks and then weigh in the refrigerant charge into the unit. For charge adjustments, be sure to consider lineset length differences and, referring to table 2, adjust for the matchup difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct leak check; evacuate as previously outlined.
- 3 - Weigh in the unit nameplate charge, adjusting for matchup and lineset length differences. If weighing facilities are not available use the Subcooling method.

## Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the heating mode to adjust the charge using the subcooling charge levels (table ). Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

*Temperature of the air entering the outdoor coil.	Model	-024	-036	-048	-060
		XP16 Only	XP16/SPB Residential Products		
	°F (°C)*	Liquid Line Pressure/Vapor Line Pressure			
Cooling First Stage (Low Capacity)	65 (18)	232 / 146	225 / 144	235 / 144	225 / 138
	75 (24)	264 / 148	261 / 147	268 / 145	264 / 141
	85 (29)	307 / 149	302 / 149	310 / 147	305 / 142
	95 (35)	353 / 151	349 / 151	356 / 148	352 / 146
	105 (41)	403 / 153	397 / 153	407 / 150	405 / 148
Cooling Second Stage (High Capacity)	115 (45)	460 / 155	461 / 157	466 / 152	459 / 150
	65 (18)	240 / 143	239 / 139	244 / 140	241 / 134
	75 (24)	279 / 145	278 / 141	283 / 141	280 / 136
	85 (29)	322 / 147	322 / 143	326 / 144	324 / 137
	95 (35)	371 / 149	367 / 146	374 / 147	373 / 138
Heating First Stage (Low Capacity)	105 (41)	423 / 151	426 / 148	427 / 148	425 / 142
	115 (45)	485 / 154	489 / 151	491 / 151	486 / 146
	50 (10)	322 / 117	333 / 118	366 / 114	335 / 92
Heating Second Stage (High Capacity)	40 (4.5)	337 / 93	328 / 98	369 / 75	351 / 63
	50 (10)	306 / 112	336 / 113	381 / 108	329 / 82
	40 (4.5)	302 / 93	322 / 92	354 / 89	318 / 69
	30 (-1)	288 / 76	309 / 75	334 / 72	323 / 70
	20 (-7)	279 / 62	296 / 62	311 / 58	308 / 59

**Table 2 - Indoor Units Matchups and Subcooling Charge Levels**

INDOOR MATCHUP	HEAT PUMP	Target Subcooling Heat Cool (±5°F)		**Add charge	INDOOR MATCHUP	HEAT PUMP	Target Subcooling Heat Cool (±1°F)		**Add charge	INDOOR MATCHUP	HEAT PUMP	Target Subcooling Heat Cool (±1°F)		**Add charge			
		lb	oz				lb	oz				lb	oz				
XP16-024				XP16-036/SPB				XP16-048/SPB				XP16-060/SPB					
CBX26UH-018		20	8	1	5	CH23-51		17	7	0	13	CH23-68		15	13	0	7
CBX26UH-024		20	8	1	5	CH23-65		12	8	1	10	CB27UH-048		17	7	0	0
CB27UH-024		12	6	0	12	CBX26UH-030		25	8	1	14	CB27UH-060		17	7	0	0
CB27UH-030		13	9	1	12	CBX26UH-036		25	8	1	14	CB30U-51, -65		17	7	0	0
CB30U-21/26		12	6	0	12	CB27UH-036		17	8	2	4	CBX32M-048, -060		17	7	0	0
CB30U-31		13	9	1	12	CB27UH-042		17	8	2	4	CBX32MV-068		16	10	0	3
CBX32M-018/024		12	6	0	12	CB30U-31		17	6	0	0	CH33-60D-2F		18	4	0	2
CBX32M-030		13	9	1	12	CB30U-41/46		17	8	2	4	CH33-62D-2F		15	10	0	4
CBX32MV-024/030		13	9	1	12	CBX32M-030		17	6	0	0	CR33-60		40	4	0	2
CBX32MV-036		12	9	0	10	CBX32M-036		17	8	2	4	CX34-60D-6F		18	4	0	2
CH33-25B		17	4	0	0	CBX32MV-024/030		17	6	0	0	CX34-62D-6F		16	8	0	2
CH33-36A-2F		12	6	0	10	CBX32MV-036		17	8	2	4	<b>XP16XP16-060/SPB</b>					
CH33-36B-2F		17	4	0	0	C33-44C		17	8	1	14	CH23-68		13	14	3	3
CH33-36C-2F		12	7	1	2	CH33-42B-2F		17	7	0	13	CH23-65		18	2	0	0
CR33-24A/B-F		20	4	0	0	CH33-44/48B-2F		12	8	1	8	CBX26UH-060		13	14	3	5
CR33-30/36A/B/C-F		20	8	1	6	CH33-48C-2F		10	8	1	6	CB27UH-060		13	10	2	1
CR33-48		21	9	0	3	CH33-43B		9	10	1	6	CBX32M-060		13	10	2	1
CX34-25A/B-6F		12	6	0	12	CH33-49C		9	10	1	6	CBX32MV-068		13	12	2	9
CX34-31A/B-6F		20	9	1	12	CR33-48B/C-F		25	8	2	0	CH33-60D-2F		15	6	1	3
CX34-36A/B/C-6F		17	5	0	5	CR33-50/60C-F		25	9	0	14	CH33-62D-2F		13	12	2	10
CX34-38A/B-6F Serial No# before 6007K		31	7	0	8	CX34-38A/B-6F Serial No# before 6007K		31	7	1	5	CR33-50/60C-F		30	6	1	3
CX34-38A/B-6F Serial No# 6007K and after		10	8	0	11	CX34-38A/B-6F Serial No# 6007K and after		10	8	1	12	CR33-60D-F		30	6	1	3
CX34-19		18	4	0	1	CX34-43B/C-6F		10	8	1	6	CX34-49C-6F		13	9	1	14
						CX34-60D		9	9	0	14	CX34-60D-6F		15	6	1	3
**Amount of charge required in additional to charge shown on unit nameplate. (Remember to consider lineset length difference.)											CX34-62C-6F		13	11	2	6	
											CX34-62D-6F		13	11	2	5	

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# R-410A CHARGING INFORMATION

FOR COMPLETE CHARGING DETAILS, REFER TO THE OUTDOOR UNIT INSTALLATION INSTRUCTION.

## Maintenance checks using the Normal Operating Pressures table

Table 1 may be used to help perform maintenance checks. This table is not a procedure for charging the system and any minor variations in the pressures may be expected due to differences in installations. However, significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system. The values in this Table 2 are "most-popular-match-up" pressures; indoor match up, indoor air quantity, and indoor load will cause the pressures to vary.

## Match-ups/Charge Levels and Line Set Lengths

Table 2 lists all the Lennox recommended indoor unit match-ups along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) line sets; be sure to consider any difference in line set length (see Installation Instructions for more details).

## Charge Using the Weigh-in Method

If the system is void of refrigerant, locate and repair any leaks and then weigh in the refrigerant charge into the unit. For charge adjustments, be sure to consider line set length differences and, referring to table 2, adjust for the matchup difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct leak check; evacuate as previously outlined.
- 3 - Weigh in the unit nameplate charge, adjusting for matchup and line set length differences. If weighing facilities are not available use the Subcooling method.

## Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the heating mode to adjust the charge using the subcooling charge levels (table ). Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

Table 1 - R-410A Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)

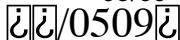
*Temperature of the air entering the outdoor coil.	Model	-024		-036		-048		-060	
		XP16 Only		XP16/SPB Residential Products					
	*°F (°C)*	Liquid Line Pressure		Vapor Line Pressure					
Cooling First Stage (Low Capacity)	65 (18)	232 / 146	225 / 144	235 / 144	225 / 138				
	75 (24)	264 / 148	261 / 147	268 / 145	264 / 141				
	85 (29)	307 / 149	302 / 149	310 / 147	305 / 142				
	95 (35)	353 / 151	349 / 151	356 / 148	352 / 146				
	105 (41)	403 / 153	397 / 153	407 / 150	405 / 148				
Cooling Second Stage (High Capacity)	115 (45)	460 / 155	461 / 157	466 / 152	459 / 150				
	65 (18)	240 / 143	239 / 139	244 / 140	241 / 134				
	75 (24)	279 / 145	278 / 141	283 / 141	280 / 136				
	85 (29)	322 / 147	322 / 143	326 / 144	324 / 137				
	95 (35)	371 / 149	367 / 146	374 / 147	373 / 138				
Heating First Stage (Low Capacity)	105 (41)	423 / 151	426 / 148	427 / 148	425 / 142				
	115 (45)	485 / 154	489 / 151	491 / 151	486 / 146				
	50 (10)	333 / 116	318 / 116	354 / 115	365 / 113				
	40 (4.5)	314 / 88	304 / 89	324 / 92	341 / 89				
	50 (10)	346 / 109	333 / 110	370 / 110	369 / 107				
Heating Second Stage (High Capacity)	40 (4.5)	321 / 89	314 / 88	345 / 92	348 / 86				
	30 (-1)	303 / 74	303 / 77	322 / 70	335 / 73				
	20 (-7)	286 / 59	289 / 63	305 / 61	318 / 59				

Table 2 - R-410A Indoor Coil/Units Matchups and Subcooling Charge Levels

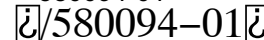
INDOOR MATCHUP	HEAT PUMP	Target Subcooling		*Add charge	INDOOR MATCHUP	HEAT PUMP	Target Subcooling		*Add charge	INDOOR MATCHUP	HEAT PUMP	Target Subcooling		*Add charge	
		Heat ±5°F	Cool ±1°F				Heat ±5°F	Cool ±1°F				Heat ±5°F	Cool ±1°F		
XP16-024					XP16-036/SPB					XP16-048/SPB					
		lb	oz				lb	oz				lb	oz		
CB30U-21/26		12	6	0	12	C33-44C	17	8	1	14	CB27UH-048	17	7	0	0
CB30U-31		13	9	1	12	CB27UH-036	17	8	2	4	CB27UH-060	17	7	0	0
CBX26UH-018		20	8	1	5	CB27UH-042	17	8	2	4	CB30U-51, -65	17	7	0	0
CBX26UH-024		20	8	1	5	CB30U-31	17	6	0	0	CBX32M-048, -060	17	7	0	0
CB27UH-024		12	6	0	12	CB30U-41/46	17	8	2	4	CBX32MV-048, -060	17	7	0	0
CB27UH-030		13	9	1	12	CBX26UH-030	25	8	1	14	CBX32MV-068	16	10	0	3
CBX32M-018/024		12	6	0	12	CBX26UH-036	25	8	1	14	CH23-68	15	13	0	7
CBX32M-030		13	9	1	12	CBX32M-030	17	6	0	0	CH33-60D-2F	18	4	0	2
CBX32MV-024/030		13	9	1	12	CBX32M-036	17	8	2	4	CH33-62D-2F	15	10	0	4
CBX32MV-036		12	9	0	10	CBX32MV-024/030	17	6	0	0	CR33-60	40	4	0	2
CBX40UHV-024, -030		13	9	1	12	CBX32MV-036	17	8	2	4	CX34-60D-6F	18	4	0	2
CBX40UHV-036		12	9	0	10	CBX40UHV-024, -030	17	6	0	0	CX34-62D-6F	16	8	0	2
CH33-25B		17	4	0	0	CBX40UHV-036, -042	17	8	2	4	XP16-060/SPB			lb	oz
CH33-36A-2F		12	6	0	10	CH23-51	17	7	0	13	CB27UH-060	13	10	2	1
CH33-36B-2F		17	4	0	0	CH23-65	12	8	1	10	CBX26UH-060	13	14	3	5
CH33-36C-2F		12	7	1	2	CH33-42B-2F	17	7	0	13	CBX32M-060	13	10	2	1
CR33-24A/B-F		20	4	0	0	CH33-44/48B-2F	12	8	1	8	CBX32MV-060	13	10	2	1
CR33-30/36A/B/C-F		20	8	1	6	CH33-48C-2F	10	8	1	6	CBX32MV-068	13	12	2	9
CR33-48		21	9	0	3	CH33-43B	9	10	1	6	CH23-68	13	14	3	3
CX34-25A/B-6F		12	6	0	12	CH33-49C	9	10	1	6	CH23-65	18	2	0	0
CX34-31A/B-6F		20	9	1	12	CR33-48B/C-F	25	8	2	0	CH33-60D-2F	15	6	1	3
CX34-36A/B/C-6F		17	5	0	5	CR33-50/60C-F	25	9	0	14	CH33-62D-2F	13	12	2	10
CX34-38A/B-6F <i>SN before 6007K</i>		31	7	0	8	CX34-38A/B-6F <i>SN before 6007K</i>	31	7	1	5	CR33-50/60C-F	30	6	1	3
CX34-38A/B-6F <i>SN 6007K and after</i>		10	8	0	11	CX34-38A/B-6F <i>SN 6007K and after</i>	10	8	1	12	CR33-60D-F	30	6	1	3
CX34-19		18	4	0	1	CX34-43B/C-6F	10	8	1	6	CX34-49C-6F	13	9	1	14
<i>SN indicates coil serial number.</i>						CX34-60D	9	9	0	14	CX34-60D-6F	15	6	1	3
											CX34-62C-6F	13	11	2	6
											CX34-62D-6F	13	11	2	5

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

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# HFC-410A CHARGING INFORMATION

FOR COMPLETE CHARGING DETAILS, REFER TO THE OUTDOOR UNIT INSTALLATION INSTRUCTION.

## Maintenance checks using the Normal Operating Pressures table

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Table 2 lists all the Lennox recommended indoor unit match-ups along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) line sets; be sure to consider any difference in line set length (see Installation Instructions for more details).

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If the system is void of refrigerant, locate and repair any leaks and then weigh in the refrigerant charge into the unit. For charge adjustments, be sure to consider line set length differences and, referring to table 2, adjust for the matchup difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct leak check; evacuate as previously outlined.
- 3 - Weigh in the unit nameplate charge, adjusting for matchup and line set length differences. If weighing facilities are not available use the Subcooling method.

## Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the heating mode to adjust the charge using the subcooling charge levels (table ). Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

Table 1 - HFC-410A Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)

Model	-024		-036		-048		-060		
	XP16 Only		XP16 and SPB*H4						
	°F (°C)	Liq	Va p	Liq	Va p	Liq	Va p	Liq	Va p
<b>Normal Operating Pressures - Cooling</b>									
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	220	141	224	143	230	137
	75 (23.9)	260	145	254	144	259	143	267	139
	85 (29.4)	301	148	295	148	302	147	311	141
	95 (35.0)	346	151	340	150	346	149	357	144
	105 (40.6)	396	153	389	153	396	152	398	147
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	444	156	450	155	453	149
	65 (18.3)	241	140	232	129	238	138	232	131
	75 (23.9)	279	142	269	136	278	140	276	133
	85 (29.4)	321	144	312	140	321	142	320	136
	95 (35.0)	369	146	346	142	372	144	367	138
105 (40.6)	421	148	409	145	424	147	421	141	
115 (46.1)	480	151	465	148	481	149	479	144	
<b>Normal Operating Pressures - Heating</b>									
First Stage (Low Capacity) Pressure	50 (10)	312	112	350	115	336	114	385	108
	60 (15.5)	330	130	372	136	363	135	414	126
Second Stage (High Capacity) Pressure	20 (-7.0)	299	64	321	61	289	57	332	59
	30 (-1.0)	312	79	347	74	294	69	349	67
	40 (4.4)	325	93	367	90	321	80	361	75
	50 (10)	344	110	387	110	341	110	383	85
60 (15.5)	358	128	395	131	361	128	425	122	

Table 2 - HFC-410A Indoor Coil/Units Matchups and Subcooling Charge Levels

Indoor Unit Match-up	Heating ±5°F	Cooling ±1°F	*Add Charge		Indoor Unit Match-up	Heating ±5°F	Cooling ±1°F	*Add Charge		Indoor Unit Match-up	Heating ±5°F	Cooling ±1°F	*Add Charge	
	Subcooling	Subcooling	lb.	oz.		Subcooling	Subcooling	lbs.	oz.		Subcooling	Subcooling	lbs.	oz.
<b>XP16-024</b>														
					CBX40UHV-042	24	11	3	0	CH33-60D	13	8	0	0
CBX26UH-024	45	6	0	15	CBX40UHV-048	24	11	3	0	CH33-62D	11	9	1	4
CBX27UH-024-230	20	7	0	9	CH33-43B	13	10	2	7	CR33-50/60C	15	7	0	10
CBX27UH-030-230	17	7	1	3	CH33-48C	37	11	2	11	CR33-60D	16	7	0	10
CBX32MV-024/030	20	7	0	9	CH33-43C	37	11	2	11	CX34-60D	14	8	1	0
CBX32MV-036	17	7	1	3	CR33-48B/C	49	7	0	9	CX34-62D	9	9	1	6
CBX40UHV-024	17	7	1	3	CX34-43B/C	29	9	2	11	CX34-62C	8	9	1	9
CBX40UHV-030	17	7	1	3	CX34-50/60C	29	9	2	11	<b>XP16/SPB*H4-060</b>				
CBX40UHV-036	17	7	1	3	<b>XP16/SPB*H4-048</b>					CBX26UH-060	20	9	4	13
CH33-31B	31	8	1	12	CBX26UH-048-230	10	8	1	4	CBX27UH-060-230	10	6	2	3
CR33-30/36A/B/C	45	4	0	0	CBX27UH-048-230	19	9	1	4	CBX32M-060	17	6	1	12
CX34-31A/B	24	7	1	11	CBX27UH-060-230	13	14	3	3	CBX32MV-060	17	6	1	12
CX34-38A/B	18	8	1	10	CBX32M-048	19	9	1	4	CBX32MV-068	15	7	2	1
<b>XP16/SPB*H4-036</b>					CBX32M-060	14	9	1	11	CBX40UHV-060	17	6	1	12
CBX26UH-036	50	5	0	0	CBX32MV-048	19	9	1	4	CH23-68	37	9	2	10
CBX27UH-036-230	22	7	0	9	CBX32MV-060	14	9	1	11	CH33-50/60C	33	8	1	0
CBX27UH-042-230	24	11	3	0	CBX32MV-068	9	8	1	11	CH33-62D	16	7	1	4
CBX32M-036	22	7	0	9	CBX40UHV-048	19	9	1	4	CR33-50/60C	24	7	0	0
CBX32MV-036	22	7	0	9	CBX40UHV-060	14	9	1	11	CR33-60D	24	7	0	0
CBX32MV-048	24	11	3	0	CH23-68	24	10	1	12	CX34-62C	21	9	2	16
CBX40UHV-030	22	7	0	9	CH33-49C	19	9	2	5	CX34-62D	13	7	1	4
CBX40UHV-036	22	7	0	9	CH33-50/60C	19	9	2	5	*Amount of charge required in additional to charge shown on unit nameplate. (Remember to consider line set length difference.)				

# HFC-410A CHARGING INFORMATION

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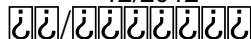
**Table 1 - Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)**

Model	Size	-024		-036		-048		-060		
	°F (°C)	Liq	Vap	Liq	Vap	Liq	Vap	Liq	Vap	
										XP16
Normal Operating Pressures - Cooling										
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	220	144	224	143	230	137	
	75 (23.9)	260	145	254	146	259	145	269	139	
	85 (29.4)	301	148	295	148	297	147	313	142	
	95 (35.0)	346	151	338	150	346	149	361	144	
	105 (40.6)	396	153	389	153	395	151	411	147	
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	444	156	452	155	466	151	
	65 (18.3)	240	142	234	138	232	138	237	131	
	75 (23.9)	278	144	269	140	271	140	275	133	
	85 (29.4)	325	147	311	142	313	142	319	135	
	95 (35.0)	372	149	355	144	362	145	368	138	
Normal Operating Pressures - Heating	105 (40.6)	423	151	409	145	415	147	419	141	
	115 (46.1)	484	153	463	149	473	150	479	145	
	First Stage (Low Capacity) Pressure	50 (10)	334	116	350	119	332	115	369	112
		60 (15.5)	358	134	382	138	352	132	394	120
	Second Stage (High Capacity) Pressure	20 (-7.0)	288	66	334	67	288	62	321	60
30 (-1.0)		308	81	359	82	301	75	335	71	
40 (4.4)		327	96	391	95	318	92	363	90	
50 (10)		350	113	414	112	337	109	380	107	
60 (15.5)	373	132	445	128	355	126	403	126		

**Table 2 - HFC-410A Indoor Coil/Units Matchups and Subcooling Charge Levels**

Indoor Unit Match-up	Heating ±5°F	Cooling ±1°F	*Add Charge		Indoor Unit Match-up	Heating ±5°F	Cooling ±1°F	*Add Charge		Indoor Unit Match-up	Heating ±5°F	Cooling ±1°F	*Add Charge	
	Subcooling	lb.	oz.	Subcooling		lbs.	oz.	Subcooling	lbs.		oz.			
<b>XP16-024</b>														
					CBX40UHV-042	24	11	3	0	CH33-60D	13	6	0	0
CBX26UH-024	45	6	0	15	CBX40UHV-048	24	11	3	0	CH33-62D	11	7	1	4
CBX27UH-024-230	20	7	0	9	CH33-43B	13	10	2	7	CR33-50/60C	15	5	0	10
CBX27UH-030-230	17	7	1	3	CH33-48C	37	11	2	11	CR33-60D	16	5	0	10
CBX32MV-024/030	20	7	0	9	CH33-43C	37	11	2	11	CX34-60D	14	6	1	0
CBX32MV-036	17	7	1	3	CR33-48B/C	49	7	0	9	CX34-62D	9	7	1	6
CBX40UHV-024	17	7	1	3	CX34-43B/C	29	9	2	11	CX34-62C	8	7	1	9
CBX40UHV-030	17	7	1	3	CX34-50/60C	29	9	2	11	<b>XP16/SPB*H4-060</b>				
CBX40UHV-036	17	7	1	3	<b>XP16/SPB*H4-048</b>					CBX26UH-060	20	9	4	13
CH33-31B	31	8	1	12	CBX26UH-048-230	10	6	1	4	CBX27UH-060-230	10	6	2	3
CR33-30/36A/B/C	45	4	0	0	CBX27UH-048-230	19	7	1	4	CBX32M-060	17	6	1	12
CX34-31A/B	24	7	1	11	CBX27UH-060-230	13	12	3	3	CBX32MV-060	17	5	1	12
CX34-38A/B	18	8	1	10	CBX32M-048	19	7	1	4	CBX32MV-068	15	7	2	1
<b>XP16/SPB*H4-036</b>														
					CBX32M-060	14	7	1	11	CBX40UHV-060	17	6	1	12
CBX26UH-036	50	5	0	0	CBX32MV-048	19	7	1	4	CH23-68	37	9	2	10
CBX27UH-036-230	22	7	0	9	CBX32MV-060	14	7	1	11	CH33-50/60C	33	8	1	0
CBX27UH-042-230	24	11	3	0	CBX32MV-068	9	6	1	11	CH33-62D	16	7	1	4
CBX32M-036	22	7	0	9	CBX40UHV-048	19	7	1	4	CR33-50/60C	24	7	0	0
CBX32MV-036	22	7	0	9	CBX40UHV-060	14	7	1	11	CR33-60D	24	7	0	0
CBX32MV-048	24	11	3	0	CH23-68	24	8	1	12	CX34-62C	21	9	2	16
CBX40UHV-030	22	7	0	9	CH33-49C	19	7	2	5	CX34-62D	13	7	1	4
CBX40UHV-036	22	7	0	9	CH33-50/60C	19	7	2	5	*Amount of charge required in additional to charge shown on unit nameplate. (Remember to consider line set length difference.)				

12/2012



# HFC-410A CHARGING INFORMATION

## Maintenance Checks Using the Normal Operating Pressures Table

Table 1 may be used to help perform maintenance checks. This table is not a procedure for charging the system. Minor variations in the pressures can be expected due to differences in installations. However, significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

## Match-Ups/Charge Levels and Line Set Lengths

Table 2 lists all the Lennox recommended indoor unit match-ups along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) line sets; consider any difference in line set length (see Installation Instructions for more details).

## Charge Using the Weigh-In Method

If the system is void of refrigerant, locate and repair any leaks, then weigh the refrigerant charge into the unit. For charge adjustments, consider line set length differences and, referring to table 2, adjust for the match-up difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct a leak check and then evacuate the system.
- 3 - Weigh in the unit nameplate charge, adjusting for match-up and line set length differences. If weighing facilities are not available, use the Subcooling method.

*NOTE - See system installation instructions to calculate charge required for longer line sets.*

## Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the subcooling method to adjust the charge using the subcooling charge levels in table 2. Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

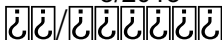
**Table 1 - Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)**

	Size	-024		-036		-048		-060	
	Model	XP16							
	°F (°C)	Liq	Vap	Liq	Vap	Liq	Vap	Liq	Vap
Normal Operating Pressures (psig) – Cooling									
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	216	142	224	143	230	137
	75 (23.9)	260	145	251	144	259	145	269	139
	85 (29.4)	301	148	291	146	297	147	313	142
	95 (35.0)	346	151	337	148	346	149	361	144
	105 (40.6)	396	153	382	150	395	151	411	147
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	438	153	452	155	466	151
	65 (18.3)	240	142	227	134	232	138	237	131
	75 (23.9)	278	144	261	138	271	140	275	133
	85 (29.4)	325	147	305	140	313	142	319	135
	95 (35.0)	372	149	349	142	362	145	368	138
Normal Operating Pressures (psig) – Heating	105 (40.6)	423	151	401	144	415	147	419	141
	115 (46.1)	484	153	463	146	473	150	479	145
	50 (10)	334	116	384	119	332	115	369	112
	60 (15.5)	358	134	410	139	352	132	394	120
	Second Stage (High Capacity) Pressure	20 (-7.0)	288	66	334	67	288	62	321
30 (-1.0)		308	81	362	82	301	75	335	71
40 (4.4)		327	96	373	95	318	92	363	90
50 (10)		350	113	400	114	337	109	380	107
60 (15.5)		373	132	427	133	355	126	403	126

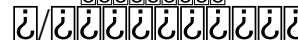
**Table 2 - HFC-410A Indoor Coil/Units Match-Ups and Subcooling Charge Levels**

Indoor Unit Match-Up	Heating ±5°F	Cooling ±1°F	*Add Charge		Indoor Unit Match-Up	Heating ±5°F	Cooling ±1°F	*Add Charge		Indoor Unit Match-Up	Heating ±5°F	Cooling ±1°F	*Add Charge	
	Subcooling	lb.	oz.	Subcooling		lbs.	oz.	Subcooling	lbs.		oz.			
<b>XP16-024</b>														
					CBX40UHV-048	17	9	1	1	CH33-60D	13	6	0	0
CBX26UH-024	45	6	0	15	CH33-43B	11	7	0	11	CH33-62D	11	7	1	4
CBX27UH-024-230	20	7	0	9	CH33-48C	20	7	1	2	CR33-50/60C	15	5	0	10
CBX27UH-030-230	17	7	1	3	CH33-43C	21	7	0	15	CR33-60D	16	5	0	10
CBX32MV-024/030	20	7	0	9	CR33-48B	53	6	0	0	CX34-60D	14	6	1	0
CBX32MV-036	17	7	1	3	CR33-48C	53	6	0	0	CX34-62D	9	7	1	6
CBX40UHV-024	17	7	1	3	CX34-43B/C	15	7	0	11	CX34-62C	8	7	1	9
CBX40UHV-030	17	7	1	3	CX34-50/60C	15	7	0	11	<b>XP16/SPB*H4-060</b>				
CBX40UHV-036	17	7	1	3	<b>XP16/SPB*H4-048</b>					CBX26UH-060	20	9	4	13
CH33-31B	31	8	1	12	CBX26UH-048-230	10	6	1	4	CBX27UH-060-230	10	6	2	3
CR33-30/36A/B/C	45	4	0	0	CBX27UH-048-230	19	7	1	4	CBX32M-060	17	6	1	12
CX34-31A/B	24	7	1	11	CBX27UH-060-230	13	12	3	3	CBX32MV-060	17	5	1	12
CX34-38A/B	18	8	1	10	CBX32M-048	19	7	1	4	CBX32MV-068	15	7	2	1
<b>XP16/SPB*H4-036</b>					CBX32M-060	14	7	1	11	CBX40UHV-060	17	6	1	12
CBX27UH-036-230	25	7	1	6	CBX32MV-048	19	7	1	4	CH23-68	37	9	2	10
CBX27UH-042-230	17	9	1	1	CBX32MV-060	14	7	1	11	CH33-50/60C	33	8	1	0
CBX32M-036	24	7	1	6	CBX32MV-068	9	6	1	11	CH33-62D	16	7	1	4
CBX32MV-036	24	7	1	6	CBX40UHV-048	19	7	1	4	CR33-50/60C	24	7	0	0
CBX32MV-048	17	9	1	1	CBX40UHV-060	14	7	1	11	CR33-60D	24	7	0	0
CBX40UHV-030	24	7	1	6	CH23-68	24	8	1	12	CX34-62C	21	9	2	16
CBX40UHV-036	24	7	1	6	CH33-49C	19	7	2	5	CX34-62D	13	7	1	4
CBX40UHV-042	17	9	1	1	CH33-50/60C	19	7	2	5	*Amount of charge required in addition to charge shown on unit nameplate. (Does not include additional charge required for extended line set lengths.)				

8/2013



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# HFC-410A CHARGING INFORMATION – FOR COMPLETE CHARGING DETAILS, REFER TO THE OUTDOOR UNIT INSTALLATION AND SERVICE PROCEDURE

## Maintenance Checks Using the Normal Operating Pressures Table

Table 1 may be used to help perform maintenance checks. This table is not a procedure for charging the system. Minor variations in the pressures can be expected due to differences in installations. However, significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

## Match-Ups/Charge Levels and Line Set Lengths

Table 2 lists all the Lennox recommended indoor unit match-ups along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) line sets; consider any difference in line set length (see Installation Instructions for more details).

## Charge Using the Weigh-In Method

If the system is void of refrigerant, locate and repair any leaks, then weigh the refrigerant charge into the unit. For charge adjustments, consider line set length differences and, referring to table 2, adjust for the match-up difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct a leak check and then evacuate the system.
- 3 - Weigh in the unit nameplate charge, adjusting for match-up and line set length differences. If weighing facilities are not available, use the Subcooling method.

*NOTE - See system installation instructions to calculate charge required for longer line sets.*

## Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the subcooling method to adjust the charge using the subcooling charge levels in table 2. Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

**Table 1 - Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)**

	Size °F (°C)	-024		-036		-048		-060	
		Liq	Vap	Liq	Vap	Liq	Vap	Liq	Vap
Normal Operating Pressures (psig) – Cooling									
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	216	142	224	143	230	137
	75 (23.9)	260	145	251	144	259	145	269	139
	85 (29.4)	301	148	291	146	297	147	313	142
	95 (35.0)	346	151	337	148	346	149	361	144
	105 (40.6)	396	153	382	150	395	151	411	147
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	438	153	452	155	466	151
	65 (18.3)	240	142	227	134	232	138	237	131
	75 (23.9)	278	144	261	138	271	140	275	133
	85 (29.4)	325	147	305	140	313	142	319	135
	95 (35.0)	372	149	349	142	362	145	368	138
	105 (40.6)	423	151	401	144	415	147	419	141
	115 (46.1)	484	153	463	146	473	150	479	145
Normal Operating Pressures (psig) – Heating									
First Stage (Low Capacity) Pressure	50 (10)	334	116	384	119	332	115	369	112
	60 (15.5)	358	134	410	139	352	132	394	120
Second Stage (High Capacity) Pressure	20 (-7.0)	288	66	334	67	288	62	321	60
	30 (-1.0)	308	81	362	82	301	75	335	71
	40 (4.4)	327	96	373	95	318	92	363	90
	50 (10)	350	113	400	114	337	109	380	107
	60 (15.5)	373	132	427	133	355	126	403	126

**Table 2 - HFC-410A Indoor Coil/Units Match-Ups and Subcooling Charge Levels**

Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge		Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge		Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge	
	Subcooling		lb.	oz.		Subcooling		lb.	oz.		Subcooling		lb.	oz.
<b>XP16-024</b>														
	45	9	0	15	CBX40UHV-042	17	9	1	1	CH33-50/60C	19	7	2	5
CBX25UHV-030	45	6	0	15	CBX40UHV-048	17	9	1	1	CH33-60D	13	6	0	0
CBX26UH-024	45	7	0	9	CH33-43B	11	7	0	11	CH33-62D	11	7	1	4
CBX27UH-024-230	20	7	0	9	CH33-48C	20	7	1	2	CR33-50/60C	15	5	0	10
CBX27UH-030-230	17	7	1	3	CH33-43C	21	7	0	15	CR33-60D	16	5	0	10
CBX32MV-024/030	20	7	0	9	CR33-48B	53	6	0	0	CX34-60D	14	6	1	0
CBX32MV-036	17	7	1	3	CR33-48C	53	6	0	0	CX34-62D	9	7	1	6
CBX40UHV-024	17	7	1	3	CX34-43B/C	15	7	0	11	CX34-62C	8	7	1	9
CBX40UHV-030	17	7	1	3	CX34-50/60C	15	7	0	11	<b>XP16/SPB*H4-060</b>				
CBX40UHV-036	17	7	1	3	<b>XP16/SPB*H4-048</b>				CBX25UHV-060	15	4	1	10	
CH33-31B	31	8	1	12	CBX25UHV-048	12	7	0	4	CBX26UH-060	20	9	4	13
CR33-30/36A/B/C	45	4	0	0	CBX26UH-048-230	10	6	1	4	CBX27UH-060-230	10	6	2	3
CX34-31A/B	24	7	1	11	CBX27UH-048-230	19	7	1	4	CBX32M-060	17	6	1	12
CX34-38A/B	18	8	1	10	CBX27UH-060-230	13	12	3	3	CBX32MV-060	17	5	1	12
<b>XP16/SPB*H4-036</b>					CBX32M-048	19	7	1	4	CBX32MV-068	15	7	2	1
CBX25UH-036	59	7	0	15	CBX32M-060	14	7	1	11	CBX40UHV-060	17	6	1	12
CBX25UHV-036														
CBX27UH-036-230	25	7	1	6	CBX32MV-048	19	7	1	4	CH23-68	37	9	2	10
CBX27UH-042-230	17	9	1	1	CBX32MV-060	14	7	1	11	CH33-50/60C	33	8	1	0
CBX32M-036	24	7	1	6	CBX32MV-068	9	6	1	11	CH33-62D	16	7	1	4
CBX32MV-036	24	7	1	6	CBX40UHV-048	19	7	1	4	CR33-50/60C	24	7	0	0
CBX32MV-048	17	9	1	1	CBX40UHV-060	14	7	1	11	CR33-60D	24	7	0	0
CBX40UHV-030	24	7	1	6	CH23-68	24	8	1	12	CX34-62C	21	9	2	16
CBX40UHV-036	24	7	1	6	CH33-49C	19	7	2	5	CX34-62D	13	7	1	4
										*Amount of charge required in addition to charge shown on unit nameplate. (Does not include additional charge required for extended line set lengths.)				

0215



580655-01

# HFC-410A CHARGING INFORMATION – FOR COMPLETE CHARGING PROCEDURES, REFER TO THE APPLICABLE INSTALLATION OR SERVICE MANUAL

## Maintenance Checks Using the Normal Operating Pressures Table

Table 1 may be used to help perform maintenance checks. This table is not a procedure for charging the system. Minor variations in the pressures can be expected due to differences in installations. However, significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

## Matched System Components/Charge Levels/Line Set Lengths/Liquid Line Sizing

Table 2 lists all the Lennox recommended indoor unit matches along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) line sets; consider line set length and liquid line sizing differences when calculating charge adjustments. For each additional foot of 3/8" liquid line set, add 0.6 ounces or for 1/2" liquid lines, add 1.0 ounce of additional charge.

## Charge Using the Weigh-In Method

If the system is void of refrigerant, locate and repair any leaks, then weigh the refrigerant charge into the unit. For charge adjustments, consider line set length differences and, referring to table 2, adjust for the match-up difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct a leak check and then evacuate the system.
- 3 - Weigh in the unit nameplate charge, adjusting for match-up and line set length differences. If weighing facilities are not available, use the Subcooling method.

## Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the subcooling method to adjust the charge using the subcooling charge levels in table 2. Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

**Table 1 - Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)**

	Size °F (°C)	-024		-036		-048		-060		
		Liq	Vap	Liq	Vap	Liq	Vap	Liq	Vap	
Normal Operating Pressures (psig) – Cooling										
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	216	142	224	143	230	137	
	75 (23.9)	260	145	251	144	259	145	269	139	
	85 (29.4)	301	148	291	146	297	147	313	142	
	95 (35.0)	346	151	337	148	346	149	361	144	
	105 (40.6)	396	153	382	150	395	151	411	147	
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	438	153	452	155	466	151	
	65 (18.3)	240	142	227	134	232	138	237	131	
	75 (23.9)	278	144	261	138	271	140	275	133	
	85 (29.4)	325	147	305	140	313	142	319	135	
	95 (35.0)	372	149	349	142	362	145	368	138	
Normal Operating Pressures (psig) – Heating	105 (40.6)	423	151	401	144	415	147	419	141	
	115 (46.1)	484	153	463	146	473	150	479	145	
	First Stage (Low Capacity) Pressure	50 (10)	334	116	384	119	332	115	369	112
		60 (15.5)	358	134	410	139	352	132	394	120
	Second Stage (High Capacity) Pressure	20 (-7.0)	288	66	334	67	288	62	321	60
30 (-1.0)		308	81	362	82	301	75	335	71	
40 (4.4)		327	96	373	95	318	92	363	90	
50 (10)		350	113	400	114	337	109	380	107	
	60 (15.5)	373	132	427	133	355	126	403	126	

**Table 2 - HFC-410A Indoor Coil/Units Match-Ups and Subcooling Charge Levels**

Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge		Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge		Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge	
	Subcooling		lb.	oz.		Subcooling		lb.	oz.		Subcooling		lb.	oz.
<b>XP16-024</b>														
					CBX40UHV-042	17	9	1	1	CH33-50/60C	19	7	2	5
CBX25UHV-024	49	5	0	0	CH33-43C	21	7	0	15	CR33-60D	16	5	0	10
CBX25UHV-030	45	9	0	15	CBX40UHV-048	17	9	1	1	CH33-60D	13	6	0	0
CBX26UH-024	45	6	0	15	CH33-43B	11	7	0	11	CH33-62D	11	7	1	4
CBX27UH-024-230	20	7	0	9	CH33-48C	20	7	1	2	CR33-50/60C	15	5	0	10
CBX27UH-030-230	17	7	1	3	CH33-43C	21	7	0	15	CR33-60D	16	5	0	10
CBX32MV-024/030	20	7	0	9	CR33-48B	53	6	0	0	CX34-60D	14	6	1	0
CBX32MV-036	17	7	1	3	CR33-48C	53	6	0	0	CX34-62D	9	7	1	6
CBX40UHV-024	17	7	1	3	CX34-43B/C	15	7	0	11	CX34-62C	8	7	1	9
CBX40UHV-030	17	7	1	3	CX34-50/60C	15	7	0	11	<b>XP16/SPB*H4-060</b>				
CBX40UHV-036	17	7	1	3	<b>XP16/SPB*H4-048</b>				CBX25UHV-060	15	4	1	10	
CH33-31B	31	8	1	12	CBX25UHV-048	12	7	0	4	CBX26UH-060	20	9	4	13
CR33-30/36A/B/C	45	4	0	0	CBX26UH-048-230	10	6	1	4	CBX27UH-060-230	10	6	2	3
CX34-31A/B	24	7	1	11	CBX27UH-048-230	19	7	1	4	CBX32M-060	17	6	1	12
CX34-38A/B	18	8	1	10	CBX27UH-060-230	13	12	3	3	CBX32MV-060	17	5	1	12
<b>XP16/SPB*H4-036</b>														
					CBX32M-048	19	7	1	4	CBX32MV-068	15	7	2	1
CBX25UH-036					CBX32M-060	14	7	1	11	CBX40UHV-060	17	6	1	12
CBX25UHV-036	59	7	0	15	CBX32MV-048	19	7	1	4	CH23-68	37	9	2	10
CBX27UH-036-230	25	7	1	6	CBX32MV-060	14	7	1	11	CH33-50/60C	33	8	1	0
CBX27UH-042-230	17	9	1	1	CBX32MV-068	9	6	1	11	CH33-62D	16	7	1	4
CBX32M-036	24	7	1	6	CBX40UHV-048	19	7	1	4	CR33-60D	24	7	0	0
CBX32MV-036	24	7	1	6	CBX40UHV-060	14	7	1	11	CR33-60D	24	7	0	0
CBX32MV-048	17	9	1	1	CH23-68	24	8	1	12	CX34-62C	21	9	2	16
CBX40UHV-030	24	7	1	6	CH33-49C	19	7	2	5	CX34-62D	13	7	1	4
CBX40UHV-036	24	7	1	6	*Amount of charge required in addition to charge shown on unit nameplate. (Does not include additional charge required for extended line set lengths.)									



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# HFC-410A CHARGING INFORMATION – FOR COMPLETE CHARGING PROCEDURES, REFER TO THE APPLICABLE INSTALLATION OR SERVICE MANUAL

## Maintenance Checks Using the Normal Operating Pressures Table

Table 1 may be used to help perform maintenance checks. This table is not a procedure for charging the system. Minor variations in the pressures can be expected due to differences in installations. However, significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

## Matched System Components/Charge Levels/Line Set Lengths/Liquid Line Sizing

Table 2 lists all the Lennox recommended indoor unit matches along with the charge levels for the various sizes of outdoor units. Charge levels on the unit nameplate are based on installations with 15' (4.6m) line sets; consider line set length and liquid line sizing differences when calculating charge adjustments. For each additional foot of 3/8" liquid line set, add 0.6 ounces or for 1/2" liquid lines, add 1.0 ounce of additional charge.

### Charge Using the Weigh-In Method

If the system is void of refrigerant, locate and repair any leaks, then weigh the refrigerant charge into the unit. For charge adjustments, consider line set length differences and, referring to table 2, adjust for the match-up difference.

- 1 - Recover the refrigerant from the unit.
- 2 - Conduct a leak check and then evacuate the system.
- 3 - Weigh in the unit nameplate charge, adjusting for match-up and line set length differences. If weighing facilities are not available, use the Subcooling method.

### Charge Using the Subcooling Method

**Cooling Mode**—When the outdoor ambient temperature is 60°F (15°C) and above, use the cooling mode to adjust the charge using the subcooling method. Target subcooling values in table 2 are based on 70 to 80°F (21-27°C) indoor return air temperature.

**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the subcooling method to adjust the charge using the subcooling charge levels in table 2. Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

**Table 1 - Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)**

Size	-024		-036		-048		-060			
	°F (°C)	Liq	Vap	Liq	Vap	Liq	Vap	Liq	Vap	
Normal Operating Pressures (psig) – Cooling										
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	216	142	224	143	230	137	
	75 (23.9)	260	145	251	144	259	145	269	139	
	85 (29.4)	301	148	291	146	297	147	313	142	
	95 (35.0)	346	151	337	148	346	149	361	144	
	105 (40.6)	396	153	382	150	395	151	411	147	
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	438	153	452	155	466	151	
	65 (18.3)	240	142	227	134	232	138	237	131	
	75 (23.9)	278	144	261	138	271	140	275	133	
	85 (29.4)	325	147	305	140	313	142	319	135	
	95 (35.0)	372	149	349	142	362	145	368	138	
Normal Operating Pressures (psig) – Heating	105 (40.6)	423	151	401	144	415	147	419	141	
	115 (46.1)	484	153	463	146	473	150	479	145	
	First Stage (Low Capacity) Pressure	50 (10)	334	116	384	119	332	115	369	112
		60 (15.5)	358	134	410	139	352	132	394	120
	Second Stage (High Capacity) Pressure	20 (-7.0)	288	66	334	67	288	62	321	60
30 (-1.0)		308	81	362	82	301	75	335	71	
40 (4.4)		327	96	373	95	318	92	363	90	
50 (10)		350	113	400	114	337	109	380	107	
60 (15.5)	373	132	427	133	355	126	403	126		

**Table 2 - HFC-410A Indoor Coil/Units Match-Ups and Subcooling Charge Levels**

Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge		Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge		Indoor Unit Match-Up	Heating +5°F	Cooling +1°F	*Add Charge	
	Subcooling		lb.	oz.		Subcooling		lb.	oz.		Subcooling		lb.	oz.
<b>XP16-024</b>														
	49	5	0	13	CBX40UHV-036	24	7	1	6	CR33-60D	16	5	0	10
CBX25UHV-024	49	5	0	13	CBX40UHV-042	17	9	1	1	CH33-60D	13	6	0	0
CBX25UHV-030	45	9	1	12	CH33-43C	21	7	0	15	CH33-62D	11	7	1	4
CBX26UH-024	45	6	1	12	CBX40UHV-048	17	9	1	1	CR33-50/60C	15	5	0	10
CBX27UH-024-230	20	7	1	6	CH33-43B	11	7	0	11	CR33-60D	16	5	0	10
CBX27UH-030-230	17	7	2	0	CH33-48C	20	7	1	2	CX34-60D	14	6	1	0
CBX32MV-024/030	20	7	1	6	CH33-43C	21	7	0	15	CX34-62D	9	7	1	6
CBX32MV-036	17	7	2	0	CR33-48B	53	6	0	0	CX34-62C	8	7	1	9
CBX40UHV-024	17	7	2	0	CR33-48C	53	6	0	0	CX35-49C	13	7	0	7
CBX40UHV-030	17	7	2	0	CX34-43B/C	15	7	0	11	CX35-60C	10	7	2	4
CBX40UHV-036	17	7	2	0	CX34-50/60C	15	7	0	11	CX35-60D	18	8	2	15
CH33-31B	31	8	2	9	<b>XP16/SPB*H4-048</b>				<b>XP16/SPB*H4-060</b>					
CH35-30B	26	6	0	14	CBX25UHV-048	12	7	0	4	CBX25UHV-060	15	4	1	10
CR33-30/36A/B/C	45	4	0	13	CBX26UH-048-230	10	6	1	4	CBX26UH-060	20	9	4	13
CX34-31A/B	24	7	2	8	CBX27UH-048-230	19	7	1	4	CBX27UH-060-230	10	6	2	3
CX34-38A/B	18	8	2	7	CBX27UH-060-230	13	12	3	3	CBX32M-060	17	6	1	12
CX35-30A/B	24	7	0	0	CBX32M-048	19	7	1	4	CBX32MV-060	17	5	1	12
CX35-36A/B	18	7	1	2	CBX32M-060	14	7	1	11	CBX32MV-068	15	7	2	1
<b>XP16/SPB*H4-036</b>					CBX32MV-048	19	7	1	4	CBX40UHV-060	17	6	1	12
CBX25UH-036	59	7	0	15	CBX32MV-060	14	7	1	11	CH23-68	37	9	2	10
CBX25UHV-036														
CBX27UH-036-230	25	7	1	6	CBX32MV-068	9	6	1	11	CH33-50/60C	33	8	1	0
CBX27UH-042-230	17	9	1	1	CBX40UHV-048	19	7	1	4	CH33-62D	16	7	1	4
CBX32M-036	24	7	1	6	CBX40UHV-060	14	7	1	11	CR33-50/60C	24	7	0	0
CBX32MV-036	24	7	1	6	CH23-68	24	8	1	12	CR33-60D	24	7	0	0
CBX32MV-048	17	9	1	1	CH33-49C	19	7	2	5	CX34-62C	21	9	2	16
CBX40UHV-030	24	7	1	6	CH33-50/60C	19	7	2	5	CX34-62D	13	7	1	4
					CH35-51C	19	7	2	5	*Amount of charge required in addition to charge shown on unit nameplate. (Does not include additional charge required for extended line set lengths.)				





# HFC-410A CHARGING INFORMATION – FOR COMPLETE CHARGING PROCEDURES, REFER TO THE APPLICABLE INSTALLATION OR SERVICE MANUAL

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**Heating Mode**—When the outdoor ambient temperature is below 60°F (15°C), use the subcooling method to adjust the charge using the subcooling charge levels in table 2. Target subcooling values in table 2 are based on 65-75°F (18-24°C) indoor return air temperature.

### Table 1 - Normal Operating Pressures (Liquid ±10 & Suction ±5 psig)

	Size °F (°C)	-024		-036		-048		-060	
		Liq	Vap	Liq	Vap	Liq	Vap	Liq	Vap
Normal Operating Pressures (psig) – Cooling									
First Stage (Low Capacity) Pressure	65 (18.3)	226	144	216	142	224	143	230	137
	75 (23.9)	260	145	251	144	259	145	269	139
	85 (29.4)	301	148	291	146	297	147	313	142
	95 (35.0)	346	151	337	148	346	149	361	144
	105 (40.6)	396	153	382	150	395	151	411	147
Second Stage (High Capacity) Pressure	115 (46.1)	451	156	438	153	452	155	466	151
	65 (18.3)	240	142	227	134	232	138	237	131
	75 (23.9)	278	144	261	138	271	140	275	133
	85 (29.4)	325	147	305	140	313	142	319	135
	95 (35.0)	372	149	349	142	362	145	368	138
105 (40.6)	423	151	401	144	415	147	419	141	
115 (46.1)	484	153	463	146	473	150	479	145	
Normal Operating Pressures (psig) – Heating									
First Stage (Low Capacity) Pressure	50 (10)	334	116	384	119	332	115	369	112
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Second Stage (High Capacity) Pressure	20 (-7.0)	288	66	334	67	288	62	321	60
	30 (-1.0)	308	81	362	82	301	75	335	71
	40 (4.4)	327	96	373	95	318	92	363	90
	50 (10)	350	113	400	114	337	109	380	107
	60 (15.5)	373	132	427	133	355	126	403	126

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	Subcooling		lb.	oz.		Subcooling		lb.	oz.		Subcooling		lb.	oz.
	<b>XP16-024</b>					<b>XP16/SPB*H4-048</b>					<b>XP16/SPB*H4-060</b>			
					CBX40UHV-042	17	9	1	1	CH35-51C	19	7	2	5
CBX25UHV-024	49	5	0	13	CBA27UHE-042	19	6	0	10	CR33-60D	16	5	0	10
CBX25UHV-030	45	9	1	12	CH33-43C	21	7	0	15	CH33-60D	13	6	0	0
CBX26UH-024	45	6	1	12	CBX40UHV-048	17	9	1	1	CH33-62D	11	7	1	4
CBX27UH-024-230	20	7	1	6	CH33-43B	11	7	0	11	CR33-50/60C	15	5	0	10
CBX27UH-030-230	17	7	2	0	CH33-48C	20	7	1	2	CR33-60D	16	5	0	10
CBX32MV-024/030	20	7	1	6	CH33-43C	21	7	0	15	CX38/CX34-60D	14	6	1	0
CBX32MV-036	17	7	2	0	CR33-48B	53	6	0	0	CX38/CX34-62D	9	7	1	6
CBX40UHV-024	17	7	2	0	CR33-48C	53	6	0	0	CX38/CX34-62C	8	7	1	9
CBX40UHV-030	17	7	2	0	CX38/CX34-43B/C	15	7	0	11	CX35-49C	13	7	0	7
CBX40UHV-036	17	7	2	0	CX38/CX34-50/60C	15	7	0	11	CX35-60C	10	7	2	4
CBA27UHE-024	16	6	0	7						CX35-60D	18	8	2	15
CH33-31B	31	8	2	9	CBX25UHV-048	12	7	0	4					
CH35-30B	26	6	0	14	CBX26UH-048-230	10	6	1	4	CBX25UHV-060	15	4	1	10
CR33-30/36A/B/C	45	4	0	13	CBX27UH-048-230	19	7	1	4	CBX26UH-060	20	9	4	13
CX38/CX34-31A/B	24	7	2	8	CBX27UH-060-230	13	12	3	3	CBX27UH-060-230	10	6	2	3
CX38/CX34-38A/B	18	8	2	7	CBX32M-048	19	7	1	4	CBX32M-060	17	6	1	12
CX35-30A/B	24	7	0	0	CBX32M-060	14	7	1	11	CBX32MV-060	17	5	1	12
CX35-36A/B	18	7	1	2	CBX32MV-048	19	7	1	4	CBX32MV-068	15	7	2	1
	<b>XP16/SPB*H4-036</b>				CBX32MV-060	14	7	1	11	CBX40UHV-060	17	6	1	12
CBX25UH-036														
CBX25UHV-036	59	7	0	15	CBX32MV-068	9	6	1	11	CBA27UHE-060	16	6	2	2
CBX27UH-036-230	25	7	1	6	CBX40UHV-048	19	7	1	4	CH23-68	37	9	2	10
CBX27UH-042-230	17	9	1	1	CBX40UHV-060	14	7	1	11	CH33-50/60C	33	8	1	0
CBX32M-036	24	7	1	6	CBA27UHE-048	17	8	0	7	CH33-62D	16	7	1	4
CBX32MV-036	24	7	1	6	CBA27UHE-060	14	9	0	0	CR33-50/60C	24	7	0	0
CBX32MV-048	17	9	1	1	CH23-68	24	8	1	12	CR33-60D	24	7	0	0
CBX40UHV-030	24	7	1	6	CH33-49C	19	7	2	5	CX38/CX34-62C	21	9	2	16
CBX40UHV-036	24	7	1	6	CH33-50/60C	19	7	2	5	CX38/CX34-62D	13	7	1	4

\*Amount of charge required in addition to charge shown on unit nameplate. (Does not include additional charge required for extended line set lengths.)

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