INSTALLATION INSTRUCTIONS

Elite® Series EL16XP1 Units

HEAT PUMP
507874-01
11/2018

General

This EL16XP1 outdoor heat pump with all-aluminum coil is designed for use with HFC-410A refrigerant only. This unit must be installed with an approved indoor air handler or coil. See the Lennox EL16XP1 Product Specifications bulletin (EHB) for approved indoor component match ups. These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

NOTICE!

Charging information is given on the charging procedure sticker on the unit access panel. For more in-depth information, consult the Installation and Service Procedures manual, available on LennoxPros.com or through the Technical Support department at 800-453-6669.

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: Special procedures are required for cleaning the all-aluminum coil in this unit. See page 18 in this instruction for information.

STEP 1 – SETTING THE UNIT – Clearances

NOTES:

Service clearance of 30 in. (762 mm) must be maintained on one of the sides adjacent to the control box.

Clearance to one of the other three sides must be 36 in (914 mm).

Clearance to one of the remaining two sides may be 12 in. (305mm) and the final side may be 6 in.(152 mm).

A clearance of 24 in. (610 mm) must be maintained between two units.

48 in. (1219 mm) clearance required on top of unit.
### UNIT DIMENSIONS - INCHES (MM)

#### SIDE VIEW

<table>
<thead>
<tr>
<th>Model Number</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL16XP1-018-230</td>
<td>45 (1143)</td>
<td>30-1/2 (775)</td>
<td>35 (889)</td>
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<td>EL16XP1-024-230</td>
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<td>35-1/2 (902)</td>
<td>39-1/2 (1003)</td>
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</tr>
<tr>
<td>EL16XP1-060-230</td>
<td>45 (1143)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TOP VIEW

#### UNIT SUPPORT FEET

**EL16XP1-018 TO -030 BASE WITH ELONGATED LEGS (MEDIUM)**

**EL16XP1-036 TO -060 BASE WITH ELONGATED LEGS (LARGE)**

### STEP 1 – SETTING THE UNIT (Continued) – Unit Placement

#### NOTICE!

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

### IMPORTANT

This unit must be matched with an indoor coil as specified in the Lennox Engineering Handbook. Coils previously charged with HCFC-22 must be flushed.
**WARNING**

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

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

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

**IMPORTANT**

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

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**PLACEMENT**

INSTALL UNIT AWAY FROM WINDOWS.

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

**FIGURE 1**

**SLAB MOUNTING**

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

**FIGURE 2**

**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 level the unit.

**FIGURE 3**

**STABILIZING UNIT ON UNEVEN SURFACES**

- **#10 X 1/2" LONG SELF-TAPPING SHEET METAL SCREWS**
- **STABILIZING BRACKET (18 GAUGE METAL — 2" WIDTH; HEIGHT AS REQUIRED)**
- **#10 X 1-1/4" LONG HEX HD SCREW AND FLAT WASHER**

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

**FIGURE 4**

**IMPORTANT**

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

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 any unit installed on unstable and uneven surfaces.
STEP 2 – REFRIGERANT PIPING

**IMPORTANT**

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

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

If a new line set is being installed, size the piping per table 1.

### TABLE 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Valve Field Connections</th>
<th>Recommended Line Set</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Liquid Line</td>
<td>Vapor Line</td>
</tr>
<tr>
<td>-018</td>
<td>3/8 in. (10 mm)</td>
<td>3/4 in. (19 mm)</td>
</tr>
<tr>
<td>-024</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-030</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-036</td>
<td>3/8 in. (10 mm)</td>
<td>7/8 in. (22 mm)</td>
</tr>
<tr>
<td>-042</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-048</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-060</td>
<td>3/8 in. (10 mm)</td>
<td>1-1/8 in. (28 mm)</td>
</tr>
</tbody>
</table>

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

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

**NOTE** - For new or replacement line set installation, refer to Service and Application Note - Corp. 9112-L4 (C-91-4).
**STEP 2 – REFRIGERANT PIPING – (Continued)**

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

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

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

- **A** - On fully cased coils, remove the coil access and plumbing panels.
- **B** - Remove any shipping clamps from the liquid line and distributor assembly.
- **C** - Disconnect the equalizer line from the 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 temporarily reconnect the liquid line to the indoor unit's liquid line orifice housing.

### 2 CONNECT GAUGES AND EQUIPMENT FOR FLUSHING PROCEDURE

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

### 3 FLUSHING LINE SET

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

- **A** - Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to allow the recovery machine to pull a vacuum on the existing system line set and indoor unit coil.
- **B** - Position the cylinder of clean HCFC-22 for delivery of liquid refrigerant and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor unit coil before it enters the recovery machine.
- **C** - After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery so that all of the HCFC-22 vapor is recovered. Allow the recovery machine to pull the system down to 0.
- **D** - Close the valve on the inverted HCFC-22 drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

**FIGURE 5**
STEP 2 – REFRIGERANT PIPING – Brazing Procedures

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

2 CAP AND CORE REMOVAL
Remove service cap and core from both the vapor and liquid line service ports.

3 ATTACH THE MANIFOLD GAUGE SET FOR BRAZING LIQUID AND 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 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 vapor line service port to allow nitrogen to escape.

CAUTION
Brazing alloys and flux contain materials which are hazardous to your health. Avoid breathing vapors or fumes from brazing operations. Perform operations only in well-ventilated areas. Wear gloves and protective goggles or face shield to protect against burns. Wash hands with soap and water after handling brazing alloys and flux.

WARNING
Danger of fire. Bleeding the refrigerant charge from only the high side may result in pressurization of the low side shell and suction tubing. Application of a brazing torch to a pressurized system may result in ignition of the refrigerant and oil mixture. Check the high and low pressures before applying heat.
4 WRAP SERVICE VALVES
To help protect service valve seals during brazing, wrap water-saturated cloths around service valve bodies and copper tube stubs. Use additional water-saturated cloths underneath the valve body to protect the base paint.

5 FLOW NITROGEN
Flow regulated nitrogen (at 1 to 2 psig) through the refrigeration gauge set into the valve stem port connection on the liquid service valve and out of the vapor valve stem port. See steps 3A, 3B and 3C on manifold gauge set connections.

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

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.
STEP 2 – REFRIGERANT PIPING – Install Indoor Expansion Valve

This outdoor unit is designed for use in systems that include an expansion valve metering device (purchased separately) at the indoor coil. See the EL16XP1 Product Specifications bulletin (EHB) for approved expansion valve kit match-ups and application information. The check expansion valve unit can be installed internal or external to the indoor coil. In applications where an uncased coil is being installed in a field-provided plenum, install the check/expansion valve in a manner that will provide access for future field service of the expansion valve. Refer to below illustration for reference during installation of expansion valve unit.

**INDOOR EXPANSION VALVE INSTALLATION**

(Uncased Coil Shown)

1. Attach the vapor line sensing bulb in the proper orientation as illustrated to the right using the clamp and screws provided.

   **NOTE** - Though it is preferred to have the sensing bulb installed on a horizontal run of the vapor line, installation on a vertical run of piping is acceptable if necessary.

   **NOTE** - Confirm proper thermal contact between vapor line and check/expansion bulb before insulating the sensing bulb once installed.

2. Connect the equalizer line from the check expansion valve to the equalizer vapor port on the vapor line. Finger tighten plus 1/8 turn (7 ft-lbs) as illustrated below.

3. Install one of the provided Teflon® rings around the stubbed end of the check expansion valve and lightly lubricate the connector threads and expose surface of the Teflon® ring with refrigerant oil.

4. Attach the stubbed end of the check expansion valve to the liquid line orifice housing. Finger tighten and use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in the figure above, or tighten to 20 ft-lb.

5. Place the remaining Teflon® washer around the other end of the check expansion valve. Lightly lubricate connector threads and expose surface of the Teflon® ring with refrigerant oil.

6. Attach the liquid line assembly to the check expansion valve. Finger tighten and use an appropriately sized wrench to turn an additional 1/2 turn clockwise as illustrated in the figure above or tighten to 20 ft-lb.

**SENSING BULB INSTALLATION**

1. Attach the vapor line sensing bulb in the proper orientation as illustrated to the right using the clamp and screws provided.

   **NOTE** - Though it is preferred to have the sensing bulb installed on a horizontal run of the vapor line, installation on a vertical run of piping is acceptable if necessary.

   **NOTE** - Confirm proper thermal contact between vapor line and check/expansion bulb before insulating the sensing bulb once installed.

2. Connect the equalizer line from the check 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.

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

ON 7/8" AND LARGER LINES, MOUNT SENSING BULB AT EITHER THE 4 OR 8 O' CLOCK POSITION.

**NOTE** - NEVER MOUNT THE SENSING BULB ON BOTTOM OF LINE.

**EQUALIZER LINE INSTALLATION**

1. Remove and discard either the flare seal cap or flare nut with copper flare seal bonnet from the equalizer line port on the vapor line as illustrated in the figure below.

2. Remove the field-provided fitting that temporarily reconnected the liquid line to the indoor unit's distributor assembly.

**FIGURE 8**
STEP 3 – LEAK TEST AND EVACUATION

LEAK TEST

1 CONNECT GAUGE SET

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

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

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

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

2 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 nitrogen with a pressure regulating valve to the center port of the manifold gauge set.

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

E - After a few minutes, open one of the service valve ports and verify that the refrigerant added to the system earlier is measurable with a leak detector.

F - After leak testing, disconnect gauges from service ports.

FIGURE 9
3 CONNECT GAUGE SET

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

A - Connect low side of manifold gauge set with 1/4 SAE in-line tee to vapor line service valve
B - Connect high side of manifold gauge set to liquid line service valve
C - Connect available micron gauge connector on the 1/4 SAE in-line tee.
D - Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set. The center port line will be used later for both the HFC-410A and nitrogen containers.
E - Shutoff the nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the nitrogen from the line set and indoor unit.
F - Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.
G - Perform the following:
   - Close manifold gauge valves.
   - Shut off HFC-410A cylinder.
   - Reinstall service valve cores by removing manifold hose from service valve. Quickly install cores with core tool while maintaining a positive system pressure.
   - Replace stem caps and finger tighten them, then tighten an additional one-sixth (1/6) of a turn as illustrated.

4 EVACUATE THE SYSTEM

A - Open both manifold valves and start the vacuum pump.
B - Evacuate the line set and indoor unit to an absolute pressure of 23,000 microns (29.01 inches of mercury).
   
   NOTE - During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once. If this occurs, repeat the leak testing procedure.
   
   NOTE - The term absolute pressure means the total actual pressure above absolute zero within a given volume or system. Absolute pressure in a vacuum is equal to atmospheric pressure minus vacuum pressure.
   
   C - When the absolute pressure reaches 23,000 microns (29.01 inches of mercury), perform the following:
      - Close manifold gauge valves.
      - Close valve on vacuum pump.
      - Turn off vacuum pump.
      - Disconnect manifold gauge center port hose from vacuum pump.
      - Attach manifold center port hose to a nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose.
      - Open manifold gauge valves to break the vacuum in the line set and indoor unit.
      - Close manifold gauge valves.
   
   D - Shut off the nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the nitrogen from the line set and indoor unit.
   
   E - Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.
   
   F - When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to a cylinder of HFC-410A positioned to deliver liquid refrigerant. Open the manifold gauge valve 1 to 2 psig in order to release the vacuum in the line set and indoor unit.
   
   G - Perform the following:
      - Close manifold gauge valves.
      - Shut off HFC-410A cylinder.
      - Reinstall service valve cores by removing manifold hose from service valve. Quickly install cores with core tool while maintaining a positive system pressure.
      - Replace stem caps and finger tighten them, then tighten an additional one-sixth (1/6) of a turn as illustrated.

WARNING !

Possible equipment damage.
Avoid deep vacuum operation. Do not use compressors to evacuate a system. Extremely low vacuum can cause internal arcing and compressor failure. Damage caused by deep vacuum operation will void warranty.
STEP 4 – ELECTRICAL – Circuit Sizing and Wire Routing

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

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

24VAC TRANSFORMER

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

**WARNING**

Electric Shock Hazard. Can cause injury or death. Unit must be properly grounded in accordance with national and local codes. Line voltage is present at all components when unit is not in operation on units with single-pole contactors. Disconnect all remote electric power supplies before opening access panel. Unit may have multiple power supplies.

1 SIZE CIRCUIT AND INSTALL SERVICE DISCONNECT SWITCH

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

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

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.

**WARNING**

Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.

**WARNING**

Failure to use properly sized wiring and circuit breaker may result in property damage. Size wiring and circuit breaker(s) per Product Specifications bulletin (EHB) and unit rating plate.

**WARNING**

Electrostatic discharge can affect electronic components. Take care during unit installation and service to protect the unit’s electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Touch hand and all tools on an unpainted unit surface before performing any service procedure to neutralize electrostatic charge.
A. Run 24VAC control wires through cutout with grommet.

B. Run 24VAC control wires through wire tie.

C. Make 24VAC control wire connections.

D. Tighten wire tie to secure 24VAC control wiring.

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

NOTE - Do not bundle any excess 24VAC control wires inside control box.
A. Run 24VAC control wires through cutout with grommet.
B. Run 24VAC control wires through wire tie.
C. Make 24VAC control wire connections.
D. Tighten wire tie to secure 24VAC control wiring.

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

LOW VOLTAGE CONNECTIONS

HIGH VOLTAGE FIELD WIRING

LOW VOLTAGE (24V) FIELD WIRING

<table>
<thead>
<tr>
<th>WIRE RUN LENGTH</th>
<th>AWG</th>
<th>INSULATION TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LESS THAN 100'</td>
<td>18</td>
<td>TEMPERATURE RATING</td>
</tr>
<tr>
<td>MORE THAN 100'</td>
<td>16</td>
<td>35°C MINIMUM.</td>
</tr>
</tbody>
</table>

NOTE - Any excess high voltage field wiring should be trimmed and secured away from any low voltage field wiring.

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

FIGURE 12

FIGURE 13
STEP 5 – UNIT START-UP

IMPORTANT

If unit is equipped with a crankcase heater, it should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

1 - Rotate fan to check for binding.
2 - Inspect all factory- and field-installed wiring for loose connections.
3 - After evacuation is complete, open the liquid line and vapor line service valve stems to release the refrigerant charge (contained in outdoor unit) into the system.
4 - Replace the stem caps and tighten to the value listed in table 2.
5 - Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit's nameplate. If not, do not start the equipment until you have consulted with the power company and the voltage condition has been corrected.
6 - Connect manifold gauge set for testing and charging.
7 - Set the thermostat for a cooling demand. Turn on power to the indoor indoor unit and close the outdoor unit disconnect switch to start the unit.
8 - Recheck voltage while the unit is running. Power must be within range shown on the unit nameplate.
9 - Check system for sufficient refrigerant using the procedures outlined under Checking Refrigerant Charge.

OPERATING MANIFOLD GAUGE SET AND SERVICE VALVES

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

Each valve is equipped with a service port which has a factory-installed valve stem. Figures 15 and 16 provide information on how to access and operate both angle- and ball-type service valves.
Torque Requirements
When servicing or repairing heating, ventilating and air conditioning components, ensure the fasteners are appropriately tightened. Table 2 lists torque values for fasteners.

**TABLE 2**

<table>
<thead>
<tr>
<th>Parts</th>
<th>Recommended Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service valve cap</td>
<td>8 ft.-lb. / 11 NM</td>
</tr>
<tr>
<td>Sheet-metal screws</td>
<td>16 in.-lb. / 2 NM</td>
</tr>
<tr>
<td>Machine screws #10</td>
<td>28 in.-lb. / 3 NM</td>
</tr>
<tr>
<td>Compressor bolts</td>
<td>90 in.-lb. / 10 NM</td>
</tr>
<tr>
<td>Gauge port seal cap</td>
<td>8 ft.-lb. / 11 NM</td>
</tr>
</tbody>
</table>

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

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 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°.

**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 2.
   - Without torque wrench, finger tighten and use an appropriately sized wrench to turn an additional 1/12 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 2.
- Without torque wrench, finger tighten and use an appropriately sized wrench to turn an additional 1/12 turn clockwise.

**FIGURE 15**

**FIGURE 16**

**FIGURE 17**
Checking Refrigerant Charge

The EL16XP1 unit is factory-charged with enough HFC-410A refrigerant to accommodate a 15-foot length of refrigerant piping. For refrigerant piping greater than 15 feet, calculate the additional charge using the table below. Then add the additional charge specified for the specific indoor coil match-up listed on the unit charging sticker.

Charge should be checked and adjusted using the tables provided on the charging procedure sticker on the unit access panel. Detailed information is given in the EL16XP1 Installation and Service Procedures manual, which is available on LennoxPros.com.

Refrigerant Charge per Line Set Length

<table>
<thead>
<tr>
<th>LIQUID LINE DIA.</th>
<th>OUNCES PER 5 FEET (G PER 1.5 M) ADJUST FROM 15 FEET (4.6 M) LINE SET*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; (9.5 MM)</td>
<td>3 OUNCES PER 5' (85 G PER 1.5 M)</td>
</tr>
</tbody>
</table>

*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.

Defrost System

This section addresses:
- Emergency Heat
- Defrost System Overview
- Defrost Control Connections, Jumper Settings and Features
- Operational Mode Overview (Calibration, Normal and Defrost)
- Defrost Cycle Actuation

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.

DEFROST SYSTEM OVERVIEW

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 control 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 demand defrost control initiates defrost cycles.

DEFROST CONTROL CONNECTIONS, JUMPER SETTINGS AND FEATURES

Defrost Temperature Termination Jumper Settings (P1)

The demand defrost control 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).

Test Pins (P1) Function

Placing the jumper on the field test pins (P1) 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

Compressor Delay Mode (P5)

The demand defrost control 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.

HIGH PRESSURE SWITCH (S4)

This unit is equipped with a high pressure switch which is located on the liquid line. The SPST, normally closed pressure switch opens when liquid line pressure rises above the factory setting of 590 + 15 psig and automatically resets at 418 + 15 psig.
Note - Component locations vary by board manufacturer.

FIGURE 18. Demand Defrost Control
DEMAND DEFROST CONTROL (A108) DIAGNOSTIC AIDS

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

**TABLE 1**

DEMAND DEFROST CONTROL (A108) DIAGNOSTIC AIDS

<table>
<thead>
<tr>
<th>DS2 Green</th>
<th>DS1 Red</th>
<th>Type</th>
<th>Condition/Code</th>
<th>Possible Cause(s)</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Status</td>
<td>Power problem</td>
<td>No power (24V) to demand defrost control terminals R and C or demand defrost control failure.</td>
<td>1. Check control transformer power (24V). 2. If power is available to demand defrost control and LED(s) do not light, replace demand defrost control.</td>
</tr>
<tr>
<td>Simultaneous SLOW Flash</td>
<td>Status</td>
<td>Normal operation</td>
<td>Unit operating normally or in standby mode.</td>
<td>None required.</td>
<td></td>
</tr>
<tr>
<td>Alternating SLOW Flash</td>
<td>Status</td>
<td>5-minute anti-short cycle delay</td>
<td>Initial power up, safety trip, end of room thermostat demand.</td>
<td>None required (jumper TEST pins to override)</td>
<td></td>
</tr>
<tr>
<td>Simultaneous FAST Flash</td>
<td>Fault</td>
<td>Ambient Sensor Problem</td>
<td>Sensor being detected open or shorted or out of temperature range. Demand defrost control will revert to time/temperature defrost operation. (System will still heat or cool).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternating FAST Flash</td>
<td>Fault</td>
<td>Coil Sensor Problem</td>
<td>Sensor being detected open or shorted or out of temperature range. Demand defrost control will not perform demand or time/temperature defrost operation. (System will still heat or cool).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>Fault</td>
<td>Demand Defrost Control Failure</td>
<td>Indicates that demand defrost control has internal component failure. Cycle 24VAC power to demand defrost control. If code does not clear, replace demand defrost control.</td>
<td></td>
</tr>
</tbody>
</table>
| OFF | SLOW Flash | Fault | Low Pressure Fault | Restricted air flow over indoor or outdoor coil.  
  Improper refrigerant charge in system.  
  Improper metering device installed or incorrect operation of metering device.  
  Incorrect or improper sensor location or connection to system. |  
  Remove any blockages or restrictions from coils and/or fans. Check indoor and outdoor fan motor for proper current draws.  
  Check system charge using subcooling method.  
  Check system operating pressures and compare to unit subcooling tables in this instruction or located on unit access panel.  
  Make sure all pressure switches and sensors have secure connections to system to prevent refrigerant leaks or errors in pressure and temperature measurements. |
| OFF | ON | Lockout | Low Pressure Lockout | |
| SLOW Flash | OFF | Fault | High Pressure Fault | |
| ON | OFF | Lockout | High Pressure Lockout | |

(Each fault adds 1 strike to that code's counter; 5 strikes per code = LOCKOUT)

**Homeowners Information**

**CAUTION**

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

In order to ensure peak performance, your system must be properly maintained. Clogged filters and blocked air flow prevent your unit from operating at its most efficient level. The system should be inspected and serviced before each cooling and heating season by a licensed professional HVAC service technician (or equivalent).

**Heat Pump Operation**

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

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

**Homeowner Maintenance**

The following maintenance may be performed by the homeowner:

- Contact a licensed professional HVAC technician to schedule inspection and maintenance appointments for your equipment before each heating and cooling season.
- Check the indoor unit filter each month and replace the filter, if necessary.
- Have your Lennox dealer show you where your indoor unit filter is located. It will be either at the indoor unit (installed internal or external to the cabinet) or behind a return air grille in the wall or ceiling. Check the filter monthly and clean or replace it as needed. Disposable filters should be replaced with a filter of the same type and size.
• Check the indoor unit drain line for obstructions monthly. The indoor coil is equipped with a drain pan to collect condensate formed as your system removes humidity from the inside air. Have your dealer show you the location of the drain line and how to check for obstructions. (This would also apply to an auxiliary drain, if installed.)
• Check the area around the outdoor unit monthly and remove any obstructions that may restrict airflow to the outdoor unit. This would include grass clippings, leaves, or papers that may have settled around the unit.
• Trim shrubbery away from the unit and periodically check for debris which collects around the unit.
• During the winter months, keep the snow level below the louvered panels.

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

**IMPORTANT**
Sprinklers and soaker hoses should not be installed where they could cause prolonged exposure to the outdoor unit by treated water. Prolonged exposure of the unit to treated water (i.e., sprinkler systems, soakers, waste water, etc.) will corrode the surface of the steel and aluminum parts, diminish performance and affect longevity of the unit.

**Thermostat Operation**
See the thermostat homeowner manual for instructions on how to operate your thermostat.

**Pre-Service Check**
If your system fails to operate, check the following before calling for service:
• Verify room thermostat settings are correct.
• Verify that all electrical disconnect switches are ON.
• Check for any blown fuses or tripped circuit breakers.
• Verify unit access panels are in place.
• Verify air filter is clean.

If service is needed, locate and write down the unit model number and have it handy before calling.

**Extended Power Outage**
The heat pump is equipped with a compressor crankcase heater which protects the compressor during cold weather operation.

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

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

**Professional Maintenance**

<table>
<thead>
<tr>
<th>NOTICE!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to follow instructions will cause damage to the unit.</td>
</tr>
<tr>
<td>This unit is equipped with an aluminum coil. Aluminum coils may be damaged by exposure to solutions with a pH below 5 or above 9. The aluminum coil should be cleaned using potable water at a moderate pressure (less than 50psi). If the coil cannot be cleaned using water alone, Lennox recommends use of a coil cleaner with a pH in the range of 5 to 9. The coil must be rinsed thoroughly after cleaning.</td>
</tr>
<tr>
<td>In coastal areas, the coil should be cleaned with potable water several times per year to avoid corrosive buildup (salt).</td>
</tr>
</tbody>
</table>

Your heating and air conditioning system should be inspected and maintained twice each year (before the start of the cooling and heating seasons) by a licensed professional HVAC technician. You can expect the technician to check the following items. These checks may only be conducted by a licensed professional HVAC technician.

**Outdoor Unit**

1. Inspect component wiring for loose, worn or damaged connections. Also check for any rubbing or pinching of wires. Confirm proper voltage plus amperage of outdoor unit.
2. Check the cleanliness of outdoor fan and blade condition (cracks) and clean or replace them, if necessary.
3. Inspect base pan drains for debris and clean as necessary.
4. Inspect the condition of refrigerant piping and confirm that pipes are not rubbing copper-to-copper. Also, check the condition of the insulation on the refrigerant lines. Repair, correct, or replace as necessary.
5. Test capacitor. Replace as necessary.
6. Inspect contactor contacts for pitting or burn marks. Replace as necessary.
7. Check outdoor fan motor for worn bearings/bushings. Replace as necessary.
8. Inspect and clean outdoor coils, if necessary and note any damage to coils or signs of leakage.

**Indoor Unit (Air Handler or Furnace)**

1. Inspect component wiring for loose, worn or damaged connections. Confirm proper voltage plus amperage of indoor unit.
2. Inspect and clean or replace air filters in indoor unit.
3. Check the cleanliness of indoor blower and clean blower, if necessary.
4 - Inspect the indoor coil drain pans and condensate drains for rust, debris, obstructions, leaks or cracks. Pour water in pans to confirm proper drainage from the pan through to the outlet of the pipe. Clean or replace as necessary.

5 - Inspect and clean indoor coil, if necessary.

6 - Inspect the condition of the refrigerant lines and confirm that pipes are not rubbing copper-to-copper. Also, ensure that refrigerant pipes are not being affected by indoor air contamination. Check condition of insulation on the refrigerant lines. Repair, correct, or replace as necessary.

7 - Inspect the duct system for leaks or other problems. Repair or replace as necessary.

8 - Check for bearing/bushing wear on indoor blower motor. Replace as necessary.

9 - If your heat pump is matched with a gas- or oil-fired furnace for auxiliary heating, indoor unit service will also include inspection and cleaning of the burners, and a full inspection of the gas valve, heat exchanger and flue (exhaust) system.

**General System Test with System Operating**

1 - Your technician should perform a general system test. He will turn on the air conditioner to check operating functions such as the startup and shutoff operation. He will also check for unusual noises or odors, and measure indoor/outdoor temperatures and system pressures as needed. He will check the refrigerant charge per the charging sticker information on the outdoor unit.

2 - Verify that system total static pressure and airflow settings are within specific operating parameters.

3 - Verify correct temperature drop across indoor coil.

---

**EL16XP1 Start-Up and Performance Checklist**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Unit Model</td>
<td>Serial</td>
</tr>
<tr>
<td>Outdoor Unit Model</td>
<td>Serial</td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
</tr>
</tbody>
</table>

**START UP CHECKS**

Refrigerant Type: ______________

Rated Load Amps: ____________ Actual Amps ___ Rated Volts _______ Actual Volts _______

Condenser Fan Full Load Amps _____ Actual Amps: __

**COOLING MODE**

Suction Pressure: ____________ Liquid Pressure: ____________

Supply Air Temperature: ____________ Ambient Temperature: ____________ Return Air: Temperature: ____________

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

<table>
<thead>
<tr>
<th>Subcooling:</th>
<th>A — B = SUBCOOLING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated Condensing Temperature (A) minus Liquid Line Temperature (B)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Approach:</th>
<th>A — B = APPROACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Line Temperature (A) minus Outdoor Air Temperature (B)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indoor Coil Temperature Drop (18 to 22°F)</th>
<th>A — B = COIL TEMP DROP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return Air Temperature (A) minus Supply Air Temperature (B)</td>
<td></td>
</tr>
</tbody>
</table>