



INSTALLATION INSTRUCTIONS

Dave Lennox Signature® Collection XC17 Units

AIR CONDITIONER
 506510-01
 04/10
 Supersedes 506498-01

TPD Technical
 Publications
 Litho U.S.A.

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

NOTICE

A thermostat is not included and must be ordered separately.

The Lennox ComfortSense® 7000 thermostat may be used, as well as other thermostats.

In all cases, setup is critical to ensure proper system operation.

Field wiring is illustrated in diagrams, which begin on Page 19.

⚠ 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.

General

This single-stage outdoor unit 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 XC17 Engineering Handbook for approved indoor component matchups.

⚠ IMPORTANT

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

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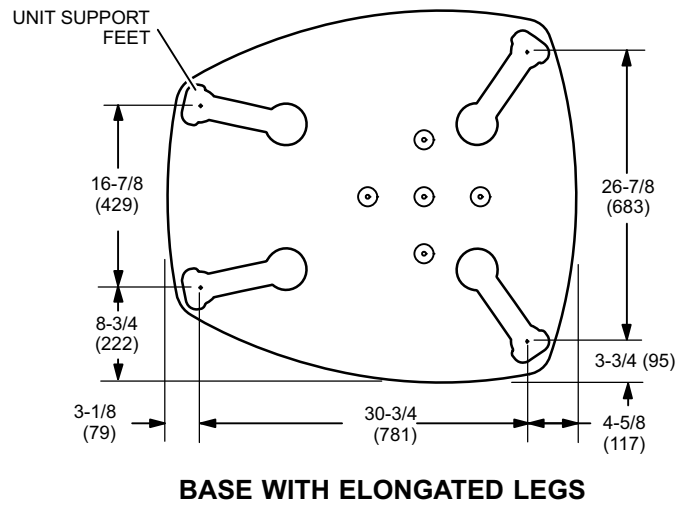
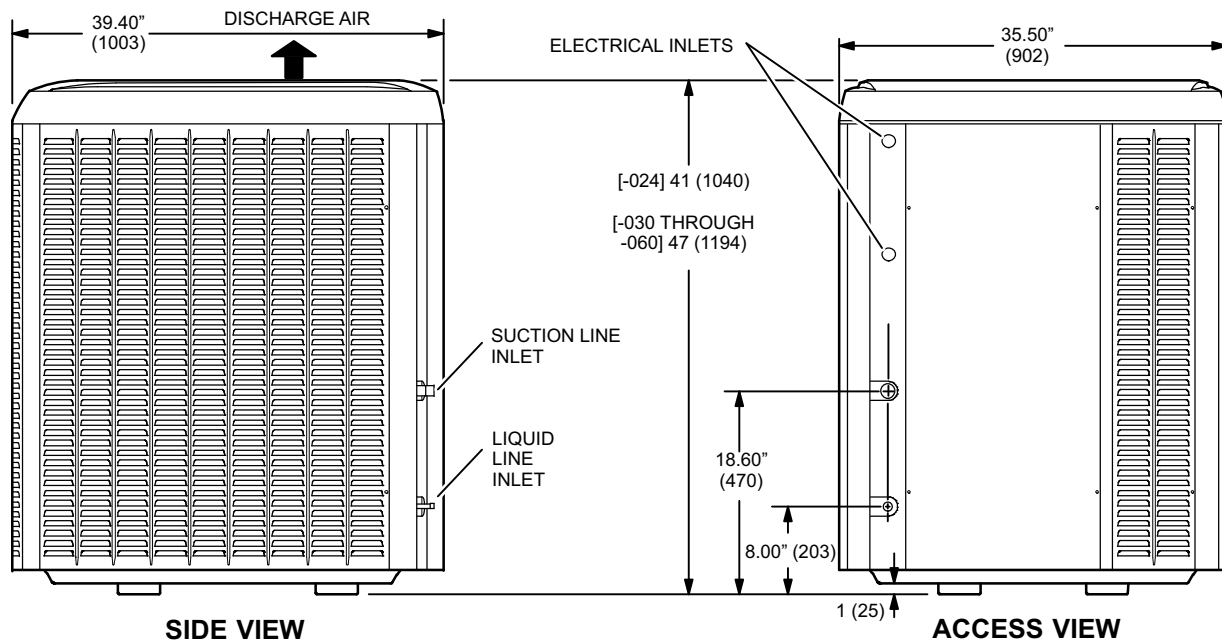
Shipping and Packing List

Check unit for shipping damage. Consult last carrier immediately if damage is found.

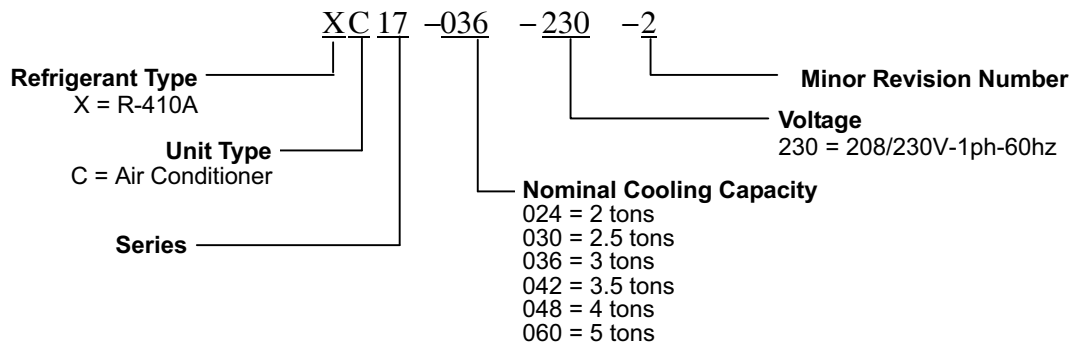
- 1 — Assembled outdoor unit.
- 1 — Bag assembly which includes the following:
 - 1 — Bushing (for low voltage wiring)
 - 2 — Isolation grommets for liquid and suction lines



Unit Dimensions - Inches (mm) and Parts Arrangement



Model Number Identification



Typical Unit Parts Arrangement

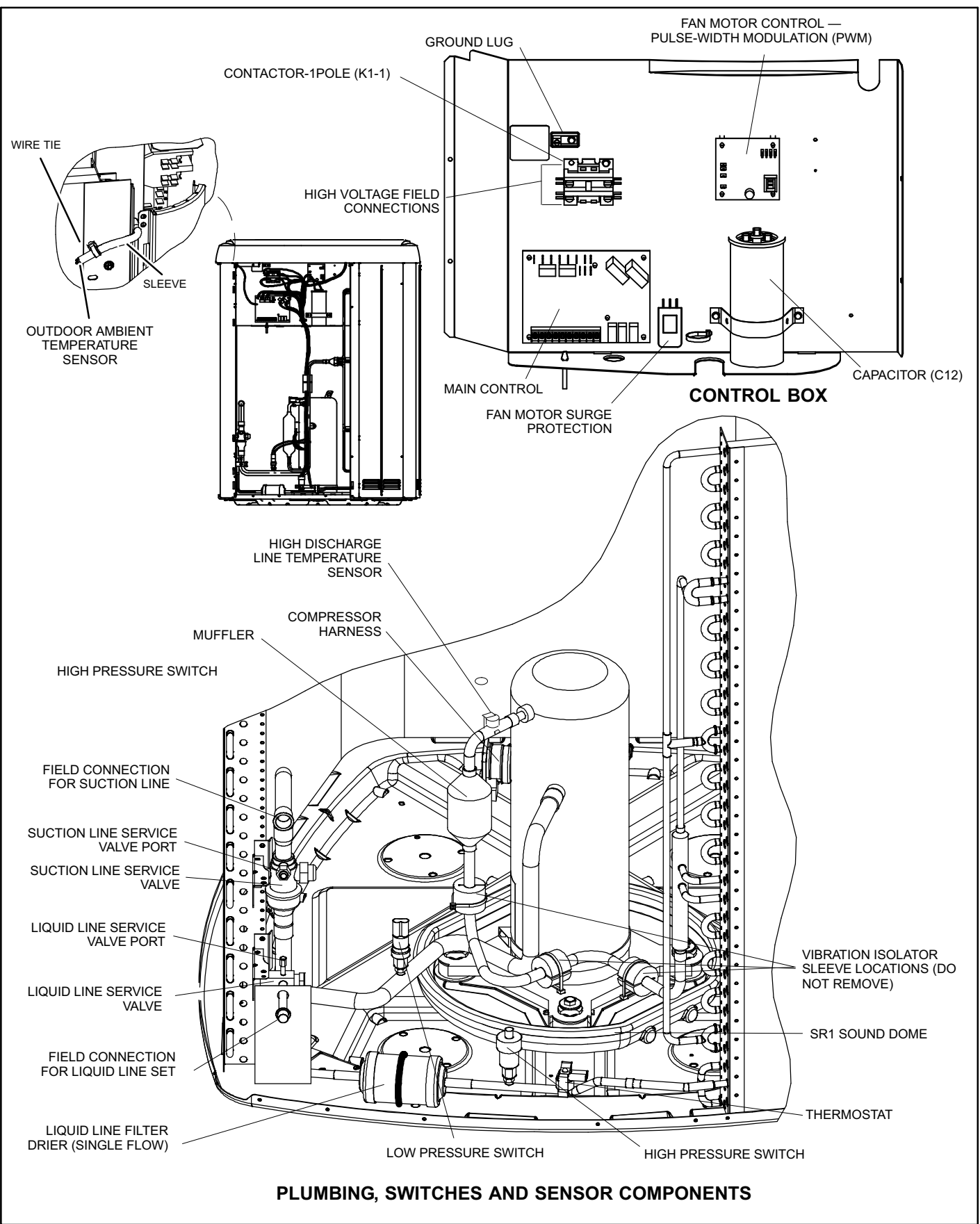


Figure 1. Typical Parts Arrangements

CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

IMPORTANT

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

IMPORTANT

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

WARNING



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

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

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.

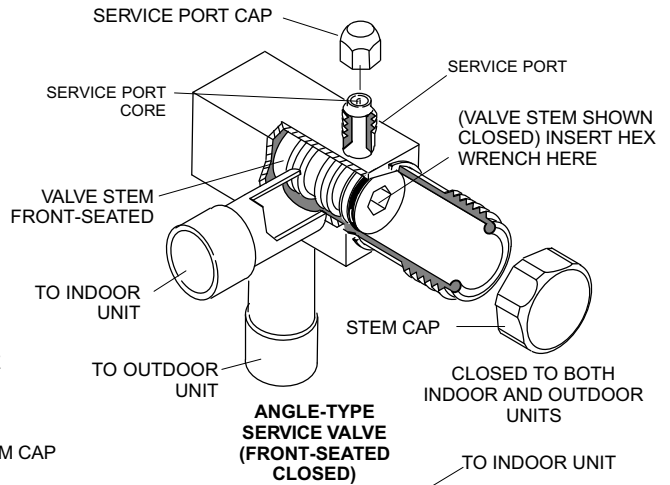
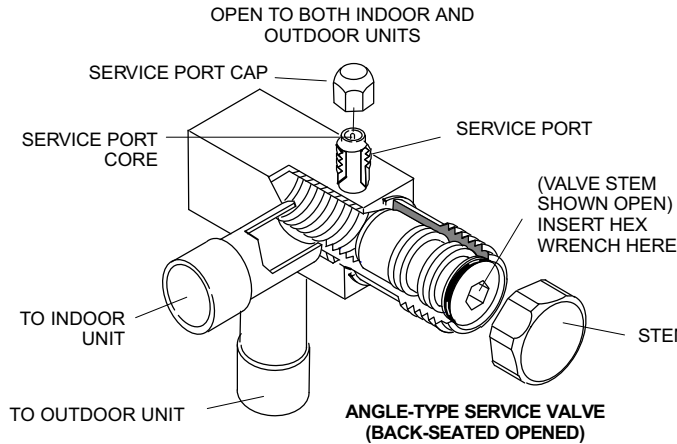
OPERATING SERVICE VALVES

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 2 provides information on how to access and operating both angle and ball service valves.

SERVICE VALVES

VARIOUS TYPES

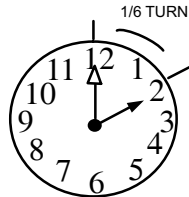
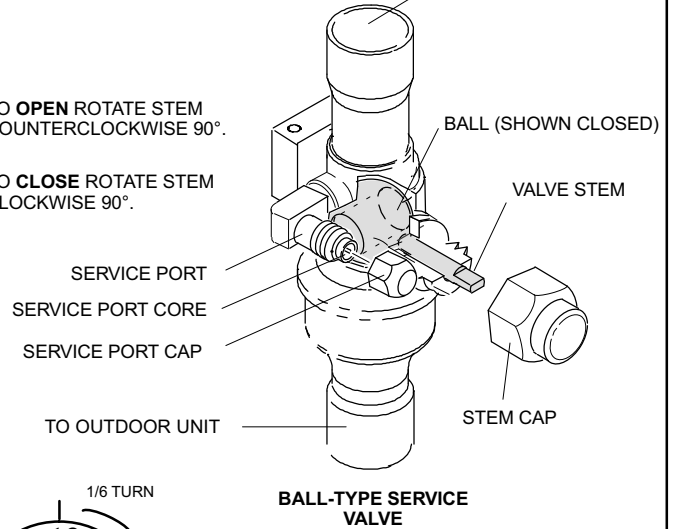


WHEN SERVICE VALVE IS CLOSED, THE SERVICE PORT IS OPEN TO THE LINE SET AND INDOOR UNIT.

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

TO OPEN ROTATE STEM COUNTERCLOCKWISE 90°.

TO CLOSE ROTATE STEM CLOCKWISE 90°.



BALL-TYPE SERVICE VALVE

To Access Service Port:

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

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

Operating Angle Type Service Valve:

1. Remove stem cap with an appropriately sized wrench.
2. Use a service wrench with a hex-head extension (3/16" for liquid line valve sizes and 5/16" for vapor line valve sizes) to back the stem out counterclockwise as far as it will go.

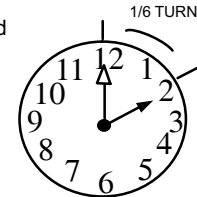
Operating Ball Type Service Valve:

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

Reinstall Stem Cap:

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

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



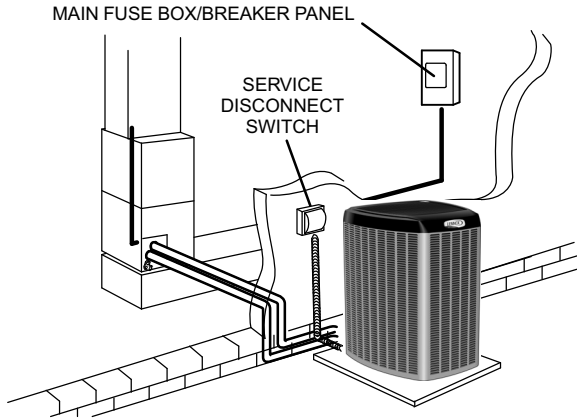
NOTE — A label with specific torque requirements may be affixed to the stem cap. If the label is present, use the specified torque.

Figure 2. Angle and Ball Service Valves

RECOVERING REFRIGERANT FROM SYSTEM

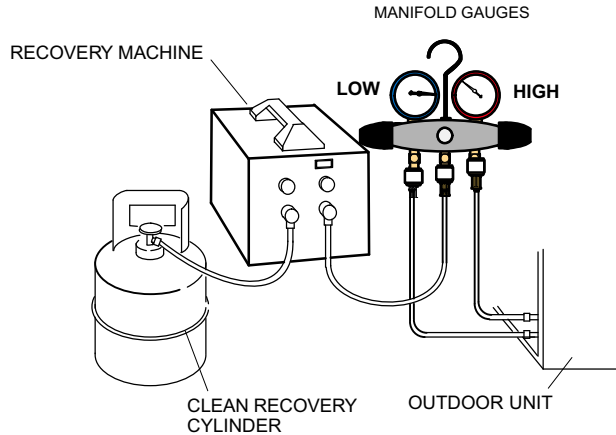
1 DISCONNECT POWER

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



2 CONNECT MANIFOLD GAUGE SET

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



3 RECOVERING REFRIGERANT

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

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

METHOD 1:

Use this method if the existing outdoor unit is not equipped with shut-off valves, or if the unit is not operational and you plan to use the existing HCFC-22 to flush the system.

Remove all HCFC-22 refrigerant from the existing system. Check gauges after shutdown to confirm that the entire system is completely void of refrigerant.

METHOD 2:

Use this method if the existing outdoor unit is equipped with manual shut-off valves, and you plan to use new HCFC-22 refrigerant to flush the system.

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

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

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

Perform the following task:

- A Start the existing HCFC-22 system in the cooling mode and close the liquid line valve.
- B Use the compressor to pump as much of the existing HCFC-22 refrigerant into the outdoor unit until the outdoor system is full. Turn the outdoor unit main power OFF and use a recovery machine to remove the remaining refrigerant from the system.

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

- C When the low side system pressures reach 0 psig, close the vapor line valve.
- D Check gauges after shutdown to confirm that the valves are not allowing refrigerant to flow back into the low side of the system.

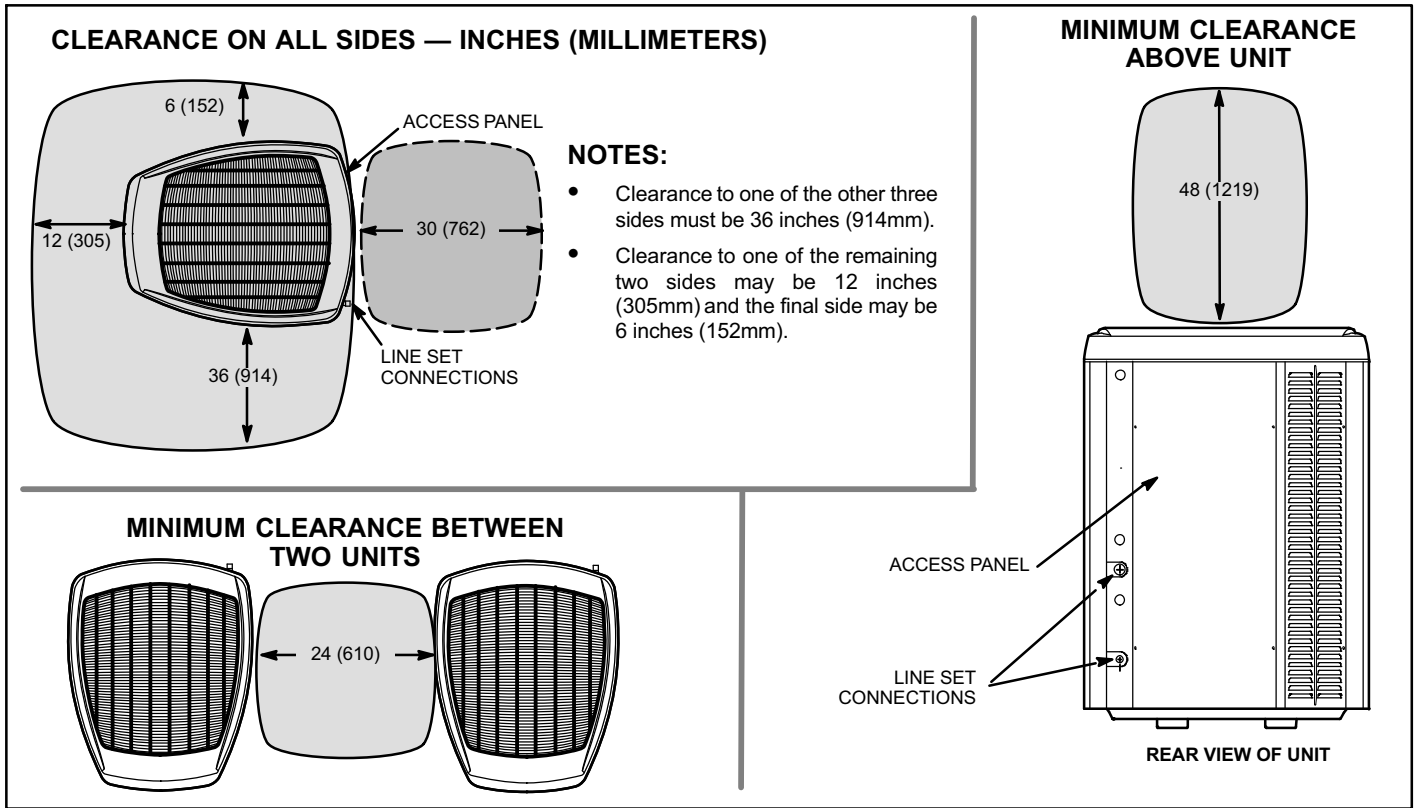


Figure 3. Installation Clearances

New Outdoor 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 3 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 4, 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 4, Detail B.

NOTE — If necessary for stability, anchor unit to slab as described in Figure 4, Detail D.

ELEVATING THE UNIT

Units are outfitted with elongated support feet as illustrated in Figure 4, 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.

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 4, Detail D 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.

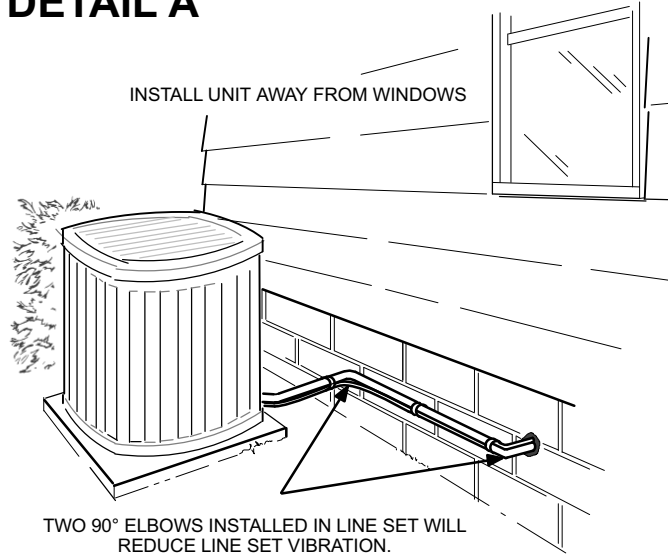
If unit coil cannot be mounted away from prevailing winter winds, a wind barrier should be constructed. Size barrier at least the same height and width as outdoor unit. Mount barrier 24 inches (610 mm) from the sides of the unit in the direction of prevailing winds.

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.

DETAIL A

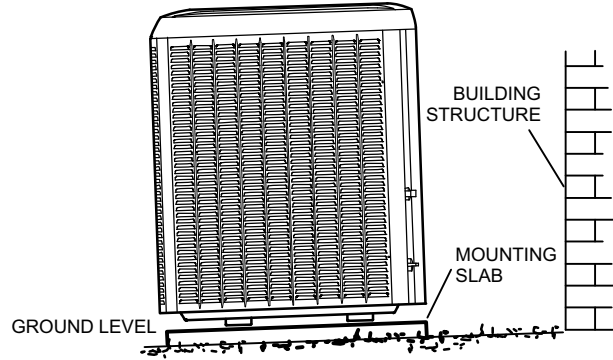


TWO 90° ELBOWS INSTALLED IN LINE SET WILL REDUCE LINE SET VIBRATION.

Outside Unit Placement

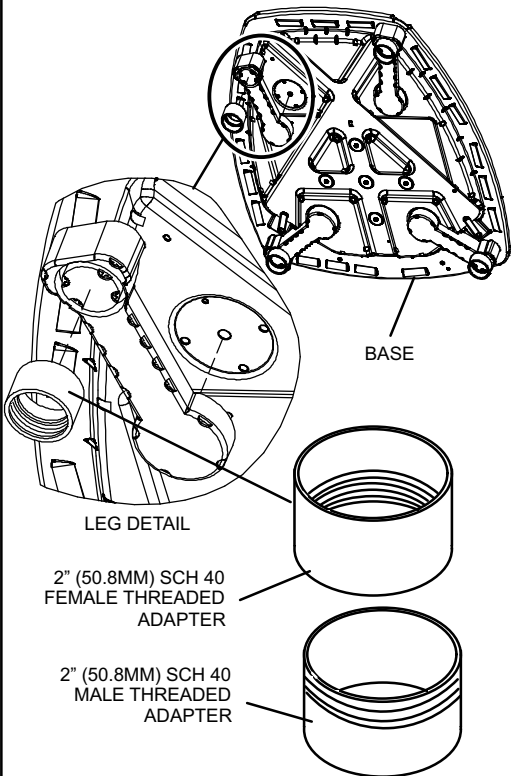
DETAIL B

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.



Slab Mounting at Ground Level

DETAIL C



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.

Elevated Slab Mounting using Feet Extenders

DETAIL D

Slab Side Mounting

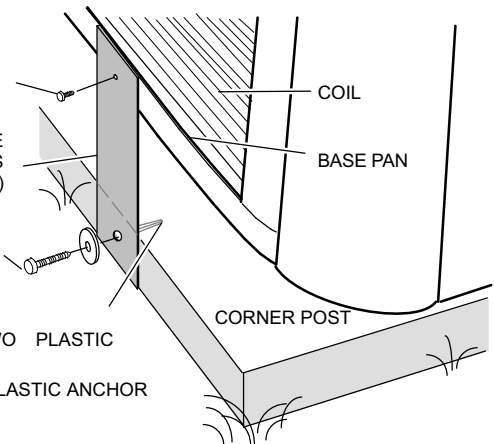
#10 1/2" LONG SELF-DRILLING SHEET METAL SCREWS

STABILIZING BRACKET (18 GAUGE METAL — 2" WIDTH; HEIGHT AS REQUIRED)

#10 1-1/4" LONG HEX HD SCREW AND FLAT WASHER

CONCRETE SLAB — USE TWO PLASTIC ANCHORS (HOLE DRILL 1/4")

WOOD OR PLASTIC SLAB — NO PLASTIC ANCHOR (HOLE DRILL 1/8")



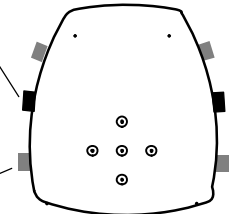
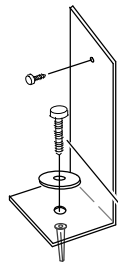
Deck Top Mounting

STABILIZING BRACKET (18 GAUGE METAL — 2" (50.8MM) WIDTH; HEIGHT AS REQUIRED); BEND TO FORM RIGHT ANGLE

SAME FASTENERS AS SLAB SIDE MOUNTING.

MINIMUM ONE PER SIDE

FOR EXTRA STABILITY



ONE BRACKET PER SIDE (MIN.); FOR EXTRA STABILITY, TWO BRACKETS PER SIDE, 2" (50.8MM) FROM EACH CORNER.

Stabilizing Unit on Uneven Surfaces

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 market-place.

Figure 4. Placement, Slab Mounting and Stabilizing Unit

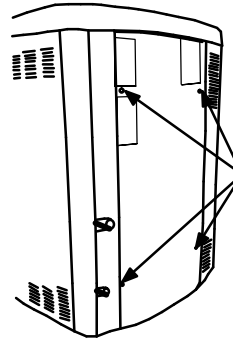
Removing and Installing Panels

PANELS

ACCESS AND LOUVERED

ACCESS PANEL REMOVAL

Removal and reinstallation of the access panel is as illustrated.



REMOVE 4 SCREWS TO REMOVE PANEL FOR ACCESSING COMPRESSOR AND CONTROLS.

POSITION PANEL WITH HOLES ALIGNED; INSTALL SCREWS AND TIGHTEN.



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.

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.

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**.

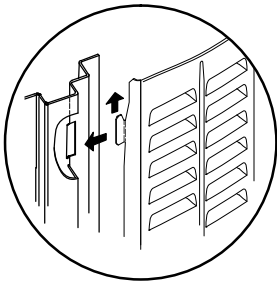
LOUVERED PANEL INSTALLATION

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.



Detail A



LIP

SCREW HOLES

Detail B



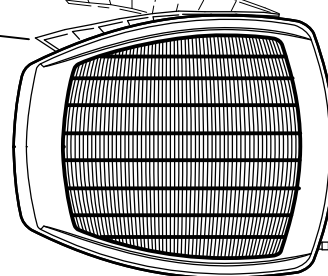
ROTATE IN THIS DIRECTION; THEN DOWN TO REMOVE PANEL

Detail D

ANGLE MAY BE TOO EXTREME

PREFERRED ANGLE FOR INSTALLATION

HOLD DOOR FIRMLY ALONG THE HINGED SIDE TO MAINTAIN FULLY-ENGAGED TABS



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.

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 13.

⚠ 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 5 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 2 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 14).

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 2.

Table 2. Refrigerant Line Set — Inches (mm)

Model Size	Field Connections		Recommended Line Set		
	Liquid Line	Vapor Line	Liquid Line	Vapor Line	L15 Line Sets Feet (Meters)
-024	3/8" (10)	3/4" (19)	3/8" (10)	3/4" (19)	L15-41 15 - 50' (5 - 15)
-030					
-036	3/8" (10)	7/8" (22)	3/8" (10)	7/8" (22)	L15-65 15 - 50' (5 - 15)
-042					
-048					
-060	3/8" (10)	1-1/8" (29)	3/8" (10)	1-1/8" (29)	Field Fabricated

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

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

⚠ IMPORTANT

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

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

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

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

- Model (XC17) and size of unit (e.g. -036).
- Line set diameters for the unit being installed as listed in Table 2 and total length of installation.
- Number of elbows vertical rise or drop in the piping.

⚠ WARNING

Danger of fire. Bleeding the refrigerant charge from only the high side may result in the low side shell and suction tubing being pressurized. Application of a brazing torch while pressurized may result in ignition of the refrigerant and oil mixture - check the high and low pressures before unbrazing.

⚠ 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.

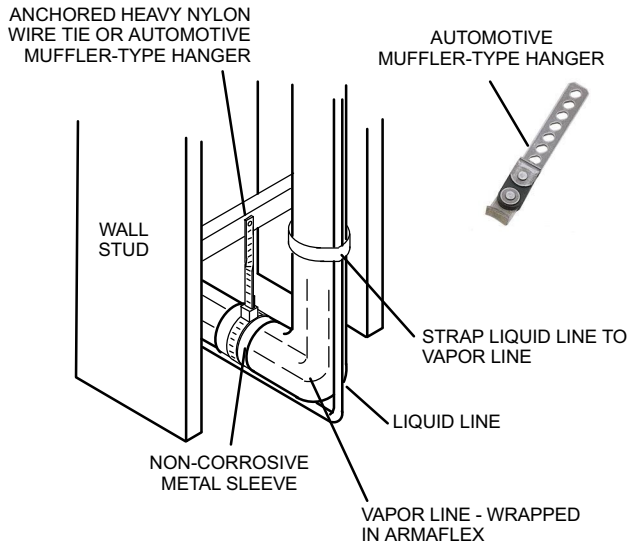
LINE SET

IMPORTANT — Refrigerant lines must not contact structure.

INSTALLATION

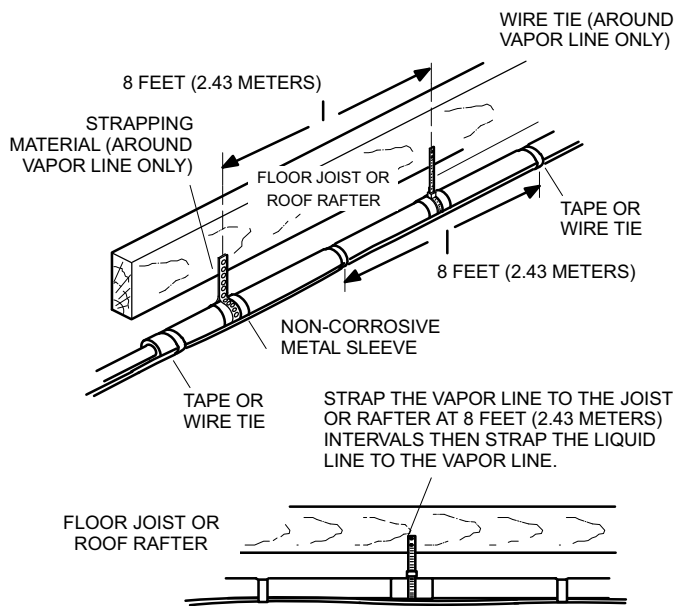
Line Set Isolation — The following illustrations are examples of proper refrigerant line set isolation:

REFRIGERANT LINE SET — TRANSITION FROM VERTICAL TO HORIZONTAL



REFRIGERANT LINE SET — INSTALLING HORIZONTAL RUNS

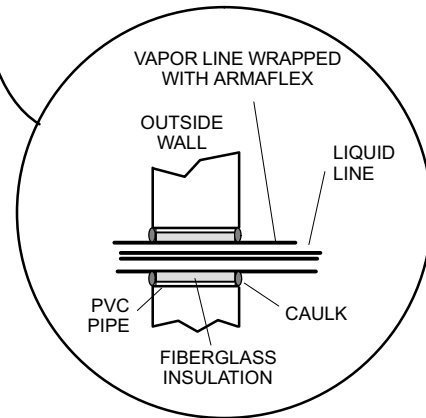
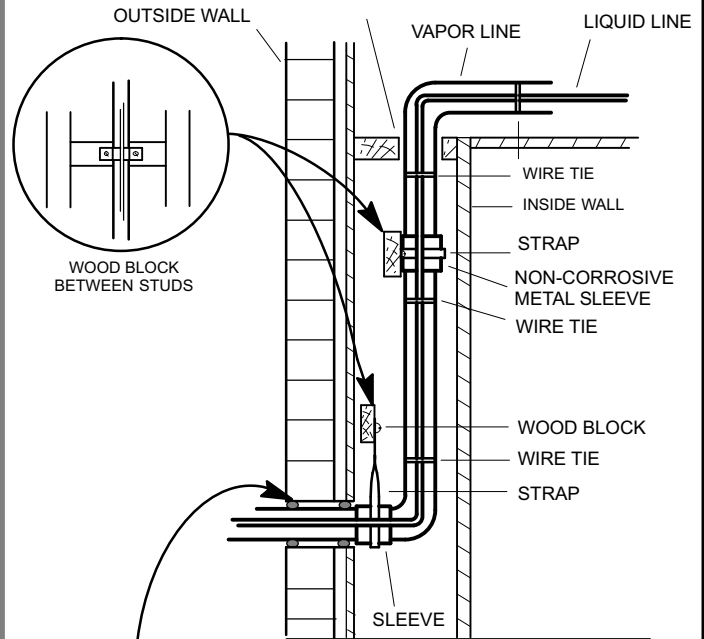
To hang line set from joist or rafter, use either metal strapping material or anchored heavy nylon wire ties.



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

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

IMPORTANT — Refrigerant lines must not contact wall



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

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

Figure 5. Line Set Installation

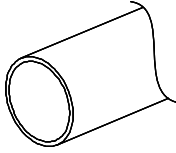
BRAZING

CONNECTIONS

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

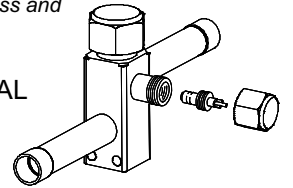
1 CUT AND DEBUR

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



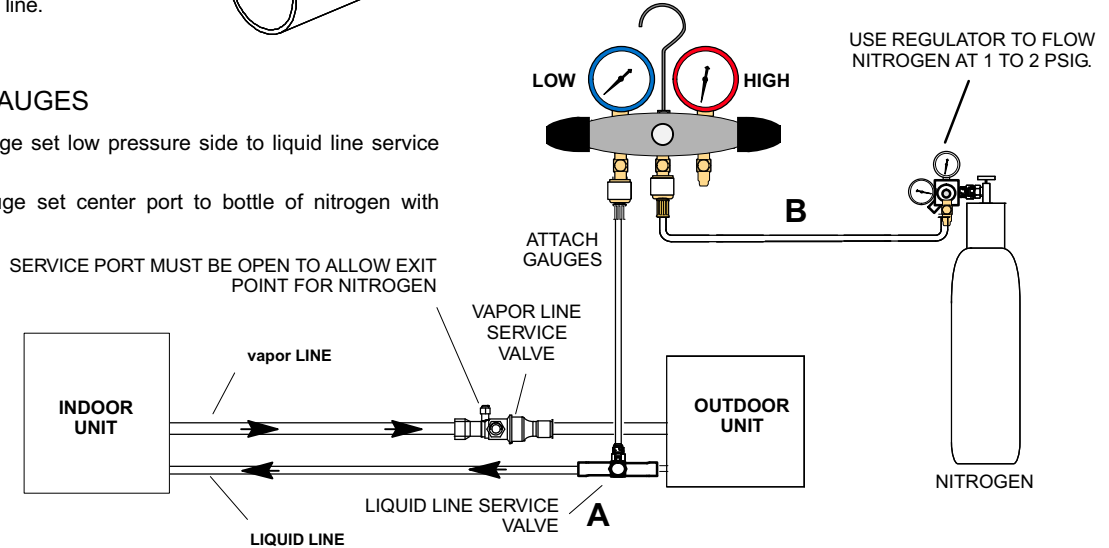
2 CAP AND CORE REMOVAL

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



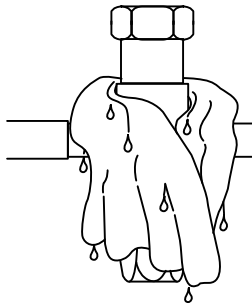
3 ATTACHED GAUGES

- A** Connect gauge set low pressure side to liquid line service valve.
- B** Connect gauge set center port to bottle of nitrogen with regulator.



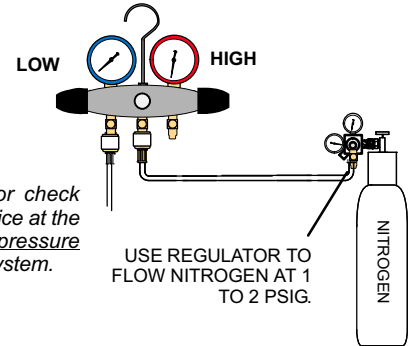
4 WRAP SERVICE VALVE

To protect components during brazing, wrap a wet cloth around the liquid line service valve body and copper tube stub and use another wet cloth underneath the valve body to protect the base paint.



5 FLOW NITROGEN

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

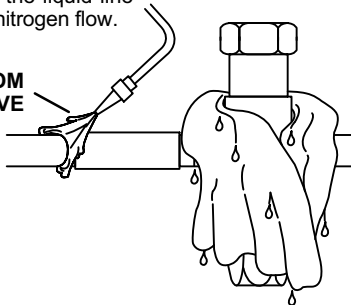


NOTE — The fixed orifice or check expansion valve metering device at the indoor unit will allow low pressure nitrogen to flow through the system.

6 BRAZE LINE SET

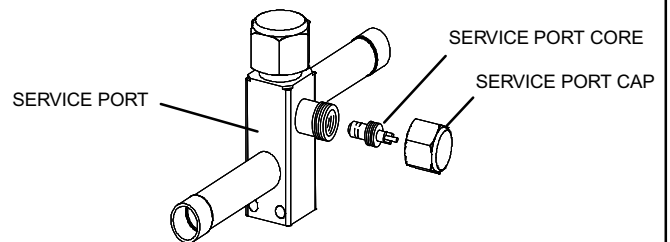
Braze the liquid line to the liquid line service valve. Turn off nitrogen flow.

POINT FLAME AWAY FROM SERVICE VALVE



7 INSTALL SERVICE PORT CAPS ONLY

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



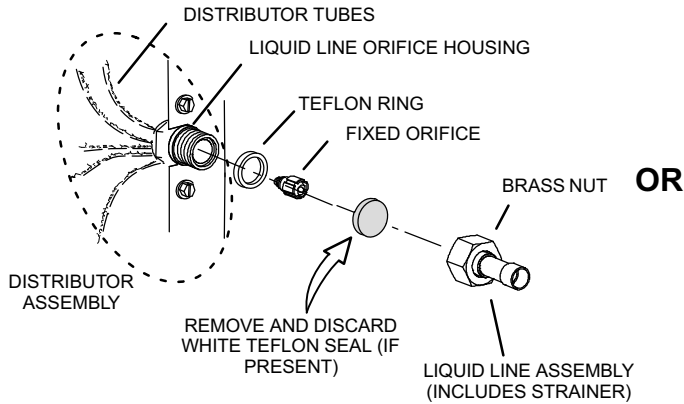
WARNING — Allow braze joint to cool before removing the wet rag from the service valve. (TEMPERATURES ABOVE 250°F CAN DAMAGE VALVE SEALS)

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

FLUSHING

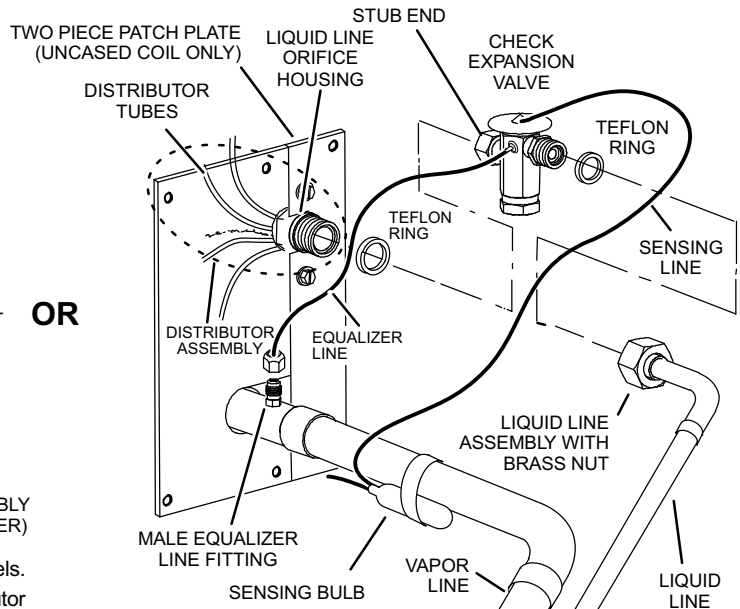
LINE SET AND INDOOR COIL (1 OF 2)

1 TYPICAL FIXED ORIFICE REMOVAL PROCEDURE (Uncased Coil Shown)



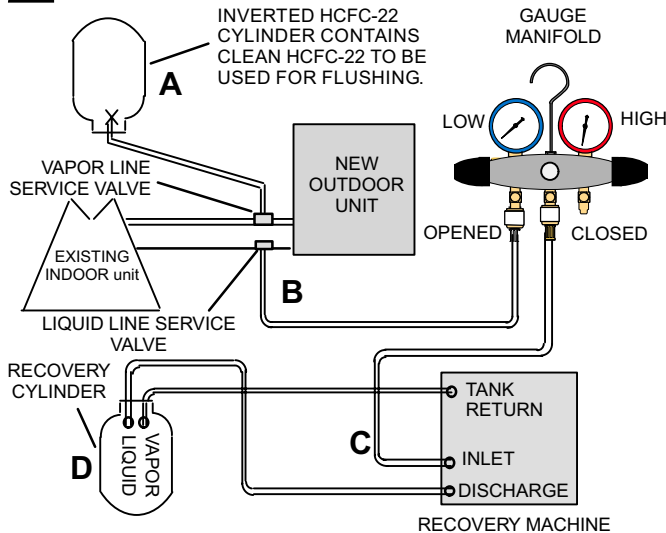
- A On fully cased coils, remove the coil access and plumbing panels.
- B Remove any shipping clamps holding the liquid line and distributor assembly.
- C Using two wrenches, disconnect liquid line from liquid line orifice housing. Take care not to twist or damage distributor tubes during this process.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

TYPICAL CHECK 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.

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

3 FLUSHING LINE SET

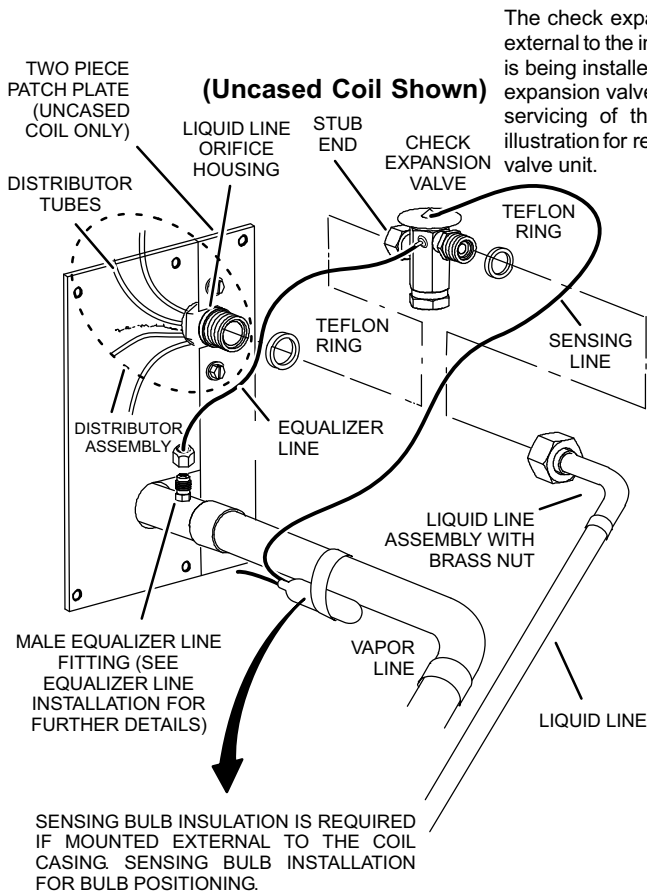
The line set and indoor unit coil must be flushed with at least the same amount of clean refrigerant that previously charged the system. Check the charge in the flushing cylinder before proceeding.

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

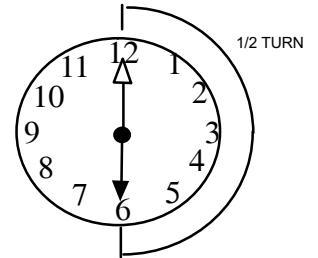
FLUSHING LINE SET AND INDOOR COIL (2 OF 2)

4 TYPICAL CHECK EXPANSION VALVE INSTALLATION PROCEDURE

This outdoor unit is designed for use in systems that use check expansion valve metering device. See the *Lennox XC17 Engineering Handbook* for approved check 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 field servicing of the check expansion valve. Refer to below illustration for reference during installation of check expansion valve unit.



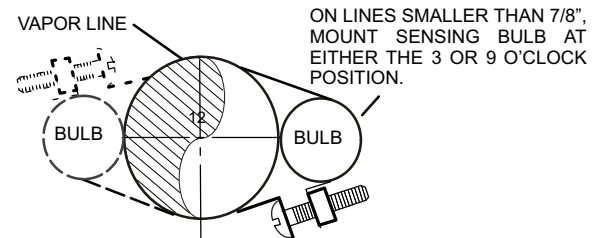
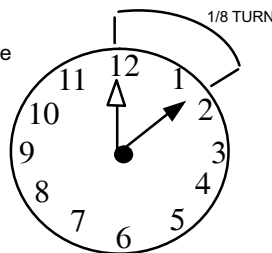
- Remove the field-provided fitting that temporary reconnected the liquid line to the indoor unit's distributor assembly.
- Install one of the provided Teflon rings around the stubbed end of the check expansion valve and lightly lubricate the connector threads and expose surface of the Teflon ring with refrigerant oil.
- 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 20 ft-lb.
- 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.
- 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 20 ft-lb.

SENSING BULB INSTALLATION

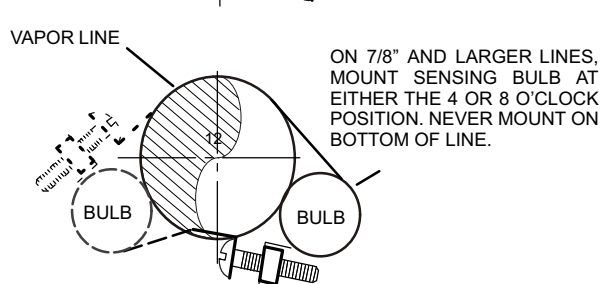
- Attach the vapor line sensing bulb in the proper orientation as illustrated to the right using the clamp and screws provided.

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 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.

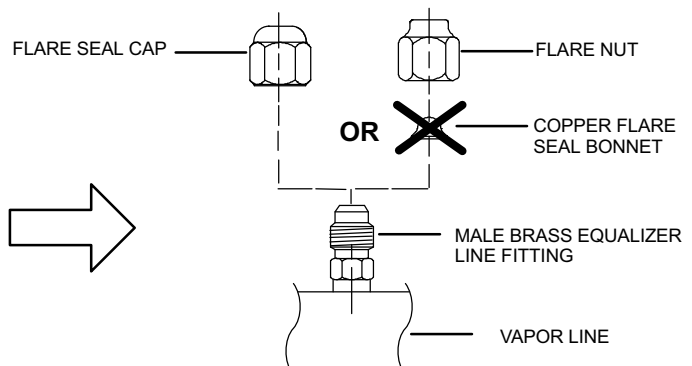


ON 7/8" AND LARGER LINES, MOUNT SENSING BULB AT EITHER THE 4 OR 8 O'CLOCK POSITION. NEVER MOUNT ON BOTTOM OF LINE.

NOTE — NEVER MOUNT ON BOTTOM OF LINE.

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.
- 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.



INSTALLING ISOLATION GROMMETS

Locate the isolation grommets (provided). Slide grommets onto vapor and liquid lines. Insert grommets into piping panel to isolate refrigerant lines from sheet metal edges.

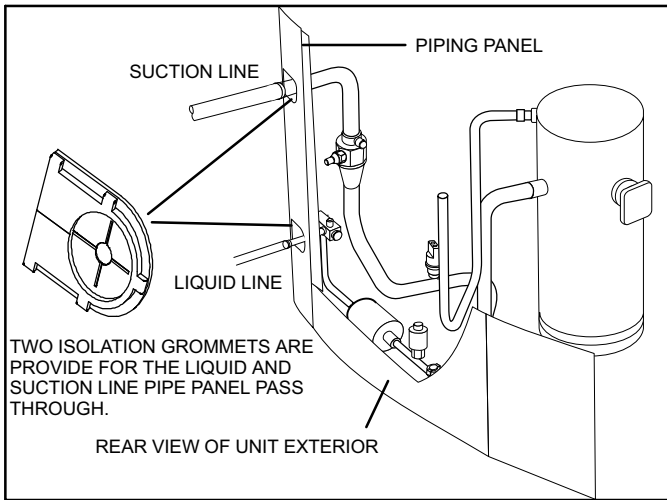


Figure 6. Isolation Grommets

! 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 Testing the System

! 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.

! WARNING



Fire, Explosion and Personal Safety Hazard.

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

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

LEAK TEST

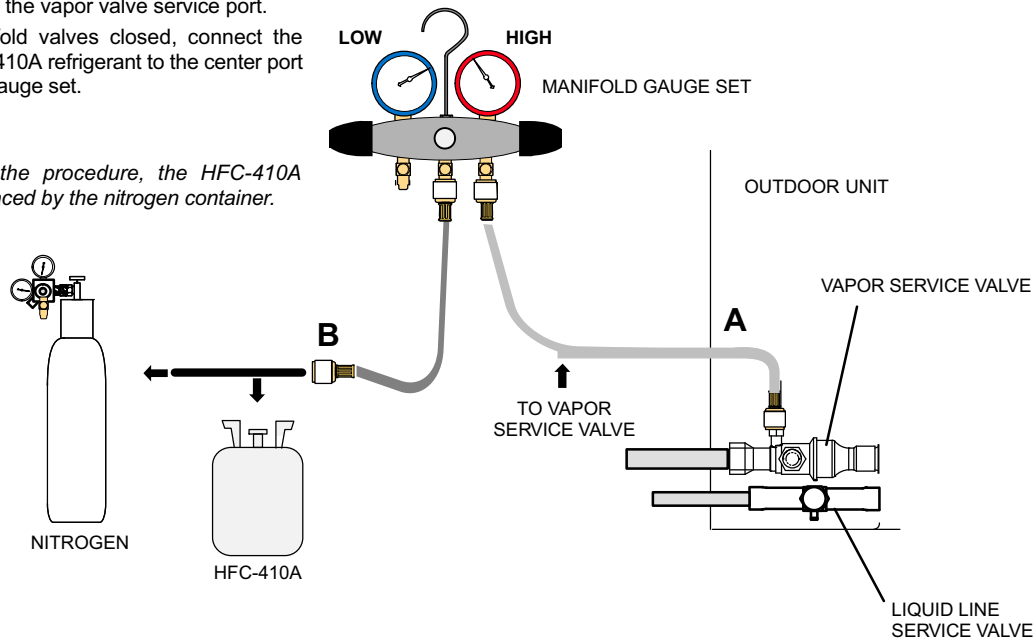
LINE SET AND INDOOR COIL

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.

1 CONNECT GAUGE SET

- A** Connect an HFC-410A manifold gauge set high pressure hose to the vapor valve service port.
- B** With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set.

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



2 TEST FOR LEAKS

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

- A** With both manifold valves closed, connect the cylinder of HFC-410A refrigerant to the center port of the manifold gauge set. Open the valve on the HFC-410A cylinder (vapor only).
- B** Open the high pressure side of the manifold to allow HFC-410A into the line set and indoor unit. Weigh in a trace amount of HFC-410A. [A trace amount is a maximum of two ounces (57 g) refrigerant or three pounds (31 kPa) pressure]. Close the valve on the HFC-410A cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect the HFC-410A cylinder.
- C** Connect a cylinder of dry nitrogen with a pressure regulating valve to the center port of the manifold gauge set.
- D** Adjust dry nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set in order to pressurize the line set and the indoor unit.
- E** After a few minutes, open one of the service valve ports and verify that the refrigerant added to the system earlier is measurable with a leak detector.
- F** After leak testing disconnect gauges from service ports.

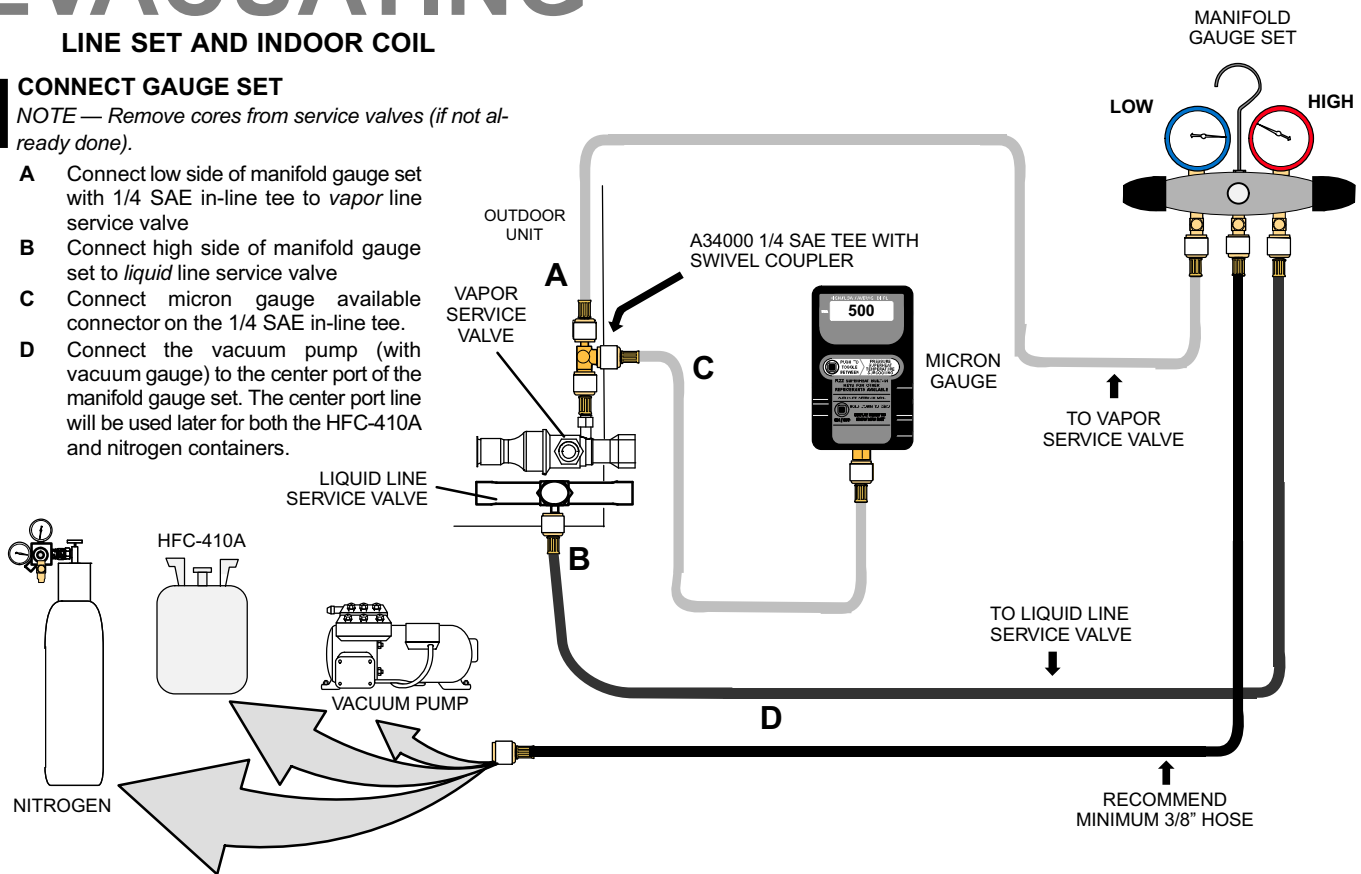
EVACUATING

LINE SET AND INDOOR COIL

1 CONNECT GAUGE SET

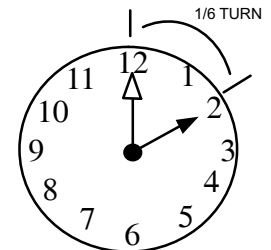
NOTE — Remove cores from service valves (if not already done).

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



2 EVACUATE THE SYSTEM

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



⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument capable of accurately measuring down to 50 microns.

⚠ WARNING

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

Evacuating the system of non-condensables is critical for proper operation of the unit. Non-condensables are defined as any gas that will not condense under

temperatures and pressures present during operation of an air conditioning system. Non-condensables and water suction combine with refrigerant to produce substances that corrode copper piping and compressor parts.

Electrical

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

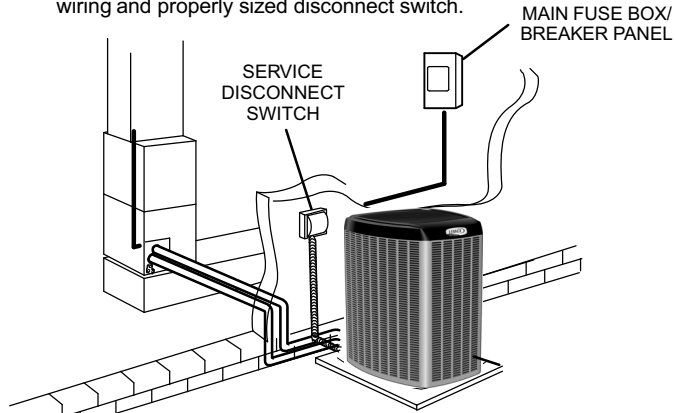
Refer to the furnace or air handler installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

24VAC TRANSFORMER

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

1 SIZE CIRCUIT AND INSTALL DISCONNECT SWITCH

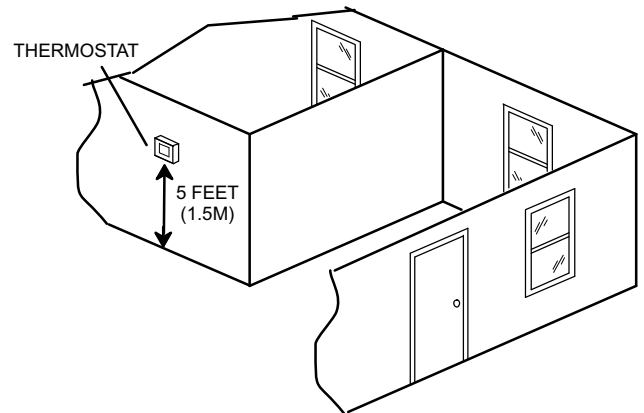
Refer to the unit nameplate for minimum circuit ampacity, and maximum fuse or circuit breaker (HACR per NEC). Install power wiring and properly sized disconnect switch.



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.

⚠ WARNING



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

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

⚠ CAUTION

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

Electrostatic discharge can affect electronic components. Take precautions 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. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure

3 ROUTE CONTROL WIRES

Install low voltage control wiring from outdoor to indoor unit and from thermostat to indoor unit as illustrated. See Figures 10 and 10 for typical configurations.

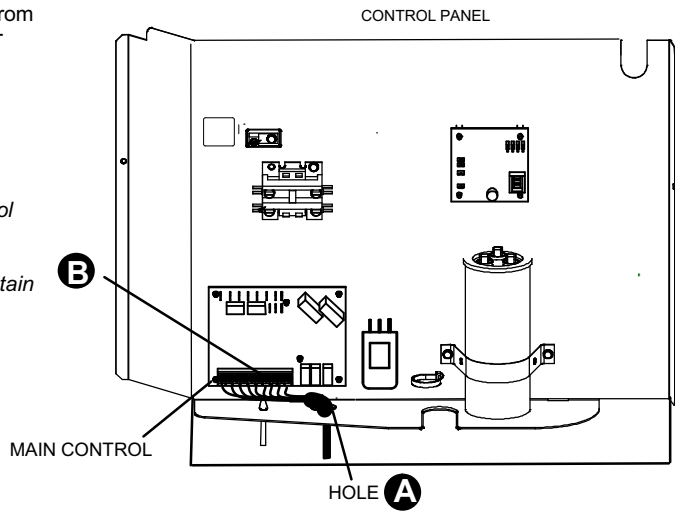
- A Run 24VAC control wires through hole with grommet.
- B Make 24VAC control wire connections to Main Control.

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

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

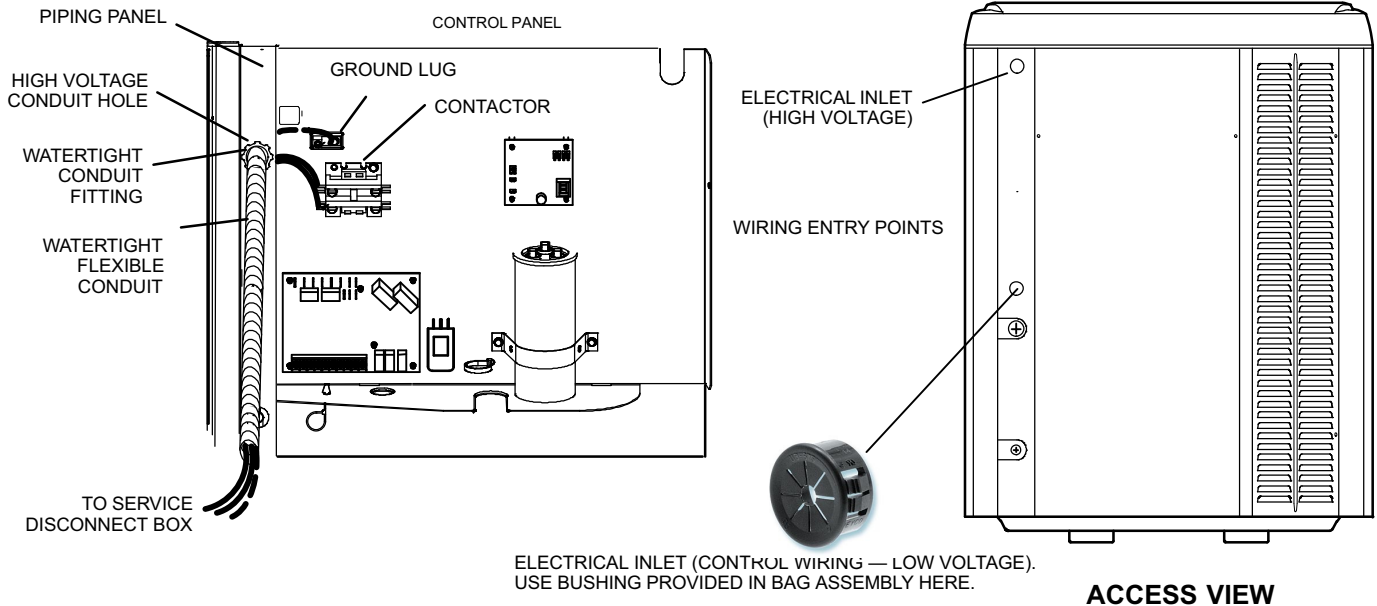
NOTE — For proper voltages, select thermostat wire (control wires) gauge per table below.

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



4 ROUTE HIGH VOLTAGE AND GROUND WIRES

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



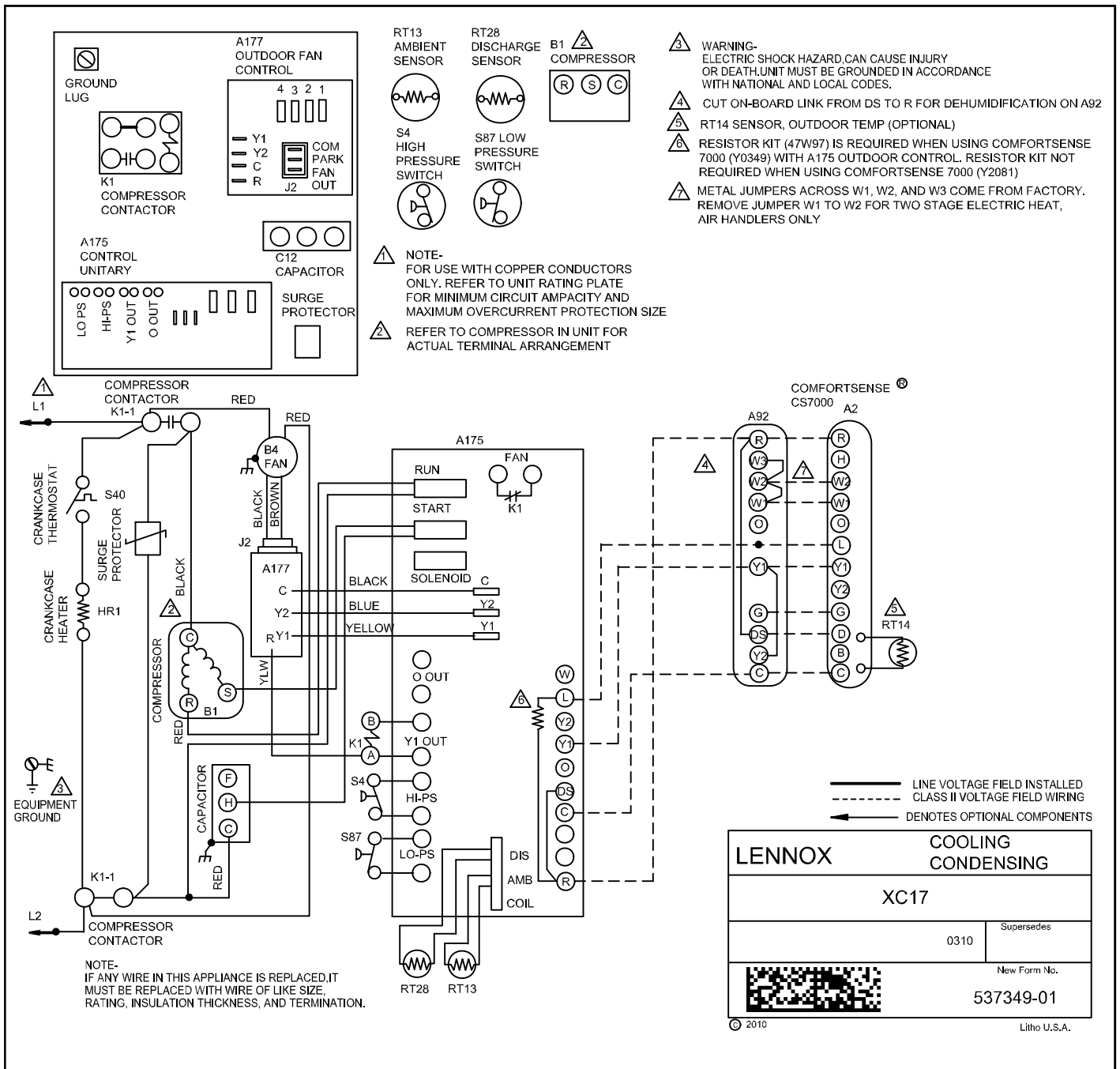


Figure 7. Typical XC17 Wiring

Main Control Jumpers and Terminals

MAIN CONTROL — AIR CONDITIONER — ONE STAGE

TABLE 3 PROVIDES ADDITIONAL INFORMATION CONCERNING JUMPERS, LOOP, AND CONNECTIONS FOR THE MAIN CONTROL.

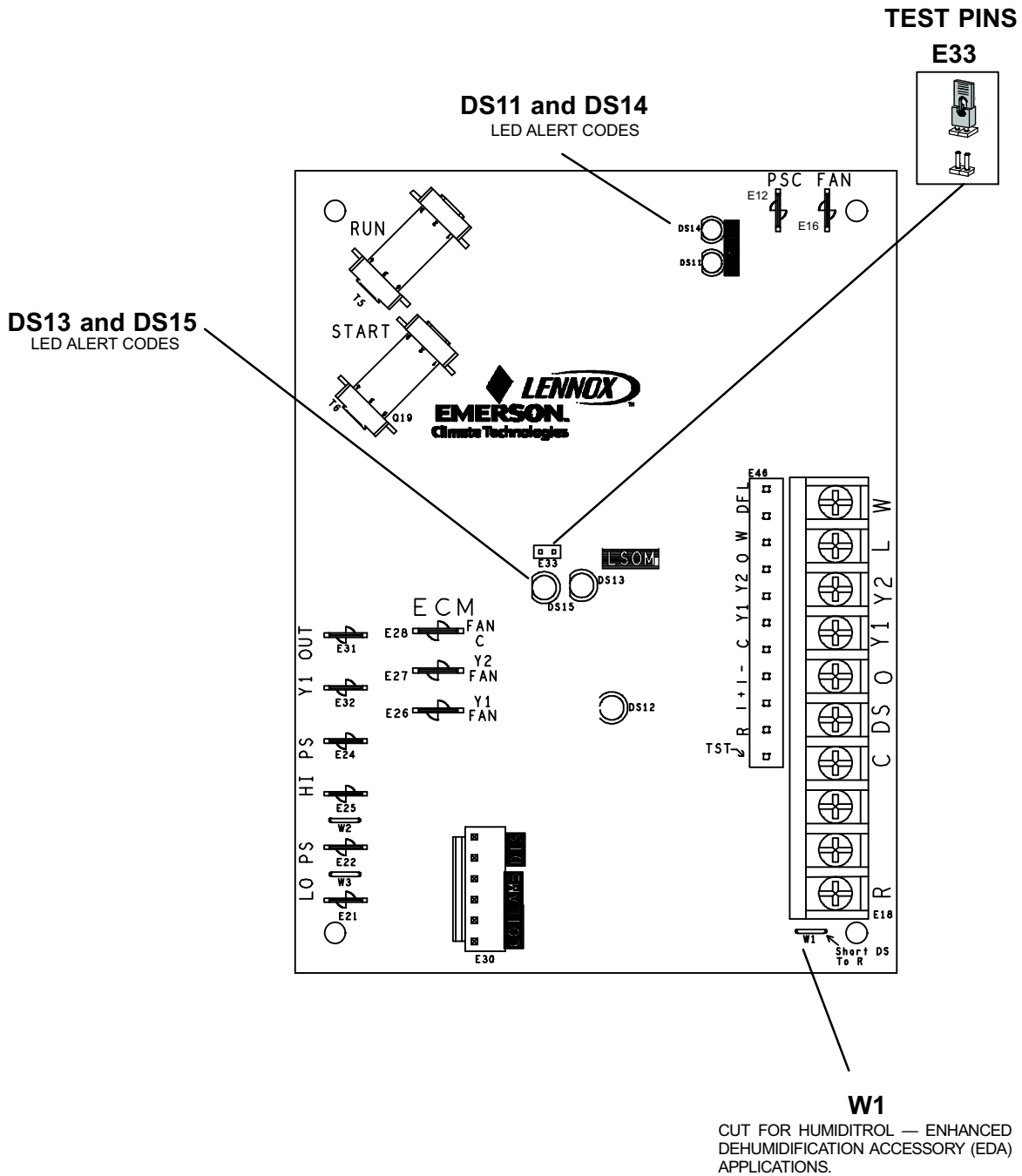


Figure 8. Control Jumpers, Loop and Terminals

Table 3. Main Control Jumpers and Terminals

Board ID	Label	Description
E12	PSC Fan	240 VAC output connection for outdoor fan.
E16	PSC Fan	240 VAC input connection for outdoor fan.
E18	W	24VAC output for defrost auxiliary heat output.
	L	Thermostat service light connection.
	Y2	24VAC thermostat input/output for second stage operation of the unit.
	Y1	24VAC thermostat input for first stage operation of the unit.
	O	24VAC thermostat input for reversing valve operation
	DS	Humiditrol Input
	C	24VAC system common
	R	24VAC system power input
E21 and E22	LO-PS	S4 connection for low-pressure switch (2.4 milliamps @ 18VAC)
E31 and E32	Y1 OUT	24VAC common output, switched for enabling compressor contactor.
E24 and E25	HS-PS	S87 connection for high-pressure switch.
E26	FAN 1	First Stage and second stage basic and precision dehumidification ECM fan motor 24VDC output connection 1.
E27	FAN 2	Second stage basic and precision dehumidification ECM fan motor 24VDC output connection 2.
E28	FAN C	ECM common connection for ECM fan.
E30	Six position square pin header E30 provides connections for the temperature sensors.	
	DIS (YELLOW) Pins 5 and 6	DIS 5 — Discharge line temperature sensor supply. DIS 6 — Discharge line temperature sensor return. Range is -35°F to 310°F. Sensor is clipped on a 1/2" copper tube.
	AMB (BLACK) Pins 3 and 4	AMB 3 — Outdoor ambient temperature sensor supply. AMB 4 — Outdoor ambient temperature return. Range is -40°F to +140°F
	COIL (BROWN) Pins 5 and 6	COIL 1 — Outdoor coil temperature sensor supply. COIL 2 — Outdoor coil temperature sensor return This model does not utilize a coil sensor. The cable harness assembly for the sensors incorporates a built-in 10K resistor between pins 5 and 6.
E33	Field Test	This jumper allows service personnel to defeat the timed off control, and field programming of unit capacity feature. Placing a jumper across both pins on E33 will terminate the anti-short delay. It will also clear lockout alarms
W1	Short DS To R	Cut for Humiditrol — Enhanced Dehumidification Accessory (EDA) applications.
* Factory default setting		

Field Control Wiring

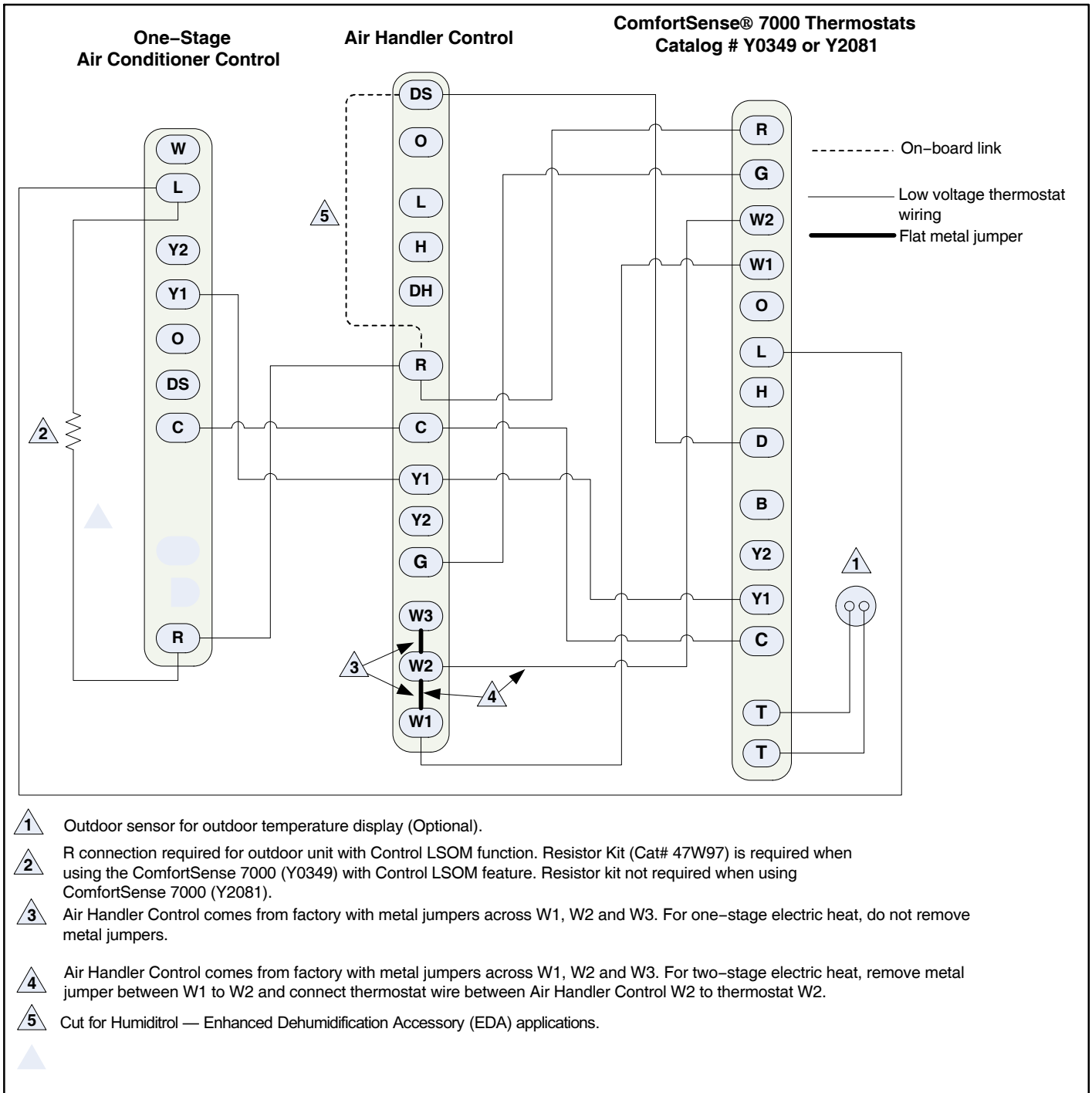
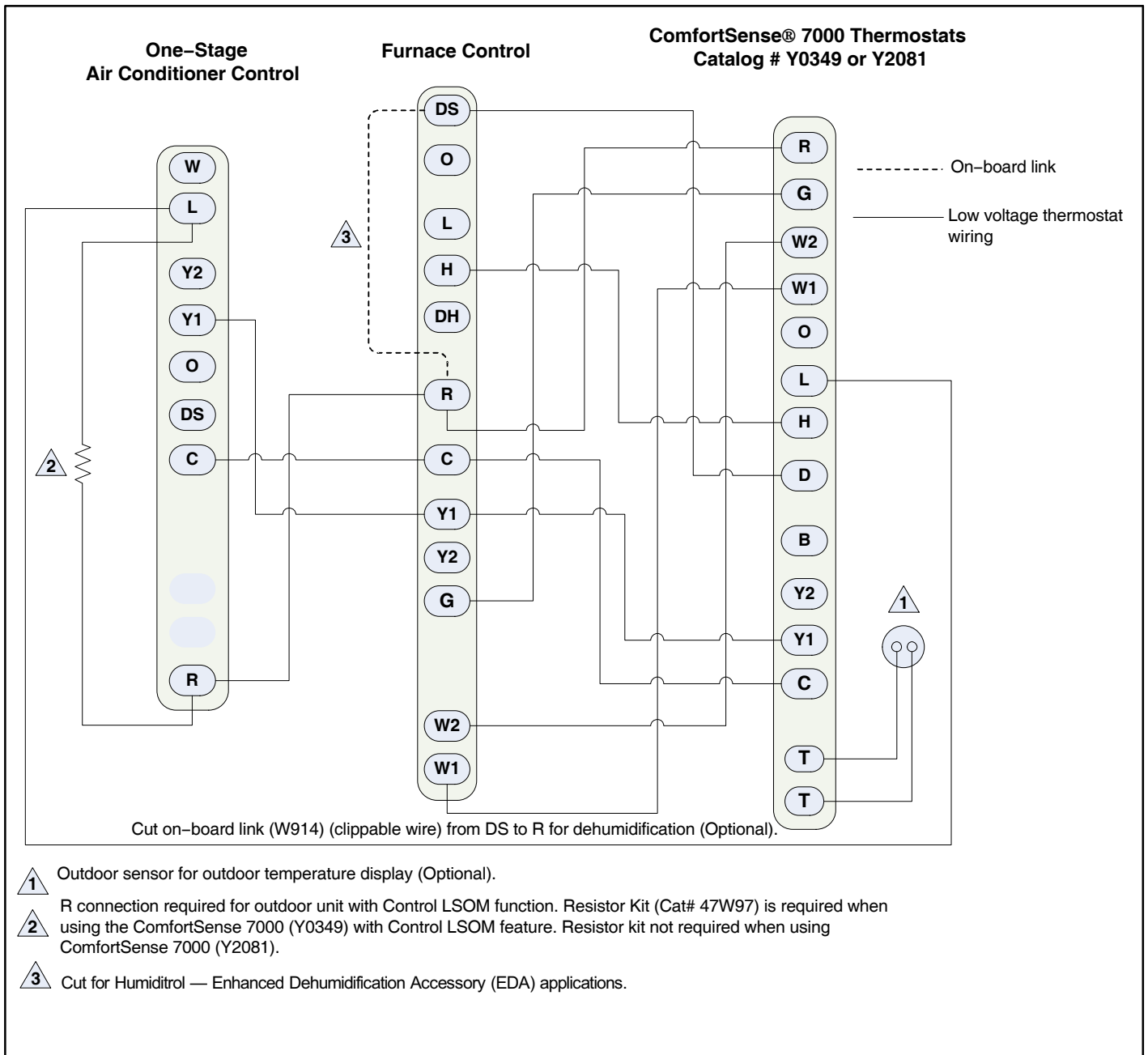


Figure 9. ComfortSense® 7000 Series Thermostat — Air Handler/One-Stage Air Conditioner



**Figure 10. ComfortSense® 7000 Series Thermostat —
 Furnace/One-Stage Air Conditioner**

Servicing Units Delivered Void of Charge

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

1. Leak check system using procedure outlined on Page 16.
2. Evacuate the system using procedure outlined on Page 18.
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 18.
5. Weigh in refrigerant using procedure outlined in Figure 14.
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*.

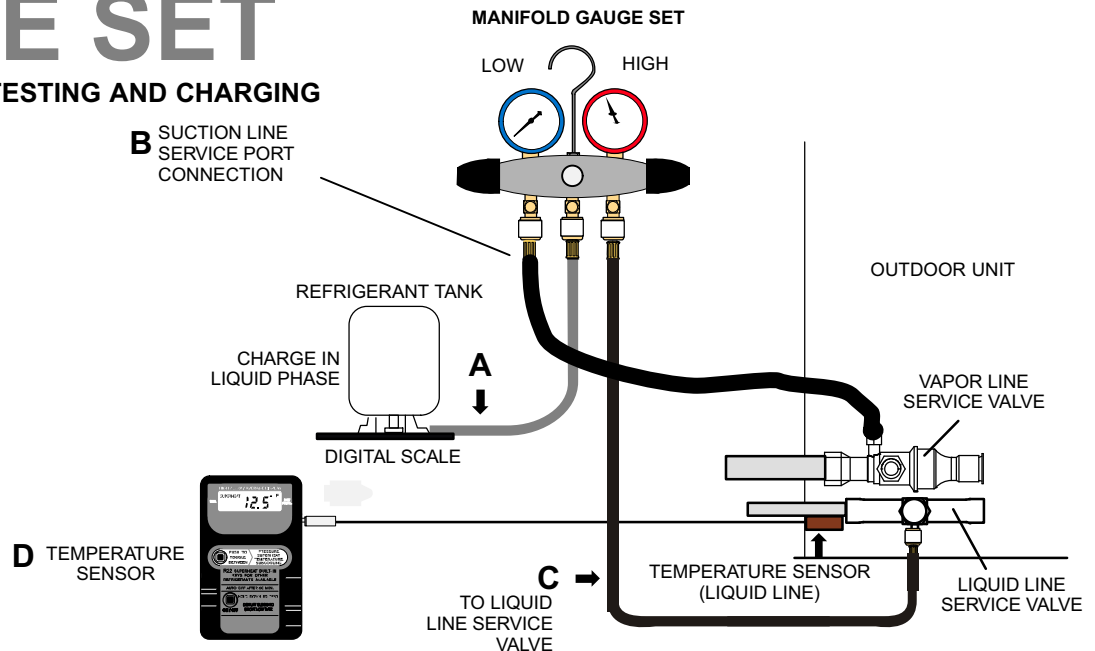
System Refrigerant

This section outlines procedures for:

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

GAUGE SET

CONNECTIONS FOR TESTING AND CHARGING



- A Close manifold gauge set valves and connect the center hose to a cylinder of HFC-410A. Set for liquid phase charging.
- B Connect the manifold gauge set's low pressure side to the suction line service port.
- C Connect the manifold gauge set's high pressure side to the liquid line service port.
- D Position temperature sensor on liquid line near liquid line service port.

Figure 11. 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. This unit is NOT approved for use with coils which use capillary tubes or fixed orifices as a refrigerant metering device. Check airflow using the Delta-T (DT) process using the illustration in Figure 12.

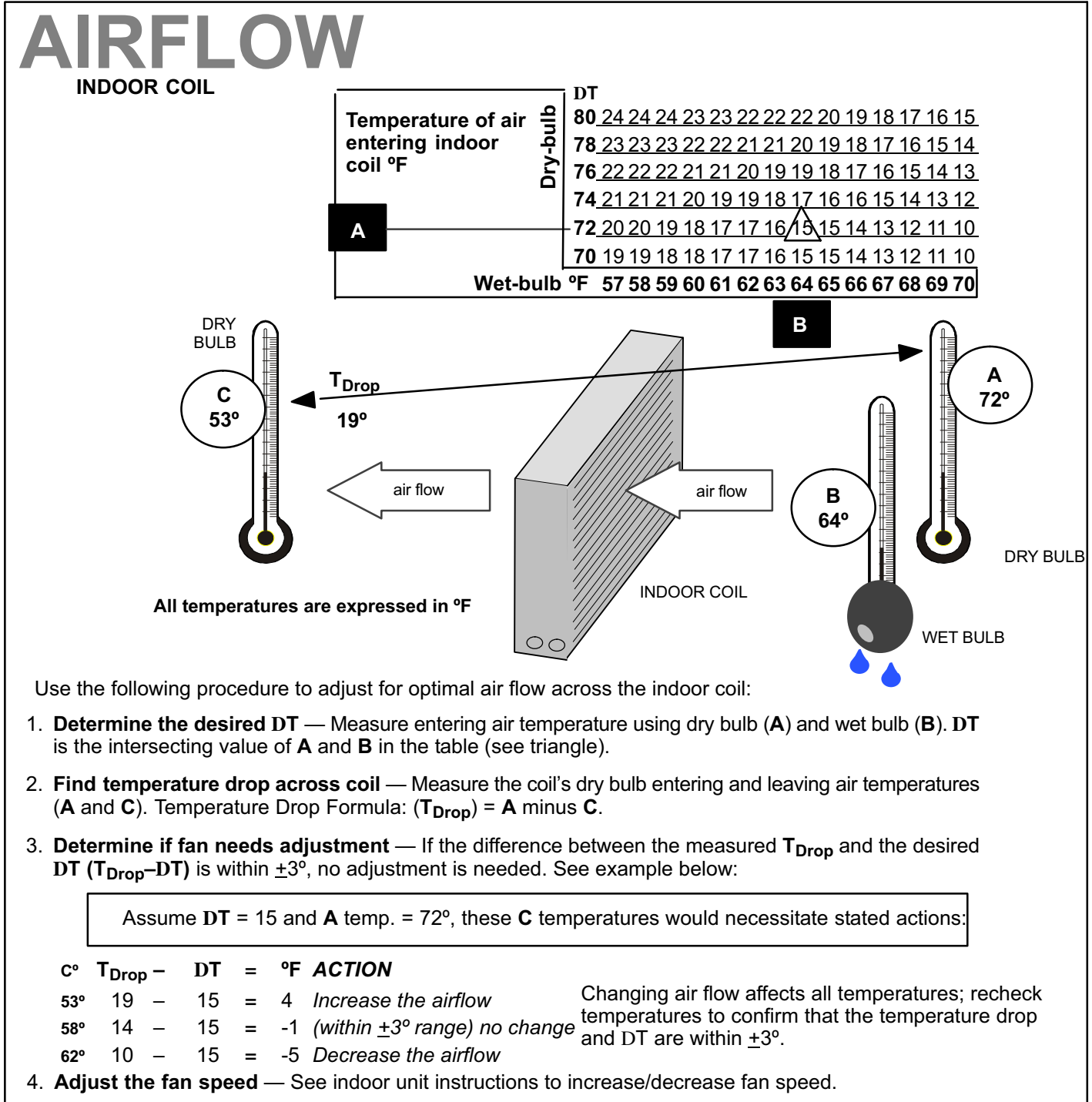


Figure 12. Checking Indoor Airflow over Evaporator Coil using Delta-T Chart

Use **WEIGH IN** to initially charge a system when the outdoor unit is void of charge. To verify charge and add or remove refrigerant use either **APPROACH** or **SUBCOOLING** methods.

START: Determine the correct charge method:

TXV

65°F (18.3°C) and Above

64°F (17.7°C) and Below

APPROACH OR SUBCOOLING WEIGH-IN

WHEN TO CHARGE?

- Warm weather best
- Can charge in colder weather

CHARGE METHOD? Determine by:

- Outdoor ambient temperature

REQUIREMENTS:

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

Figure 13. Determining Charge Method

WEIGH IN

CHARGING METHOD 64°F (17.7°C) and Below

CALCULATING SYSTEM CHARGE FOR OUTDOOR UNIT VOID OF CHARGE

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

Amount specified on nameplate

Adjust amount, for variation in line set length listed on line set length table below.

±

=

Total charge

Refrigerant Charge per Line Set Length

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

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

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

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

Figure 14. Using HFC-410A Weigh In Method

APPROACH

TEST AND CHARGE METHOD

65°F (18.3°C) and Above

If refrigerant added or removed, retest to confirm that unit is properly charged



If value is greater than shown (high approach), add refrigerant; if less than shown (liquid temp too close to ambient temp, low approach), remove refrigerant.



APP° (Approach) Values (F: +/-1.0° [C: +/-0.6°])*

	Models					
°F (°C)*	-024	-030	-036	-042 . . .	-048 . . .	-060
Any	10 (5.6)	10 (5.6)	6 (3.3)	10 (5.6)	8 (4.4)	8 (4.4)

*Temperature of air entering outdoor coil

* These approach values are also listed on the unit charging sticker 580005-01 located on the access panel.

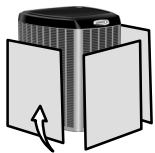
1. Confirm proper airflow across coil using Figure 12.
2. Compare unit pressures with Table 4, *Normal Operating Pressures*.
3. Use APPROACH to correctly charge unit or to verify the charge is correct.
4. Set thermostat to call for heat (must have a cooling load between 70-80°F (21-26°C).
5. Connect gauge set.
6. When heat demand is satisfied, set thermostat to call for cooling.
7. Allow temperatures and pressures to stabilize.
8. Record outdoor ambient temperature:
AMB° = _____
9. Record line temperature:
LIQ° = _____
10. Subtract to determine approach (APP°):
LIQ° _____ - AMB° _____ = APP° _____
11. Compare results with table to the left.

Figure 15. Using Approach Test and Charge Method

SUBCOOLING

TEST AND CHARGE METHOD

65°F (18.3°C) and Above



CARDBOARD OR PLASTIC SHEET

BLOCK OUTDOOR COIL: [sometimes necessary with lower temperatures] Use cardboard or plastic sheet to restrict the airflow through the outdoor coil to achieve pressures from 325-375 psig (2240-2585 kPa). Higher pressures are needed to check charge. Block equal sections of air intake panels and move coverings sideways until the liquid pressure is in the above noted ranges.

If refrigerant added or removed, verify charge using the approach method



If value is greater than shown, remove refrigerant; if less than shown, add refrigerant



SC° (Subcooling) Values (F: +/-1.0° [C: +/-0.6°])

	Models					
°F (°C)*	-024	-030	-036	-042 . . .	-048 . . .	-060
Any	4 (2.2)	4 (2.2)	7 (3.9)	5 (2.8)	6 (3.3)	6 (3.3)

*Temperature of air entering outdoor coil

* These subcooling values are also listed on the unit charging sticker 580005-01 located on the access panel.

1. Confirm proper airflow across coil using Figure 12.
2. Compare unit pressures with Table 4, *Normal Operating Pressures*.
3. Use SUBCOOLING to correctly charge unit or to verify the charge is correct.
4. Set thermostat to call for heat (must have a cooling load between 70-80°F (21-26°C)
5. Connect gauge set
6. Measure outdoor ambient temperature
7. When heat demand is satisfied, set thermostat to call for cooling
8. Allow temperatures and pressures to stabilize.
NOTE - If necessary, block outdoor coil to maintain 325 - 375 psig.
9. Record liquid line temperature:
LIQ° = _____
10. Measure liquid line pressure and use the value to determine saturation temperature (see Table 5):
SAT° = _____
11. Subtract to determine subcooling (SC°):
SAT° _____ - LIQ° _____ = SC° _____
12. Compare results with table to the left.

Figure 16. Using Subcooling Test and Charge Method

Operating and Temperature Pressures

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.

Table 4. Normal Operating Pressures (Liquid +10 and Suction +5 psig)*

⚠ IMPORTANT	Use this table to perform maintenance checks; it is not a procedure for charging the system. Minor variations in these pressures may be due to differences in installations. Significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.											
	Model	-024		-030		-036		-042		-048		-060
°F (°C)**	Liquid	Suction	Liquid	Suction	Liquid	Suction	Liquid	Suction	Liquid	Suction	Liquid	Suction
65 (18.3)	234	139	236	134	226	134	232	137	232	132	236	131
70 (21.1)	249	140	251	135	245	135	249	139	249	133	254	132
75 (23.9)	268	141	271	138	266	137	270	140	268	134	273	133
80 (26.7)	289	142	291	139	287	138	291	141	288	135	294	135
85 (29.4)	310	142	312	140	310	139	314	142	311	136	317	136
90 (32.2)	334	144	335	142	333	140	338	143	333	137	340	137
95 (35.0)	358	145	358	142	358	141	363	144	357	138	364	139
100 (37.8)	383	146	383	143	383	143	389	145	380	139	389	140
105 (40.6)	408	147	409	144	410	144	419	147	406	140	416	142
110 (43.3)	436	148	436	145	437	145	447	148	433	142	444	143
115 (46.1)	465	150	467	147	464	146	480	149	462	143	475	145
* Typical pressures only, expressed in psig (liquid +/- 10 and vapor +/- 5 psig); indoor match up, indoor air quality, and indoor load will cause the pressures to vary. These operating pressures are also listed on the unit charging sticker (580005-01) located on the access panel.												
** Temperature of air entering outdoor coil.												

Table 5. HFC-410A Temperature (° Fahrenheit) — Pressure (Psig)

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

System Operation

⚠ IMPORTANT

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

The Main Control provides the following system functions:

- Compressor anti-short-cycle delay.
- High and low pressure switches
- Ambient and Discharge Line Temperatures Monitoring and Protection.
- Five strikes lockout safety feature for High/Low Pressure Switches and High Discharge Line Temperature. See Figures 19, 20 and 21 feature function.

COMPRESSOR ANTI-SHORT CYCLE DELAY

The Main Control protects the compressor from:

- Short cycling (five minutes) when there is initial power up
- Interruption in power to the unit
- High or low pressure switch or discharge line sensor trips
- Delay after Y1 demand is removed.

The anti-short timer in the outdoor control is 5 minutes. To override timer when active or inactive - place jumper on the field test pins between 1 and 2 seconds.

Resetting Anti-Short Cycle Delay

The **FIELD TEST** pins (E33) on the Main Control can be jumpered between 1 to 2 seconds to bypass delay.

HIGH AND LOW PRESSURE SWITCHES

The unit's reset pressure switches LO PS (S4) and HI PS (S87) are factory-wired into the Main Control on the LO-PS and HI-PS terminals, there locations are illustrated on Page 3. Sequence of operations for both pressure switches are provided in Figures 19 and 20.

HIGH DISCHARGE LINE TEMPERATURE SENSOR (RT28)

The high discharge line temperature sensor location is illustrated on Page 3. This sensor's sequence of operations is provided in Figure 21.

High Discharge Line Sensor Open/Shorted Event Condition

Discharge sensor open / short fault is ignored during initial 90-seconds of compressor run time. After that, if discharge temperature sensor is detected open or short, the control will de-energize all the outputs and anti-short cycle timer is started. Discharge sensor faulty alert LED code will be displayed.

OUTDOOR AMBIENT TEMPERATURE (RT13)

If the outdoor ambient temperature sensor detected a open, or out of range -40°F to +140°F (-40°C to 60°C) then LED alert codes are displayed, however cooling operation will continue. See Table 9 for LED alert codes for the ambient sensor. Location of outdoor ambient temperature sensor is illustrated on Page 3.

COIL TEMPERATURE SENSOR

This model does not use a coil temperature sensor. The cable assembly attached to the Main Control's E30 connection has a 10K resistor installed between pins 5 and 6 as illustrated in Figure 17. No alerts or alarms would be generated if resistor is damage.

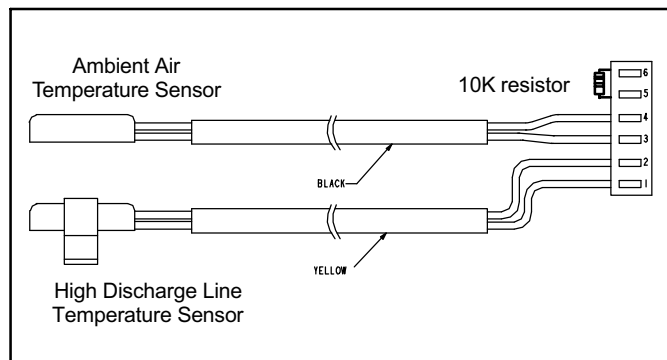


Figure 17. 10k Resistor Location

TESTING AMBIENT AND HIGH DISCHARGE LINE TEMPERATURE SENSORS

Sensors connect through a field-replaceable harness assembly that plugs directly into the Main Control. Through these sensors, the Main Control can monitor outdoor ambient and discharge line temperature fault conditions. As the detected temperature changes, the resistance across the sensor changes. Figures 6 and 7 lists how the resistance varies as the temperature changes for both type of sensors. Sensor resistance values can be checked by ohming across pins shown in Table 8.

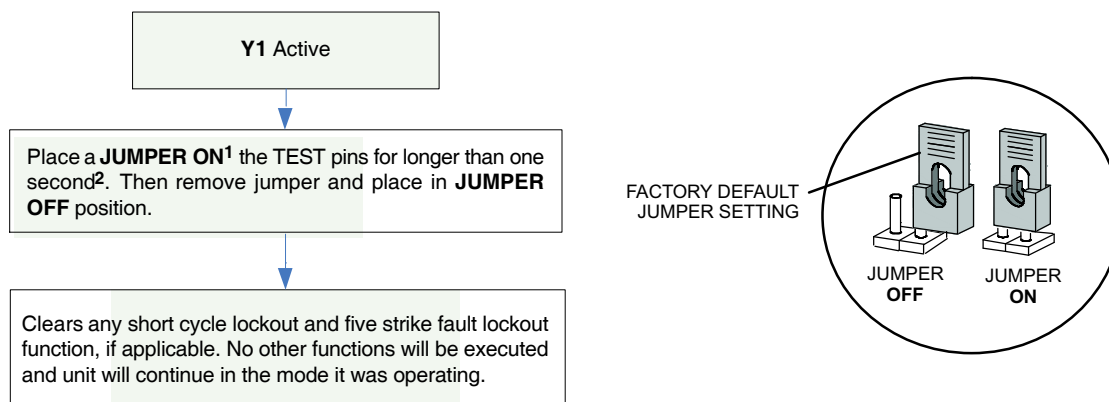
When a sensor indicates a resistance value that is not within the range as listed in Table 8, then the following condition may be present:

- Sensor detects an out-of-range outdoor ambient air temperature condition and will display LED alert code on the Main Control.
- The sensor is operating normally when the ambient air temperature at the sensor is below or above the Main Control's expected ohm values. The Main Control will indicate the sensor as faulty, however under this scenario, the sensor is not actually faulty.
- Once the outdoor ambient air temperature has returned to within the sensor's normal operating range, the LED alert code will automatically stop.

TEST PINS FUNCTION

Placing the **JUMPER ON** the field test pins (E33) (see Page 22 for location of **TEST** pins) allows the technician to

- Clear compressor anti-short cycle delay.
- Clear five-strike fault lockouts — High / Low pressure switches and High Discharge Temperature Sensor.



NOTES:

1 — Placing a **JUMPER ON** the TEST pins will not bring the unit out of inactive mode. The only way manually activate the outdoor unit from an inactive mode is to cycle the 24VAC power to the outdoor unit's Main Control.

2 — If the jumper remains on the TEST pins for longer than five seconds, the Main Control will ignore the **JUMPER ON** TEST pins and revert to normal operation.

Figure 18. Clearing Anti-Short Cycle Delay and Five-Strike Fault Lockouts

Table 6. Ambient Sensor Temperature / Resistance Range

Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance
136.3	2680	56.8	16657	21.6	44154	-11.3	123152
133.1	2859	56.0	16973	21.0	44851	-11.9	125787
130.1	3040	55.3	17293	20.5	45560	-12.6	128508
127.3	3223	54.6	17616	20.0	46281	-13.2	131320
124.7	3407	53.9	17942	19.4	47014	-13.9	134227
122.1	3592	53.2	18273	18.9	47759	-14.5	137234
119.7	3779	52.5	18607	18.4	48517	-15.2	140347
117.5	3968	51.9	18945	17.8	49289	-15.9	143571
115.3	4159	51.2	19287	17.3	50074	-16.5	146913
113.2	4351	50.5	19633	16.8	50873	-17.2	150378
111.2	4544	49.9	19982	16.3	51686	-17.9	153974
109.3	4740	49.2	20336	15.7	52514	-18.6	157708
107.4	4937	48.5	20695	15.2	53356	-19.3	161588
105.6	5136	47.9	21057	14.7	54215	-20.1	165624
103.9	5336	47.3	21424	14.1	55089	-20.8	169824
102.3	5539	46.6	21795	13.6	55979	-21.5	174200
100.6	5743	46.0	22171	13.1	56887	-22.3	178762
99.1	5949	45.4	22551	12.5	57811	-23.0	183522
97.6	6157	44.7	22936	12.0	58754	-23.8	188493
96.1	6367	44.1	23326	11.5	59715	-24.6	193691
94.7	6578	43.5	23720	11.0	60694	-25.4	199130
93.3	6792	42.9	24120	10.4	61693	-26.2	204829
92.0	7007	42.3	24525	9.9	62712	-27.0	210805
90.6	7225	41.7	24934	9.3	63752	-27.8	217080
89.4	7444	41.1	25349	8.8	64812	-28.7	223677
88.1	7666	40.5	25769	8.3	65895	-29.5	230621
86.9	7890	39.9	26195	7.7	67000	-30.4	237941
85.7	8115	39.3	26626	7.2	68128	-31.3	245667
84.5	8343	38.7	27063	6.7	69281	-32.2	253834
83.4	8573	38.1	27505	6.1	70458	-33.2	262482
82.3	8806	37.5	27954	5.6	71661	-34.1	271655
81.2	9040	37.0	28408	5.0	72890	-35.1	281400
80.1	9277	36.4	28868	4.5	74147	-36.1	291774
79.0	9516	35.8	29335	3.9	75431	-37.1	302840
78.0	9757	35.2	29808	3.4	76745	-38.2	314669
77.0	10001	34.7	30288	2.8	78090	-39.2	327343
76.0	10247	34.1	30774	2.3	79465		
75.0	10496	33.5	31267	1.7	80873		
74.1	10747	33.0	31766	1.2	82314		
73.1	11000	32.4	32273	0.6	83790		
72.2	11256	31.9	32787	0.0	85302		
71.3	11515	31.3	33309	-0.5	86852		
70.4	11776	30.7	33837	-1.1	88440		
69.5	12040	30.2	34374	-1.7	90068		
68.6	12306	29.6	34918	-2.2	91738		
67.7	12575	29.1	35471	-2.8	93452		
66.9	12847	28.6	36031	-3.4	95211		
66.0	13122	28.0	36600	-4.0	97016		
65.2	13400	27.5	37177	-4.6	98870		
64.4	13681	26.9	37764	-5.2	100775		
63.6	13964	26.4	38359	-5.7	102733		
62.8	14251	25.8	38963	-6.3	104746		
62.0	14540	25.3	39577	-6.9	106817		
61.2	14833	24.8	40200	-7.5	108948		
60.5	15129	24.2	40833	-8.2	111141		
59.7	15428	23.7	41476	-8.8	113400		
59.0	15730	23.2	42130	-9.4	115727		
58.2	16036	22.6	42794	-10.0	118126		
57.5	16345	22.1	43468	-10.6	120600		

Table 7. High Discharge Sensor Temperature / Resistance Range

Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance	Degrees Fahrenheit	Resistance
303.1	183	186.1	1052	136.8	2656	94.5	6613
298.1	195	185.0	1072	136.0	2698	93.6	6739
293.4	207	183.9	1093	135.2	2740	92.8	6869
289.0	220	182.8	1114	134.5	2783	92.0	7002
284.8	232	181.8	1135	133.7	2827	91.2	7139
280.9	245	180.7	1157	132.9	2872	90.3	7281
277.1	258	179.6	1179	132.2	2917	89.5	7426
273.6	270	178.6	1201	131.4	2963	88.6	7575
270.2	283	177.6	1223	130.6	3010	87.8	7729
267.0	297	176.6	1245	129.9	3057	86.9	7888
263.9	310	175.5	1268	129.1	3105	86.0	8051
260.9	323	174.6	1291	128.4	3154	85.2	8220
258.1	336	173.6	1315	127.6	3204	84.3	8394
255.3	350	172.6	1338	126.8	3255	83.4	8574
252.7	364	171.6	1362	126.1	3307	82.5	8759
250.1	378	170.6	1386	125.3	3359	81.6	8951
247.7	391	169.7	1411	124.6	3413	80.7	9149
245.3	405	168.7	1435	123.8	3467	79.8	9354
243.0	420	167.8	1460	123.1	3523	78.8	9566
240.8	434	166.9	1486	122.3	3579	77.9	9786
238.6	448	165.9	1511	121.6	3637	76.9	10013
236.5	463	165.0	1537	120.8	3695	76.0	10250
234.4	478	164.1	1563	120.1	3755	75.0	10495
232.4	492	163.2	1590	119.3	3816	74.1	10749
230.5	507	162.3	1617	118.5	3877	73.1	11014
228.6	523	161.4	1644	117.8	3940	72.1	11289
226.7	538	160.5	1672	117.0	4005	71.1	11575
224.9	553	159.7	1699	116.3	4070	70.0	11873
223.2	569	158.8	1728	115.5	4137	69.0	12184
221.5	584	157.9	1756	114.8	4205	68.0	12509
219.8	600	157.1	1785	114.0	4274	66.9	12848
218.1	616	156.2	1815	113.2	4345	65.8	13202
216.5	632	155.3	1845	112.5	4418	64.7	13573
214.9	649	154.5	1875	111.7	4491	63.6	13961
213.4	665	153.6	1905	111.0	4567	62.5	14368
211.9	682	152.8	1936	110.2	4644	61.3	14796
210.4	698	152.0	1968	109.4	4722	60.2	15246
208.9	715	151.1	1999	108.7	4802	59.0	15719
207.5	732	150.3	2032	107.9	4884	57.8	16218
206.0	750	149.5	2064	107.1	4968	56.6	16744
204.6	767	148.7	2098	106.4	5054	55.3	17301
203.3	785	147.9	2131	105.6	5141	54.0	17891
201.9	803	147.1	2165	104.8	5231	52.7	18516
200.6	821	146.2	2200	104.0	5323	51.4	19180
199.3	839	145.4	2235	103.3	5416	50.0	19887
198.0	857	144.6	2270	102.5	5512	48.6	20641
196.8	876	143.8	2306	101.7	5610	47.2	21448
195.5	894	143.0	2343	100.9	5711	45.7	22311
194.3	913	142.3	2380	100.1	5814		
193.1	932	141.5	2418	99.3	5920		
191.9	952	140.7	2456	98.5	6028		
190.7	971	139.9	2495	97.7	6139		
189.5	991	139.1	2534	96.9	6253		
188.4	1011	138.3	2574	96.1	6370		
187.2	1031	137.6	2615	95.3	6489		

Table 8. Sensor Temperature / Resistance Range

Sensor	Temperature Range °F (°C)	Resistance values range (ohms)	Pins/Wire Color
Outdoor (Ambient)	-40°F to 140°F (-40°C to 60°C)	280,000 to 3750	3 and 4 (Black)
Discharge	-35°F to 310°F (-37°C to 154°C)	41,000 to 103	1 and 2 (Yellow)

Note: Sensor resistance decreases as sensed temperature increases (see Figures 6 and 7).

Main Control LED Alert Codes

Main Control LED alert codes (simply referred to as LED alert codes) are located on the Main Control and marked with the following identification.

DS11 AND DS14 LED SYSTEM AND ALERT CODES

DS11 (Green) and DS14 (Red) LEDs indicate diagnostics conditions that are listed in Table 9.

These LEDs display fault conditions in system cooling capacity, dehumidification mode, anti-short cycle lockout, high and low pressures, discharge line temperature, outdoor temperature, and discharge sensor failures.

DS15 AND DS13 LED COMPRESSOR ALERT CODES

DS15 (Yellow) and DS13 (Red) LEDs indicate diagnostics conditions that are listed in Table 9.

These LEDs display the most common fault conditions in the system. When an abnormal condition is detected, this function communicates the specific condition through LEDs. The diagnostic function is capable of detecting both mechanical and electrical system abnormal conditions.

RESETTING LED ALERT CODES

LED alert codes can be reset either manually or automatically:

1. Manual Reset

Manual reset can be achieved by one of the following methods:

- Disconnect **R** wire from the Main Control's **R** terminal.
- Turning main power **OFF** and then **ON** at the unit's disconnect switch.

After power up, existing code will display for 60 seconds and then clear.

2. Automatic Reset

After an alert is detected, the Main Control continues to monitor the unit's system and compressor operations. When/if conditions return to normal, the alert code is turned off automatically.

⚠ IMPORTANT

LED alert codes do not provide safety protection. This is a monitoring function only and cannot control or shut down other devices.

Table 9. System LED Alert Codes

Outdoor Main Control LEDs		Condition	Possible Cause(s)	Solution
DS11 Green	DS14 Red			
SYSTEM STATUS				
OFF	OFF	Power problem	No power (24V) to control terminals R and C or control failure.	1 Check control transformer power (24V). 2 If power is available to control and LED(s) do not light, replace control.
Simultaneous SLOW Flash		Normal operation	Unit operating normally or in standby mode.	Indicates that control has internal component failure. Cycle 24 volt power to control. If code does not clear, replace control.
Alternating SLOW Flash		5-minute anti-short cycle delay	Initial power up, safety trip, end of room thermostat demand.	None required (Jumper FIELD TEST pins to override)
Simultaneous FAST Flash		Ambient Sensor Problem	Sensor being detected open or shorted or out of temperature range. control will revert to time/temperature defrost operation. (System will still heat or cool).	
Alternating FAST Flash		Coil Sensor Problem	This model does not utilize a coil sensor, however this alert indicates either an open or shorted circuit. See if 10K resistor is not damaged or missing. Resistor is located in the sensor harness assembly, brown lead.	
ON	ON	Main Control Board Failure	Indicates that control has internal component failure. Cycle 24 volt power to control. If code does not clear, replace control.	

Outdoor Main Control LEDs		Condition	Possible Cause(s)	Solution
DS11 Green	DS14 Red			
OFF	1 Fast Flash then Pause	Heating Low Capacity	These are codes that show status of operation whether in low stage or high stage, heating or cooling, defrost or in the EDA mode.	
OFF	2 Fast Flash then Pause	Heating High Capacity		
ON	2 Fast Flash then Pause	Defrost		
1 Fast Flash then Pause	OFF	Cooling Low Capacity		
2 Fast Flash then Pause	OFF	Cooling High Capacity		
2 Fast Flash then Pause	ON	Dehumidification Mode		
ALERT STATUS				
OFF	SLOW Flash	Low Pressure Fault	<ol style="list-style-type: none"> 1 Restricted air flow over indoor or outdoor coil. 2 Improper refrigerant charge in system. 3 Improper metering device installed or incorrect operation of metering device. 4 Incorrect or improper sensor location or connection to system. 	<ol style="list-style-type: none"> 1 Remove any blockages or restrictions from coils and/or fans. Check indoor and outdoor fan motor for proper current draws. 2 Check system charge using approach and subcooling temperatures. 3 Check system operating pressures and compare to unit charging charts. 4 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	Low Pressure Switch Lockout		
SLOW Flash	OFF	High Pressure Fault		
ON	OFF	High Pressure Discharge Sensor Lockout		
SLOW Flash	ON	Discharge Line Temperature Fault	This code detects high discharge temperatures. If the discharge line temperature exceeds a temperature of 279°F (137°C) during compressor operation, the control 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). See Figure 21 for further details concerning lockouts and reset procedures.	
FAST Flash	ON	Discharge Line Temperature Lockout		
OFF	Fast Flash	Discharge Sensor Fault	The control detects open or short 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 control will raise the alarm.	
Fast simultaneous flashing of DS11, DS13, DS14 and DS15		OEM Mode	Factory Test Mode.	

Table 10. Compressor LED Alert Codes

Outdoor Main Control LEDs		Condition	Possible Cause(s)	Solution	Clearing Status
DS15 Yellow	DS13 Red				
OFF	ON	Compressor Internal Overload Trip	Thermostat demand signal Y1 is present, but compressor not running	<ol style="list-style-type: none"> 1 Compressor protector is open. <ul style="list-style-type: none"> • Check for high head pressure • Check compressor supply voltage 2 Outdoor unit power disconnect is open. 3 Compressor circuit breaker or fuse(s) is open. 4 Broken wire or connector is not making contact. 5 Low or high pressure switch open if present in the system. 6 Compressor contactor has failed to close. 	Clears the error after current is sensed in the run and start winding for two seconds, service removed or power reset.
1 Flashes then Pause	OFF	Long run time.	Compressor is running extremely long run cycles.	<ol style="list-style-type: none"> 1 Low refrigerant charge. 2 Evaporator blower is not running. <ul style="list-style-type: none"> • Check blower relay coil and contacts • Check blower motor capacitor • Check blower motor for failure or blockage • Check evaporator blower wiring and connectors • Check indoor blower control • Check thermostat wiring for open circuit 3 Evaporator coil is frozen. <ul style="list-style-type: none"> • Check for low suction pressure • Check for excessively low thermostat setting • Check evaporator airflow (coil blockages or return air filter) • Check ductwork or registers for blockage. 4 Faulty metering device. <ul style="list-style-type: none"> • Check TXV bulb installation (size, location and contact) • Check if TXV/fixed orifice is stuck closed or defective 5 Condenser coil is dirty. 6 Liquid line restriction (filter drier blocked if present). 7 Thermostat is malfunctioning. <ul style="list-style-type: none"> • Check thermostat sub-base or wiring for short circuit • Check thermostat installation (location and level) 	Clears the error after 30 consecutive normal run cycles, or after power reset.
2 Flashes then Pause	OFF	System Pressure Trip	Indicates the compressor protector is open or missing supply power to the compressor.	<ol style="list-style-type: none"> 1 High head pressure. <ul style="list-style-type: none"> • Check high pressure switch if present in system • Check if system is overcharged with refrigerant • Check for non-condensable in system 2 Condenser coil poor air circulation (dirty, blocked, damaged). 3 Condenser fan is not running. <ul style="list-style-type: none"> • Check fan capacitor • Check fan wiring and connectors • Check fan motor for failure or blockage 4 Return air duct has substantial leakage. 	Clears after four consecutive normal compressor run cycles, or after power reset.
3 Flashes then Pause	OFF	Short Cycling	Compressor is running less than three minutes.	<ol style="list-style-type: none"> 1 Thermostat demand signal is intermittent. 2 Time delay relay or Main Control is defective. 3 If high pressure switch is present, see Flash Code 2 information. 	Clears after four consecutive normal compressor run cycles, or after power reset.
4 Flashes then Pause.	OFF	Locked Rotor	Compressor has a locked out due to run capacitor short, bearings are seized, excessive liquid refrigerant.	<ol style="list-style-type: none"> 1 Run capacitor has failed. 2 Low line voltage (contact utility if voltage at disconnect is low). <ul style="list-style-type: none"> • Check wiring connections 3 Excessive liquid refrigerant in the compressor. 4 Compressor bearings are seized. 	Clears after power reset or four normal compressor cycles.

Outdoor Main Control LEDs		Condition	Possible Cause(s)	Solution	Clearing Status
DS15 Yellow	DS13 Red				
5 Flashes then Pause	OFF	Open Circuit	Compressor has an open circuit due to power disconnection, fuse is open or other similar conditions.	<ol style="list-style-type: none"> 1 Outdoor unit power disconnect is open. 2 Unit circuit breaker or fuse(s) is open. 3 Unit contactor has failed to close. <ul style="list-style-type: none"> • Check compressor contactor wiring and connectors • Check for compressor contactor failure (burned, pitted or open) • Check wiring and connectors between supply and compressor • Check for low pilot voltage at compressor contactor coil 4 High pressure switch is open and requires manual reset. 5 Open circuit in compressor supply wiring or connections. 6 Unusually long compressor protector reset time due to extreme ambient temperature. 7 Compressor windings are damaged. <ul style="list-style-type: none"> • Check compressor motor winding resistance 	Clears after one normal compressor run cycle or power reset.
6 Flashes then Pause	OFF	Open Start Circuit	Current not sensed by Start transformer.	<ol style="list-style-type: none"> 1 Run capacitor has failed. 2 Open circuit in compressor start wiring or connections. <ul style="list-style-type: none"> • Check wiring and connectors between supply and the compressor S terminal 3 Compressor start winding is damaged. <ul style="list-style-type: none"> • Check compressor motor winding resistance 	Clears when amperage is detected in RUN and START sensors, or after power reset.
7 Flashes then Pause	OFF	Open Run Circuit	Current not sensed by run transformer.	<ol style="list-style-type: none"> 1 Open circuit in compressor start wiring or connections. <ul style="list-style-type: none"> • Check wiring and connectors between supply and the compressor R terminal 2 Compressor start winding is damaged. <ul style="list-style-type: none"> • Check compressor motor winding resistance 	Clears when amperage is detected in RUN and START sensors, or after power reset.
8 Flashes then Pause	OFF	Welded Contactor	Compressor always runs	<ol style="list-style-type: none"> 1 Compressor contactor failed to open. 2 Thermostat demand signal not connected to module. 	Clears after one normal compressor run cycle or after power reset.
9 Flashes then Pause	OFF	Secondary Low Voltage	24VAC is below 18VAC.	<ol style="list-style-type: none"> 1 Control circuit transformer is overloaded. 2 Low line voltage (contact utility if voltage at disconnect is low). <ul style="list-style-type: none"> • Check wiring connections 	Clears after voltage is higher than 20VAC for two seconds, or after power reset.
Fast simultaneous flashing of DS11, DS13, DS14 and DS15		OEM Mode	Factory Test Mode.		

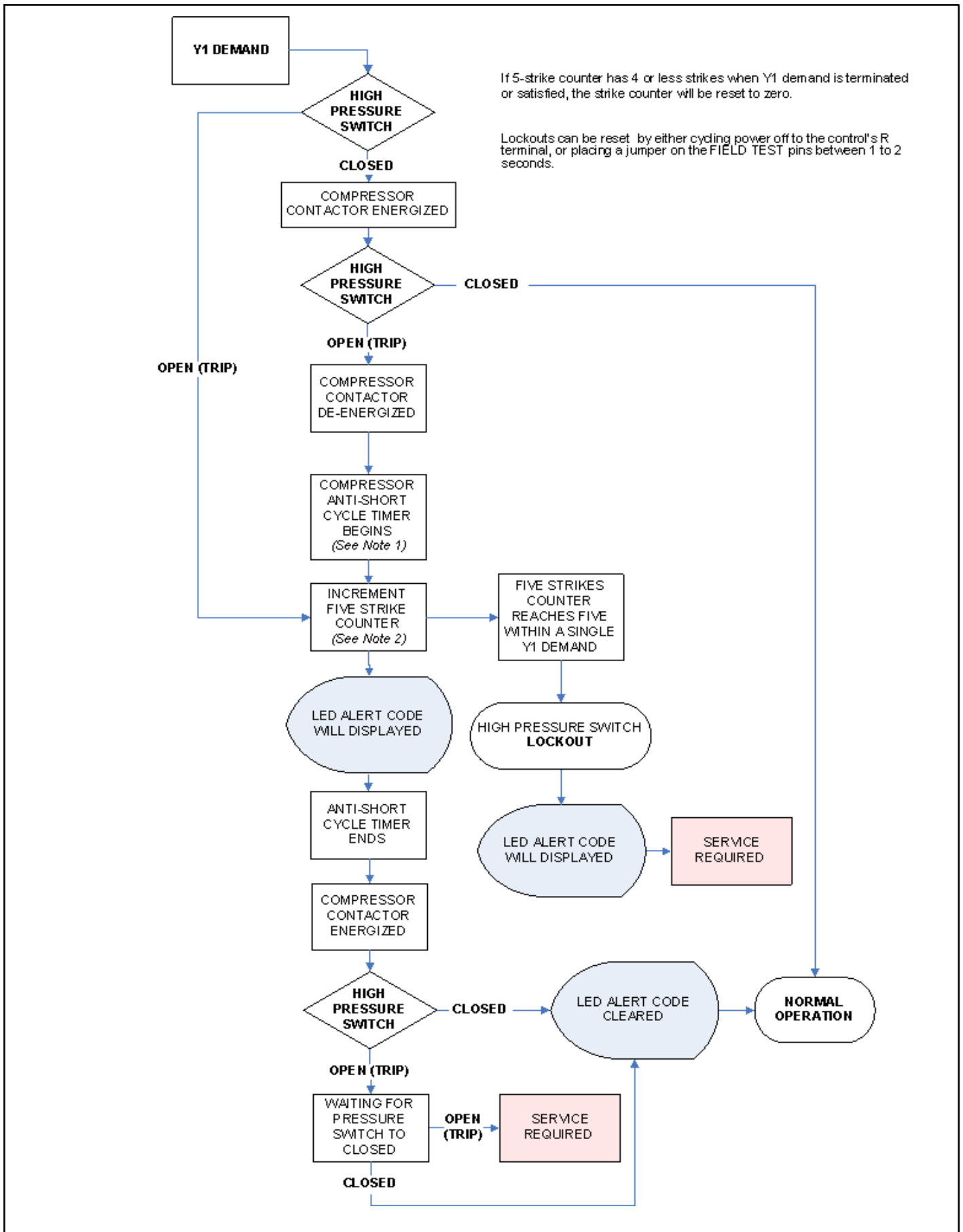


Figure 19. High Pressure Switch Operation

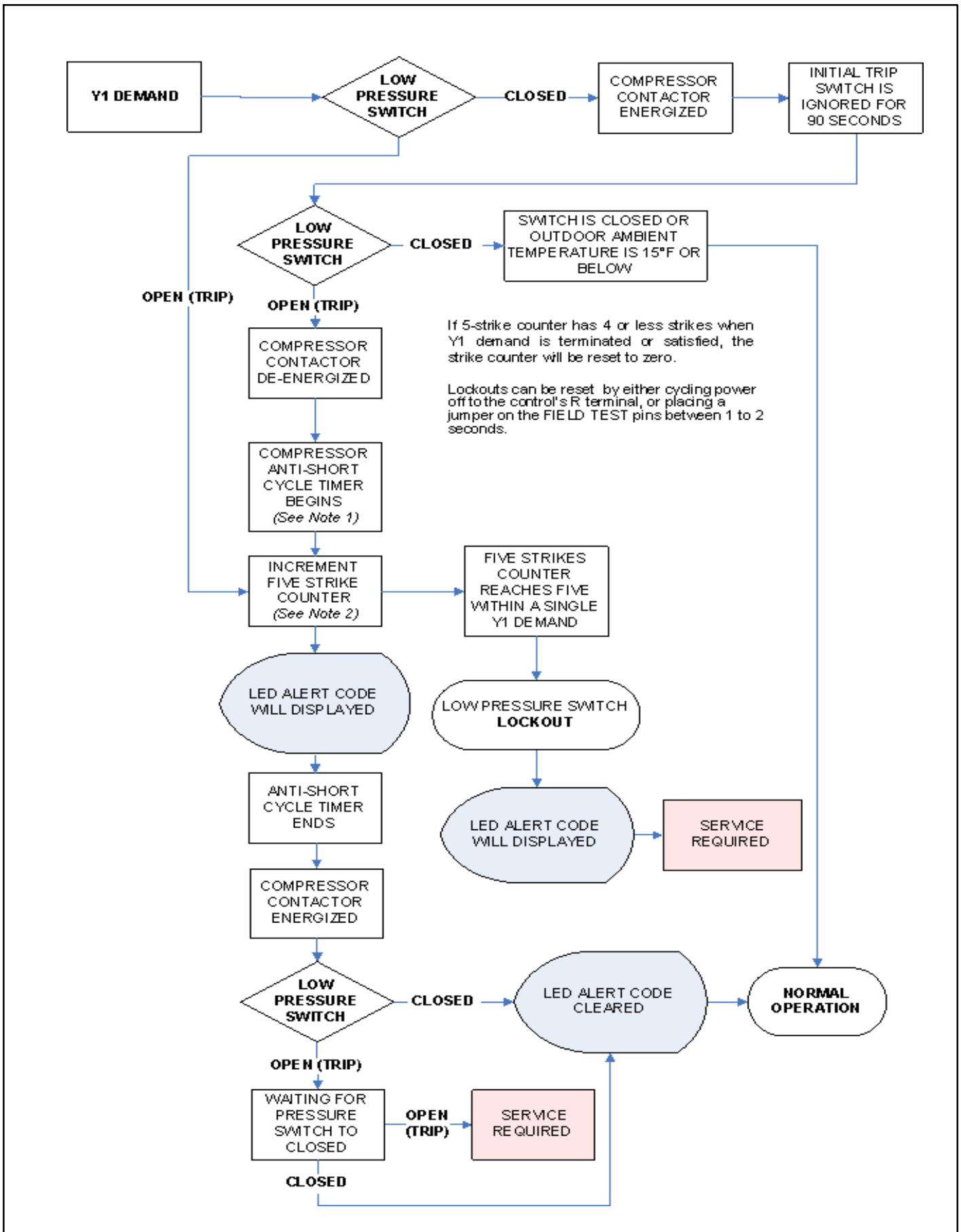


Figure 20. Low Pressure Switch Operation

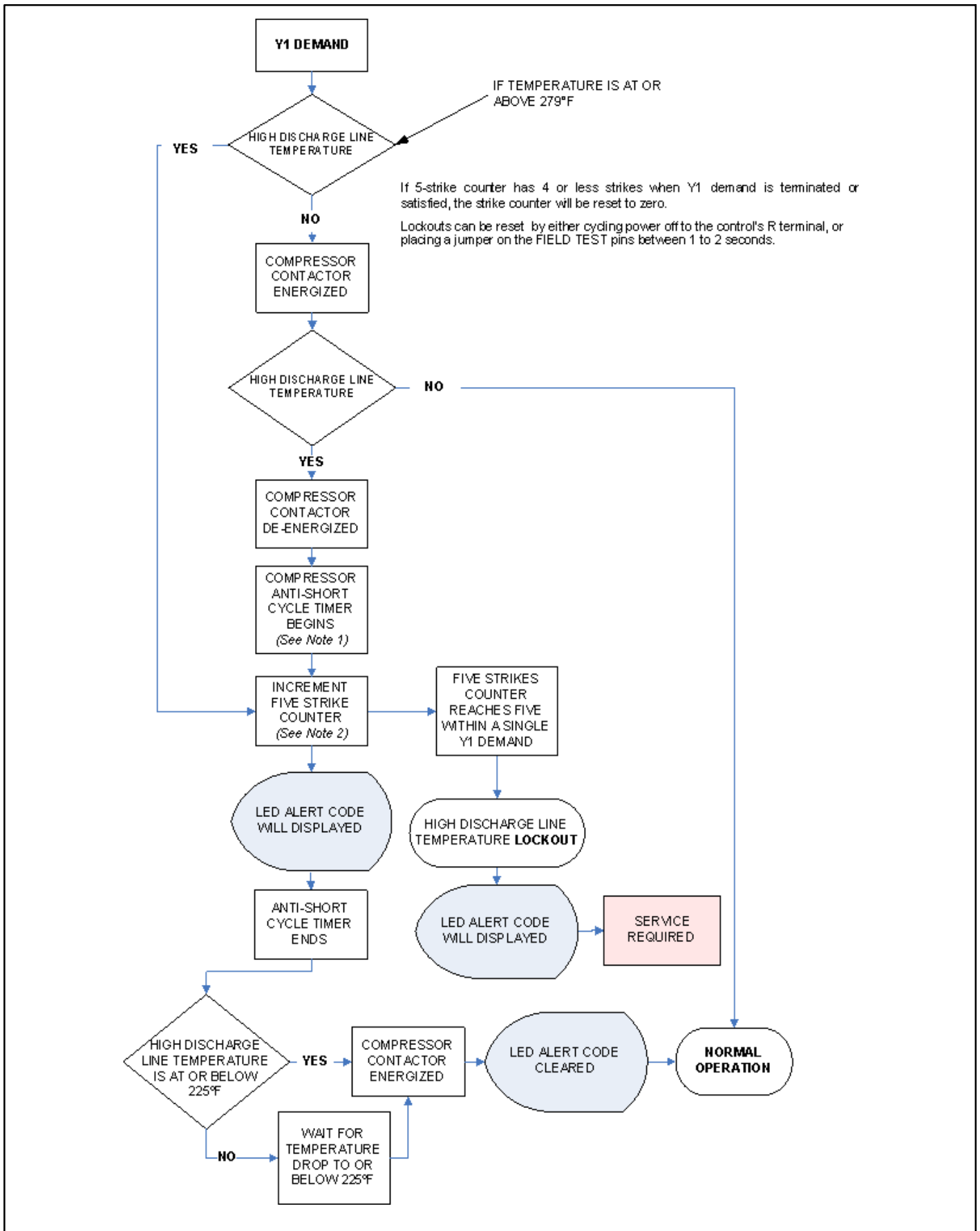


Figure 21. High Discharge Temperature Sensor Operation

⚠ 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.

VERIFYING LED STATUS CODES

During start up, the fan motor control LED will display any error conditions. If error conditions exist then no other codes will display. If no error conditions are present, then the stage status and and RPM indicator are displayed. Fan motor speeds are not adjustable for a single stage outdoor unit (see table 11).

VERIFYING CORRECT DC OUTPUT VOLTAGE (J2)

The following three methods can be used to determine whether the fan motor is operating at the correct RPMs based on unit size.

1. Use the information provided in tables 11 to verify that all four jumper terminals are set correctly for the specific size unit.
2. Verify LED RPM indicator is displaying the correct flash sequence for the applicable size unit (see Table 11).
3. Test DC voltage output on the Motor Control's J2 terminals (see Figure 23) while under full load and verify the voltage read to the voltage listed in Table 11 for the applicable size unit.
4. If no voltage is detected at the J2 terminals, verify there is a Y1 demand at the thermostat and 24V present at the Fan Control's EXT PWR/R terminal during that Y1 demand (see Figure 24).
5. If 24V is present at the Fan Control EXT PWR/R terminal during a Y1 thermostat demand, and no voltage is present at the J2 terminals, then Fan Control should be replaced.

DEALER

Verifying Fan Motor Operation

FAN MOTOR CONTROL AND START UP

This motor control is used in controlling motors which employ a Pulse Width Modulation (PWM) controller. A PWM signal will run the fan motor at a revolutions per minute (RPM) that corresponds to a specific PWM signal.

VERIFYING JUMPER SETTINGS (J2)

The unit is shipped from the factory with the default motor RPM setting required for the specific model size. Use table 11 for one-stage to verify that the jumpers are set correctly for the specific size unit.

Table 11. One Stage — Motor Control RPM Jumper Settings, LED RPM Indicator and P2 DC Voltage Outputs

Model	LED Code*	CFM Profile Pin Select				ECM1/Y1 (One Stage and EDA Operation)	
		4	3	2	1	RPM	(J2) DC Volt
XP/XC17-048, -060	9	OFF	OFF	OFF	ON	675	21.6
XP/XC17-036, -042	8	OFF	OFF	ON	ON	600	19.2
XP/XC17-030	6	OFF	ON	ON	OFF	450	14.3
XP/XC17-024	5	OFF	ON	ON	ON	400	12.7

* LED Code indicates Fan Control LED flash sequence. For example, LED Code 9 indicates 9 slow flashes and pause.

LED CODES AND SEQUENCE OF OPERATIONS

During start up, the LED will first display any error conditions (see table 12) if present. If no errors are detected then the LED code indicating one or two stage operation will display then a long pause. The RPM indicator is displayed next. After the RPM indicator is displayed there is a short pause and the sequence repeats if a thermostat demand is still present. See Figure 22 for LED sequence of operations. See table 13 for description of flash and pause durations.

Table 12. Error/Fault LED Codes

Unit Status	Motor Control LED	Possible Cause
Mismatched RPM	Fast Flash with no pause	Internal feedback, PWM does not match target.
CRC Failure	Constant ON.	Microcontroller CRC failure.

Table 13. Fan Motor Board Unit LED Codes

Unit Status	Unit Status	Motor Control LED
One Stage Operation	Low Stage — ECM1/Y1 ONLY	One slow flash, then short pause.
RPM Indicator <i>NOTE — There is a long pause between stage operation and RPM indicator. See Tables 1 and 2 for LED RPM indicator.</i>	RPM Indicator	Appropriate number of flashes (See Tables 11 and 2).

Flash Flash = Three flashes per second.
 Slow Flash = One flash per second.
 Short Pause = Two seconds of OFF time.
 Long Pause = Five seconds of OFF time.

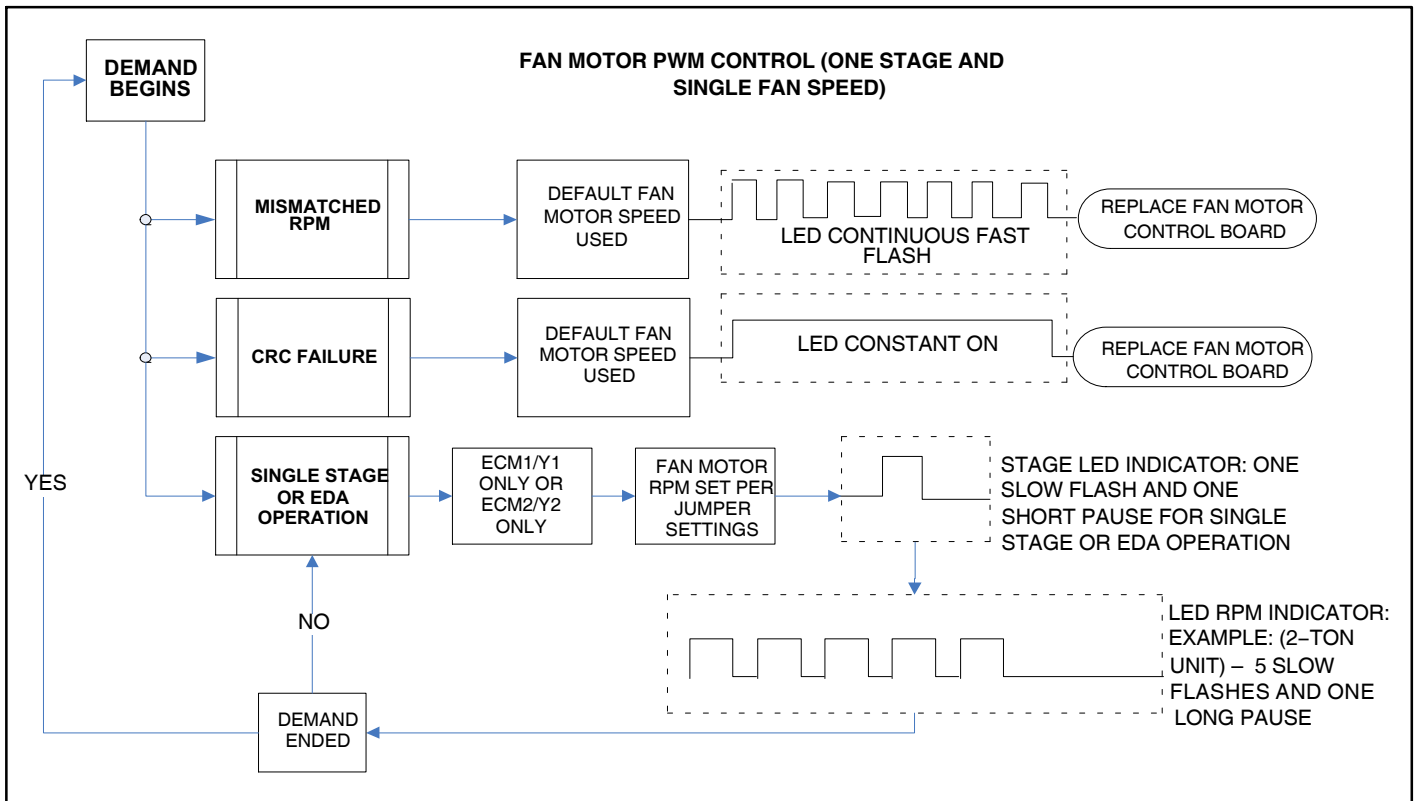


Figure 22. Single Stage LED Sequence of Operation

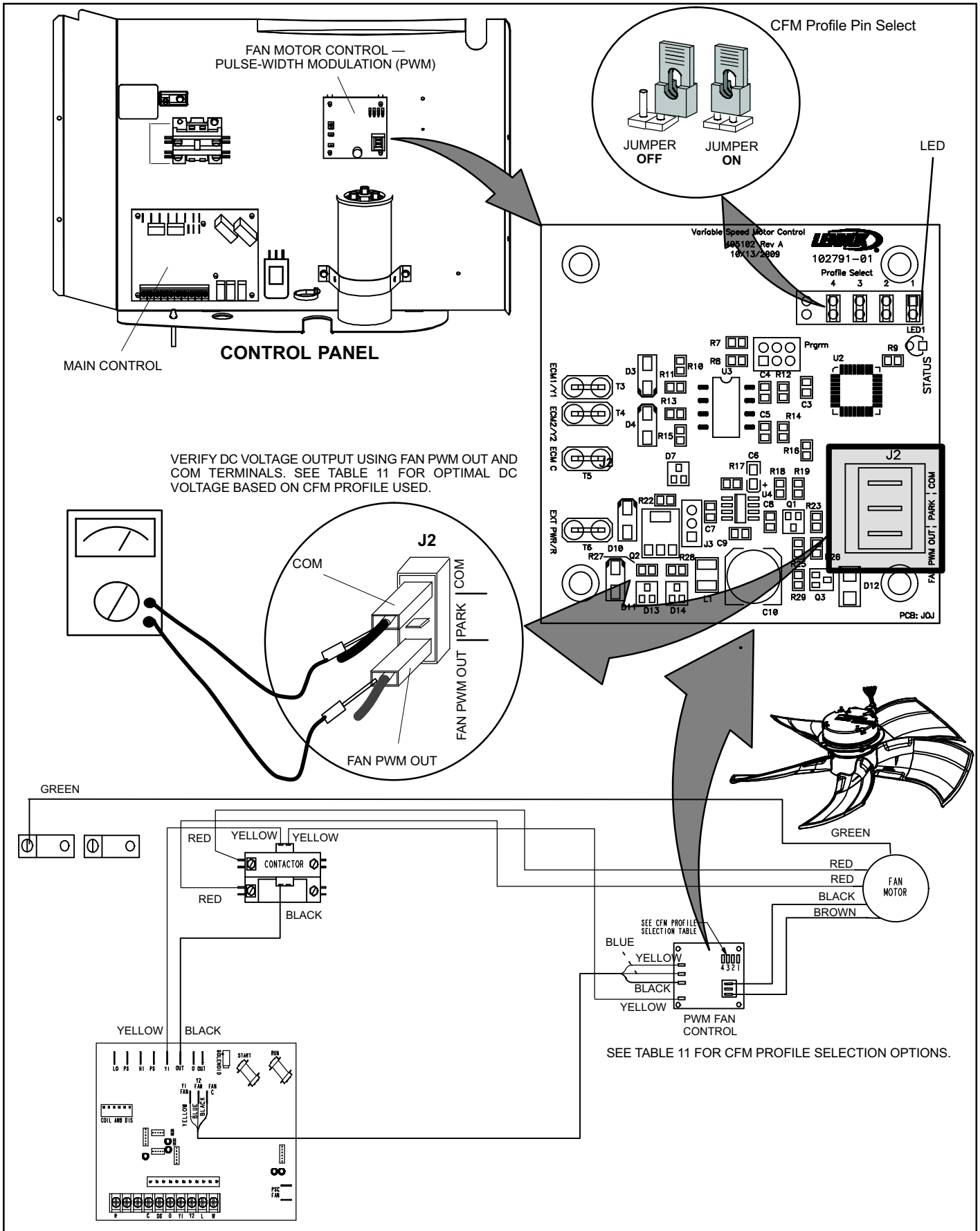


Figure 23. Fan Control, Wiring, Jumper Settings, Testing and LED Location

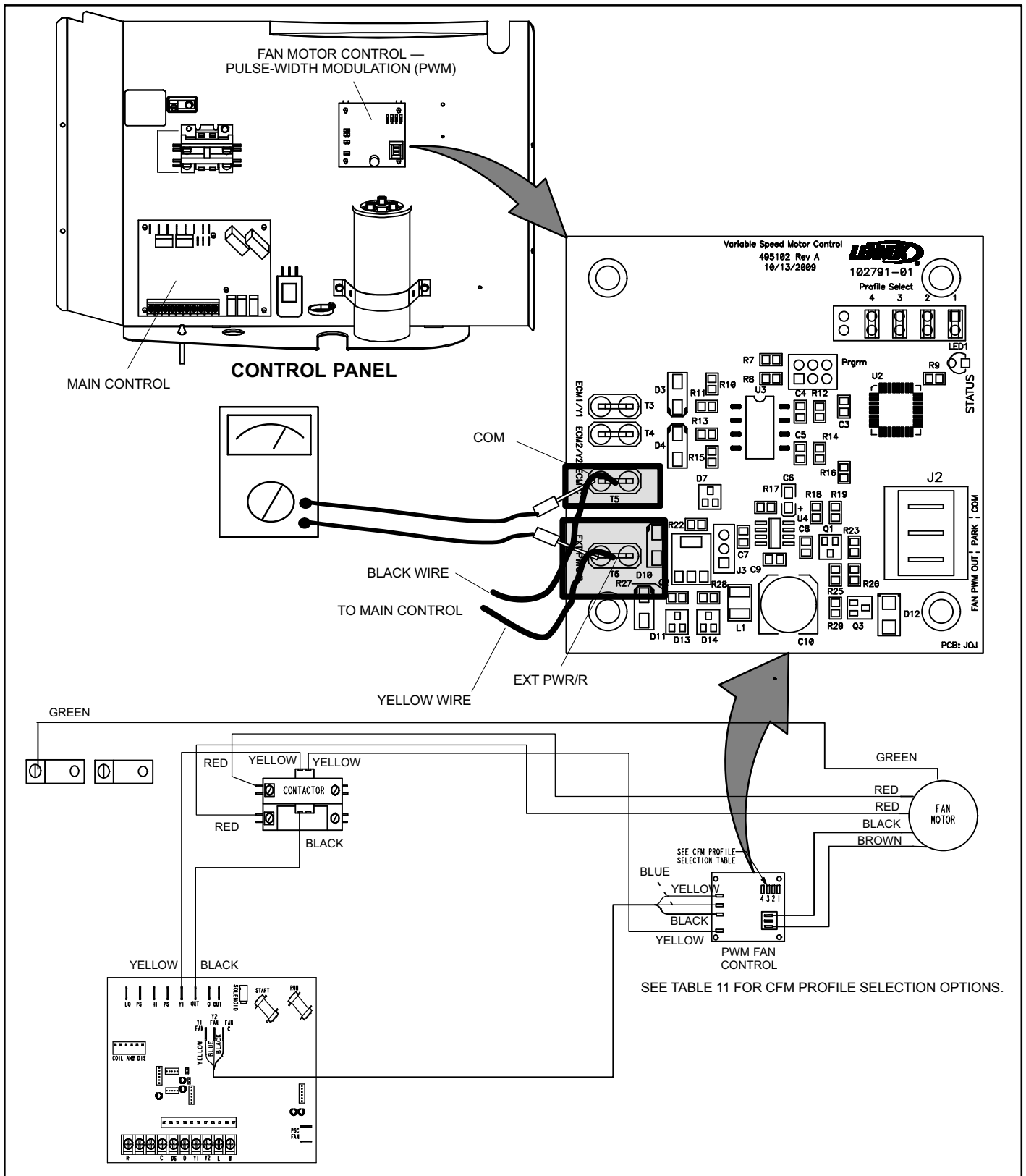


Figure 24. Testing for External Power to Fan Control

FAN MOTOR TEST PROCEDURE

A simple test can be used to test the fan motor operation. A fully charged 9V battery will be required for this procedure.

FAN MOTOR TEST

This is a test that will verify that the motor does operate.

1. Verify main (240 volt) power is **OFF** to unit.
2. Remove both wires (brown and black) from the J2 terminal on the fan motor control.
3. Room thermostat should be in **OFF** position (Unit in idle mode - no heating or cooling demands)
4. Turn main power (240 volt) **ON** to unit.
5. Connect 9 Volt battery to outdoor fan motor plugs as noted in picture below..
6. Outdoor fan motor should run at a reduced fan speed.
7. If Outdoor fan motor does not run, then replace fan motor assembly.

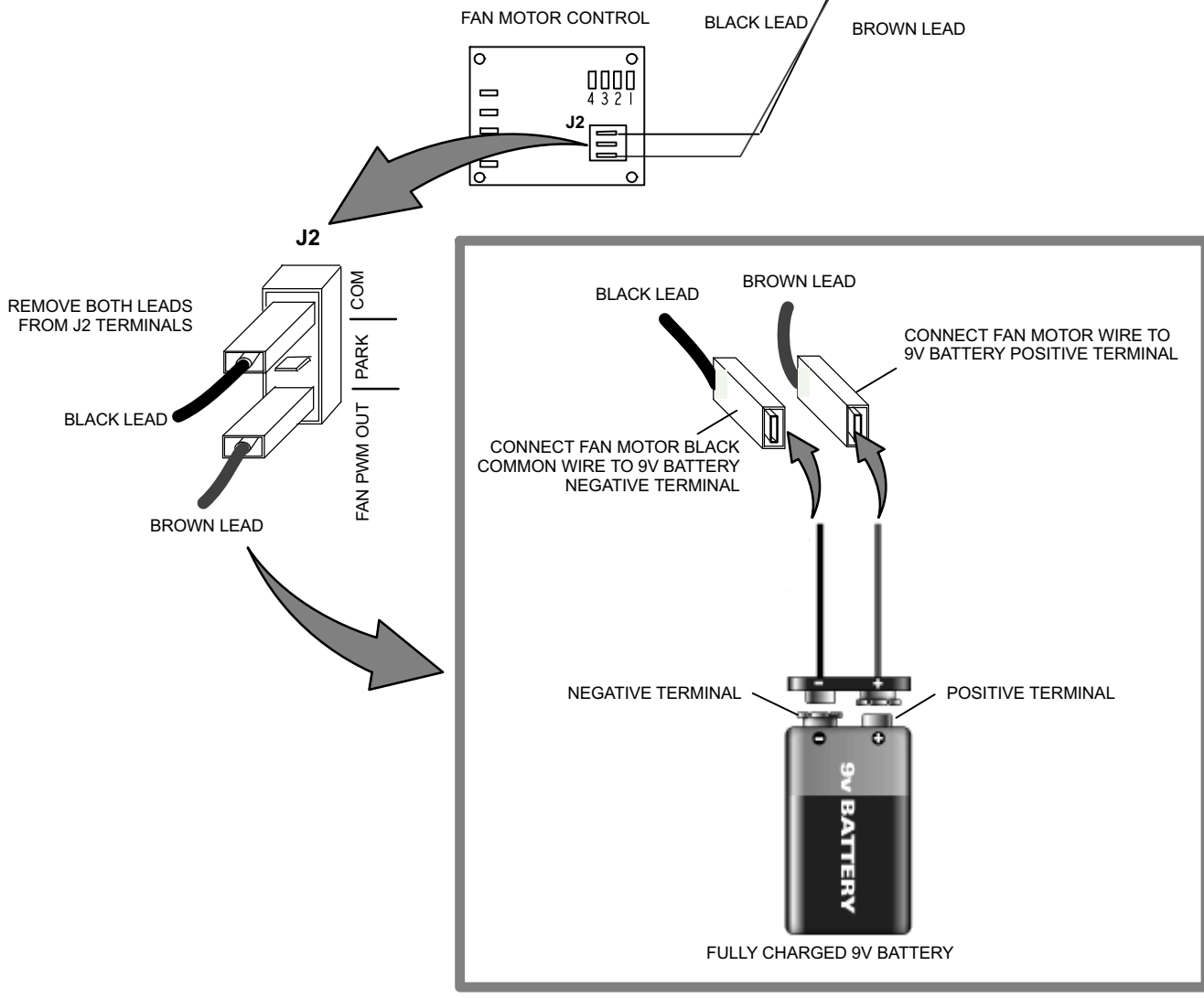
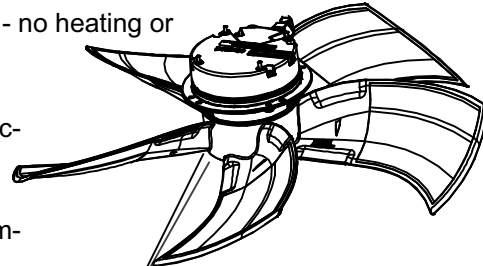


Figure 25. Fan Motor Test

FAN MOTOR SURGE PROTECTION

Surge Protector (Metal Oxide Varistor - MOV) - A part designed to protect electrical devices from voltage spikes that are 3 to 4 times the normal circuit voltage (See Figure 26 for illustration of component).

An MOV works as follows: It is essentially a batch of metallic-oxide grains separated by insulating layers. Repeated voltage surges break down the insulating layers, lowering the overall resistance and eventually causing the device to draw too much current and trip whatever over-current protection is inherent in the system)

MOV Check: They are supposed to be located beyond the line fuse (though possibly not always). In this case, where the line fuse blows or circuit breaker trips but there is no visible damage to the MOV(s), the simplest test may be to just temporarily remove the MOV(s) and see if the problem goes away.

See Figure 1 for location of the Surge Protections device which is located in the unit control box area.

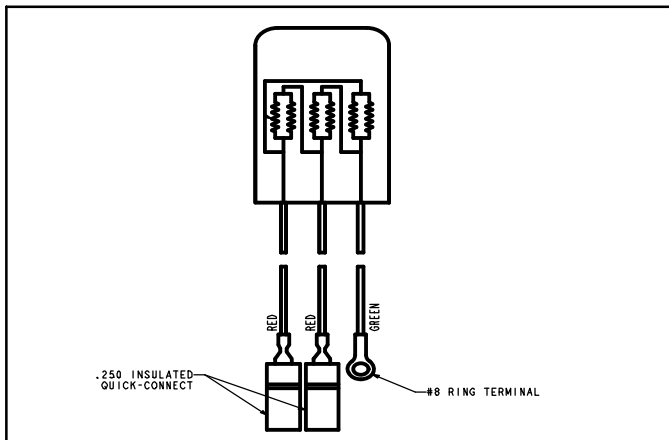


Figure 26. Fan Motor Surge Protection Device

Outdoor Unit

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:

1. Outdoor unit fan motor is pre-lubricated and sealed. No further lubrication is needed.
2. Visually inspect all connecting lines, joints and coils for evidence of oil leaks.
3. Check all wiring for loose connections.
4. Check for correct voltage at unit (unit operating).
5. Check amperage draw on outdoor fan motor.

Motor Nameplate: _____ **Actual:** _____.

6. Inspect drain holes in coil compartment base and clean if necessary.

NOTE - If insufficient cooling occurs, the unit should be gauged and refrigerant charge should be checked.

Outdoor Coil

Clean and inspect outdoor coil (may be flushed with a water hose). Ensure power is off before cleaning.

NOTE — It may be necessary to flush the outdoor coil more frequently if it is exposed to substances which are corrosive or which block airflow across the coil (e.g., pet urine, cottonwood seeds, fertilizers, fluids that may contain high levels of corrosive chemicals such as salts)

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 amperage draw on blower motor.

Motor Nameplate: _____ **Actual:** _____.

Indoor Coil

1. Clean coil if necessary.
2. Check connecting lines, joints and coil for evidence of oil leaks.
3. Check condensate line and clean if necessary.

HOMEOWNER

Cleaning of the outdoor unit's coil should be performed by a trained service technician. Contact your dealer and set up a schedule (preferably twice a year, but at least once a year) to inspect and service your outdoor unit. The following maintenance may be performed by the homeowner.

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near these areas during installation or while servicing this equipment.

⚠ IMPORTANT

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

Outdoor Coil

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

- Please contact your dealer to schedule proper inspection and maintenance for your equipment.
- Make sure no obstructions restrict airflow to the outdoor unit.
- Grass clippings, leaves, or shrubs crowding the unit can cause the unit to work harder and use more energy.
- Keep shrubbery trimmed away from the unit and periodically check for debris which collects around the unit.

Routine Maintenance

In order to ensure peak performance, your system must be properly maintained. Clogged filters and blocked airflow prevent your unit from operating at its most efficient level.

1. **Air Filter** — Ask your Lennox dealer to show you where your indoor unit's filter is located. It will be either at the indoor unit (installed internal or external to the cabinet) or behind a return air grille in the wall or ceiling. Check the filter monthly and clean or replace it as needed.

2. **Disposable Filter** — Disposable filters should be replaced with a filter of the same type and size.

NOTE — If you are unsure about the filter required for your system, call your Lennox dealer for assistance.

3. **Reusable Filter** — Many indoor units are equipped with reusable foam filters. Clean foam filters with a mild soap and water solution; rinse thoroughly; allow filter to dry completely before returning it to the unit or grille.

NOTE — The filter and all access panels must be in place any time the unit is in operation.

4. **Electronic Air Cleaner** — Some systems are equipped with an electronic air cleaner, designed to remove airborne particles from the air passing through the cleaner. If your system is so equipped, ask your dealer for maintenance instructions.

5. **Indoor Unit** — The indoor unit's evaporator coil is equipped with a drain pan to collect condensate formed as your system removes humidity from the

inside air. Have your dealer show you the location of the drain line and how to check for obstructions. (This would also apply to an auxiliary drain, if installed.)

Thermostat Operation

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

Preservice Check

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

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

Accessories

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

- Lennox XC17 Engineering Handbook
- Lennox Product Catalog
- Lennox Price Book

WARNING

This product and/or the indoor unit it is matched with may contain fiberglass wool.

Disturbing the insulation during installation, maintenance, or repair will expose you to fiberglass wool dust. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379-9900

XC17 Start-Up and Performance Checklist

Customer _____	Address _____
Indoor Unit Model _____	Serial _____
Outdoor Unit Model _____	Serial _____
Notes: _____	

START UP CHECKS

Refrigerant Type: ___			
Rated Load Amps ___	Actual Amps _____	Rated Volts _____	Actual Volts _____
Condenser Fan Full Load Amps _____	Actual Amps: _____		

COOLING MODE

XC17 Start-Up and Performance Checklist

Suction Pressure: _____	Liquid Pressure: _____				
Supply Air Temperature: _____	Ambient Temperature: _____	Return Air Temperature: _____			
System Refrigerant Charge (Refer to manufacturer's information on unit or installation instructions for required subcooling and approach temperatures.)					
Subcooling:	A	—	B	=	SUBCOOLING
Saturated Condensing Temperature (A) <i>minus</i> Liquid Line Temperature (B)					
Approach:	A	—	B	=	APPROACH
Liquid Line Temperature (A) <i>minus</i> Outdoor Air Temperature (B)					
Indoor Coil Temperature Drop (18 to 22°F)	A	—	B	=	COIL TEMP DROP
Return Air Temperature (A) <i>minus</i> Supply Air Temperature (B)					