

INSTALLATION MANUAL

R-410A Outdoor Split-System Air Conditioning

Models: 13, 14, and 17 SEER

YCD, YCE, YCG, YCS, YFD, YFE, TC3, TC4, TC7,
CC7, TW4, TF3, TF4, TCD, TCG, RAC13L, RAC14L,
RAC17L, RAW14L, RAC13F, RAC14F SERIES



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Section I: General

These outdoor condensing units are designed to be connected to a matching indoor coil. They are equipped with a filter drier located in the liquid line.

Units with quick-connect coupling connections are factory charged with refrigerant to be matched with the appropriate pre-charged refrigeration piping and indoor coil.

Section II: Safety



This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words **DANGER**, **WARNING**, or **CAUTION**.

DANGER indicates an **imminently** hazardous situation, which, if not avoided, **will result in death or serious injury**.

WARNING indicates a **potentially** hazardous situation, which, if not avoided, **could result in death or serious injury**.

CAUTION indicates a **potentially** hazardous situation, which, if not avoided **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

⚠ WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer or service agency.

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to building, electrical, and mechanical codes.

⚠ CAUTION

R-410A systems operate at higher pressures than R-22 systems. Do not use R-22 service equipment or components on R-410A equipment. Service equipment **must be rated** for R-410A.

Inspection

As soon as a unit is received, inspect it for possible damage during transit. If damage is evident, note the extent of the damage on the carrier's delivery receipt. Make a separate request for inspection by the carrier's agent in writing. Consult your local distributor for more information.

Requirements for installing or servicing R-410A equipment

- Gauge sets, hoses, refrigerant containers, and the recovery system must be designed to handle the POE type oils and the higher pressures of R-410A.
- Manifold sets must be high side and low side with low side retard.
- All hoses must have a 700 psig service pressure rating.
- Leak detectors must be designed to detect HFC refrigerant.
- Recovery equipment, including refrigerant recovery containers, must be specifically designed to handle R-410A.
- Do not use an R-22 TXV.

Limitations

Install the unit in accordance with all national, state, and local safety codes, and the following limitations:

- Limitations for the indoor unit, coil, and appropriate accessories must also be observed.
- The outdoor unit must not be installed with any duct work in the air stream. The outdoor fan is the propeller type and is not designed to operate against any additional external static pressure.
- The maximum and minimum conditions for operation must be observed to ensure a system that gives maximum performance with minimum service.

Table 1: Application limitations

Model	Ambient air temperature on outdoor coil (°F)		Air temperature on indoor coil (°F)	
	Minimum DB	Maximum DB	Minimum WB	Maximum WB
YCD/TC3/RAC13L	55	115	57	72
YCS/YFE/YCE/TW4/ TF4/TC4/RAC14L/ RAW14L/RAC14F/ YCG/TC7/CC7/RAC17L	55	125	57	72

- The unit must not be operated at outdoor temperatures below 55°F without an approved low ambient operation accessory kit installed.
- The maximum allowable line length for this product is 80 ft. To install more than the maximum allowable line length, refer to the *Piping Application Guide* (P/N 247077).

Section III: Unit installation

Location

Before starting the installation, select and check the suitability of the location for both the indoor and outdoor unit. Observe all limitations and clearance requirements.

The outdoor unit must have sufficient clearance for air entrance to the condenser coil, air discharge, and service access. See Figure 1 and Figure 2.

NOTICE

For multiple unit installations, units must be spaced a minimum of 24 in. (61 cm) apart (coil face to coil face).

If the unit is to be installed on a hot sun-exposed roof or a paved ground area that is seasonally hot, the unit must be raised sufficiently above the roof or ground to avoid taking the accumulated layer of hot air into the outdoor unit.

If the system is being installed during seasonally cold weather of 55°F or below, the preferred method is to weigh in the charge. For charging or checking the system charge at 55°F or below, see the *Cold weather charging* procedures in the *System Charge* section. There is an optional Cold Weather Charging accessory kit to prevent the outdoor unit from taking in cold air below 55°F. The kit part number can be found in the list of accessory kits at www.simplygettingthejobdone.com.

Provide adequate structural support for the unit.

Add-on replacement or retrofit

When using this unit as a replacement for an R-410A unit, you must replace the outdoor unit, indoor coil, and metering device. The following steps must be performed in order to ensure correct system operation and performance. Refrigeration piping change out is also recommended.

1. Change out the indoor coil to an approved R-410A coil and condensing unit combination with the appropriate metering device.
2. Change out the refrigeration piping when replacing an R-22 unit with an R410-A unit to reduce cross-contamination of oils and refrigerants. If change-out of the refrigeration piping is not practical, then the following precautions must be taken:
 - Inspect the refrigeration piping for kinks, sharp bends, or other restrictions, and for corrosion.
 - Determine if there are any low spots that might be serving as oil traps.
 - Flush the refrigeration piping with a commercially available flush kit to remove as much of the existing oil and contaminants as possible.
 - Install a suction line filter drier to trap any remaining contaminants and remove after 50 h of operation.

If replacing the outdoor unit due to a compressor burnout, then installation of a 100% activated alumina suction-line filter drier in the suction-line is required, in addition to the factory installed liquid-line drier. Install the suction-line filter drier by completing the following steps:

1. Operate the system for 10 h and monitor the suction drier pressure drop. If the pressure drop exceeds 3 psig, replace both the suction-line and liquid-line driers.
2. After a total of 10 h run time where the suction-line pressure drop has not exceeded 3 psig, replace the liquid-line drier and remove the suction-line drier. Never leave a suction-line drier in the system longer than 50 h of run time.

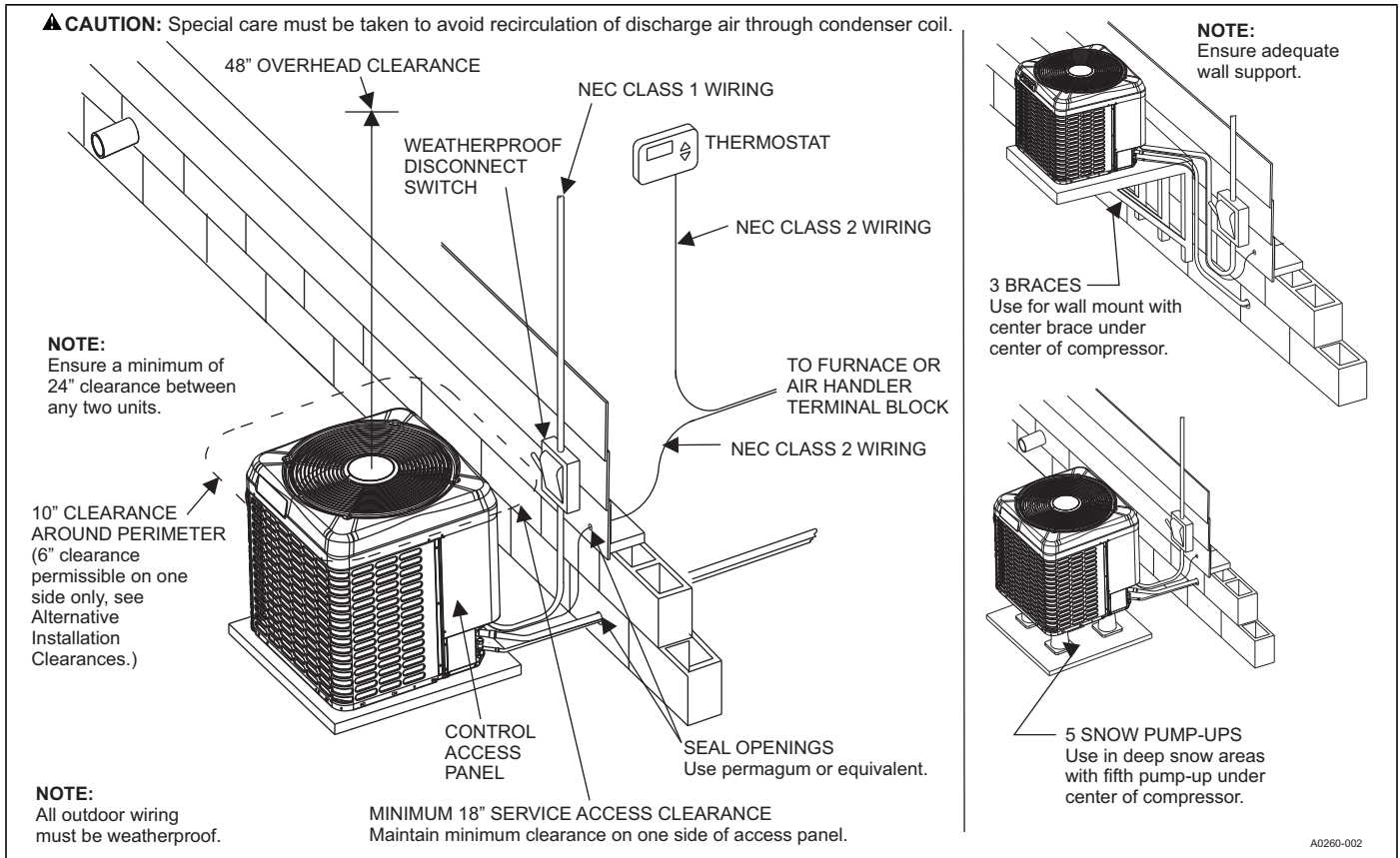


Figure 1: Typical installation clearances

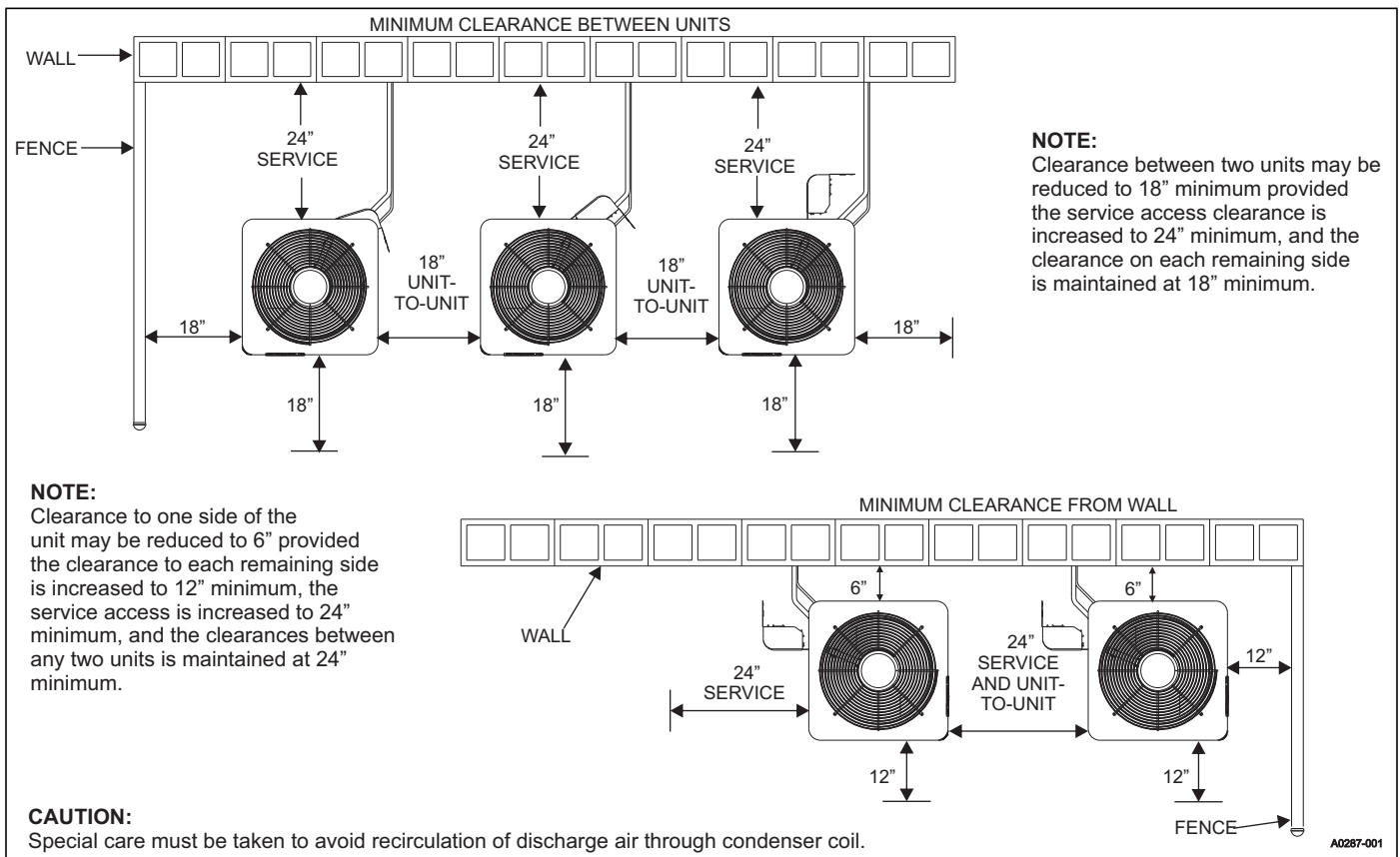


Figure 2: Alternative installation clearances

Ground installation

The unit must be installed on a solid base that is 2 in. (5.1 cm) above grade and will not shift or settle, causing strain on the refrigerant lines and possible leaks. Maintain the clearances shown in Figures 1 and 2 and install the unit in a level position. The base pad must not come in contact with the foundation or side of the structure because sound may be transmitted to the residence.

The length of the refrigerant tubing between the outdoor unit and indoor coil must be as short as possible to avoid capacity and efficiency losses. Excessive spacing of the outdoor unit from the home can result in the refrigerant lines being restricted by trampling or being punctured by lawn mowers. Locate the outdoor unit away from bedroom windows or other rooms where sound might be objectionable.

Adverse effects of snow or sleet accumulating on the outdoor coil can be eliminated by placing the outdoor unit where the prevailing wind does not blow across the unit. Trees, shrubs, corners of buildings, and fences standing off from the coil can reduce capacity loss due to wind chill effect.

Provide ample clearance from shrubs to allow adequate air to pass across the outdoor coil without leaves or branches being pulled into the coil.

Roof installation

When installing units on a roof, the structure must be capable of supporting the total weight of the unit, including a pad, lintels, rails, or any components used to minimize the transmission of sound or vibration into the conditioned space.

Wall mount installation

Care must be taken to mount the outdoor unit on a solid base that is sloped to shed water, secure from settlement, and isolated from the structural foundation or walls to prevent sound and vibration transmission into the living space.

On occasion, site conditions may require direct wall mounted brackets to be used to locate and support the outdoor unit. In these applications, care must be taken to address unit base pan support, structural integrity, safe access and serviceability, as well as the possible sound and vibration transmission into the structure. These applications are best served by a correctly engineered solution.

Liquid line filter drier

The air conditioning unit is filter drier is located inside the unit on the liquid line between the outdoor coil and the liquid valve.

CAUTION

Using a granular type drier may result in damage to the equipment.

Filter drier Source 1 part number	Apply with models
S1-401021	All

Piping connections

The outdoor condensing unit must be connected to the indoor evaporator coil using field supplied refrigerant grade (ACR) copper tubing that is internally clean and dry. Units must be installed only with the tubing sizes for approved system combinations as specified in the *Tabular Data Sheet*. The charge given is applicable for total tubing lengths up to 15 ft (4.6 m). Refer to the *Piping Application Guide* (P/N 24077) for installing tubing of longer lengths and elevation differences.

NOTICE

Using a larger than specified line size could result in oil return problems. Using too small a line will result in loss of capacity and other problems caused by insufficient refrigerant flow. Slope horizontal vapor lines at least 1 in. (2.5 cm) every 20 ft (6.1 m) toward the outdoor unit to facilitate proper oil return. If more than the 80-ft line length is necessary, facilitate proper refrigerant velocity with adjusted line diameter in accordance with the *Piping Application Guide* (P/N 24077).

CAUTION

This system uses R-410A refrigerant, which operates at higher pressures than R-22. No other refrigerant may be used in this system. Gauge sets, hoses, refrigerant containers, and the recovery system must be designed to handle R-410A. If you are unsure, consult the equipment manufacturer.

WARNING

Never install a suction-line filter drier in the liquid line of an R-410A system. Failure to follow this warning can cause a fire, injury or death.

Precautions for line installation

1. Install the lines with as few bends as possible. Care must be taken not to damage the couplings or kink the tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary. If soft copper must be used, care must be taken to avoid sharp bends, which may cause a restriction.
2. The lines must be installed so that they do not obstruct service access to the coil, air handling system, or filter.
3. Care must also be taken to isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.
4. The vapor line must be insulated with a minimum of 1/2 in. foam rubber insulation (Armaflex or equivalent). Liquid lines that are exposed to direct sunlight, high temperatures, or excessive humidity must also be insulated.
5. Tape and suspend the refrigerant lines as shown in Figure 3. Do not allow tube metal-to-metal contact.
6. Use PVC piping as a conduit for all underground installations as shown in Figure 4. Buried lines must be kept as short as possible to minimize the build up of liquid refrigerant in the vapor line during long periods of shutdown.

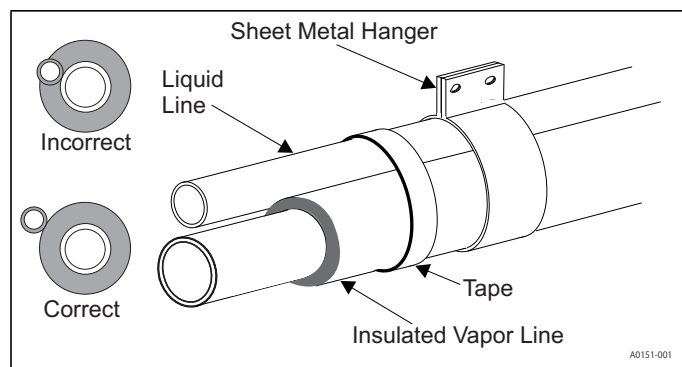


Figure 3: Installation of vapor line

7. Pack fiberglass insulation and a sealing material such as perma-gum around refrigerant lines where they penetrate a wall to reduce vibration and to retain some flexibility.
8. For systems with total line length exceeding 75 ft (22.8 m), refer to the *Piping Application Guide* (P/N 24077) for vapor and liquid line sizing, calibration of liquid line pressure loss or gain, determination of vapor line velocity, elevation limitations, TXV connections, system charging or traps.

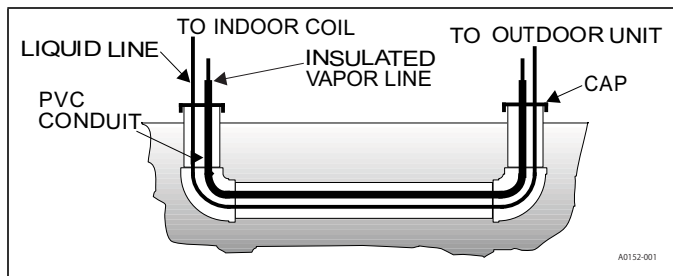


Figure 4: Underground installation

Precautions for brazing the lines

All outdoor unit and evaporator coil connections are copper-to-copper and must be brazed with a phosphorous-copper alloy material such as Silfos-5 or equivalent. Do not use soft solder. The outdoor units have reusable service valves on both the liquid and vapor connections. The total system refrigerant charge is retained within the outdoor unit during shipping and installation. The reusable service valves are provided to evacuate and charge per this instruction.

Serious service problems can be avoided by taking adequate precautions to ensure an internally clean and dry system.

⚠ CAUTION

Dry nitrogen must always be supplied through the tubing while it is being brazed, because the temperature required is high enough to cause oxidation of the copper unless an inert atmosphere is provided. The flow of dry nitrogen must continue until the joint has cooled. Always use a pressure regulator and safety valve to ensure that only low pressure dry nitrogen is introduced into the tubing. Only a small flow is necessary to displace air and prevent oxidation.

Precautions for brazing the service valve

Precautions must be taken to prevent heat damage to service valve by wrapping a wet rag around it as shown in Figure 5. Protect all painted surfaces, insulation, and the plastic base during brazing. After brazing, cool the joint with a wet rag.

⚠ WARNING

This is not a backseating valve. The service access port has a valve core. Opening or closing valve does not close service access port.

If the valve stem is backed out past the chamfered retaining wall, the O-ring can be damaged causing leakage or system pressure could force the valve stem out of the valve body possibly causing personal injury.

Open the valve by removing the service valve cap, fully inserting a hex wrench into the stem, and backing out counterclockwise until the valve stem just touches the chamfered retaining wall.

Connecting the refrigerant lines

1. Remove the cap and Schrader core from both the liquid and vapor service valve service ports at the outdoor unit. Connect low pressure nitrogen to the liquid line service port.
2. Braze the liquid line to the liquid valve at the outdoor unit. Be sure to wrap the valve body with a wet rag. Allow the nitrogen to continue flowing.
3. Carefully remove the plugs from the indoor coil liquid and vapor connections at the indoor coil.

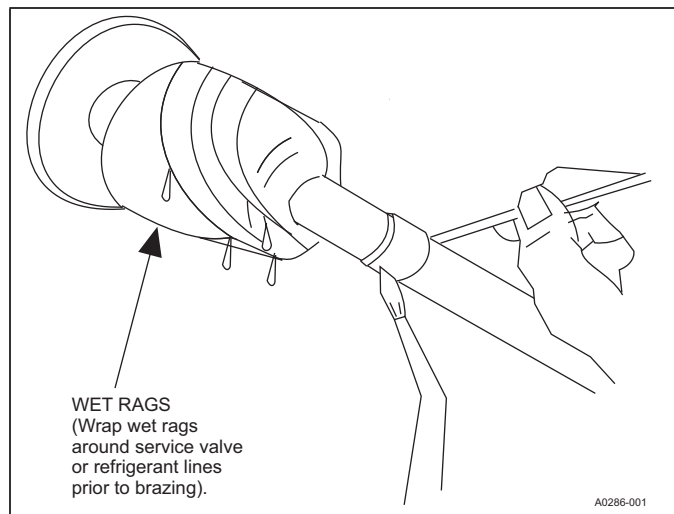


Figure 5: Heat protection

⚠ CAUTION

Do not install any coil in a furnace which is to be operated during the heating season without attaching the refrigerant lines to the coil. The coil is under pressure which must be released to prevent excessive pressure build-up and possible coil damage.

4. Braze the liquid line to the indoor coil liquid connection. Nitrogen must be flowing through the indoor coil.
5. Slide the grommet away from the vapor connection at the indoor coil. Braze the vapor line to the evaporator vapor connection. After the connection has cooled, slide the grommet back into original position.
6. Protect the vapor valve with a wet rag and braze the vapor line connection to the outdoor unit. The nitrogen flow must exit the system from the vapor service port connection. After this connection cools, remove the nitrogen source from the liquid fitting service port.
7. Replace the Schrader core in the liquid and vapor valves.
8. See the *Coil metering devices* section for TXV installation instructions.
9. Leak test all refrigerant piping connections, including the service port flare caps, to be sure they are leaktight. Do not over-tighten (between 40 in. lb and 60 in. lb maximum).

NOTICE

Refrigeration piping and indoor coil can be pressurized to 250 psig with dry nitrogen and leak tested with a bubble type leak detector. Then release the nitrogen charge.

Do not use the system refrigerant in the outdoor unit to purge or leak test.

10. Evacuate the vapor line, indoor coil, and liquid line to 500 microns or less.
11. Replace cap on service ports. Do not remove the flare caps from the service ports except when necessary for servicing the system.

⚠ CAUTION

Do not connect manifold gauges unless trouble is suspected. Approximately 3/4 oz of refrigerant is lost each time a standard manifold gauge is connected.

12. Release the refrigerant charge into the system. Open both the liquid and vapor valves by removing the plunger cap and with an hex wrench, back out counterclockwise until the valve stem just touches the chamfered retaining wall. If the service valve is a ball valve, use an adjustable wrench to turn the valve stem 1/4 turn counterclockwise to open. Do not overturn or the valve stem may break or become damaged. See *Precautions during brazing service valve*.
13. Replace the plunger cap finger tight, then tighten an additional 1/12 turn (1/2 hex flat). The cap must be replaced to prevent leaks.

⚠ WARNING

Never attempt to repair any brazed connections while the system is under pressure. Personal injury could result.

See *System charge* for checking and recording system charge.

Section IV: Coil metering devices

A piston or a TXV is to be installed in the field. There is an installation manual that comes with the TXV kit. Install the piston or TXV kit before installing the coil and brazing the refrigeration piping. Until brazing is completed and cooled, the TXV sensing bulb must not be installed.

Refer to the outdoor *Technical Guide* for outdoor units for the required piston or TXV on the indoor coil. The piston and the Schrader core are supplied with the outdoor unit. When using the piston instead of the TXV, the Schrader core is installed in the suction-line equalizer connection port and is capped with the supplied plastic cap. The Schrader core must not be installed if the TXV is installed, because the TXV equalizer line attaches to the equalizer connection port.

⚠ CAUTION

COIL UNDER PRESSURE.

Verify that pressure has been released by depressing the Schrader valve core.

The coil requires a metering device to be added.

Refer to the outdoor unit documentation for the correct TXV or piston to be used.

NOTICE

To prevent moisture and contaminants from entering the system, the coil must not be open to atmosphere for extended periods of time. If the coil cannot be brazed into the refrigeration system during a routine installation period, the ends must be temporarily closed or plugged. For a short term delay, use masking tape over the ends of the copper tubing to close the tube from the air. For a longer term delay, use plugs or caps. There is no need to purge the coil if this procedure is followed.

Piston installation

⚠ WARNING

Failure to install the Schrader Valve Core in the vapor line equalizer connection port for piston applications could result in total refrigerant loss of the system.

Installing the Schrader valve core and piston

1. After the holding charge is completely discharged, remove the black plastic cap from the equalizer connection port on the vertical part of the vapor line.
2. Adjust the distributor position to allow the preformed liquid line assembly to correctly line up with the hole in the tubing access panel. Raise the distributor body approximately 2 in. toward the top of the coil or what would be the top of the coil if the coil was in the upflow position. See Figure 6 and adjust as necessary.
3. Install the Schrader valve core supplied with the outdoor unit into the equalizer fitting connection port using a valve core tool.
4. Loosen and remove the liquid line connection nut and the sealing disc from the distributor assembly. Note that the fitting has right-hand threads.
5. Slide the nut over the liquid line to be installed and discard the seal disc.
6. Install the required size piston into the distributor. Refer to the *Tabular Data Sheet* for the specific piston size and indoor coil match up.
7. Verify that the PTFE washer is still in place in the distributor opening. See Figure 7.

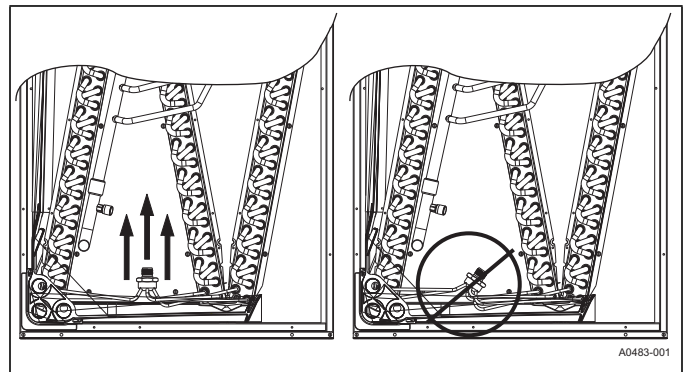


Figure 6: Recommended distributor adjustment

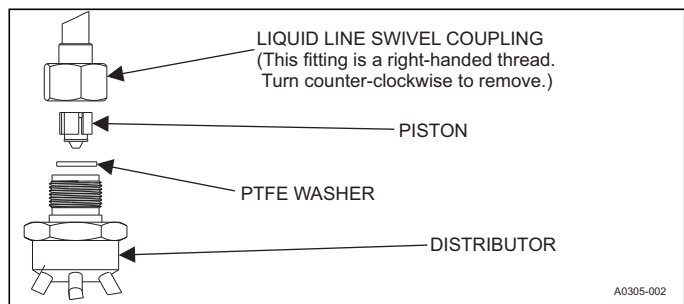


Figure 7: Piston installation

⚠ CAUTION

Do not over-tighten. Do not use slip joint pliers. This distorts the aluminum distributor and the brass fitting (potentially causing leaks).

8. After installing the piston, install the liquid line to the top of the piston or distributor assembly. Hand tighten and turn an additional 1/4 turn to seal. Do not over-tighten the fittings.
9. Replace the black plastic cap on the unused equalizer fitting connection port.
10. After installing the refrigeration piping, leak test the system.

Thermostatic expansion valve (TXV) installation

⚠ CAUTION

Outdoor unit model numbers ending with an H have a factory installed hard start kit which is required when a TXV kit is installed. Outdoor unit model numbers with no H ending do not require a hard start kit unless local regulations dictate it.

The following are basic steps for installation. For detailed instructions, refer to the *TXV kit Installation Manual*. Install the TXV as follows:

IMPORTANT: Refer to the *Technical Guide* for the unit to determine the proper TXV to be used on this product.

1. Relieve the holding charge by depressing the Schrader core on the suction manifold stub out.
2. After the holding charge is completely discharged, loosen and remove the Schrader core.
3. Place a backup wrench on the distributor, then loosen and remove the brass distributor nut. Retain the brass nut for use on the liquid line. Keep the PTFE washer in place and discard the clear disk.
4. Install the thermal expansion valve to the distributor assembly with the supplied fittings. Ensure the PTFE washer is seated in the distributor. Hand tighten and turn an additional 1/4 turn to seal. Do not over-tighten the fittings. See Figure 8.

⚠ CAUTION

Do not over-tighten. Do not use slip joint pliers. This distorts the aluminum distributor and the brass fitting (potentially causing leaks).

5. Slide the nut removed in Step 3 over the supplied liquid line. Place the supplied PTFE washer from the TXV kit on the TXV, and install the liquid line to the top of the thermal expansion valve. Adjust the assembly so the liquid line aligns with the hole in the access panel. See Figure 9. Hand tighten the liquid line and apply an additional 1/4 turn to seal.

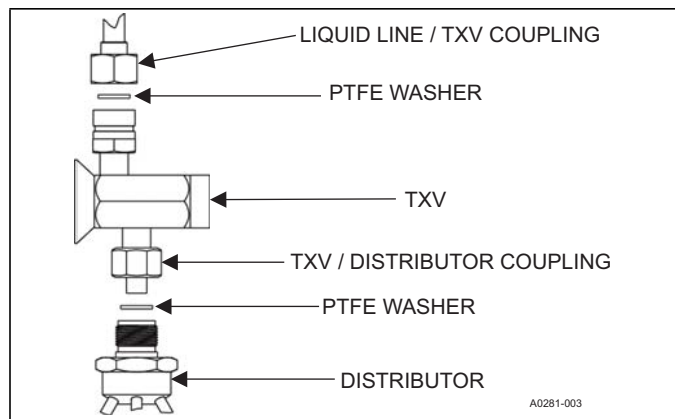


Figure 8: TXV installation

⚠ WARNING

The Schrader valve core **must not** be installed with TXV installation. Poor system performance or system failure could result.

6. Install the TXV equalizer line onto the vapor line by hand tightening the 1/4 in. SAE coupling nut to the equalizer fitting and apply an additional 1/3 turn to seal. See Figures 9, 10, and 11.

⚠ CAUTION

In all cases, mount the TXV temperature sensing bulb after the vapor line is brazed and sufficiently cooled.

Failure to use a suction-line split grommet may result in TXV failure.

7. Pass the temperature sensing bulb tube for the TXV through the tube opening in the split grommet of the access panel.
8. Install the TXV bulb to the vapor line near the cabinet, using the bulb clamps furnished with the TXV assembly. Ensure the bulb makes maximum contact. See Figures 9, 10 and 11, and do the following:
 - a. If possible, install the temperature bulb on a horizontal run of the vapor line. Ensure that the bulb is installed at a 10 o'clock or 2 o'clock position. See Figure 10.
 - b. If bulb installation is made on a vertical run, ensure that the bulb is a minimum of 8 in. (20.3 cm) away from the elbow coming out of the coil. Position the bulb with the tail of the bulb at the top, so that the bulb acts as a reservoir. See Figure 11.
 - c. Insulate the bulb using the thermal insulation provided to protect it from the effect of the surrounding ambient temperature. Cover completely to insulate.

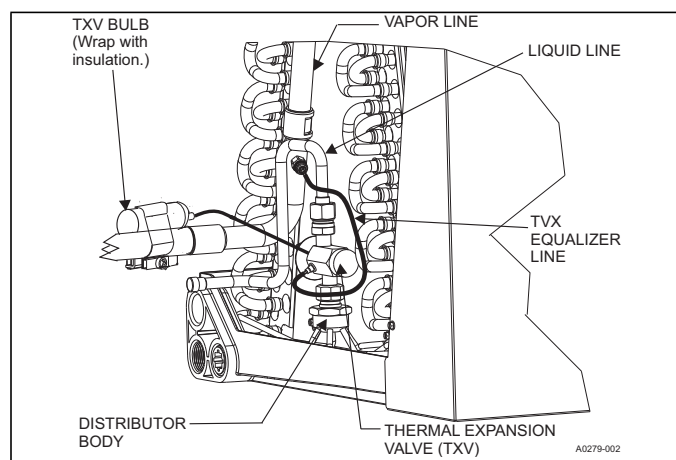


Figure 9: TXV bulb and equalizer line installations

9. After the refrigeration piping is installed, leak test the system.

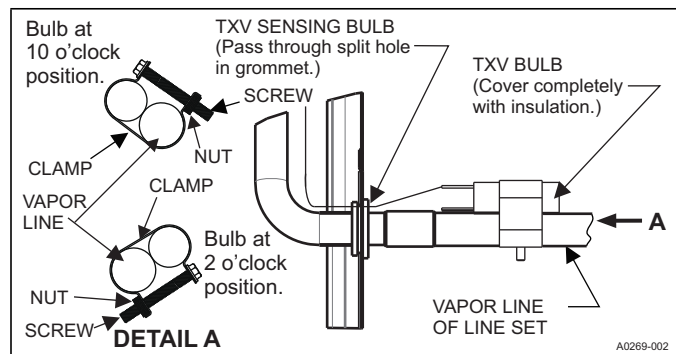


Figure 10: Correct bulb location

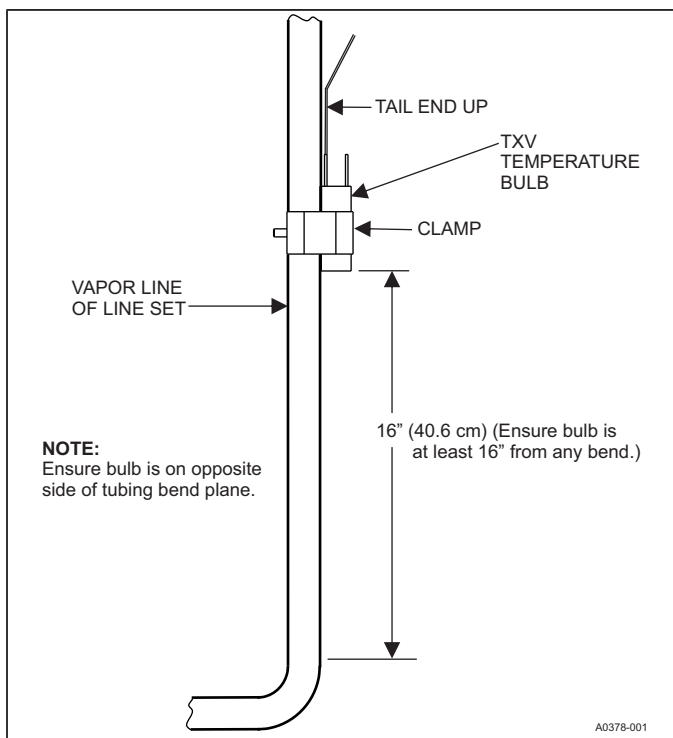


Figure 11: Vertical temperature bulb orientation

Section V: Evacuation

It is necessary to evacuate the system to 500 microns or less. If a leak is suspected, leak test with dry nitrogen to locate the leak. Repair the leak and test again.

To verify that the system has no leaks, close the valve to the vacuum pump suction to isolate the pump and hold the system under vacuum. Watch the micron gauge for a few minutes. If the micron gauge indicates a steady and continuous rise, it is an indication of a leak. If the gauge shows a rise, then levels off after a few minutes and remains fairly constant, it is an indication that the system is leak free but still contains moisture and may require further evacuation if the reading is above 500 microns.

Section VI: System charge

To ensure that your unit performs at the published levels, it is important that the indoor airflow is determined and refrigerant charge is added accordingly.

Measuring indoor airflow

To determine rated airflow for a specific match, consult the technical literature at www.simplygettingthejobdone.com. When attempting to match this airflow, select the lowest possible speed tap, measure the actual airflow, and adjust as necessary.

To measure actual airflow, it is not an acceptable method to check the jumper pin setting tables and to assume 0.5 in. W.C. total external static pressure.

To determine indoor airflow, first measure the static pressure with a manometer between the filter and blower. On a single-piece air handler, take a second reading after the coil. On a furnace or modular air handler, take the second reading after the heat exchanger but before the indoor coil. Add the negative return static to the positive supply static to determine the system total static pressure. Treat the negative return static as a positive pressure (even though it is a negative reading). If there is static pressure on the blower return (-0.1), add it to a supply static (0.4) which equals a (0.5) total system static pressure. Compare this value to the table for the indoor unit's static pressure against CFM or to a curve chart.

System charging

NOTICE

For cold weather charging of the system at temperatures of 55°F or below, see the *Cold weather charging* procedures in the *System Charge* section.

CAUTION

R-410A refrigerant cylinders are rose colored. Always charge the system slowly with liquid R-410 refrigerant.

The factory charge in the outdoor unit includes enough charge for the unit, a 15 ft (4.6 m) refrigeration piping, and the smallest indoor coil match-up. Some indoor coil matches may require additional charge. Refer to the *Tabular Data Sheet* for charge requirements.

CAUTION

Do not leave the system open to the atmosphere.

The total system charge must be permanently stamped on the unit data plate.

Total system charge is determined as follows:

1. Determine the base charge shipped in the outdoor unit by referring to the *Tabular Data Sheet* included with the outdoor unit.
2. Determine the charge adder for the matched indoor unit by referring to the *Tabular Data Sheet*.
3. If the refrigeration piping length is greater than 15 ft (4.6 m), calculate the charge adder for actual refrigeration piping length by referring to the *Tabular Data Sheet*.
4. Once the charge adders for the matched indoor unit and for the refrigeration piping have been weighed in, verify the system operation against the temperatures and pressures in the charging chart for the outdoor unit. Refer to the *Charging Charts* on the outdoor unit or in the *Service Application Data* on www.simplygettingthejobdone.com. Follow the subcool or the superheat charging procedure in this section according to the type of indoor metering device in the system, and allow 10 min after each charge adjustment for the system operation to stabilize. Record the charge adjustment made to match the charging chart.
5. Verify that total system charge = base charge as shipped + charge adder for matched indoor unit + charge adder for actual refrigeration piping length + charge adjustments to match the charging chart.
6. Permanently stamp the unit data plate with the total system charge as defined in these instructions.

Use this method whenever additional refrigerant is required for the system charge.

WARNING

Do not attempt to pump the total system charge into the outdoor unit for maintenance or service. This may cause damage to the compressor or other components. Recover and weigh the system charge into an appropriate recovery cylinder for any instances requiring evacuation.

WARNING

Do not attempt to pump more than the factory charge and an additional 15-ft line charge into a tube and fin outdoor unit for maintenance or service. This can cause damage to the compressor or other components.

CAUTION

Refrigerant charging must only be carried out by a qualified air conditioning contractor.

⚠ CAUTION

Compressor damage will occur if system is improperly charged. On new system installations, charge system per tabular data sheet for the matched coil and follow guidelines in this instruction.

If a calibrated charging cylinder or accurate weighing device is available, add refrigerant accordingly. Otherwise, model-specific charging charts are provided on the access panel of the unit.

Subcooling charging method - TXV indoor

The outdoor unit comes equipped with subcooling charts optimized for that particular unit. Follow the instructions on the unit. If those instructions are not readily available, follow the instructions below.

1. Set the system running in cooling mode by setting the thermostat at least 6°F below the room temperature and operate system for at least 10 min to 15 min.
2. Refer to the *Technical Guide* for the recommended indoor airflow and verify it is correct (it must be between 350 SCFM/ton and 400 SCFM/ton).
3. Measure and record the indoor wet bulb (WB) and the outdoor ambient dry bulb (DB) temperature.
4. Using the charging chart located on the unit, find the intersection of the indoor wet bulb and the outdoor dry bulb. This is the recommended liquid pressure and subcooling value.
5. Measure and record the pressure at the liquid valve pressure port and compare to the value obtained in step 4.
6. Add charge if the measured liquid pressure is lower than the recommended value. Remove or recover the charge if the measured liquid pressure is above the recommended value.

Example: The liquid pressure listed at the intersection of the indoor WB and the outdoor DB is 320 psig. The pressure at the liquid valve is 305 psig. It is necessary to add refrigerant to increase the liquid pressure to 320 psig.

Condenser subcooling is obtained by calculating the difference of the saturated refrigerant temperature of the pressure measured at the liquid base valve and the liquid tube temperature as measured at the liquid base valve.

$$\text{Subcooling Temperature (TC)} = \text{Saturated Temperature (TS)} - \text{Liquid Temperature (T)}$$

⚠ CAUTION

It is unlawful to knowingly vent, release, or discharge refrigerant into the open air during repair, service, maintenance, or the final disposal of this unit.

Superheat charging method - piston indoor

1. Set the system running in cooling mode by setting the thermostat at least 6°F below the room temperature and operate the system for at least 10 min to 15 min.
2. Refer to the *Technical Guide* for the recommended indoor airflow and verify it is correct (it must be between 350 SCFM/ton and 400 SCFM/ton).
3. Measure and record the outdoor ambient (DB) temperature and the suction pressure at the suction service valve.
4. Using the charging chart located on the unit, find the intersection of the outdoor ambient dry bulb and the suction pressure obtained in Step 3. This is the recommended suction tube temperature at the service valve.
5. Measure and record the suction tube temperature at the service valve and compare to the recommended temperature obtained in Step 4.
6. Add charge if the measured suction temperature in Step 5 is above the recommended value. Remove or recover the refrigerant if the measured suction temperature is below the recommended value.

Example: The suction tube temperature listed in the table at the intersection of the outdoor DB and the suction pressure is 63°F. The temperature of the suction tube at the service valve is 68°F. It is necessary to add refrigerant to drop the suction tube temperature to 63°F.

Table 2: R-410A saturation properties

Temperature (°F)	Pressure (psig)	Temperature (°F)	Pressure (psig)	Temperature (°F)	Pressure (psig)	Temperature (°F)	Pressure (psig)	Temperature (°F)	Pressure (psig)
45	130	60	170	75	217	90	274	105	341
46	132	61	173	76	221	91	278	106	345
47	135	62	176	77	224	92	282	107	350
48	137	63	179	78	228	93	287	108	355
49	140	64	182	79	232	94	291	109	360
50	142	65	185	80	235	95	295	110	365
51	145	66	188	81	239	96	299	111	370
52	147	67	191	82	243	97	304	112	375
53	150	68	194	83	247	98	308	113	380
54	153	69	197	84	250	99	313	114	385
55	156	70	201	85	254	100	317	115	391
56	158	71	204	86	258	101	322	116	396
57	161	72	207	87	262	102	326	117	401
58	164	73	211	88	266	103	331	118	407
59	167	74	214	89	270	104	336	119	412

Cold weather charging

NOTICE

For better airflow, the size of the charging tent must be at least 70 in. x 70 in. x 70 in. and must have some adjustable flaps or windows to control the temperature inside the charging tent. The charging tent must not have a floor or floor covering. See the *System Charge* procedures.

1. Assemble the charging tent.
2. Slide the charging tent over the top of the condenser unit.
3. Position the door zipper over the refrigeration piping so the charging tent sits evenly on the ground.
4. Make sure the distance around the condenser inside of the charging tent is even for airflow.
5. Stake down the edges of the charging tent cover to prevent the unit fan from blowing the charging tent away.
6. Start the condenser.
7. For better temperature measurement inside the charging tent, use a thermocouple to monitor temperature readings. Locate the thermocouple monitor approximately 8 in. to 10 in. away from the coil guard and 2/3 of the way above the bottom of the coil on the opposite side from the control box.
8. Based on the outdoor ambient temperature, begin adjusting the windows to achieve a stable temperature above 55°F inside the tent. Note that the colder the outdoor ambient temperature is the fewer windows need removal.
9. Use the condenser charging chart. Verify that the outdoor ambient temperature listed on the charging chart is the temperature inside the charging tent.
10. Carefully adjust the charging tent windows until reaching the desired temperature, and allow the unit to stabilize for a minimum of 15 min. Check the thermocouple to make sure the temperature is still maintained at the preferred temperature. If the temperature is out of range, adjust the windows by opening or closing them.
11. When the condition inside the charging tent is stabilized, follow the *System Charge* procedure to adjust charge in the unit.
12. Add or remove charge and adjust the windows to maintain the preferred temperature inside the tent.

Section VII: Electrical connections

General information and grounding

The control box cover is held in place with three screws with one screw in each lower corner, and one screw at the top center post. The control box can swing open by removing the screw from the center of each side of the control box and allowing the control box to lower approximately 1 in. into a pivotal position.

NOTICE

A flexible electrical whip must be installed in order to use the swing away function of the control box. Other type electrical whips require the wiring to be disconnected in order to swing the control box open.

The control box can then swing open from the left by rotating on the right side pivots for easy service of refrigeration components. If no wiring is in or routed through the control box, it can be removed from the unit by lifting slightly, tilting the top hinge out, and lifting the bottom hinge out. During the installation, route the low-voltage wiring for the thermostat along the unit whip to help facilitate the swing away feature of the control box. See Figure 12.

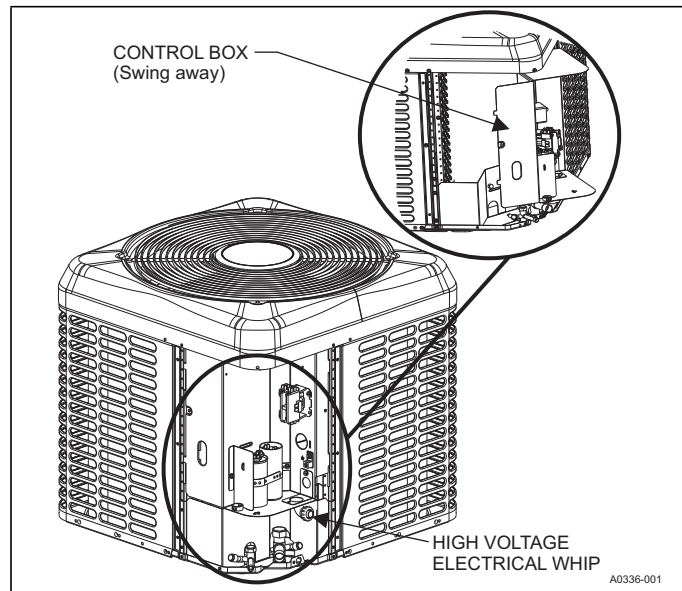


Figure 12: Outdoor unit swing away control box

Check the electrical supply to ensure it meets the values specified on the unit nameplate and wiring label.

Power wiring, control (low-voltage) wiring, disconnect switches, and over current protection must be supplied by the installer. Wire size must be sized following NEC requirements.

CAUTION

All field wiring must only use copper conductors and be in accordance with Local, National, Fire, Safety and Electrical Codes. This unit must be grounded with a separate ground wire in accordance with the above codes.

The complete connection diagram and schematic wiring label is located on the inside surface of the unit service access panel.

Field connections power wiring

1. Install the correct size weatherproof disconnect switch outdoors and within sight of the unit.
2. Remove the screws at the top and sides of the corner cover. Slide the control box cover down and remove from unit.
3. Run power wiring from the disconnect switch to the unit.
4. Route wires from disconnect through power wiring exit provided and into the unit control box as shown in Figures 12, 13, 14, and 15.
5. Install the correct size time-delay fuses or circuit breaker, and make the power supply connections.

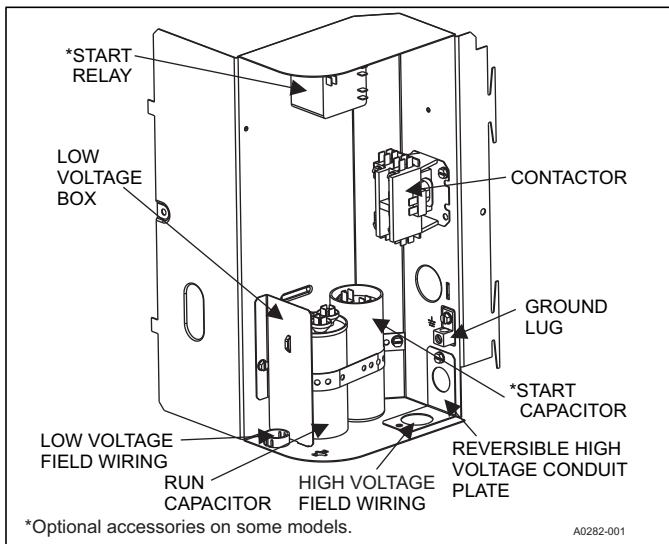


Figure 13: Outdoor unit control box (single-phase - smaller base)

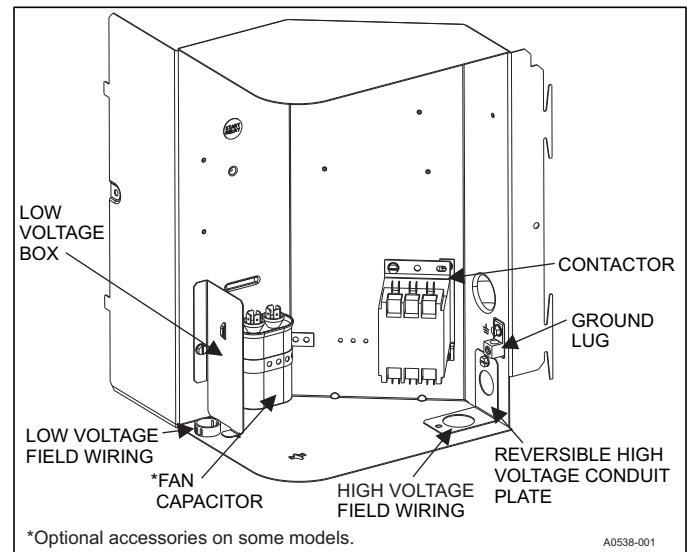


Figure 15: Outdoor unit control box (three-phase)

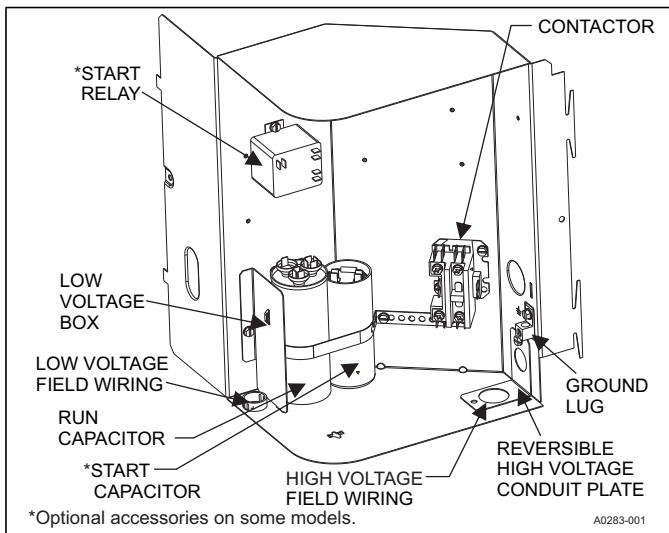


Figure 14: Outdoor unit control box (single-phase - larger base)

Field connections control wiring

1. Route low-voltage wiring into the bottom of the control box as shown in Figure 13, 14, or 15. Make low-voltage wiring connections inside the low-voltage box as shown in Figure 16.
2. The complete connection diagram and schematic wiring label is located on the inside surface of the unit service access panel.
3. Replace the control box cover removed in Step 2 of the *Field Connections Power Wiring* procedures.
4. All field wiring to be in accordance with national electrical codes (NEC) or local city codes.

NOTICE

A Start Assist Kit is available and recommended for long lineset applications or in areas of known low-voltage problems. The kit may be required when a TXV is used (refer to the *Tabular Data Sheet* to determine if applicable).

5. Mount the thermostat about 5 ft above the floor, where it is exposed to normal room air circulation. Do not place it on an outside wall or where it is exposed to the radiant effect from exposed glass or appliances, drafts from outside doors or supply air grilles.
6. Route the 24-V control wiring (NEC Class 2) from the outdoor unit to the indoor unit and thermostat.

NOTICE

To eliminate erratic operation, seal the hole in the wall at the thermostat with permagum or equivalent to prevent air drafts affecting the operation of in the thermostat.

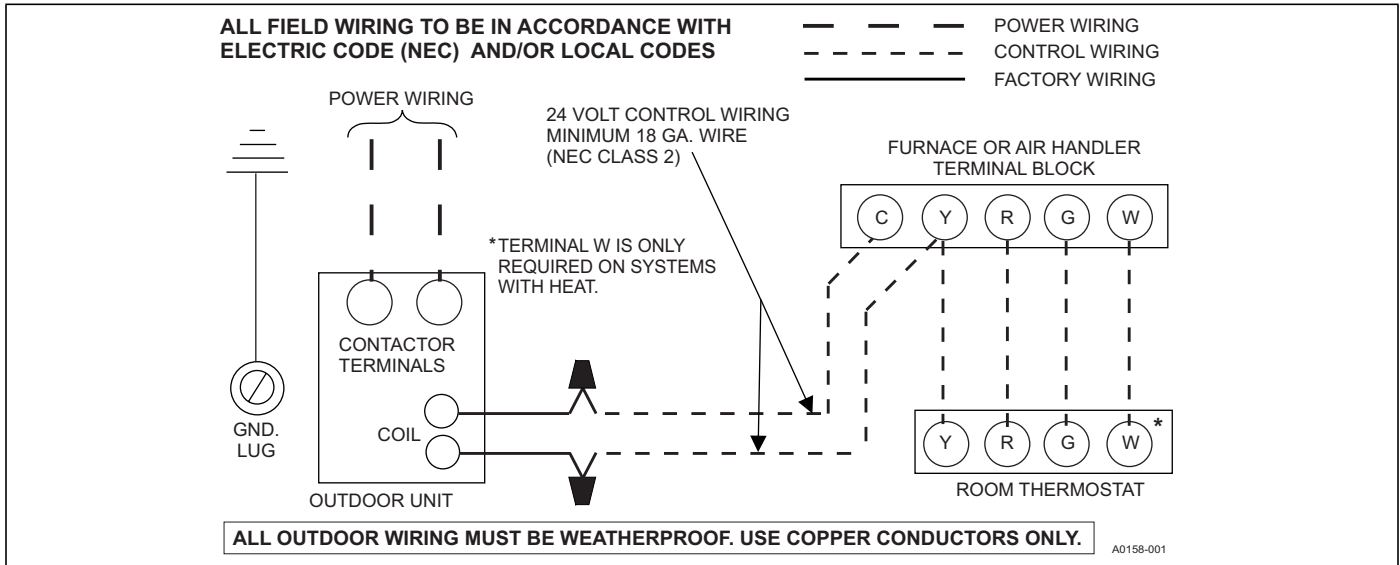


Figure 16: Typical field wiring (air handler/electrical heat) (single-phase)

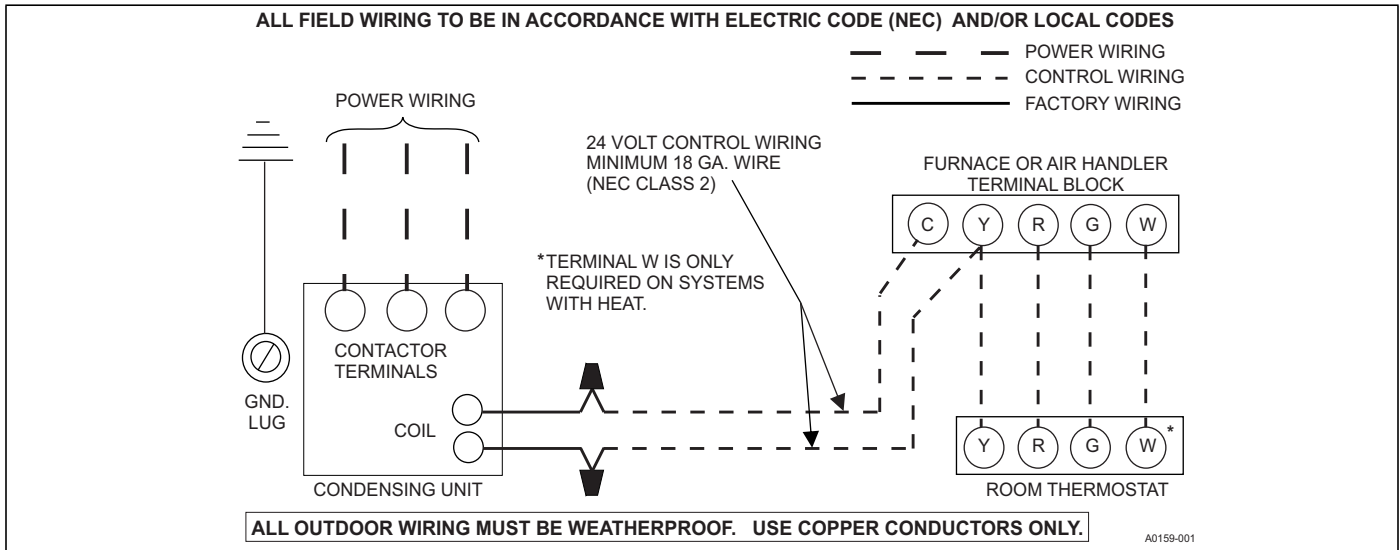


Figure 17: Typical field wiring (air handler/electrical heat) (three-phase)

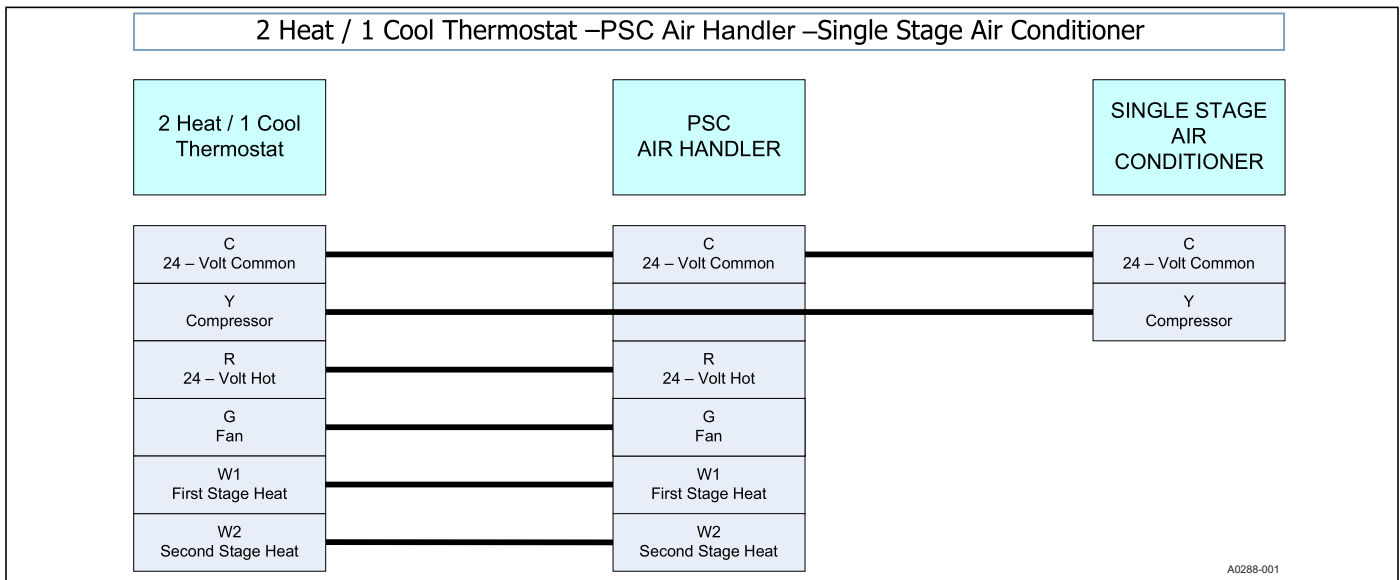


Figure 18: Thermostat chart - PSC air handler with single-stage air conditioner

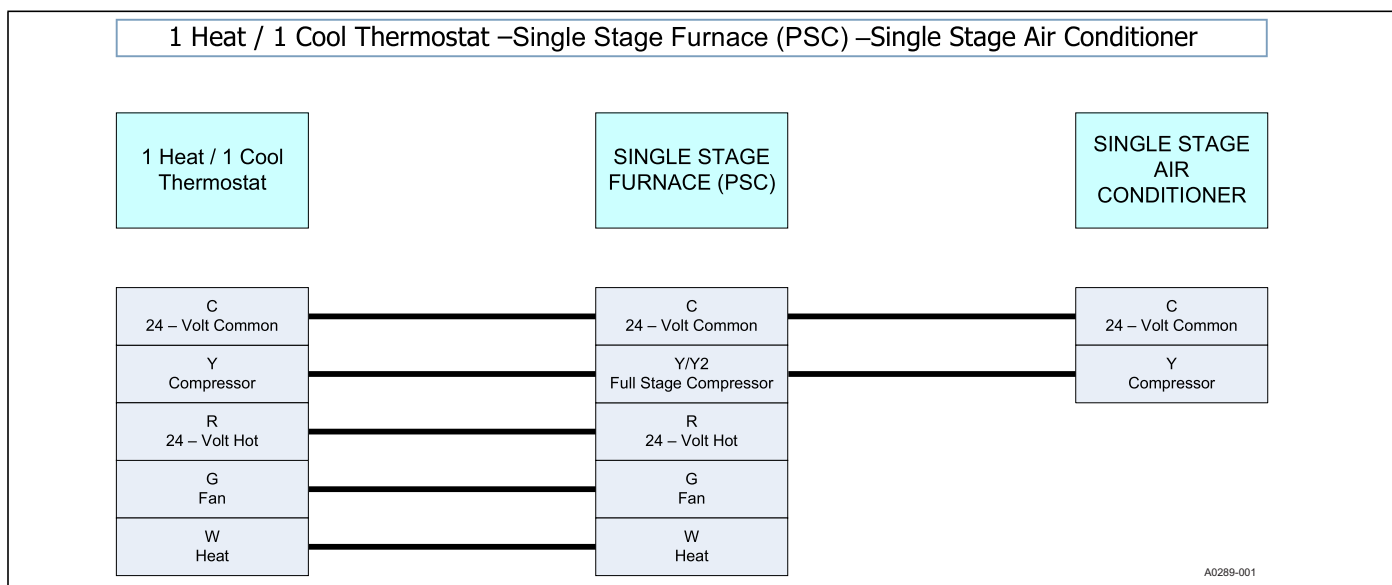


Figure 19: Thermostat chart - single-stage PSC Furnace with single-stage air conditioner

Section VIII: Instructing the user

Assist the user with processing warranty cards or online registration. Review the *User's Information Manual*, and provide a copy to the user and guidance on correct operation and maintenance. Instruct the user how to start, stop, and adjust the temperature setting.

When applicable, instruct the user that the compressor is equipped with a crankcase heater to prevent the migration of refrigerant to the compressor during the OFF cycle. The heater is energized only when the unit is not running. If the main switch is disconnected for long periods of shut down, do not attempt to start the unit until 8 h after the switch has been connected. This allows sufficient time for all liquid refrigerant to be driven out of the compressor.

The installer must also instruct the user on correct operation and maintenance of all other system components.

Maintenance

1. Do not allow dirt to accumulate on the outdoor coils or other parts in the air circuit. Clean as often as necessary to keep the unit clean. Use a brush, vacuum cleaner attachment, or other suitable means.

2. The outdoor fan motor is permanently lubricated and does not require periodic oiling.
3. If the coil needs to be cleaned, use clean water to wash dust, dirt, and debris from outdoor condensing coil.

NOTICE

Do not use coil cleaners to clean outdoor condensing coil. Cleaners containing hydrogen fluoride (HF), hydroxides, chlorides, and sulfates can greatly reduce the lifetime of the micro channel coil.

4. Refer to the furnace or air handler instructions for filter and blower motor maintenance.
5. The indoor coil and drain pan must be inspected and cleaned regularly to prevent odors and assure proper drainage.

⚠ CAUTION

It is unlawful to knowingly vent, release, or discharge refrigerant into the open air during repair, service, maintenance, or the final disposal of this unit.

Section IX: Wiring diagrams

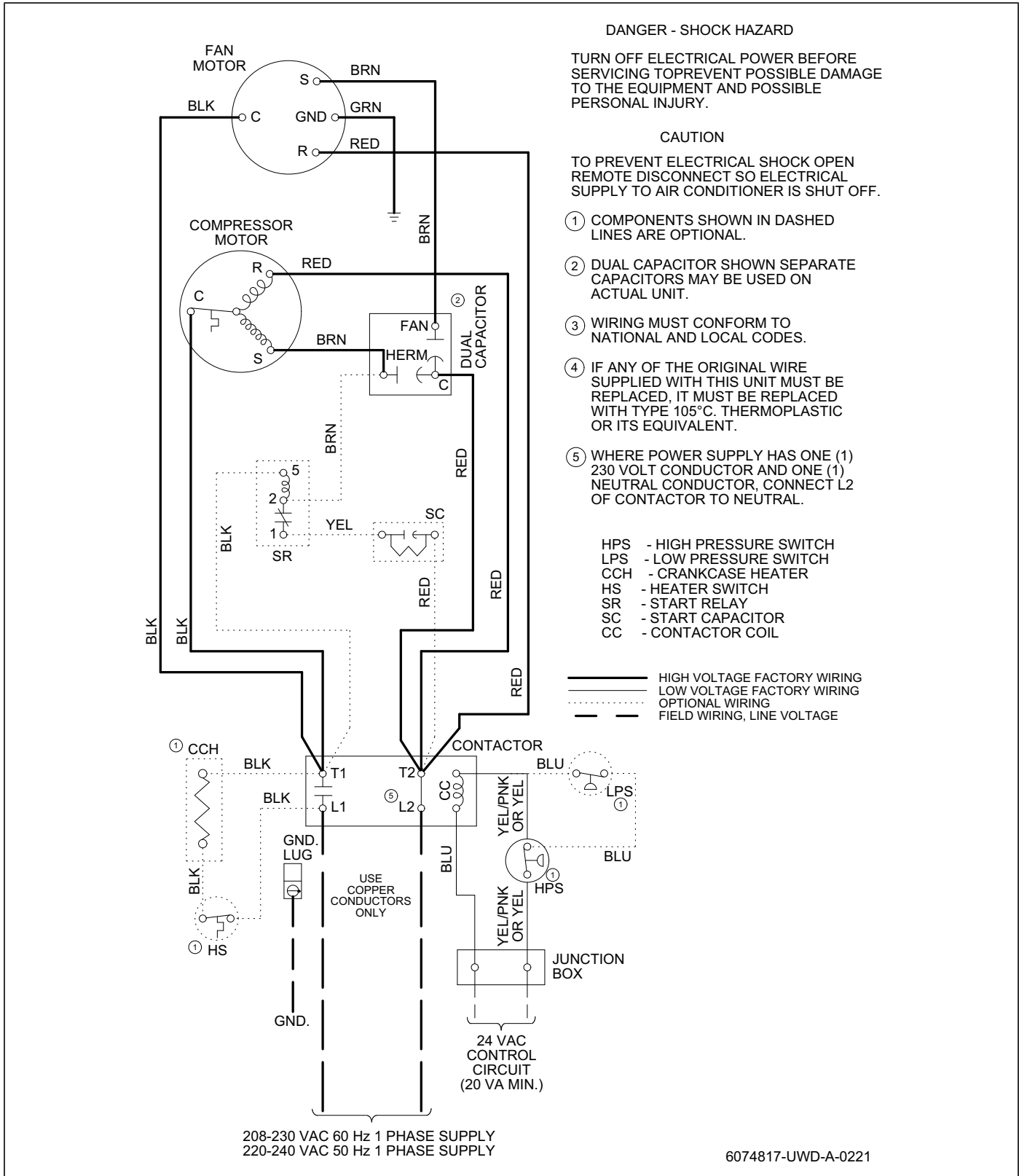


Figure 20: Wiring diagram - single-phase 13 SEER and 14 SEER

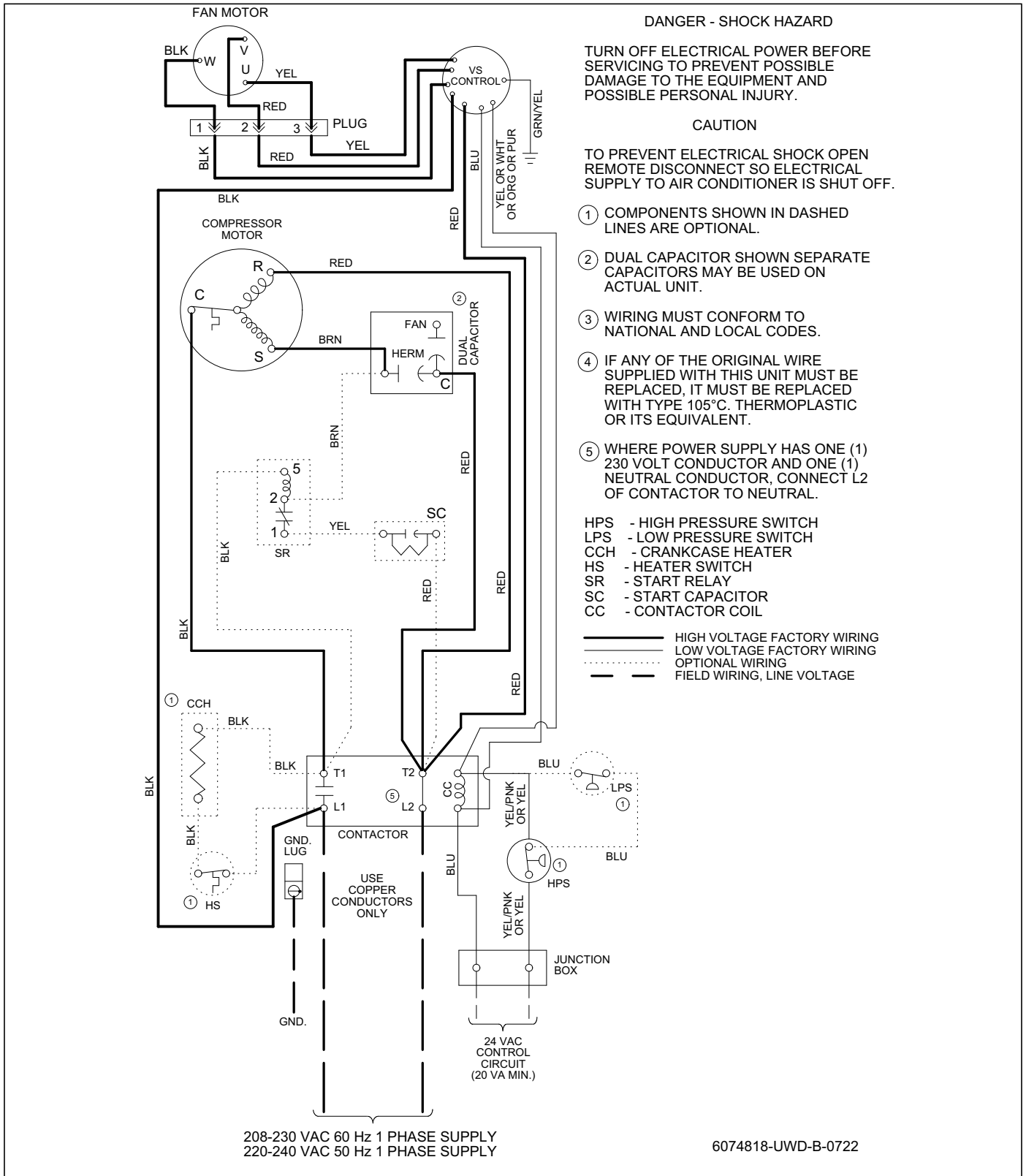


Figure 21: Wiring diagram - single-phase 17 SEER

DANGER - SHOCK HAZARD

TURN OFF ELECTRICAL POWER BEFORE SERVICING TO PREVENT POSSIBLE DAMAGE TO THE EQUIPMENT AND POSSIBLE PERSONAL INJURY.

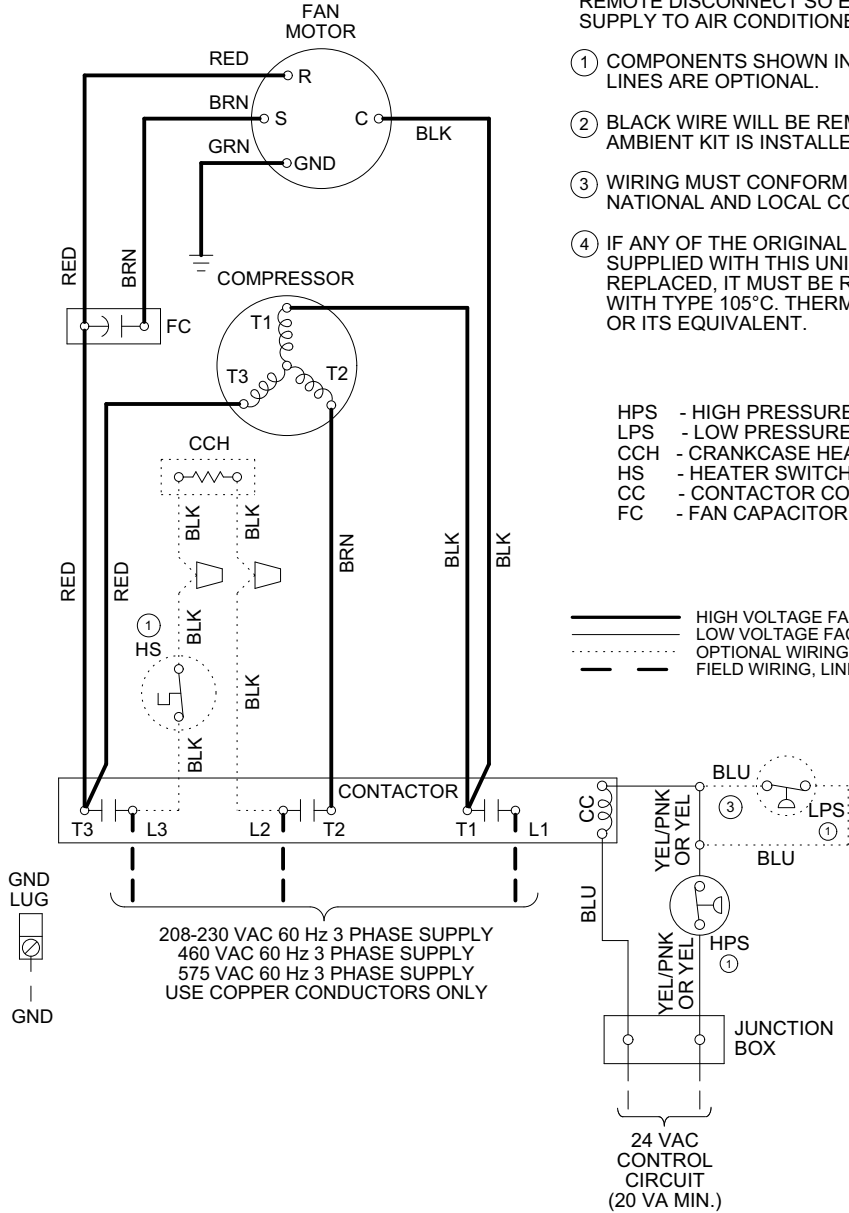
CAUTION

TO PREVENT ELECTRICAL SHOCK OPEN REMOTE DISCONNECT SO ELECTRICAL SUPPLY TO AIR CONDITIONER IS SHUT OFF.

- ① COMPONENTS SHOWN IN DASHED LINES ARE OPTIONAL.
- ② BLACK WIRE WILL BE REMOVED IF LOW AMBIENT KIT IS INSTALLED.
- ③ WIRING MUST CONFORM TO NATIONAL AND LOCAL CODES.
- ④ IF ANY OF THE ORIGINAL WIRE SUPPLIED WITH THIS UNIT MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 105°C. THERMOPLASTIC OR ITS EQUIVALENT.

HPS - HIGH PRESSURE SWITCH
 LPS - LOW PRESSURE SWITCH
 CCH - CRANKCASE HEATER
 HS - HEATER SWITCH
 CC - CONTACTOR COIL
 FC - FAN CAPACITOR

— HIGH VOLTAGE FACTORY WIRING
 — LOW VOLTAGE FACTORY WIRING
 - - - OPTIONAL WIRING
 - - - FIELD WIRING, LINE VOLTAGE



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Figure 22: Wiring diagram - three-phase 13 SEER

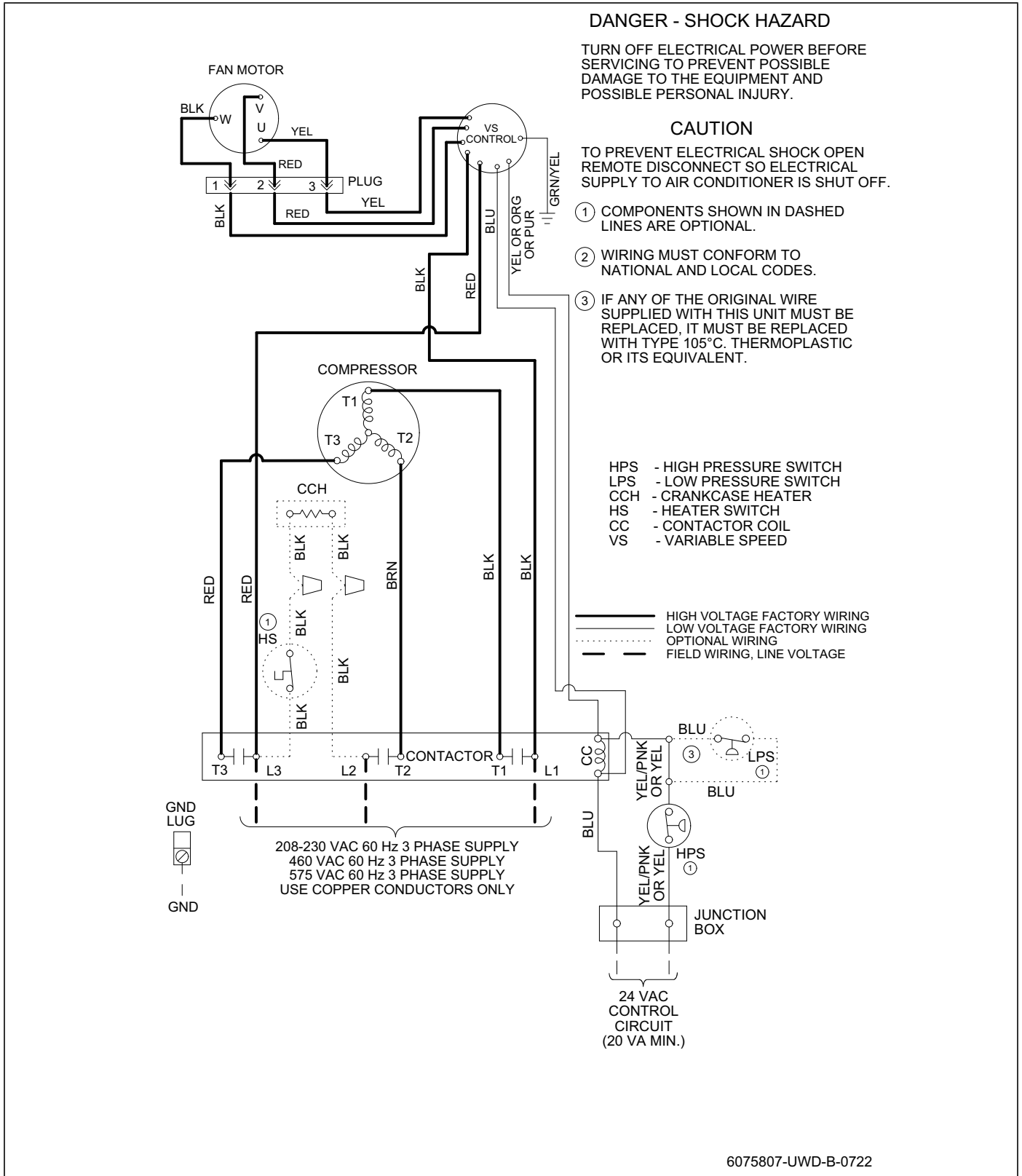


Figure 23: Wiring diagram - three-phase 17 SEER

NOTES

Section X: Start-up sheet**Air Conditioning and Heating Start-Up Sheet**

Proper start-up is critical to customer comfort and equipment longevity

Start-Up Date Technician Performing Start-Up Installing Contractor Name **Owner Information**Name Address City State or Province Zip or Postal Code **Equipment Data** Upflow Downflow Horizontal Left Horizontal RightIndoor Unit Model # Indoor Unit Serial # Indoor Coil Model # Indoor Coil Serial # Outdoor Unit Model # Outdoor Unit Serial # **Filter, Thermostat, Accessories**Filter Type Filter Size Filter Location(s) Thermostat Type Other System Equipment and Accessories **Connections -- Per Installation Instructions and Local Codes**

- Unit is level Supply plenum and return ducts are connected and sealed Refrigerant piping complete and leak tested
 Gas piping is connected (if applicable) Vent system is connected (if applicable)
 Condensate drain for indoor coil properly connected Condensate drain for furnace (if applicable)

Electrical: Line VoltageIndoor unit (volts AC) Outdoor unit (volts AC) Overcurrent Protection Breaker / Fuses Amperes

- Ground wire is connected Polarity is correct (120vac indoor units) black is L1 (hot), white is N (neutral)

Electrical: Low Voltage

Thermostat wiring complete Heat anticipator recommended value
 Heat anticipator is set to the recommended value listed in the Installation Instructions

Low voltage values: "R" and "C" at Indoor unit control board (volts AC) "R" and "C" Outdoor unit control board (volts AC) **Heating Set-Up**Heating Type Electric Air Handler Natural Gas LP Gas (Requires LP Conversion Kit)Inlet Gas Pressure (in. w.c.) Manifold Gas Pressure (in. w.c.) LP Gas Conversion Kit Part # Used Calculated input in btuh - clock the gas meter (Nat Gas Only) LP Kit Installed By Electric Heat Kit Part # (if applicable) KW installed Rated BTU/H (furnaces) **Venting (if applicable)** Venting system properly sized, within the limitations of the charts in the installation instructions.Intake Size # of 90 Degree Ells # Of 45 Degree Ells Length Exhaust Size # of 90 Degree Ells # Of 45 Degree Ells Length

Air Side: System Total External Static Pressure

Supply static before indoor coil (in w.c.)	<input type="text"/>	Supply static after indoor coil (in w.c.)	<input type="text"/>
Return Static (in w.c.) before filter	<input type="text"/>	Return Static (in w.c.) after filter (furnace side)	<input type="text"/>
Total External Static Pressure	<input type="text"/>	Maximum Rated ESP (in w.c.)	<input type="text"/>

Cooling Indoor Blower Set-Up

COOL	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	
ADJUST	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	
DELAY	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	
<input type="radio"/> ECM					
<input type="radio"/> X-13	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<input type="radio"/> PSC	<input type="radio"/> Low	<input type="radio"/> Medium Low	<input type="radio"/> Medium	<input type="radio"/> Medium High	<input type="radio"/> High

Return Air: Dry Bulb	<input type="text"/>	Wet Bulb	<input type="text"/>	Supply Air: Dry Bulb	<input type="text"/>	Wet Bulb	<input type="text"/>	Temperature Drop	<input type="text"/>	Outside Air: Dry Bulb	<input type="text"/>
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Heating Indoor Blower Set-Up

HEAT	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	
<input type="radio"/> ECM					
<input type="radio"/> X-13	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<input type="radio"/> PSC	<input type="radio"/> Low	<input type="radio"/> Medium Low	<input type="radio"/> Medium	<input type="radio"/> Medium High	<input type="radio"/> High

Return Air: Dry Bulb	<input type="text"/>	Wet Bulb	<input type="text"/>	Supply Air: Dry Bulb	<input type="text"/>	Wet Bulb	<input type="text"/>	Temperature Rise	<input type="text"/>
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Refrigerant Charge and Metering Device

<input type="radio"/> R-407C	<input type="radio"/> R-410A	<input type="radio"/> TXV	<input type="radio"/> Fixed Orifice	Additional Lineset Length	<input type="text"/>	Adder per foot - lbs.	<input type="text"/>	Oz.	<input type="text"/>		
				# Elbows	<input type="text"/>	# 45s	<input type="text"/>	Total Added - lbs.	<input type="text"/>	Oz.	<input type="text"/>
Orifice Size	<input type="text"/>	Liquid Line Temp	<input type="text"/>	High Side Pressure	<input type="text"/>	Suction Line Temp	<input type="text"/>	Low Side Pressure	<input type="text"/>		
TXV #	<input type="text"/>	Subcooling	<input type="text"/>	Superheat	<input type="text"/>						

Cycle Test

- Operate the unit through continuous fan cycles from the thermostat, noting and correcting any problems
- Operate the unit through a cooling cycles, noting and correcting any problems
- Operate the unit through several heating cycles (if applicable) from the thermostat, noting and correcting any problems

Clean Up

- Installation debris disposed of and indoor and outdoor areas cleaned up?

Owner Education

- Provide owner with the owner's manual
- Explain operation of system to equipment owner
- Explain thermostat use and programming (if applicable) to owner
- Explain the importance of regular filter replacement and equipment maintenance

Comments Section