

# INSTALLATION MANUAL

## R-410A OUTDOOR SPLIT-SYSTEM HEAT PUMP

MODELS: 13 SEER & 14.5 SEER -  
THJ(D,F)/YHJ(D,F)/YHJR/THJR SERIES  
1.5 TO 5 TONS – 1 & 3 PHASE



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## SECTION I: GENERAL

The outdoor units are designed to be connected to a matching indoor coil with sweat connect lines. Sweat connect units are factory charged with refrigerant for the smallest rated indoor coil plus 15 feet of field supplied lines.

Matching indoor coils can be used with a thermostatic expansion valve (TXV) or an orifice. Refer to the Tabular Data Sheet or to the Technical Guide for the proper selection.

## 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, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's delivery receipt. A separate request for inspection by the carrier's agent should be made in writing. Local Distributor can be contacted for more information.

**Requirements For Installing/Serviceing R-410A Equipment**

- Gauge sets, hoses, refrigerant containers, and recovery system must be designed to handle the POE type oils, and the higher pressures of R-410A.
- Manifold sets should be 800 psig high side and 250 psig low side with 550 psig low side restart.
- All hoses must have a 700 psig service pressure rating.
- Leak detectors should be designed to detect HFC refrigerant.
- Recovery equipment (including refrigerant recovery containers) must be specifically designed to handle R-410A.
- An R-22 TXV must not be used.
- A liquid-line filter drier is required on every unit.

**LIMITATIONS**

The unit should be installed in accordance with all National, State, and Local Safety Codes and the limitations listed below:

1. Limitations for the indoor unit, coil, and appropriate accessories must also be observed.
2. 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.
3. The maximum and minimum conditions for operation must be observed to assure a system that will give maximum performance with minimum service. Refer to the dry bulb (DB) and wet bulb (WB) temperature limitations in Table 1.
4. The maximum allowable line length for this product is 75 feet.

**TABLE 1:** Maximum / Minimum Operating Limit Conditions

AIR TEMPERATURE AT OUTDOOR COIL, °F				AIR TEMPERATURE AT INDOOR COIL, °F			
Min.		Max.		Min.		Max.	
DB Cool	DB Heat	DB Cool	DB Heat	WB Cool	DB Heat	WB Cool	DB Heat
50	-10	115	75	57	50 <sup>1</sup>	72	80

1. Operation below this temperature is permissible for a short period of time, during morning warm-up.

**SECTION III: UNIT INSTALLATION**

**LOCATION**

Before starting the installation, the suitability of the location for both the indoor and outdoor units need to be checked. All required limitations and clearances must be observed. The outdoor unit must have sufficient clearance for air entrance to the condenser coil, for air discharge, and for service access as shown in Figure 1.

NOTICE

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

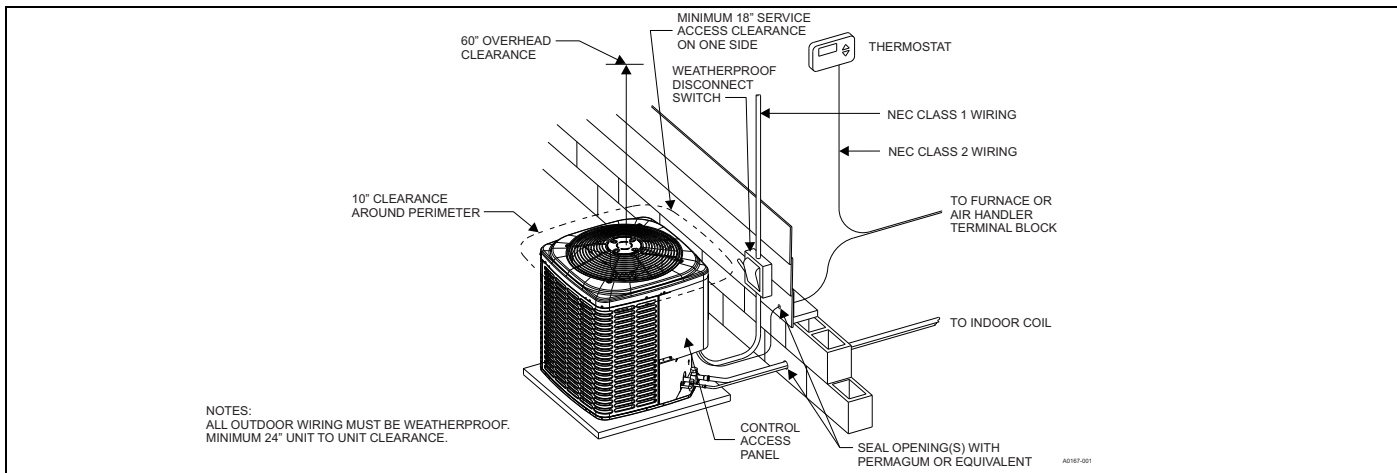
If the unit is to be installed on a hot sun exposed roof or a paved ground area that is seasonally hot, the unit should be raised sufficiently above the roof or ground to avoid taking the accumulated layer of hot air into the outdoor unit.

Provide adequate structural support.

**ADD-ON REPLACEMENT/RETROFIT**

When this unit is being used as a replacement for an R-22 unit, it is required that the outdoor unit, indoor coil, and metering device all be replaced. The following steps should be performed in order to insure proper system operation and performance. Line-set change out is also recommended.

1. Change-out of the indoor coil to an approved R-410A coil/ condensing unit combination with the appropriate metering device.
2. Change-out of the line-set when replacing an R-22 unit with an R410-A unit is highly recommended to reduce cross-contamination of oils and refrigerants.
3. If change-out of the line set is not practical, then the following precautions should be taken.
  - Inspect the line set for kinks, sharp bends, or other restrictions, and for corrosion.
  - Determine if there are any low spots which might be serving as oil traps.
  - Flush the line set 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 hours of operation.
4. If the outdoor unit is being replaced 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. Operate the system for 10 hours. Monitor the suction drier pressure drop. If the pressure drop exceeds 3 psig, replace both the suction-line and liquid-line driers. After a total of 10 hours run time where the suction-line pressure drop has not exceeded 3 psig, replace the liquid line drier, and remove the suction-line drier. During the contamination removal procedure, never leave a suction-line drier in the system longer than 50 hours of run time.



**FIGURE 1:** Typical Installation with Required Clearances

## GROUND INSTALLATION

The unit may be installed at ground level on a solid base that will not shift or settle, causing strain on the refrigerant lines and possible leaks. The unit must be installed in as level a position as possible while maintaining the clearances shown in Figure 1.

Normal operating sound levels may be objectionable if the unit is placed directly under windows of certain rooms (bedrooms, study, etc.).

Condensate will drain from beneath the coil of the outdoor unit during the defrost cycle. Normally this condensate may be allowed to drain directly on the ground.

### ⚠ WARNING

*The outdoor unit should not be installed in an area where mud or ice could cause personal injury. Remember that condensate will drip from the unit coil during heat and defrost cycles and that this condensate will freeze when the temperature of the outdoor air is below 32°F.*

Elevate the unit sufficiently to prevent any blockage of the air entrances by snow in areas where there will be snow accumulation. Check the local weather bureau for the expected snow accumulation in your area. Isolate the unit from rain gutters to avoid any possible wash out of the foundation.

## 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, etc., which should be 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 is isolated from the structural foundation or walls to prevent sound and vibration transmission into the living space. In addition heat pump units must be elevated above anticipated snow accumulation levels to allow for proper defrost drainage and airflow.

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 properly engineered solution.

## UNIT PLACEMENT

### NOTICE

*Heat pumps will defrost periodically resulting in water drainage. The unit should not be located where water drainage may freeze and create a hazardous condition - such as sidewalks and steps.*

1. Provide a base in the pre-determined location.
2. Remove the shipping carton and inspect for possible damage.
3. Ensure that compressor tie-down bolts remain tightened.
4. Position the unit on the base provided.

## LIQUID LINE FILTER-DRIER

The heat pumps have a solid core bi-flow filter/drier located on the liquid line.

### ⚠ CAUTION

*Failure to use the same as the original factory drier or using a substitute drier or a granular type may result in damage to the equipment.*

### NOTICE

*Replacements for the liquid line drier must be exactly the same as marked on the original factory drier. See Source 1 for O.E.M. replacement driers.*

R-410A Filter-Drier Source 1 Part No.	Apply with Models
S1-404101	All

## PIPING CONNECTIONS

### ⚠ 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.*

### ⚠ CAUTION

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

The outdoor unit must be connected to the indoor coil using field supplied refrigerant grade copper tubing that is internally clean and dry. Units should be installed only with the tubing sizes for approved system combinations as specified in Tabular Data Sheet. The charge given is applicable for total tubing lengths up to 15 feet. See Application Data Part Number 247077 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" every 20 feet toward the outdoor unit to facilitate proper oil return.*

## PRECAUTIONS DURING LINE INSTALLATION

1. Install the lines with as few bends as possible. Make sure there is no damage done to the couplings or kink made in the tubing. Use clean hard drawn copper tubing where no appreciable amount of bending around obstruction is necessary. If soft copper must be used, make sure to avoid sharp bends which may cause a restriction.
2. Ensure that the lines are installed so they do not obstruct service access to the coil, air handling system, or filter.
3. Make sure to isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.
4. Make sure to insulate the vapor line with a minimum of 3/8" foam rubber insulation (Armaflex or equivalent). Make sure to insulate the liquid lines which are exposed to direct sunlight and/or high temperatures.
5. Tape and suspend the refrigerant lines as shown in Figure 2. DO NOT allow tube metal-to-metal contact.
6. Use PVC piping as a conduit for all underground installations as shown in Figure 3. Keep buried lines as short as possible to minimize the build up of liquid refrigerant in the vapor line during long periods of shutdown.
7. Pack fiberglass insulation and a sealing material such as permagum around refrigerant lines where they penetrate a wall to reduce vibration and to retain some flexibility.
8. See Application Data Part Number 247077 for additional piping information.

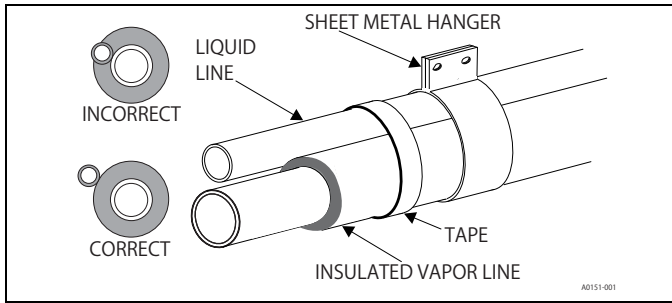


FIGURE 2: Tubing Hanger

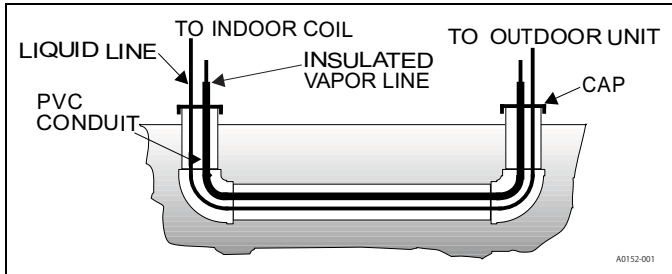


FIGURE 3: Underground Installation

### PRECAUTIONS DURING BRAZING OF LINES

All outdoor unit and evaporator coil connections are copper-to-copper and should 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 assure an internally clean and dry system.

### ⚠ CAUTION

*Dry nitrogen should 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 should continue until the joint has cooled. Always use a pressure regulator and safety valve to insure that only low pressure dry nitrogen is introduced into the tubing. Only a small flow is necessary to displace air and prevent oxidation.*

### PRECAUTIONS DURING BRAZING SERVICE VALVE

Precautions should be taken to prevent heat damage to service valve by wrapping a wet rag around it as shown in Figure 4. Also, all painted surfaces, insulation, and the plastic base should be protected during brazing. After brazing, joint should be cooled with 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.*

Valve can be opened by removing the plunger cap and fully inserting a hex wrench into the stem and backing out counter-clockwise until valve stem just touches the chamfered retaining wall.

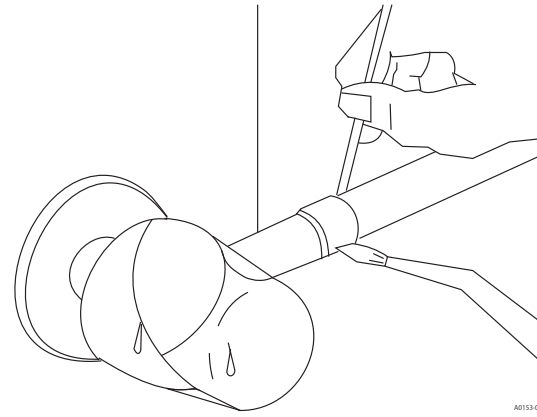


FIGURE 4: Heat Protection

Connect the refrigerant lines using the following procedure:

### ⚠ WARNING

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

1. Remove the cap and Schrader core from both the liquid and vapor valve service ports at the outdoor unit. Connect low pressure nitrogen to the liquid line service port.
2. Brazed 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. Refer to the Tabular Data Sheet for proper liquid line sizing.
3. Go to SECTION IV or SECTION V, and accomplish the orifice or the TXV Installation procedures (depending on application).

### ⚠ 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 30 to 35 psig inert gas pressure which must be released to prevent excessive pressure build-up and possible coil damage.*

4. Brazed the liquid line to the evaporator liquid connection. Ensure that nitrogen is flowing through the evaporator coil to prevent oxidation during brazing procedure.
5. Remove the split rubber grommet from the vapor connection at the indoor coil. Brazed the vapor line to the evaporator vapor connection. After the connection has cooled, place the rubber grommet back into the mounting position. Refer to the Tabular Data Sheet for proper vapor line sizing.
6. Protect the vapor valve with a wet rag, and brazed the vapor line connection to the outdoor unit. Ensure that the nitrogen flow is exiting the system from the vapor service port connection. After this connection has cooled, remove the nitrogen source from the liquid fitting service port.
7. Replace the Schrader core in the liquid and vapor valves.

### 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 from the outdoor unit to purge or leak test the system.*

8. Leak test and repair leaks in all refrigerant piping connections including the service port flare caps. DO NOT OVERTIGHTEN caps. Torque caps between 40 and 60 inch - lbs. maximum.
9. Evacuate the vapor line, the evaporator, and the liquid line to 500 microns or less in accordance with the EVACUATION procedures.



**▲ CAUTION**

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

10. Release the refrigerant charge into the system in accordance with the SYSTEM CHARGE procedures. Open the liquid line base valve first and let pressures equalize. Then, open the suction line base valve. When opening either valve, use an appropriate hex head wrench and back seat the base valve by turning it counter clockwise until it stops against the chamfered retaining wall, and then turn it back 1/8 turn. If the service valve is a ball valve, use an adjustable end wrench to turn valve stem one-quarter turn counterclockwise to open. Do not overturn (or the valve stem may break or become damaged).
11. To prevent leaks, replace base valve caps finger tight, and then tighten the cap an additional 1/12 turn (1/2 hex flat).
12. Replace cap on service ports. Do not remove the flare caps from the service ports except when necessary for servicing the system.
13. See "System Charge" section for checking and recording system charge.

## SECTION IV: INDOOR EXPANSION DEVICE ORIFICE INSTALLATION

Before accomplishing the following procedures, verify the proper size orifice or TXV kit to be installed on the coil. Refer to supplied Tabular Data Sheet for specific orifice size and indoor coil match up.

**▲ WARNING**

*When installing the orifice and liquid line on the coil distributor, failure to install the Schrader Valve Core on the equalizer fitting of the suction (vapor) line could result in total refrigerant loss from the system during the charging procedure.*

**▲ CAUTION**

*Do not use slip joint pliers. Damage and distortion of distributor can prevent proper seal. Use appropriate sized adjustable end wrench.*

### Install Schrader Valve Core and Orifice as follows:

1. Relieve nitrogen holding charge by depressing the Schrader valve stem located in the end of the suction line. After nitrogen holding charge is completely discharged, cut the spundown copper to allow installation of the suction line.
2. Slide indoor coil out of cabinet far enough to gain access to equalizer fitting on the suction line.
3. Remove black plastic cap from equalizer fitting on suction line.

**NOTICE**

*Do not install Schrader Valve Core into equalizer fitting until field supplied suction line is brazed onto the indoor coil suction line and cooled.*

4. Install Schrader Valve Core supplied with the outdoor unit into equalizer fitting using a valve core tool.
5. Loosen and remove the cap from the orifice distributor assembly. Note that the fitting has right hand threads.

**NOTICE**

*Do not install orifice into distributor assembly until field supplied liquid line is brazed onto the indoor coil liquid line and cooled.*

6. Install proper size orifice supplied with outdoor unit. Refer to supplied Tabular Data Sheet for specific orifice size and indoor coil match up.

7. After orifice is installed, reinstall the liquid line to the top of the orifice distributor assembly. Hand tighten and turn an additional 1/8 turn to seal. Do not over tighten fittings.
8. Replace black plastic cap over Schrader Valve on equalizer fitting of suction line.
9. Slide indoor coil back into cabinet.
10. Leak test system after outdoor unit is connected.

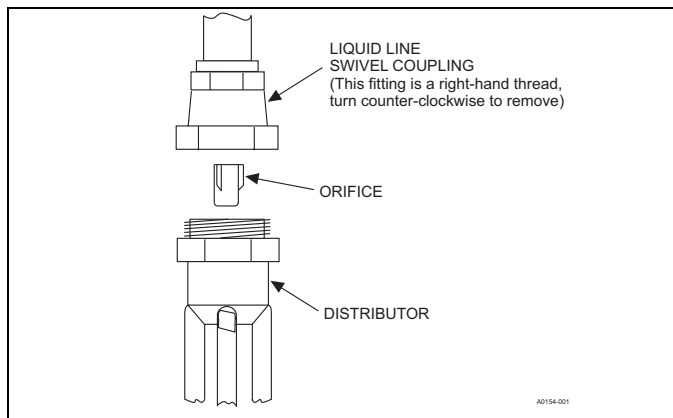


FIGURE 5: Orifice Installation

## THERMOSTATIC EXPANSION VALVE (TXV) INSTALLATION

Before accomplishing the following procedures, verify the proper TXV kit to be installed on the coil. Refer to supplied Tabular Data Sheet for specific TXV kit and indoor coil match up.

For installations requiring a TXV, the following are basic steps for the installation. For detailed instructions, refer to the Installation Instructions accompanying the TXV kit.

Install TXV kit as follows:

1. Relieve nitrogen holding charge by depressing the Schrader valve stem located in the end of the suction line. After nitrogen holding charge is completely discharged, cut off the spundown copper end of the suction line to allow installation of the field supplied suction line.

**▲ CAUTION**

*In all cases, do not mount the TXV bulb until after the suction line is brazed and has had sufficient time to cool.*

**▲ CAUTION**

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

2. Slide indoor coil out of cabinet far enough to gain access to equalizer fitting on the suction line.

**NOTICE**

*All connections to be brazed are copper-to-copper and should be brazed with a phosphorous-copper alloy material such as Silfos-5 or equivalent. Soft solder is NOT to be used.*

3. Before the suction line from the outdoor unit is brazed to the indoor coil suction line, remove and discard black plastic cap from equalizer fitting on the indoor coil suction line.
4. Loosen and remove distributor cap seal.

**NOTICE**

*Do not install TXV onto distributor assembly until field supplied liquid line is brazed onto the indoor coil liquid line and cooled.*

5. Install the TXV to the distributor assembly by hand tightening, and then turn fitting an additional 1/4 turn to seal. **Do not overtighten fittings.**

**⚠ CAUTION**

*Do not use slip joint pliers. Damage and distortion of distributor can prevent proper seal. Use appropriate sized adjustable end wrench.*

6. Install the liquid line to the top of the TXV using the liquid line fitting which is supplied with the indoor coil. Hand modify the liquid line to align with casing opening. Hand tighten the liquid line on the TXV, and tighten an additional 1/4 turn to seal.

**⚠ WARNING**

*A schrader valve core **MUST NOT** be installed in the equalizer fitting when the TXV kit is installed. Poor system performance or system failure could result.*

**NOTICE**

*Do not install TXV equalizer line onto equalizer fitting nor the TXV bulb onto the suction vapor line until field supplied suction line is brazed onto the indoor coil suction line and cooled.*

7. Install the TXV equalizer line onto the equalizer fitting of the suction line. Hand tighten the 1/4" SAE nut to the equalizer fitting, and tighten an additional 1/3 turn to seal.

**NOTICE**

*The TXV bulb is to be installed on the suction line near the equalizer line, using the two bulb clamps furnished with the TXV assembly kit. The bulb is to make maximum contact. The TXV installation instruction provide an illustration of proper bulb location.*

8. Install the TXV bulb to the suction line near the equalizer line, using the bulb clamp(s) furnished with the TXV assembly kit. Ensure the bulb is making maximum contact.
- Install the bulb on the suction line near the equalizer line with the bulb horizontal to the suction line. On a suction line under 7/8" Outside Diameter (O.D.), install the bulb on top of the line. On a suction line 7/8" O.D. or larger, install the bulb at about the 2 or 10 o'clock position.
  - If bulb must be installed vertically to the suction line, position the bulb at least 16 inches (40.6 cm) from any bend and on the opposite side of the bend plane. Position the bulb with the bulb tail at the top, so that the bulb acts as a reservoir.
  - Use thermal insulation provided to protect the bulb from the effect of the surrounding ambient temperature. Cover the bulb completely to insulate from air-stream.
9. Slide indoor coil back into cabinet.  
10. Leak test system after outdoor unit is connected.

**SECTION V: EVACUATION**

During this process, it is necessary to evacuate the system to 500 microns or less. If a leak is suspected, a dry nitrogen charge is used to locate leak(s). After repairing any leaks, another leak test is to be performed.

To verify that the system has no leaks, the system is held under a vacuum by closing the valve to the vacuum pump suction isolating the pump. The micron gauge is observed 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 above 500 microns, it is an indication that the system is leak free but still contains moisture and may require further evacuation. Proper system evacuation requires the micron gauge to indicate a vacuum holding below 500 microns for several minutes.

**SECTION VI: SYSTEM CHARGE****⚠ CAUTION**

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

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

**MEASURE INDOOR AIR FLOW**

To determine rated air flow for a specific match, consult the technical literature at [www.upgnet.com](http://www.upgnet.com). When attempting to match this air flow, select the lowest possible speed tap, measure the actual flow, and adjust as necessary.

**To measure actual air flow, it is not an acceptable method to just check the jumper pin setting tables and to assume 0.5" static pressure drop.**

To determine indoor air flow, 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 (i.e. -.10) return, add it to a supply static (.40) which equals a (.50) total system static pressure. Compare this value to the table for the indoor unit's static pressure vs. CFM or to a curve chart.

**CHARGING THE UNIT****⚠ CAUTION**

*R-410A refrigerant cylinders are rose colored, and have a dip tube which allows liquid to flow out of the cylinder in the **Upright Position**. Always charge the system slowly with the tank in the upright position.*

The factory charge in the outdoor unit includes enough charge for the unit, 15 ft. (4.6 m) of refrigerant piping, and the smallest indoor coil/air handler match-up. Some indoor coil/air handler matches may require additional charge.

**⚠ 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.*

See Tabular Data Sheet provided in unit Customer Booklet for charge requirements.

The "TOTAL SYSTEM CHARGE" must be permanently marked on the unit data plate.

**⚠ CAUTION**

*Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the POE oil in the system. This type of oil is highly susceptible to moisture absorption.*

## TOTAL SYSTEM CHARGE DETERMINED

1. Determine outdoor unit factory charge from Tabular Data Sheet.
2. Determine indoor coil adjustment (if any) from Tabular Data Sheet.
3. Calculate the additional charge for refrigerant piping using the Tabular Data Sheet if line length is greater than 15 feet (4.6 m).
4. Total system charge = item 1 + item 2 + item 3.
5. Permanently mark the unit data plate with the total amount of refrigerant in the system.

### ⚠ WARNING

*DO NOT attempt to pump "Total System Charge" into outdoor unit for maintenance, service, etc. This may cause damage to the compressor and/or other components. The outdoor unit only has enough volume for the factory charge, not the "Total System Charge".*

### ⚠ 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.*

## CHARGING IN COOLING MODE

The unit includes heating charging charts and cooling charging charts. All units include a subcooling charging chart for cooling. If the unit can be used with an indoor orifice, then a cooling superheat chart is also included. If a charging chart is not on the unit, then it can be obtained at [www.upgnet.com](http://www.upgnet.com) under the Heating Service Condenser Guide.

Cooling charts should not be used to charge the unit. They are reference charts for servicing the unit.

After the unit has been serviced, collect the charge and weigh it back in according to the directions.

When charging a unit in cooling mode, the charge MUST be weighed in. Charging by any other method, such as superheat, subcooling, cooling charging charts, feeling the line set, etc is not acceptable. Most heat pumps are sensitive to charge in heating, requiring more charge, so charging by an unacceptable method will cause the unit to perform poorly in heating mode.

### NOTICE

*This method is for systems that only have interconnecting lines. If any other objects that adjust the charge levels are placed between the indoor and outdoor units (example: a refrigerant flow meter), then before adding charge, the device must first be removed. Follow the steps above. Run the system in both cooling and heating mode and record the high side pressure in each mode. Then insert the device and charge the system by matching the same high side pressure in both heating and cooling as that value recorded without the device. It is not acceptable to add a pre-determined charge amount listed by the device manufacturer nor is it acceptable to use any other method.*

## CHARGING IN HEATING MODE

If charging in heating mode, there are two methods for charging: Weighing in the charge is the best method for ensuring the unit performs as rated. However, if a device is installed in the line set that alters

the amount of refrigerant, such as a refrigerant flow meter, then the better method for charging is to match the liquid pressure from the heating charging chart (if available) or heating service data (available from [www.upgnet.com](http://www.upgnet.com)). If no such device exists in the line set, then the method is acceptable if weighing in the charge is not an option.

If servicing a unit for low heating performance and you find that you have to add a significant amount of charge (ex: 20-30 ounces) in order to match the published liquid pressures, the unit will NOT be overcharged in cooling. Heat pumps are sensitive to charge in heating, but not in cooling.

## CHARGING WITH GAUGES

### ⚠ CAUTION

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

Do not charge a heat pump in cooling mode with gauges or charging charts or any other method other than weighing in the charge.

### ⚠ 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.*

However for servicing a heat pump unit, the charging charts are an acceptable troubleshooting method, but when the servicing is completed, the charge should be reclaimed and weighed in (to guarantee optimal performance in heating mode). If servicing in heating mode, the charge does not have to be reclaimed if the liquid pressures match the published values.

Before measuring the pressures, use the method above to check the air flow and then consult the table and match the liquid pressure to that air flow.

**Before servicing a unit, confirm that your gauges are accurate by comparing the gauges against a calibrated pressure gauge that has been calibrated against a national standard. If a calibrated pressure gauge is not available, place a R-410A virgin refrigerant container in a conditioned space long enough to come to temperature equilibrium with the surroundings. Then measure the temperature of the air and the pressure of the refrigerant and compare it to the following table:**

TABLE 2: R-410A Saturation Properties

Temp (°F)	Pressure (Psig)	Temp (°F)	Pressure (Psig)	Temp (°F)	Pressure (Psig)
40	119	75	218	110	365
45	130	80	236	115	391
50	143	85	255	120	418
55	156	90	274	125	447
60	170	95	295	130	477
65	185	100	317		
70	201	105	341		

If the gauges are correct, then measure the pressures using both the cooling and heating charts.

## SECTION VII: ELECTRICAL CONNECTIONS

### GENERAL INFORMATION & GROUNDING

Check the electrical supply to be sure that 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 should be sized per NEC requirements.

### ▲ CAUTION

All field wiring must **USE COPPER CONDUCTORS ONLY** and be in accordance with Local, National, Fire, Safety & 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 control box cover.

### FIELD CONNECTIONS POWER WIRING

1. Install the proper size weatherproof disconnect switch outdoors and within sight of the unit.
2. Remove the screws from the control box cover and remove from unit.
3. Run power wiring from the disconnect switch to the unit.
4. Route wires from disconnect through the reversible high voltage conduit plate and then into the unit control box shown in Figures 6 or 7.
5. Install the proper size time-delay fuses or circuit breaker, and make the power supply contactor connections.
6. Energize the crankcase heater if equipped to save time by preheating the compressor oil while the remaining installation is completed.

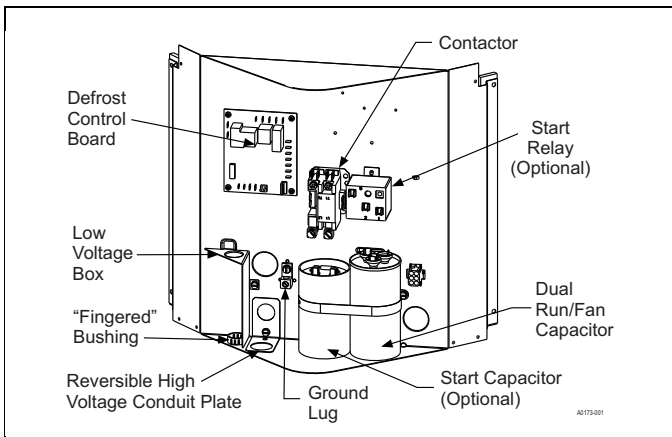


FIGURE 6: Outdoor Unit Control Box - Single Phase

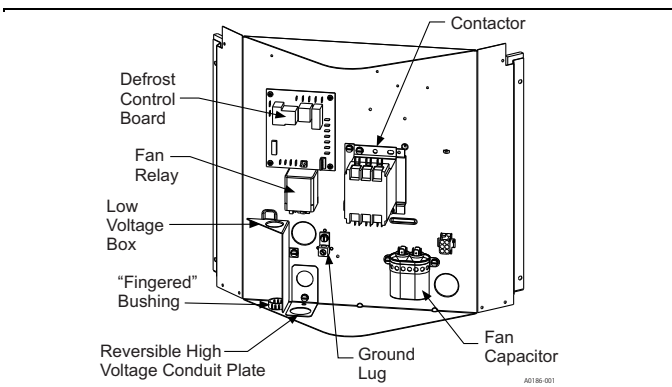


FIGURE 7: Outdoor Unit Control Box - Three Phase

### FIELD CONNECTIONS CONTROL WIRING

1. Route low voltage wiring through the fingered bushing in the low voltage box as shown in Figures 6 or 7. Make low voltage wiring connections inside the low voltage box per Figures 8-9.
2. The complete connection diagram and schematic wiring labels are located on the inside surface of the unit control box cover.
3. Replace the control box cover removed in Step 2 of the "Field Connections Power Wiring" procedures.
4. All field wiring to be done in accordance with national electrical codes (NEC) and/or local city codes.
5. Mount the thermostat about 5 ft. above the floor, where it will be 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-volt 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.

A Start Assist Kit is available and recommended for long line set applications or in areas of known low voltage problems.

### DEHUMIDIFICATION CONTROL (Typical)

The indoor unit Installation Manual instructions for the air handler or furnace describe the interface with the outdoor heat pump. A dehumidification control accessory 2HU16700124 may be used with variable speed air handlers or furnaces in high humidity areas. This control works with the variable speed indoor unit to provide cooling at a reduced air flow, lowering evaporator temperature and increasing latent capacity. The humidistat in this control opens the humidistat contacts as the humidity rise. Installation instructions are packaged with the accessory. Prior to the installation of the dehumidification control, the humidistat jumper must be set to "YES" on the indoor variable speed air handler or furnace control board.

During cooling, if the relative humidity in the space is higher than the desired set point of the dehumidification control, the variable speed blower motor will operate at lower speed until the dehumidification control is satisfied. A 40-60% relative humidity level is recommended to achieve optimum comfort.

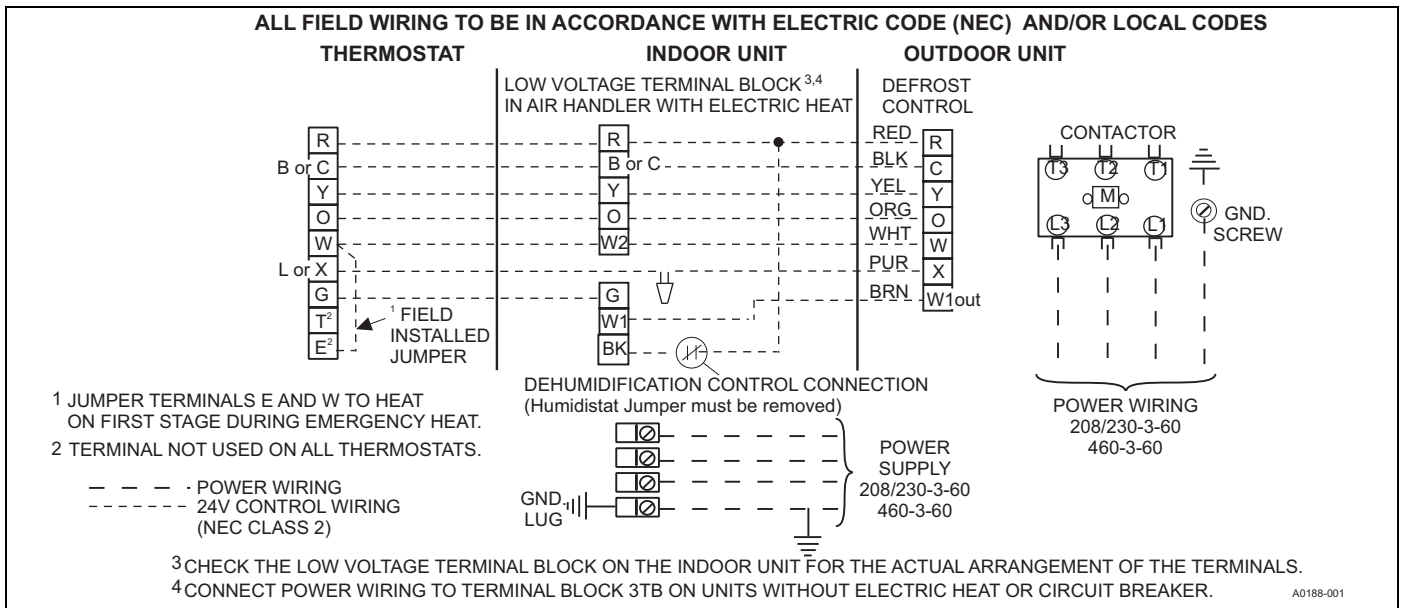
If a dehumidification control is installed, it is recommended that a minimum air flow of 325 cfm/ton be supplied at all times.

To see connection diagrams of all UPG equipment, the "Low Voltage System Wiring" document is available online at [www.upgnet.com](http://www.upgnet.com) in the Product Catalog Section.

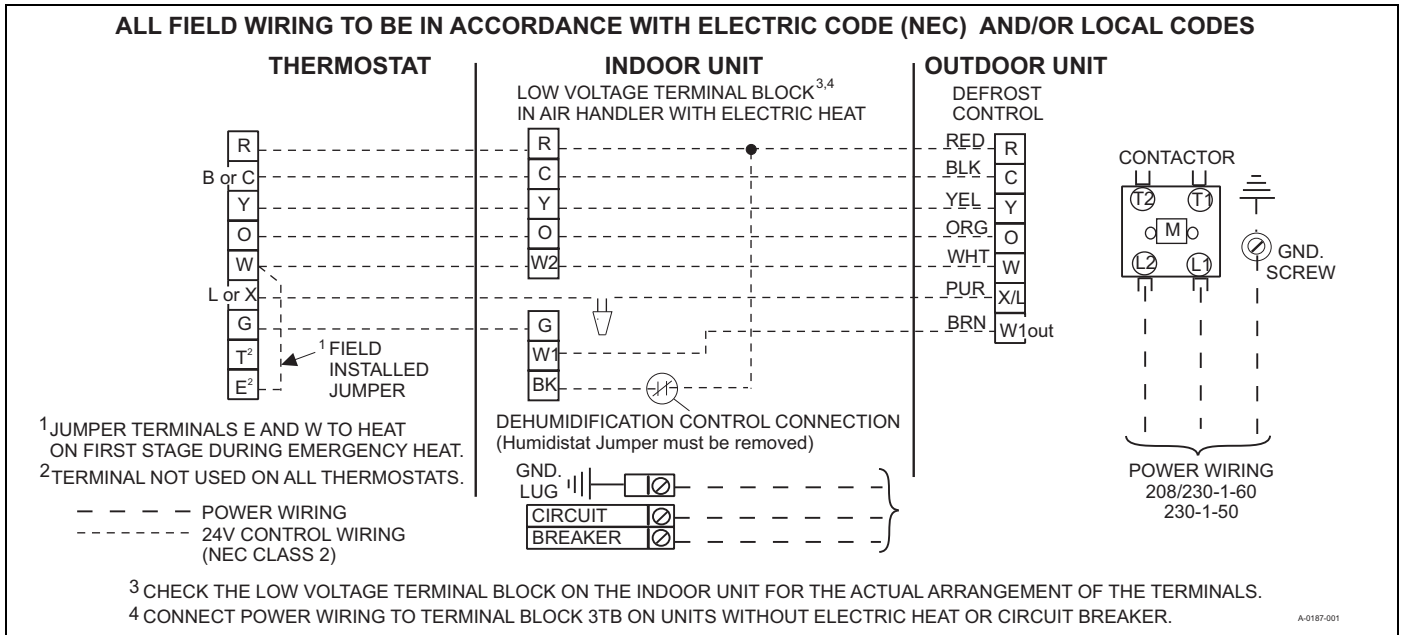
### INDOOR CUBIC FEET PER MINUTE (CFM) SELECTION BOARD SETTINGS (Typical)

Refer to the indoor unit Installation Manual instructions for the air handler or furnace interface with the outdoor heat pump. Refer to the Outdoor Technical Guide for the recommended indoor air flow settings of each specific heat pump. For the system to operate correctly, ensure that the indoor CFM Selection control jumpers are properly set. Set the indoor cooling fan speed per the instructions for the air handler or furnace by selecting the correct COOL and ADJUST (or ADJ) taps. Verify the indoor airflow by using the LED display on the indoor CFM selection board.





**FIGURE 8:** Typical Field Wiring (Air Handler / Electrical Heat) - (Three Phase)



**FIGURE 9:** Typical Field Wiring (Air Handler / Electrical Heat) (Single-Phase)

## SECTION VIII: SYSTEM START-UP

### ENERGIZE CRANKCASE HEATER

In order to energize the crankcase heater, set the indoor cooling thermostat to the OFF position. Close the line power disconnect to the unit.

## IMPORTANT

*An attempt to start the compressor without at least 8 hours of crankcase heat will damage the compressor.*

#### WITH POWER TO UNIT AND THERMOSTAT IN **COOLING** POSITION:

1. In the cooling cycle, discharge gas is pumped to the outdoor coil which is the condenser. The indoor coil is the evaporator.
2. If fan switch is in ON position, a circuit is made through blower relay to provide continuous blower operation.
3. With fan switch in AUTO position, a circuit is made from thermostat cooling contact through blower relay to provide blower operation.
4. System will cycle with thermostat demand to provide cooling as needed.

## SECTION IX: SYSTEM OPERATION

### ANTI SHORT-CYCLE DELAY

The control includes a five-minute anti short-cycle delay (ASCD) timer to prevent the compressor from short-cycling after a power or thermostat signal interruption. The ASCD timer is applied when the control is first powered from the indoor unit thermostat and immediately following the completion of a compressor run cycle. The compressor and the outdoor fan will not operate during the five minutes that the timer is active.

The ASCD timer can be bypassed by shorting the TEST terminals for three seconds while the thermostat is calling for compressor operation (Y input signal energized).

### LOW VOLTAGE DETECTION

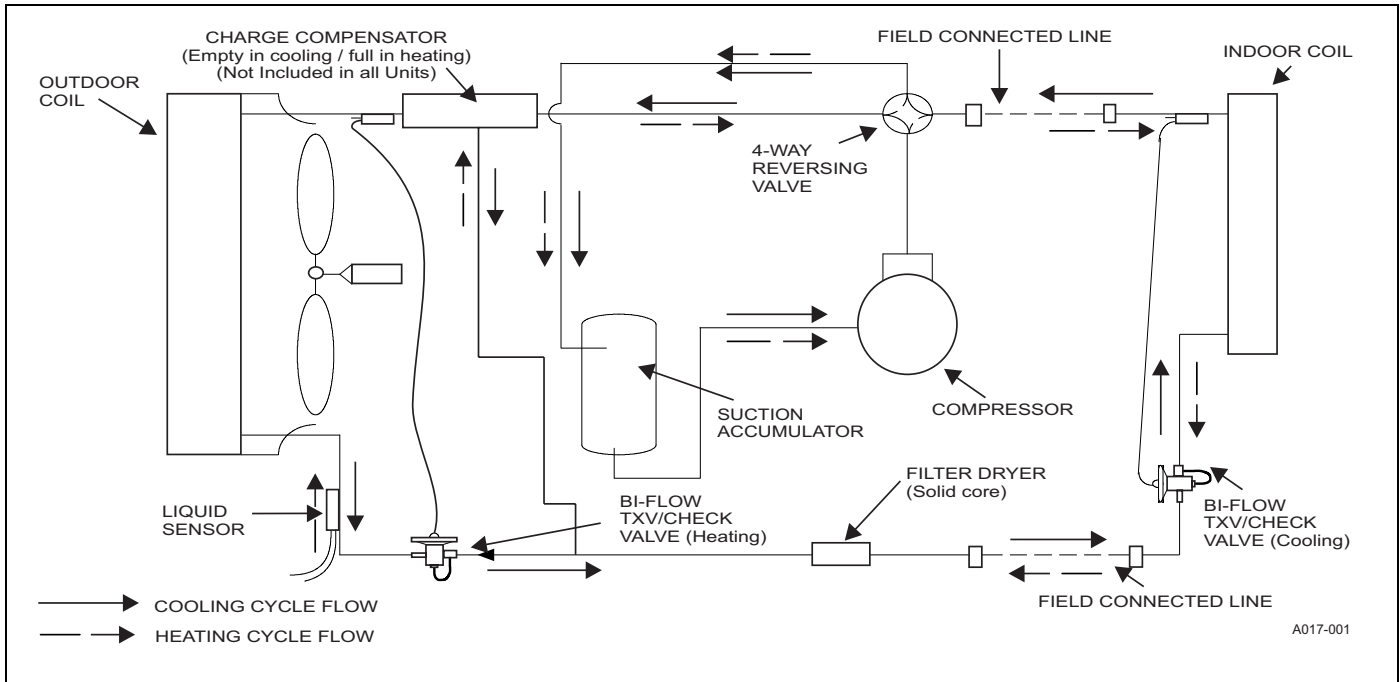
The control monitors the transformer secondary (24 VAC) voltage and provides low voltage protection for the heat pump and its components. In particular, the control prevents contactor chatter during low voltage conditions. If the voltage drops below approximately 19 VAC, the control will continue to energize any relays that are already energized but will not energize any additional relays until the voltage level increases. If the voltage drops below approximately 16 VAC, the control will immediately de-energize the relay outputs and will not energize any relays until the voltage level increases.

### TEST INPUT

The control includes a TEST input connector that can be used for various testing functions during installation and service. The TEST input connector is shown in Figures 11 & 12. The following table summarizes the behavior of the control when the two TEST pins are connected. More detailed descriptions of the various functions are included in other sections of this document.

**TABLE 3: TEST Input Functionality**

Duration of Connection (seconds)		Control Behavior
Time-Temp	Demand Defrost	
Less than 2	Less than 2	No response
2-9	2-6	Bypass ASCD. If Y is present and pressure switch is closed, contactors will be energized.
		Clear lockout
More than 9	More than 6	Initiate defrost cycle. (Demand only: Energize X/L with active defrost curve flash code)
Connection removed		Terminate defrost as normal
Connection not removed		Continue defrost cycle (Demand only: and X/L flash code) until TEST connection removed.



**FIGURE 10: Heat Pump Flow Diagram**

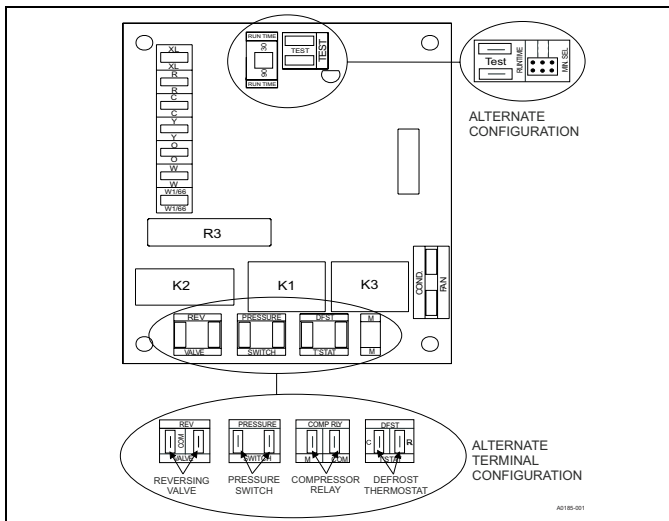


FIGURE 11: Time/Temp Control Module

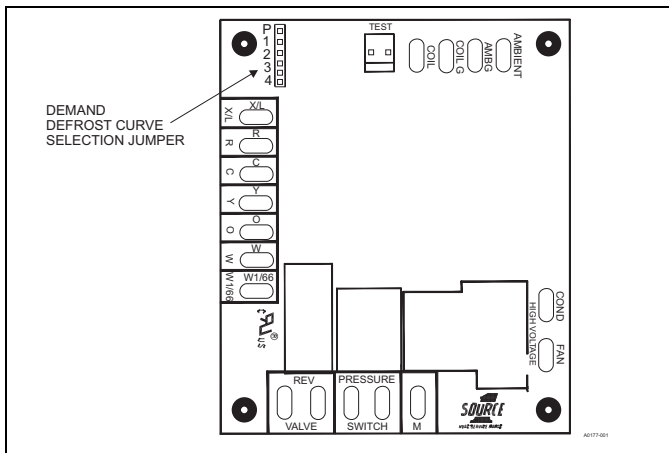


FIGURE 12: Demand Defrost Control Module

## FAULT CODE DISPLAY

### X/L Output

The X/L terminal of the heat pump control is typically connected to the X/L input of the room thermostat. The thermostat uses this signal to notify the homeowner of a problem with the heat pump using an LED or LCD display. When the control energizes the X/L terminal, the thermostat displays the flash code so the homeowner can see it.

TABLE 4: X/L Output Categories

Condition	X/L
Pressure Switch lockout - last mode of operation was heating or cooling	2 flashes
Pressure Switch lockout - last mode of operation was defrost	3 flashes
Incorrect Defrost Curve - jumper selection	On

When the control locks out the compressor because of a pressure switch lockout, it will energize the X/L output as shown in Table 4. The control has a three second delay between fault code flashes.

If the conditions above exist during cooling mode, the system could be in the loss of charge condition.

## DEFROST OPERATION

### Time/Temperature Defrost (13 Seer 2 - 4 Ton)

The defrost control is a time/temp. control which includes a field-selectable (tap located at board edge) time period between defrost cycle (30, 60, and 90 minutes). The jumper is factory set at 60 minutes. See Figure 11.

The electronic timer and the defrost cycle will start only when the contactor is energized and the defrost thermostat is closed. The defrost thermostat is closed when the liquid temperature falls below approximately 31° F.

The defrost mode is identical to the cooling mode except that the outdoor fan motor stops and the first stage of heat is turned on through W1 / 66 to continue warming the conditioned space.

The defrost cycle will be terminated when the defrost thermostat is opened at 55° F or 10 minutes of compressor accumulated run time, whichever comes first.

## NOTICE

*The defrost thermostat delay will make the coil temperature about 75 - 80° F. Please note that the timer will stop the circuit when R to Y is disconnected.*

### Demand Defrost (13 Seer 1.5 & 5 Ton, 14.5 Seer 1.5 - 4 Ton)

The control maintains proper airflow through the outdoor coil during heating operation by melting frost and ice that may form on the coil. Frost may accumulate unevenly in different sections of the coil because of the arrangement of the refrigeration circuit within the coil. The control may initiate a defrost cycle even when the coil is not completely covered with frost. This is normal operation.

The control regulates the defrost operation of the heat pump based on accumulated compressor run time, outdoor coil temperature, and outdoor ambient temperature. The control will cause the heat pump unit to operate in the normal heating mode until it determines that a defrost cycle is needed.

All defrost timings are based on accumulated compressor run time.

### Operation

The defrost mode is equivalent to the cooling mode except that the outdoor fan motor is de-energized. The control shall do the following to initiate a defrost cycle.

- De-energize the outdoor fan.
- Energize the reversing valve.
- Energize the auxiliary heat output through the W1/66 terminal.
- Begin the maximum defrost cycle length timer.

If the call for heating (Y) is removed from the control during the defrost cycle, it will terminate the defrost cycle and de-energize the compressor. The control will also stop the defrost cycle length timer but not reset it. When the control receives another call for heating, it will restart the defrost cycle and the timer at the point at which the call for heating was removed. This will happen only if the liquid line temperature conditions allow defrost to occur.

### Defrost Curves

The control uses a set of defrost curve parameters that are selected using the defrost curve selection jumper. The location of the defrost curve selection jumper is shown in Figure 12. Table 5 shows the jumper position that is appropriate for each heat pump model. Jumper position 4 is not used and the control will not allow the compressor to operate when the jumper is in this position.

## Defrost Curve Selection

The factory will place the defrost curve selection jumper in the P position or in a numbered position appropriate for the specific heat pump model. You should not have to change the defrost curve selection jumper during initial installation.

If the jumper is inadvertently moved, it should be placed in the appropriate numbered location based on the model number and Table 5. The control will not energize the compressor if the defrost curve selection jumper is in a numbered position that is not described in Table 5 or if the defrost curve selection jumper is missing. The control will output the proper fault code when a defrost curve jumper error is present. The control will output the active defrost curve using the X/L terminal when the heat pump is operating in a defrost cycle that has been forced using the TEST inputs. For instance, the X/L output will be energized with two flashes when defrost curve 2 is active.

The control only reads the jumper input when the Y and W thermostat inputs are de-energized. If a jumper position is changed while either of these inputs is energized, the control will not act upon the jumper changes until the thermostat calls are de-energized or power (24 VAC) to the control is cycled.

## Defrost Cycle Initiation

The control will allow the heat pump to operate in the heating mode until the combination of outdoor ambient and outdoor coil temperatures indicate that a defrost cycle is necessary.

The control will initiate a defrost cycle when the liquid line temperature is below the initiate point for the measured ambient temperature (See Figure 13) continuously for 4-1/2 minutes. This delay eliminates unnecessary defrost cycles caused by refrigeration surges such as those that occur at the start of a heating cycle.

The control will initiate a defrost cycle every 6 hours (accumulated compressor run time) to recirculate refrigerant lubricants. This forced defrost timer will be reset and restarted following the completion or termination of a defrost cycle.

The control will also initiate a defrost cycle when the TEST terminals are shorted. This feature allows an installer or service technician to start a defrost cycle immediately as required. When the TEST terminals are shorted for more than six seconds with a Y input energized and the

pressure switch input is closed, the ASCD will be bypassed and the compressor and the W1/66 terminal to auxiliary heat will be energized.

When the TEST inputs are used to force a defrost cycle, the control will ignore the state of the liquid line temperature and outdoor ambient temperature inputs. The coil does not have to be cold and the outdoor temperature does not have to be within a certain range for the heat pump to be forced into a defrost cycle. After the TEST input jumper is removed, the defrost mode will be terminated as normal. The defrost cycle length timer will not be started until the TEST input is removed. If the TEST terminals remain shorted, the control will keep the unit in defrost mode.

## Defrost Inhibition

The control will not initiate a defrost cycle if the liquid line temperature is above 40°F unless the defrost cycle is forced using the TEST input.

The control will also prevent a defrost cycle from being initiated too soon after the initiation of the previous defrost cycle. When power is applied to the control and after the completion or termination of each defrost cycle, the control will start a 40-minute timer. When this timer expires, the control will allow another defrost cycle when needed. The timer is based on accumulated compressor run time.

## Defrost Termination

The control will terminate the defrost cycle immediately after the liquid line temperature reaches 80°F or after eight minutes of defrost operation.

The control will do the following to terminate a defrost cycle:

- Energize the outdoor fan.
- De-energize the reversing valve.
- De-energize the auxiliary heat output through the W1/66 terminal.
- Reset and restart the 40-minute defrost inhibit timer.

## Compressor Delay

When Defrost Jumper Position #2 is selected the compressor is shut down for 30 seconds entering and exiting defrost mode. This delay is present in normal operation but is not present when the TEST pins are shorted to force a defrost cycle. Position #1 is recommended for reciprocating compressors, and Position #2 is recommended for scroll compressors.

**TABLE 5:** Defrost Initiate Curves

	Defrost Curve Selection - Jumper Position			
	Pin 1**	Pin 2**	Pin 3**	Pin 4**
YHJR*, THJR*	None	60	None	None
CHJD*, YHJD*, THJD*, GHGD*, THGD*	None	18, 60	None	None
YHJF*, THJF*	36, 60	18, 24, 30, 42, 48	None	None

\*Units not listed use time-temperature defrost boards with jumper at the "60" position.

\*\*Jumper settings 1-3 are different defrost curve settings. 4 & P will not work in application.



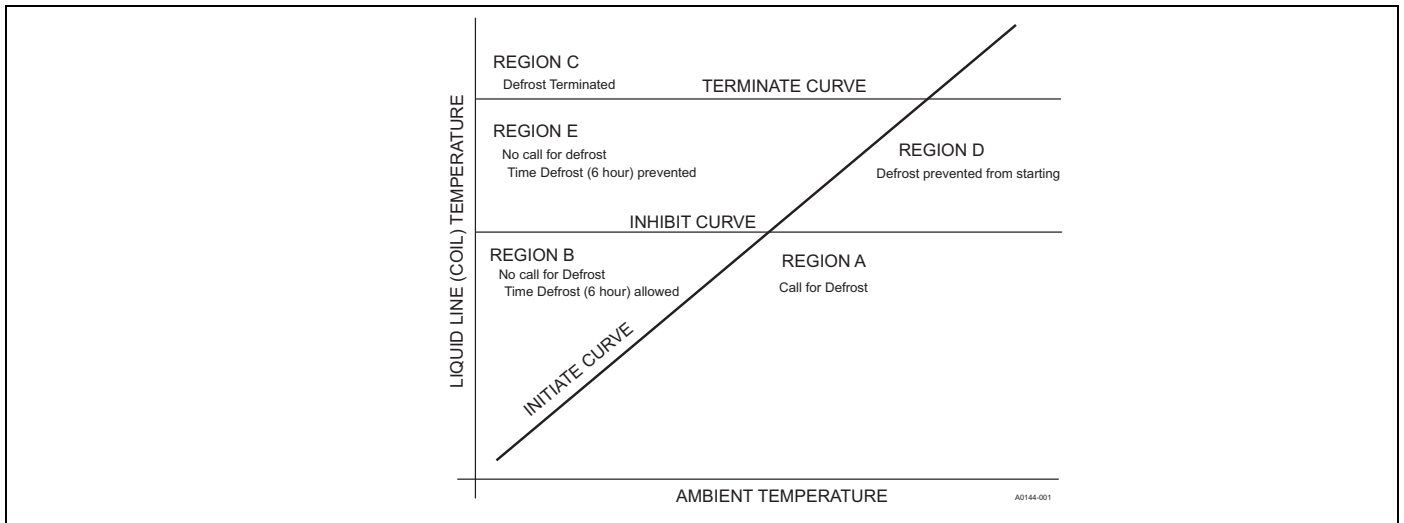


FIGURE 13: Defrost Operation Curves

## COOLING OPERATION

During cooling operation, the control will receive thermostat signals at the Y and O input terminals. The control will energize the M compressor output terminal. This signal energizes the coil of the compressor contactor causing the compressor to run. The control also delivers power to the COND FAN terminals causing the outdoor fan to operate. The control energizes the REV VALVE terminal with 24VAC to switch the reversing valve.

## HEATING OPERATION

During normal heating mode, the control will receive a thermostat signal at the Y input terminal. The control will energize the M compressor output terminal. This signal energizes the coil of the compressor contactor causing the compressor to run. The control also delivers power to the COND FAN terminals causing the outdoor fan to operate. The reversing valve is not energized in heating mode.

## EMERGENCY HEAT

When the thermostat calls for emergency heat operation (W signal without a Y signal), the control will de-energize the compressor and energize the W1/66 terminal immediately.

## PRESSURE SWITCH FAULT & LOCKOUT

The heat pump is equipped with a pressure switch, loss of charge switch and an over temp switch (units equipped with scroll compressor) that are connected to the control at the pressure switch terminals. If one of these switches input opens for more than 40 milliseconds, the control will de-energize the compressor. If the switch closes and a thermostat call for compressor operation is present, the control will apply the five-minute anti short-cycle delay timer and start the compressor when the timer expires.

When the compressor is started following a switch fault, the control will start a six-hour timer based on accumulated compressor run time. If the control senses another opening of the switch before the timer expires, it will cause a soft lockout condition. The second opening of the switch must be greater than 160 milliseconds for the lockout to occur. If the second opening is between 40 and 160 milliseconds, the control will de-energize the compressor but not cause a soft lockout condition. If the control does not sense a second switch opening before the six-hour timer expires, the timer and counter will be reset.

During the soft lockout mode, the control will de-energize the compressor and energize the X/L output with the appropriate flash code.

The control will reset the soft lockout condition when any of the following occur after removal of the fault condition.

1. Power is cycled to the R or Y inputs of the control. This will cause the soft lockout condition to be reset when the thermostat is satisfied or when the thermostat is set to SYSTEM OFF and back to HEAT or COOL mode.

2. The TEST terminals are shorted for more than two seconds.

When the soft lockout condition is reset, the control will stop displaying the fault code and will respond to thermostat inputs normally.

## SECTION X: INSTRUCTING THE OWNER

Assist owner with processing warranty cards and/or online registration. Review Owners Guide and provide a copy to the owner and guidance on proper operation and maintenance. Instruct the owner or the operator how to start, stop and adjust temperature setting.

When applicable, instruct the owner 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 hours after the switch has been connected. This will allow sufficient time for all liquid refrigerant to be driven out of the compressor.

The installer should also instruct the owner on proper operation and maintenance of all other system components.

## MAINTENANCE

1. Dirt should not be allowed 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 bearings are permanently lubricated and do not require periodic oiling.
3. If the coil needs to be cleaned, it should be washed with Calgon Coilclean (mix one part Coilclean to seven parts water). Allow solution to remain on coil for 30 minutes before rinsing with clean water. Solution should not be permitted to come in contact with painted surfaces.
4. Refer to the furnace or air handler instructions for filter and blower motor maintenance.
5. The indoor coil and drain pan should 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.*

**SUBCOOLING CHARGE TABLE IS ON THE INSIDE OF THE CONTROL BOX COVER.**

SECTION XI: WIRING DIAGRAM

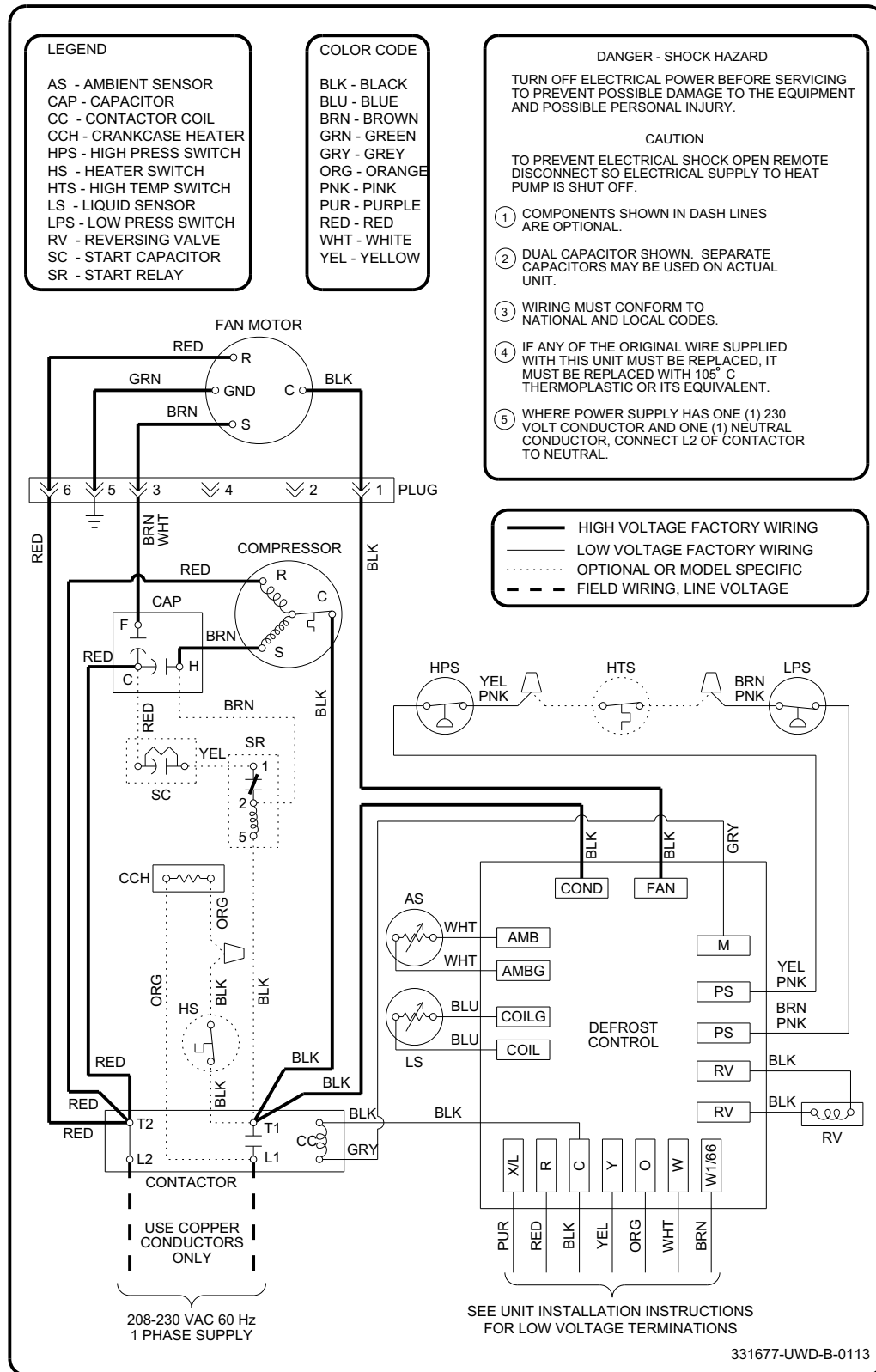


FIGURE 14: Wiring Diagram - Single Phase (Demand Defrost)

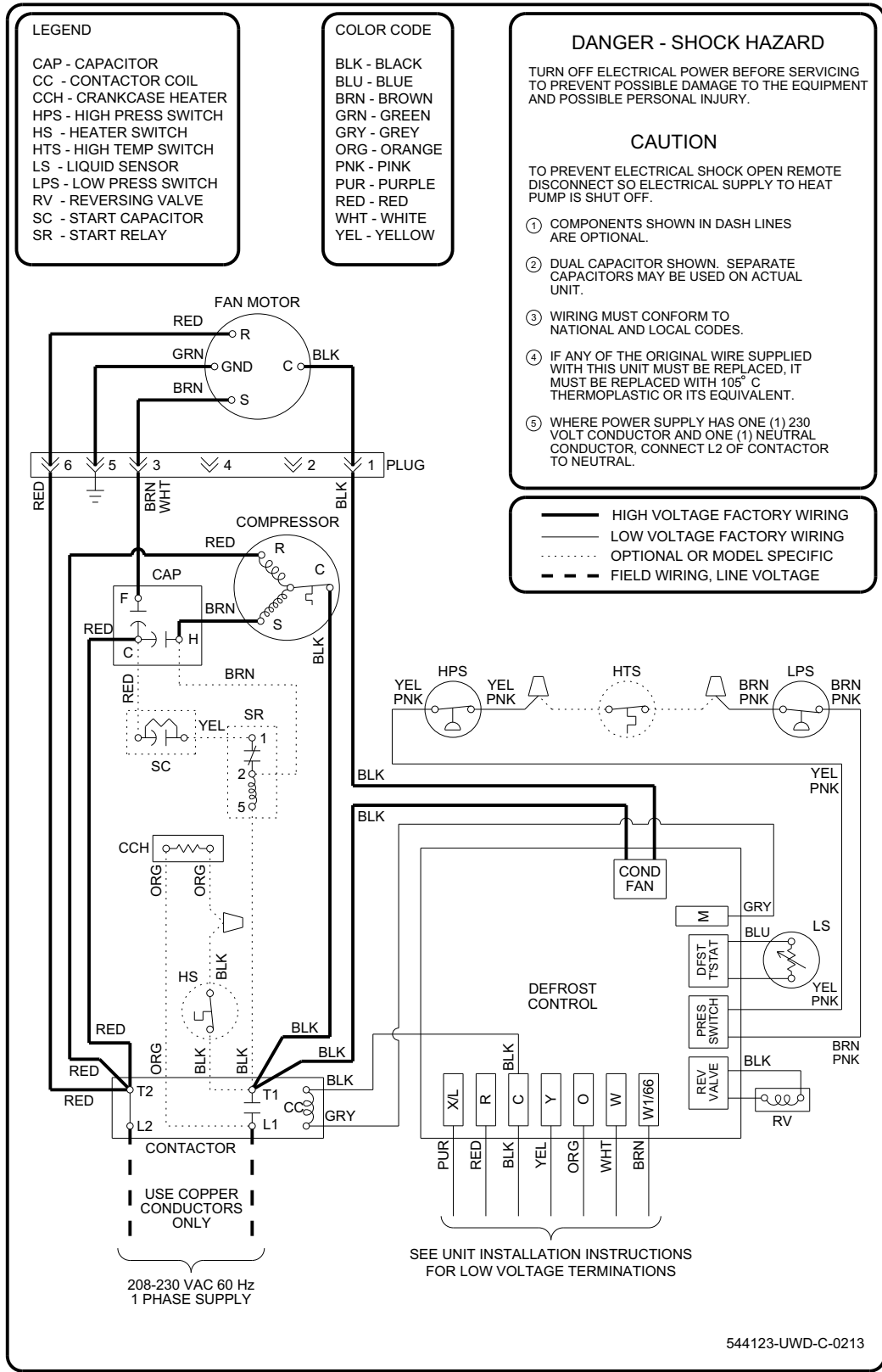


FIGURE 15: Wiring Diagram - Single Phase (Time-Temp)



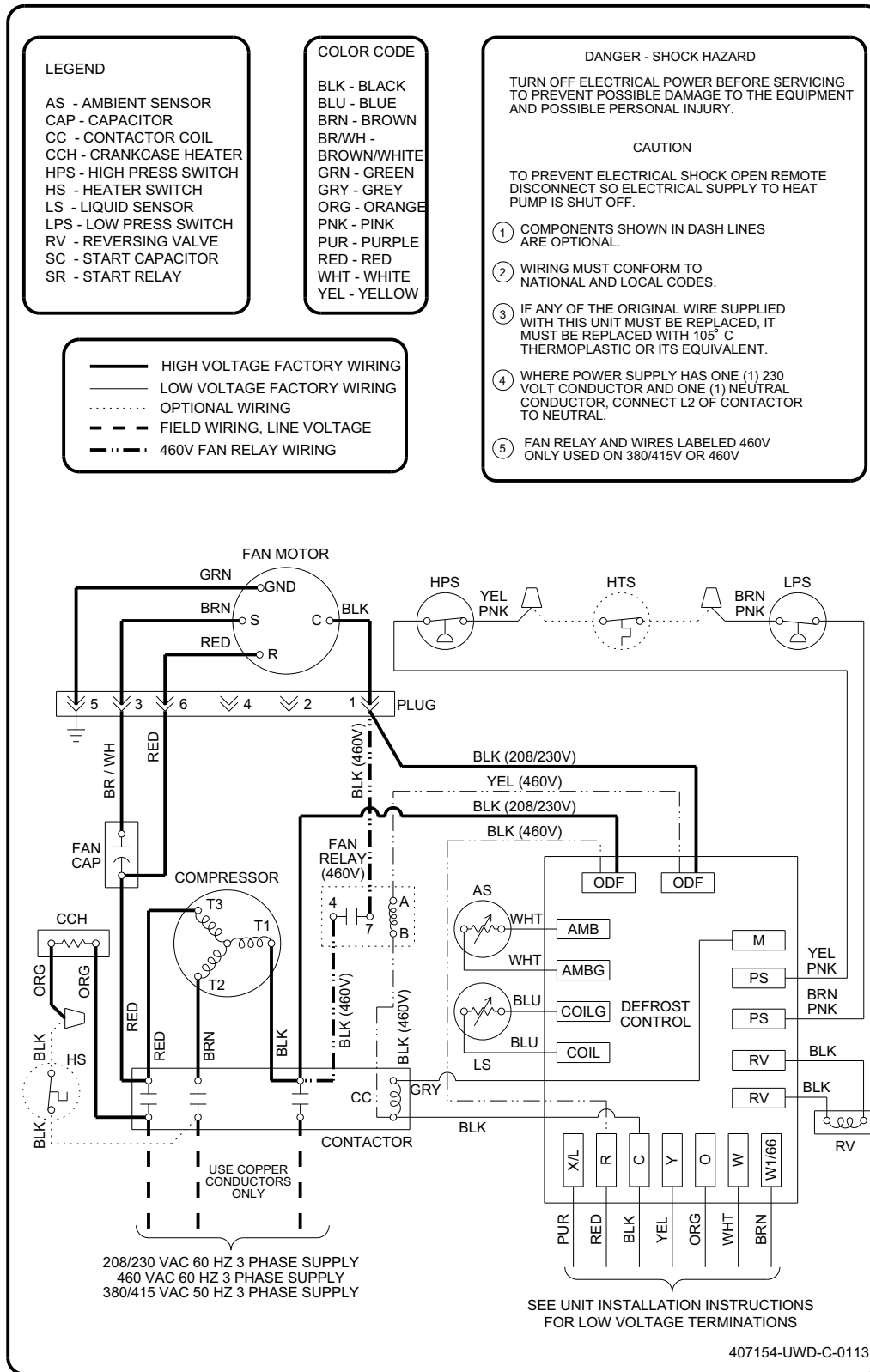


FIGURE 16: Wiring Diagram - Three Phase (Demand Defrost)

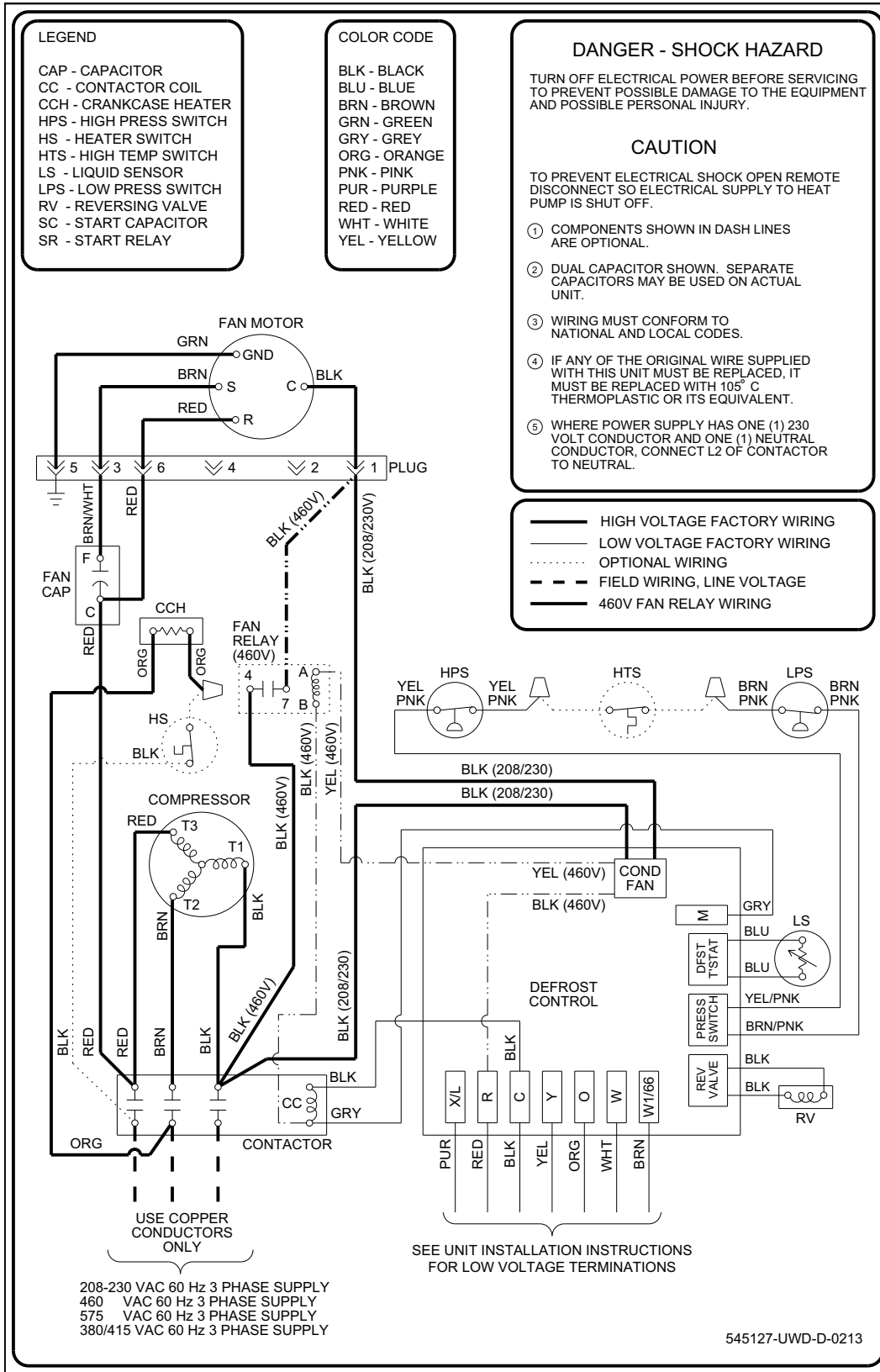


FIGURE 17: Wiring Diagram - Three Phase (Time-Temp)

## SECTION XII: START UP SHEET

Heat Pump and Supplementary Heat Start-Up Sheet	
<input type="button" value="Print Form"/>	Proper start-up is critical to customer comfort and equipment longevity
Start-Up Date	<input style="width: 80px;" type="text"/>
Technician Performing Start-Up	<input style="width: 150px;" type="text"/>
Installing Contractor Name	<input style="width: 150px;" type="text"/>
<b>Owner Information</b>	
Name	<input style="width: 250px;" type="text"/>
Address	<input style="width: 350px;" type="text"/>
City	<input style="width: 150px;" type="text"/>
State or Province	<input style="width: 150px;" type="text"/>
Zip or Postal Code	<input style="width: 100px;" type="text"/>
<b>Equipment Data</b>	
<input type="radio"/> Upflow <input type="radio"/> Downflow <input type="radio"/> Horizontal Left <input type="radio"/> Horizontal Right	
Indoor Unit Model #	<input style="width: 200px;" type="text"/>
Indoor Unit Serial #	<input style="width: 200px;" type="text"/>
Indoor Coil Model #	<input style="width: 200px;" type="text"/>
Indoor Coil Serial #	<input style="width: 200px;" type="text"/>
Outdoor Unit Model #	<input style="width: 200px;" type="text"/>
Outdoor Unit Serial #	<input style="width: 200px;" type="text"/>
<b>Filter, Thermostat, Accessories</b>	
Filter Type	<input style="width: 150px;" type="text"/>
Filter Size	<input style="width: 80px;" type="text"/>
Filter Location(s)	<input style="width: 200px;" type="text"/>
Thermostat Type	<input style="width: 150px;" type="text"/>
Other System Equipment and Accessories	<input style="width: 200px;" type="text"/>
<b>Connections -- Per Installation Instructions and Local Codes</b>	
<input type="checkbox"/> Unit is level <input type="checkbox"/> Supply plenum and return ducts are connected and sealed <input type="checkbox"/> Refrigerant piping complete and leak tested <input type="checkbox"/> Gas piping is connected (if applicable) <input type="checkbox"/> Vent system is connected (if applicable) <input type="checkbox"/> Condensate drain for indoor coil properly connected <input type="checkbox"/> Condensate drain for furnace (if applicable)	
<b>Electrical: Line Voltage</b>	
Indoor unit (volts AC)	<input style="width: 50px;" type="text"/>
Outdoor unit (volts AC)	<input style="width: 50px;" type="text"/>
Overcurrent Protection Breaker / Fuses Amperes	<input style="width: 100px;" type="text"/>
<input type="checkbox"/> Ground wire is connected <input type="checkbox"/> Polarity is correct (120vac indoor units) black is L1 (hot), white is N (neutral)	
<b>Electrical: Low Voltage</b>	
<input type="checkbox"/> Thermostat wiring complete              Heat anticipator recommended value <input style="width: 50px;" type="text"/>	
<input type="checkbox"/> 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)	<input style="width: 50px;" type="text"/>
"R" and "C" Outdoor unit control board (volts AC)	<input style="width: 50px;" type="text"/>
<b>Supplementary Heating Set-Up</b>	
Heating Type <input type="radio"/> Electric Air Handler <input type="radio"/> Natural Gas <input type="radio"/> LP Gas (Requires LP Conversion Kit)	
Inlet Gas Pressure (in. w.c.)	<input style="width: 50px;" type="text"/>
Manifold Gas Pressure (in. w.c.)	<input style="width: 50px;" type="text"/>
LP Gas Conversion Kit Part # Used	<input style="width: 100px;" type="text"/>
Calculated input in btuh - clock the gas meter (Nat Gas Only)	<input style="width: 100px;" type="text"/>
LP Kit Installed By	<input style="width: 100px;" type="text"/>
Electric Heat Kit Part # (if applicable)	<input style="width: 100px;" type="text"/>
KW installed	<input style="width: 50px;" type="text"/>
Rated BTU/H (furnaces)	<input style="width: 100px;" type="text"/>
<b>Venting (if applicable)</b>	
<input type="checkbox"/> Venting system properly sized, within the limitations of the charts in the installation instructions.	
Intake Size	<input style="width: 50px;" type="text"/>
# of 90 Degree Ells	<input style="width: 50px;" type="text"/>
# of 45 Degree Ells	<input style="width: 50px;" type="text"/>
Length	<input style="width: 50px;" type="text"/>
Exhaust Size	<input style="width: 50px;" type="text"/>
# of 90 Degree Ells	<input style="width: 50px;" type="text"/>
# of 45 Degree Ells	<input style="width: 50px;" type="text"/>
Length	<input style="width: 50px;" type="text"/>
Continued on next Page	

**Air Side: System Total External Static Pressure**

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

<b>Cooling &amp; Heat Pump Indoor Blower Set-Up</b>	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
	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"/>	Temperature Drop	<input type="text"/>	Outside Air: Dry Bulb	<input type="text"/>
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<b>Supplementary Heating Indoor Blower Set-Up</b>	HEAT	<input type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	
	ECM					
	X-13	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
	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"/> Temperature Rise <input type="text"/>						

**Defrost Control Board**

Fill in the information ie.. "ON", "OFF" or the appropriate "Value" for the fields that apply to the defrost control board installed

<input type="radio"/> YorkGuard VI	<input type="radio"/> Demand Defrost	<input type="radio"/> Time and Temperature	Part Number	<input type="text"/>	Version Number	<input type="text"/>					
Low Temp Cut Out	<input type="text"/>	Balance Point	<input type="text"/>	Defrost Curve	<input type="text"/>	Y2 Lock	<input type="text"/>	FFUEL	<input type="text"/>	Switch Point	<input type="text"/>
Hot Heat Pump	<input type="text"/>	Bonnet Sensor Present	<input type="text"/>	Run Time: Time and Temperature board only 30, 60 or 90 minutes			<input type="text"/>				

**Refrigerant Charge and Metering Device**

<input type="radio"/> R-22	<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 several heating cycles from the thermostat, noting and correcting any problems
- 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 an emergency heating cycles, noting and correcting any problems

**Clean Up**

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

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**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**