

# INSTALLATION INSTRUCTIONS

## T4BD - 018, 024, 030, 036, 042, 048, & 060 (1.5, 2, 2.5, 3, 3.5, 4, & 5 Ton) Series

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## IMPORTANT

### ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

**DO NOT DESTROY. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.**

## IMPORTANT SAFETY INFORMATION

INSTALLER: Please read all instructions before servicing this equipment. Pay attention to all safety warnings and any other special notes highlighted in the manual. Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored. **WARNING** indicates a potentially hazardous situation that if not avoided, could result in personal injury or death. **CAUTION** indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

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### **WARNING:**

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#### **ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD**

**Failure to follow safety warnings exactly could result in serious injury or property damage.**

**Improper servicing could result in dangerous operation, serious injury, death or property damage.**

- **Before servicing, disconnect all electrical power to the indoor blower.**
- **When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.**
- **Verify proper operation after servicing.**

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### **WARNING:**

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**T4BD Split System Heat Pumps are shipped charged with R410A refrigerant and ready for installation. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified trained personnel thoroughly familiar with this equipment. Under no circumstances should the owner attempt to install and/or service this equipment. Failure to comply with this warning could result in property damage, personal injury, or death.**

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### **CAUTION:**

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**This unit uses R-410A refrigerant. DO NOT use any other refrigerant in this unit. Use of another refrigerant will damage the unit.**

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### **WARNING:**

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**Unless noted otherwise in these instructions, only factory authorized parts or accessory kits may be used with this product. Improper installation, service, adjustment, or maintenance may cause explosion, fire, electrical shock or other hazardous conditions which may result in personal injury or property damage.**

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- Installation of equipment may require brazing operations. Installer must comply with safety codes and wear appropriate safety equipment (safety glasses, work gloves, fire extinguisher, etc.) when performing brazing operations.
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.
- Use caution when handling this appliance or removing components. Personal injury can occur from sharp metal edges present in all sheet metal constructed equipment.

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### **WARNING:**

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**The information listed below and the next page must be followed during the installation, service, and operation of this furnace. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.**

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- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI CI) for special installation requirements.
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code Part 1 CSA C.22.1.
- This equipment contains liquid and gaseous refrigerant under high pressure. **DO NOT USE ANY PORTION OF THE CHARGE FOR PURGING OR LEAK TESTING.** Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.
- Fully annealed, refrigerant grade copper tubing should be used when installing the system. Refrigerant suction line tubing should be fully insulated.
- This unit is designed for outdoor installations only and should be positioned as described on page 3.

## HEAT PUMP INSTALLATION

### General Information

Split system heat pumps are designed only for outdoor rooftop or ground level installations. This unit has been tested for capacity and efficiency in accordance with AHRI Standards and will provide many years of safe and dependable comfort, providing it is properly installed and maintained. Abuse, improper use, and/or improper maintenance can shorten the life of the appliance and create unsafe hazards.

To achieve optimum performance and minimize equipment failure, it is recommended that periodic maintenance be performed on this unit. The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools.

### Before You Install the Heat Pump

- ✓ The cooling load of the area to be conditioned must be calculated and a system of the proper capacity selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. The system must be wired and provided with circuit protection in accordance with local building codes. If there is any question concerning the power supply, contact the local power company.
- ✓ The indoor section (air handler, furnace, etc) should be installed before routing the refrigerant tubing. Refer to the indoor unit's installation instructions for installation details.
- ✓ All units are securely packed at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Verify coil fins are straight. If necessary, comb fins to remove flattened or bent fins. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ✓ Please consult your dealer for maintenance information and availability of maintenance contracts. Please read all instructions before installing the unit.

### Locating the Heat Pump

- Survey the job site to determine the best location for mounting the outdoor unit.
- Overhead obstructions (Figure 1), poorly ventilated areas, and areas subject to accumulation of debris should be avoided.
- Sufficient clearance for unobstructed airflow through the outdoor coil must be maintained in order to achieve rated performance. See Figure 1 for minimum clearances to obstructions.
- Consideration should be given to availability of electric power, service access, noise, and shade.

### Packaging Removal

To prevent damage to the tubing connections, carefully remove the carton and user's manual from the equipment. Discard the shipping carton.

### Ground Level

Ground level installations must be located according to local building codes or ordinances and these requirements:

- Clearances must be in accordance with those shown in Figure 1.
- A suitable mounting pad must be provided and be separate from the building foundation. The pad must be level and strong enough to support the unit's weight. The slab height must be a minimum of 2" (5 cm) above grade and with adequate drainage. See Figure 1.

### Rooftop

- The method of mounting should be designed so that it does not overload roof structures or transmit noise to the interior of the structure. The roof must be structurally capable of handling the weight of the unit.
- Full perimeter support is required under the unit. Support must be made of weather resistant materials and installed prior to unit installation.
- The support must be built to raise the unit 6" above the roof.

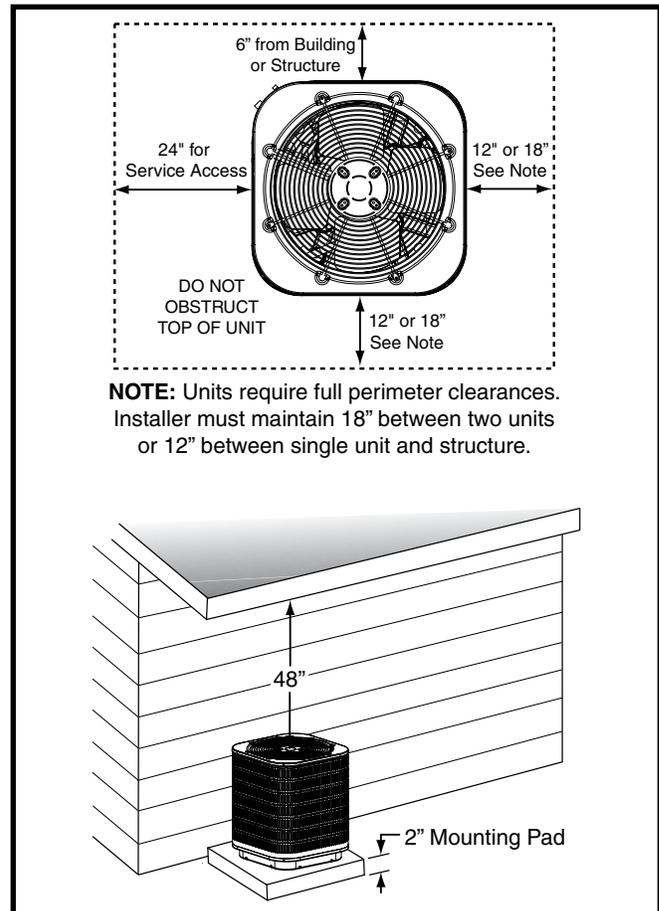


Figure 1. Clearance Requirements

## Connecting Refrigerant Tubing Between the Indoor & Outdoor Unit

### CAUTION:

**When servicing, cover or seal openings to minimize the exposure of the refrigerant system to air to prevent accumulation of moisture and other contaminants.**

After outdoor and indoor unit placement has been determined, route refrigerant tubing between the equipment in accordance with sound installation practices.

- When connecting refrigerant linesets together, it is recommended that dry nitrogen be flowing through the joints during brazing. This will prevent internal oxidation and scaling from occurring.
- Refrigerant tubing should be routed in a manner that minimizes the length of tubing and the number of bends in the tubing.
- Refrigerant tubing should be supported in a manner that the tubing will not vibrate or abrade during system operation.
- Tubing should be kept clean of foreign debris during installation.
- Every effort should be made by the installer to ensure that the field installed refrigerant containing components of the system have been installed in accordance with these instructions and sound installation practices to insure reliable system operation and longevity.
- The maximum recommended interconnecting refrigerant line length is 75 feet, and the vertical elevation difference between the indoor and outdoor sections should not exceed 20 feet.
- If precise forming of refrigerant lines is required, a copper tubing bender is recommended. Avoid sharp bends and contact of the refrigerant lines with metal surfaces.
- A filter dryer is provided with the unit and must be installed in the liquid line of the system. If the installation replaces a system with a filter dryer already present

in the liquid line, the filter dryer must be replaced with the one supplied with the unit. The filter dryer must be installed in strict accordance with the manufacturer's installation instructions.

- Optional equipment such as liquid line solenoid valves, low ambient, etc., should be installed in strict accordance with the manufacturer's installation instructions.

### Outdoor Orifice Removal & Installation

The orifice installed in the outdoor unit has been sized for use with the most popularly matched indoor units. Depending on the indoor coil that the unit is being matched with, the outdoor restrictor may need to be changed. Please refer to the Quick Reference Data sheet that is supplied with the outdoor unit for more information.

If the outdoor unit has the liquid valve shown in Figure 2 (page 5) then the restrictor is located inside the swivel nut connection of the liquid valve and not inside the outdoor unit's distributor. Perform steps 1 - 5 if the outdoor restrictor needs to be changed.

### CAUTION:

**When servicing, cover or seal openings to minimize the exposure of the refrigerant system to air to prevent accumulation of moisture and other contaminants.**

### CAUTION:

**To prevent damage to the unit or internal components, it is recommended that two wrenches be used when loosening or tightening nuts. Do not over tighten!**

1. Using two wrenches loosen the nut and liquid valve. Turn the assembly nut counter-clockwise until the orifice body halves are separated.
2. Insert a light-gauge wire hook between the valve body and the restrictor orifice (Figure 3, page 5) while being careful not to scratch either part. Carefully remove the restrictor orifice from the valve body.
3. Check the actual size of the new orifice. **NOTE:** The size is stamped on its side. Do not use pin gauges to measure the orifice diameter.
4. Insert the new orifice into the valve body, with the rounded end facing into the valve. See Figure 2.

### CAUTION:

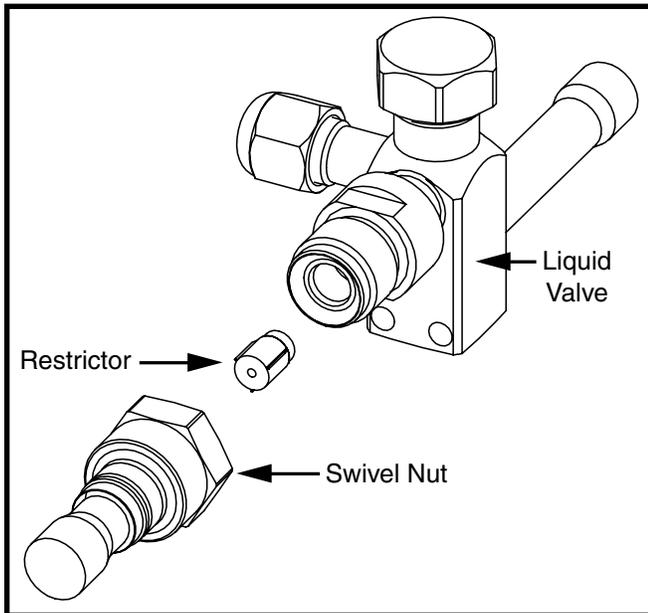
**To prevent damage to the unit or internal components, it is recommended that two wrenches be used when loosening or tightening nuts. Do not over tighten!**

COPPER WIRE SIZE — AWG (1% Voltage Drop)				
Supply Wire Length-Feet				Supply Circuit Ampacity
200	150	100	50	
6	8	10	14	15
4	6	8	12	20
4	6	8	10	25
4	4	6	10	30
3	4	6	8	35
3	4	6	8	40
2	3	4	6	45
2	3	4	6	50
2	3	4	6	55
1	2	3	4	60

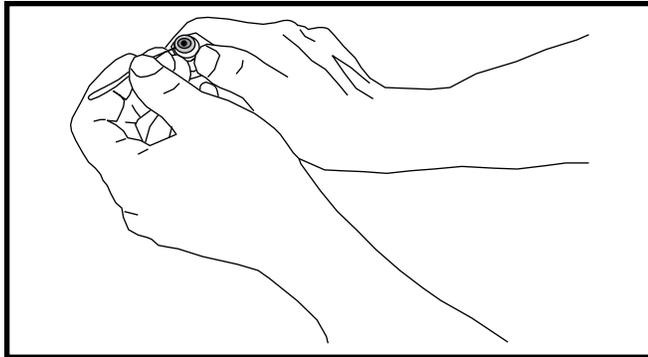
Wire Size based on N.E.C. for 60° type copper conductors.

**Table 1. Copper Wire Size**

5. Realign the assembly nut on the valve body and hand tighten both components. Mark a line on both bodies and then tighten an additional  $\frac{1}{4}$  turn using two wrenches. The movement of the two lines will show how much the nut is tightened.



**Figure 2. Liquid Valve, Restrictor, & Swivel Nut Adapter**



**Figure 3. Removal of Orifice**

## ELECTRICAL WIRING

### **⚠ WARNING:**

**To avoid risk of electrical shock, personal injury, or death, disconnect all electrical power to the unit before performing any maintenance or service. The unit may have more than one electrical supply.**

**Label all wires prior to disconnection when servicing the unit. Wiring errors can cause improper and dangerous operation**

- All electrical connections must be in compliance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70).
- For Canadian installations the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA C22.1 and/or local codes).

### **Pre-Electrical Checklist**

- ✓ Verify that the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate.
- ✓ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. Refer to the unit wiring label for proper high and low voltage wiring.
- ✓ Verify factory wiring is in accordance with the unit wiring diagram (Figures 13-16, pages 22-25). Inspect for loose connections.
- ✓ Phase balance on 3 phase units must always be checked. See Unbalanced 3-Phase Supply Voltage section (page 8).

### **Line Voltage**

- A wiring diagram is located on the inside cover of the electrical box of the outdoor unit. The installer should become familiar with the wiring diagram before making any electrical connections to the outdoor unit.
- **An electrical disconnect must be located within sight of and readily accessible to the unit.** This switch shall be capable of electrically de-energizing the outdoor unit.
- Line voltage to the unit should be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit. Incoming field wiring and minimum size of electrical conductors and circuit protection must be in compliance with information listed on the outdoor unit data label. Any other wiring methods must be acceptable to authority having jurisdiction.
- The outdoor unit requires both power and control circuit electrical connections. Refer to the wiring diagrams for identification and location of outdoor unit field wiring interfaces. Make all electrical connections in accordance with all applicable codes and ordinances.

- Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to applicable local codes. See the unit rating plate for minimum circuit ampacity and maximum overcurrent protection limits.
- Provide power supply for the unit in accordance with the unit wiring diagram, and the unit rating plate. Connect the line-voltage leads to the terminals on the contactor inside the control compartment.
- Use only copper wire for the line voltage power supply to this unit as listed in Table 1 (page 4). Use proper code agency listed conduit and a conduit connector for connecting the supply wires to the unit. Use of rain tight conduit is recommended.
- 208/230 Volt units are shipped from the factory wired for 230 volt operation. For 208V operation, remove the lead from the transformer terminal marked 240V and connect it to the terminal marked 208V.
- Optional equipment requiring connection to the power or control circuits must be wired in strict accordance of the NEC (ANSI/NFPA 70), applicable local codes, and the instructions provided with the equipment.

### Comfort Alert™ Diagnostics Module (Select Models Only)

The Comfort Alert™ Diagnostics Module (Figure 4) is a breakthrough innovation for troubleshooting heat pump and air conditioning system failures. The module installs easily in the electrical box of the outdoor unit near the compressor contactor. By monitoring and analyzing data from the Copeland scroll compressor and the thermostat demand, the module can accurately detect the cause of electrical and system related failures without any sensors. A flashing LED indicator communicates the ALERT code and a diagnostic key is also imprinted on the side of the module to quickly direct the technician to the root cause of a problem. **NOTE:** This module does not provide safety protection! The Comfort Alert™ Diagnostics Module is a monitoring device and cannot control or shut down other devices.

### 24 VAC Power Wiring

The Comfort Alert™ module requires a constant nominal 24 VAC power supply. The module cannot be powered by the **C** terminal on a defrost board or other control board without experiencing nuisance alerts. **NOTE:** The wiring to the module's **R** & **C** terminals must be routed directly from the indoor unit or thermostat.

If the constant 24 VAC (**R** wire) is not present in the outdoor unit, use one of the spare wires in the thermostat cable to bring power to the module. Connect the other end of the spare wire to **R** at the indoor unit or thermostat.

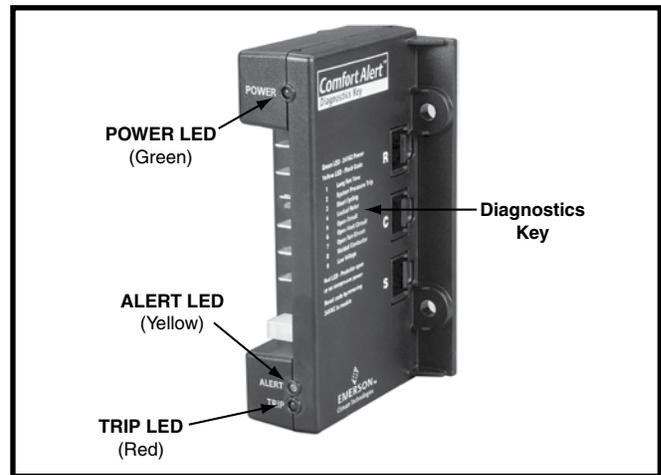


Figure 4. Comfort Alert™ Diagnostics Module

### Thermostat Demand Wiring

The Comfort Alert™ module requires a thermostat demand signal to operate properly. The thermostat demand signal input (labeled **Y** on the module), should always be connected to the compressor contactor coil. **NOTE:** When the coil is energized, the demand signal input is 24 VAC. When the coil is not energized, the demand signal input should be less than 0.5 VAC.

#### NOTES:

- Factory installed modules have different thermostat demand signal wiring. Always follow manufacturer wiring instructions when replacing the module.
- After the thermostat demand signal is connected, verify that 24 VAC across **Y** & **C** when demand is present.

### Interpreting the Diagnostic LED's

When an abnormal system condition occurs, the Comfort Alert™ module displays the appropriate ALERT and/or TRIP LED will flash a number of times consecutively, pause and then repeat the process. To identify a Flash Code number, count the number of consecutive flashes.

Each time the module powers up, the last ALERT Flash Code that occurred prior to shut down is displayed for one minute. The module will continue to display the LED until the condition returns to normal or if 24 VAC power is removed from the module. See Table 17 (page 26) for flash code identification or Table 18 (page 27) for module wiring troubleshooting.

### LED Description

- **POWER LED (Green):** indicates voltage is present at the power connection of the module.
- **ALERT LED (Yellow):** communicates an abnormal system condition through a unique flash code. **NOTE:** The ALERT LED will flash consecutively, pause and then repeat the process. The number of consecutive flashes, referred to as the Flash Code, correlates to a particular abnormal condition. Detailed descriptions of these ALERT Flash Codes are listed in Table 17.
- **TRIP LED (Red):** indicates a demand signal is received from the thermostat, but current to the compressor is

not detected by the module. The TRIP LED typically indicates if the compressor protector is open or the compressor has no power.

The scroll compressor's **R** (run), **C** (common), and **S** (start) wires are routed through the holes in the Comfort Alert™ module marked **R**, **C**, & **S**. **NOTE:** The common wire does not need to be routed through the module for it to operate.

### Blower Time Delay Relay (Select Models)

A time delay relay may be provided with the unit and must be installed in the indoor section. The relay will keep the indoor blower running an additional 40 seconds for increased cooling efficiency after the outdoor unit shuts off.

The relay has four terminals and one mounting hole.

- Connect terminal 1 to load side of blower relay.
- Connect terminal 2 to terminal **R** of T'stat.
- Connect terminal 3 to common terminal at blower relay or transformer.
- Connect terminal 4 to terminal **G** on T'stat.

### Thermostat / Low Voltage Connections

- Thermostat connections should be made in accordance with the instructions supplied with the thermostat and the indoor equipment. A typical installation with a heat pump thermostat and air handler is shown in Figure 5.
- The outdoor unit is designed to operate from a 24 VAC Class II control circuit. The control circuit wiring must comply with the current provisions of the NEC (ANSI/NFPA 70) and with applicable local codes having jurisdiction.
- The low voltage wires must be properly connected to the units low voltage terminal block. Recommended wire gauge and wire lengths for typical thermostat connections are listed in Table 2.
- The thermostat should be mounted about 5 feet above the floor on an inside wall. **DO NOT** install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat manufacturer's instruction sheet for detailed mounting and installation information.

### Reverse Rotation Verification

After making all of the power connections to the unit, the rotation of the compressor must be checked. If the rotation is in the wrong direction, the compressor will make an abnormally loud noise. To check the rotation perform the following steps:

1. Make sure the outside power disconnect is in the OFF position.
2. Set the indoor thermostat to a set point that will call for cooling.
3. Return to the outside power disconnect and switch it to the ON position. If the compressor is making an

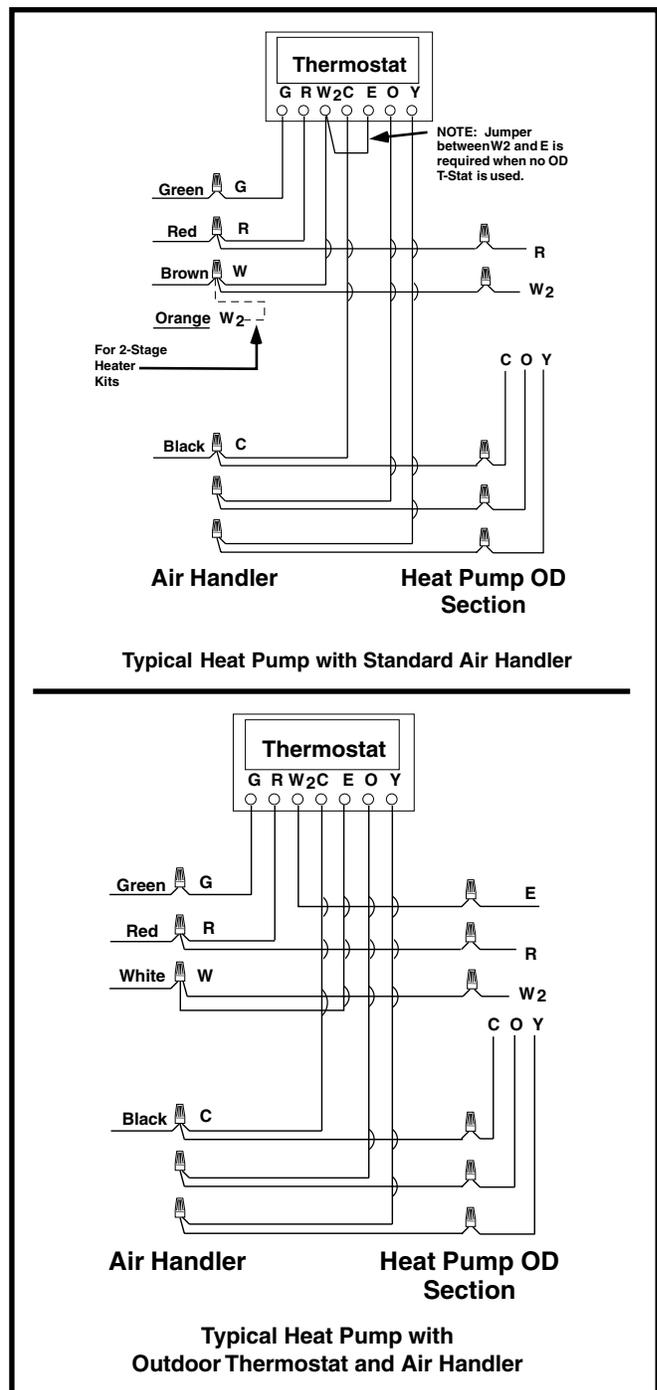


Figure 5. Typical Thermostat Connections

Thermostat Wire Gauge	Recommended T-Stat Wire Unit to T-Stat (Length in FT)	
	2-Wire (Heating)	5-Wire (Heating/Cooling)
24	55	25
22	90	45
20	140	70
18	225	110

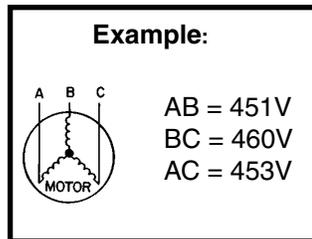
Table 2. Thermostat Wire Gauge

- abnormally loud noise, immediately switch the outside power disconnect to the OFF position.
- Switch any two of the three power leads at the power connections to the unit.
  - Set Return to the outside power disconnect and switch it to the ON position.
  - Verify that the compressor is now running properly.

### Unbalanced 3-Phase Supply Voltage

Voltage unbalance occurs when the voltages of all phases of a 3-phase power supply are no longer equal. This unbalance reduces motor efficiency and performance. Some underlying causes of voltage unbalance may include: Lack of symmetry in transmission lines, large single-phase loads, and unbalanced or overloaded transformers. A motor should never be operated when a phase imbalance in supply is greater than 2%. Perform the following steps to determine the percentage of voltage imbalance:

- Measure the line voltages of your 3-phase power supply where it enters the building and at a location that will only be dedicated to the unit installation (at the unit's circuit protection or disconnect).
- Determine the average voltage in the power supply.



In this example, the measured line voltages were 451, 460, and 453. The average would be 454 volts ( $451 + 460 + 453 = 1,364 / 3 = 454$ ).

- Determine the maximum deviation:

**Example:**

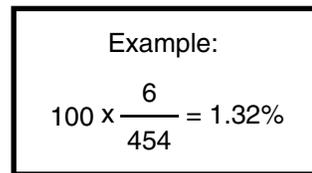
From the values given in step 1, the BC voltage (460V) is the greatest difference in value from the average:

$$460 - 454 = 6 \leftarrow \text{Highest Value}$$

$$454 - 451 = 3$$

$$454 - 453 = 1$$

- Determine percent of voltage imbalance by using the results from steps 2 & 3 in the following equation.



$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

The amount of phase imbalance (1.32%) is satisfactory since the amount is lower than the maximum allowable 2%. Please contact your local electric utility company if your voltage imbalance is more than 2%.

## Grounding

### **WARNING:**

**The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. Do not use gas piping as an electrical ground!**

This unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code (ANSI/NFPA 70) or the CSA C22.1 Electrical Code. Use the grounding lug provided in the control box for grounding the unit.

## START UP & ADJUSTMENTS

### Pre-Start Check List

- ✓ Verify the unit is level and has sufficient clearances for unobstructed airflow.
- ✓ Verify the outdoor coil and top of the unit are free from obstructions and debris, and all equipment access/control panels are in place.
- ✓ Verify that the line voltage power leads are securely connected and the unit is properly grounded.
- ✓ Verify that the low voltage wires are securely connected to the correct leads on the low voltage terminal strip.
- ✓ Verify that the power supply branch circuit overcurrent protection is sized properly.
- ✓ Verify that the thermostat is wired correctly.

### Start-Up Procedures

### **WARNING:**

**This unit is equipped with a crankcase heater. Allow 24 hours prior to continuing the start up procedures to allow for heating of the refrigerant compressor crankcase. Failure to comply may result in damage and could cause premature failure of the system. This warning should be followed at initial start up and any time the power has been removed for 12 hours or longer.**

### Air Circulation - Indoor Blower

- Set the thermostat system mode on OFF and the fan mode to ON.
- Verify the blower runs continuously. Check the air delivery at the supply registers and adjust register openings for balanced air distribution. If insufficient air is detected, examine ductwork for leaks or obstructions.
- Set the thermostat fan mode to AUTO and verify the blower stops running.

**NOTE:** On 3-phase air handler models only - If blower is spinning opposite of arrow direction, shut off the main power to the unit and switch any two field wires at the disconnect. **DO NOT alter unit wiring.**

## Short Cycle Protection

1. Set the thermostat system mode to COOL. Observe the temperature setting of the thermostat and gradually raise the set-point temperature until the unit de-energizes.
2. Immediately lower the set point temperature of the thermostat to its original setting and verify that the indoor blower is energized and outdoor unit remains de-energized.
3. After approximately 5 minutes, verify the outdoor unit energizes and the temperature of the discharge air is cooler than the room temperature.

## System Cooling

1. Set the thermostat's system mode to COOL and the fan mode to AUTO. Gradually lower the thermostat temperature setpoint below room temperature and verify the outdoor unit and indoor blower energize.
2. Verify blower wheel is spinning in direction indicated by arrow. Feel the air being circulated by the indoor blower and verify that it is cooler than ambient temperature. Listen for any unusual noises. If unusual sounds occur, determine the source of the noise and correct as necessary.
3. Verify HI and LO refrigerant pressures.  
**NOTE:** If refrigerant pressures are abnormal and the compressor is rotating backwards, shut off main power to the unit and switch any two field wires at the disconnect.  
**DO NOT alter unit wiring.**
4. Allow the system to operate for several minutes and then set the temperature selector above room temperature. Verify the fan and compressor cycle off with the thermostat. **NOTE:** The blower should also stop unless fan switch is set to the ON position.

## System Heating

1. Set the thermostat's system mode to HEAT and the temperature mode to below room temperature.
2. Verify the outdoor unit and indoor fan stop running. After 5 minutes, increase the temperature on the thermostat to its maximum setting.
3. Verify the outdoor unit and indoor blower energize. Feel the air being circulated by the indoor blower and verify that it is warmer than ambient temperature. Listen for any unusual noises. If unusual sounds occur, determine the source of the noise and correct as necessary.

## **Defrost Cycle Timer**

The defrost cycle timer controls the time interval of the hot gas defrost after the defrost sensor closes. It is located in the lower left corner of the defrost control board on the of the control panel. Three interval settings are available: 30, 60, and 90 minutes. Time setting selection is dependent on the climate where the unit is being installed.

- Example 1: Dry climate of Southern Arizona - A 90 minute setting is recommended.
- Example 2: Moist climate of Seattle, Washington - A 30 minute setting is recommended.

To set the cycle timer, place the timing pin on the defrost control board to the desired time interval post.

**NOTE:** All units are shipped from the factory with the default time setting of 30 minutes. Longer settings are recommended for drier climate areas and shorter time intervals are recommended for moist climate areas. Maximum heating performance can be achieved by setting the time to 90 minutes.

## **Defrost Control Board**

### Operational Information

- Terminals **R - RC** must have 24±V present between them in order for the time delay and defrost sequences to be operational.
- Jumpering the **T2-DFT** test pins will communicate to the board that the defrost T-stat is closed (if compressor is running). The defrost thermostat tells the board whether a defrost cycle needs to be started or terminated.

**NOTE:** The defrost T-stat is closed at 32° F or below and is open at 68° F or above, but its state is unknown if the temperature is between 32° F & 68° F.

- With the DFT closed, the unit will run for 30/60/90 minutes in heat mode and then defrost the outdoor coil. The defrost will turn off the outdoor fan, turn on the compressor and raise the coil temperature to 68° F. This will open the DFT and terminate the defrost. If the DFT does not open the defrost will end after 10 minutes.
- To over-ride the defrost board and initiate a faster defrost test in 5, 10 or 15 seconds as determined by the 30, 60 or 90 minute defrost pin settings (factory setting is 30 minutes), jumper the **TEST** terminal to the **C** (common) terminal while the compressor is in heat mode.
  - This will bypass the compressor off delay when the unit goes into defrost test and if left in defrost test, the delay will be bypassed when the test is terminated by the processor. **NOTE:** If the jumper is removed before the test is over, the processor will perform the remainder of a normal defrost. See bullet 2 above.
- To switch from no-delay to delay, remove the pin from the **no - delay** pin location and shift it to the **delay** pin location. The delay/no-delay pin concerns compressor operation during defrosts. The default setting is delay.
  - Reciprocating compressors should only use this setting in conjunction with an approved hard start kit.
  - Scroll compressors that have noise issues while going into or coming out of defrost should use this 30 second delay to reduce the defrost noise.
  - Manually initiating a defrost will cause the compressor to run continually when entering defrost.

### Normal defrost operation

To test normal defrost operation when the temperature is above 35° F, jumper **R** to **DFT** on the board and allow the unit to run for 30 minutes. Defrost will continue until the **R** to **DFT** jumper is removed or for 10 minutes. Remove the jumper.

The 5 minute time delay feature can be shortened 1 time to 1 second by jumping the **Test** to **C** terminal. Remove the jumper and repeat as desired.

**NOTE:** If jumper is left on the **Test** to **common** pins permanently, the defrost cycle will become inoperable.

### Defrost Test Procedure

1. Jumper **T2** to **DFT** at the test terminals.
2. With unit running in heat mode, short the **TEST** terminal to the common terminal near it. This will speed up the board and cause it to enter defrost mode in 5/10/15 seconds depending on the defrost time selection. Compressor delay will not function during speed-up.
3. This test will end in 5 seconds if the **TEST**-common short is not removed.
4. Remove both the short and the **T2** to **DFT** jumper to terminate the defrost cycle. The 30 second compressor delay should operate normally.
5. Test is complete, reset thermostat to home owner preference.

### **Anti Short Cycle Timer Test**

The 5 minute time delay feature can be bypassed or shortened to 1 second by jumping the **Test** to **C** terminal.

**NOTE:** If jumper is left on the **Test** to **common** pins permanently, the defrost cycle will become inoperable.

### **Refrigerant Charging**

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## **WARNING:**

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**T4BD Split System Heat Pumps are shipped charged with R410A refrigerant and ready for installation. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified trained personnel thoroughly familiar with this equipment. Under no circumstances should the owner attempt to install and/or service this equipment. Failure to comply with this warning could result in property damage, personal injury, or death.**

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After refrigerant line connections are completed, it is required that you leak check and evacuate the indoor section and all line connections (using proper methods) before finalizing the full system refrigerant charge.

- To achieve rated capacity and efficiency, the compressor must be exposed to refrigerant for at least 24 hours prior to running and then the compressor must be run for a minimum of 12 hours.
- Cooling mode charging charts are applicable only to matched equipment and listed airflows for the indoor coil. T4BD outdoor units with non-AHRI listed indoor coils are not recommended and deviations from rated airflows or non-listed combinations may require modification to the expansion device and refrigerant charging procedures for proper and efficient system

operation. Refer to Figures 6-12 (pages 14-17) and Tables 3-9 (pages 12 - 14) for correct system charging.

- The refrigerant charge can be checked and adjusted through the service ports provided external to the outdoor unit. Use only gage line sets which have a “Schrader” depression device present to actuate the valve. A common suction port for heating mode charging is included and located on the compressor access panel above the outdoor unit service valves.
- Heat Mode Verification Tables (Tables 10 - 16, pages 19 - 21) are provided for quick reference when the unit is in heating mode and for the inspection of the liquid line pressures and temperatures.

### Charging the Unit in AC Mode with Outdoor

#### Temperatures Above 55° F

*(for optimized sub-cooling of 10° F to 12° F)*

1. With the system operating at steady-state, measure the liquid refrigerant pressure (in psig) at the outdoor unit service valve.
2. Measure the liquid refrigerant temperature (in Fahrenheit) at the service valve.
3. Determine the required liquid refrigerant pressure. Refer to Figures 6-12 (pages 14-17) & Tables 3-9 (pages 12-14).
  - If the pressure measured in Step 1 is greater than the required liquid refrigerant pressure determined in Step 3, then there is too much charge in the system. Remove refrigerant and repeat Steps 1 through 3 until the system is correctly charged.
  - If the pressure measured in Step 1 is less than the required liquid refrigerant pressure determined in Step 3, there is too little charge in the system. Add refrigerant and repeat Steps 1 through 3 until the system is correctly charged.

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## **HEAT PUMP MAINTENANCE**

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## **WARNING:**

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**To prevent electrical shock, personal injury, or death, disconnect all electrical power to the unit before performing any maintenance or service. The unit may have more than one electrical supply.**

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Proper maintenance is important to achieve optimum performance from the heat pump. The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these skills, contact your dealer for maintenance. Consult your local dealer about the availability of maintenance contracts. Routine maintenance should include the following:

- Inspect and clean or replace air filters at the beginning of each heating and cooling season, or more frequently if required.

- Inspect the outdoor coil at the beginning of each cooling season. Remove any debris. Clean the outdoor coil and louvers as necessary using a mild detergent and water. Rinse thoroughly with water.
- Inspect the electrical connections for tightness at the beginning of each heating and cooling season. Service as necessary.

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**⚠ CAUTION:**

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**The unit should never be operated without a filter in the return air system. Replace disposable filters with the same type and size.**

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- Do not add additional oil to motors unequipped with oil tubes. The compressor is hermetically sealed at the factory and does not require lubrication.

### COMPONENT FUNCTIONS

**Comfort Alert™ Diagnostics** - The Comfort Alert diagnostics module troubleshoots heat pump and air conditioning system failures and accurately detects the cause of electrical and system related failures without any sensors. A flashing LED indicator communicates the ALERT code to quickly direct the technician to the root cause of a problem.

**High Pressure Switch (HPS)** - A high-pressure switch is factory-installed and located in the compressor discharge line internal to the outdoor unit. The switch is designed to de-energize the system when very high pressures occur during abnormal conditions. Under normal conditions, the switch is closed. If the discharge pressure rises above 575 psig, then the switch will open and de-energize the outdoor unit. The switch will close again once the liquid pressure decreases to 460 psig. Please note that the switch interrupts the thermostat inputs to the unit. When the switch opens and then closes, there will be a 5 minute short cycling delay before the outdoor unit will energize.

**Low Pressure Switch (LPS)** - A low-pressure switch is factory-installed in select models only. If provided, this located in the suction line internal to the outdoor unit. The switch is designed to protect the compressor from a loss of charge. Under normal conditions, the switch is closed. If the suction pressure falls below 5 psig, then the switch will open and de-energize the outdoor unit. The switch will close again once the suction pressure increases above 20 psig. Please note that the switch interrupts the thermostat inputs to the unit. When the switch opens and then closes, there will be a 5 minute short cycling delay before the outdoor unit will energize.

## T4BD REFRIGERANT CHARGING CHARTS - COOLING ONLY

### Application Notes on the Use of Charging Charts

#### LEGEND

-  Shaded boxes indicate flooded conditions.
-  Rated design values. The suction pressure will be lower than design value if outdoor air flow, entering dry bulb, or entering wet bulb temperatures are lower than design.

#### NOTES:

1. All pressures are listed psig and all temperatures in °F
2. Discharge temperatures GREATER than charted values indicate an UNDERCHARGED system.
3. Discharge temperatures LESS than charted values indicate an OVERCHARGED system.

- **This equipment's cooling system contains refrigerant under high pressure. Always use safe and environmentally sound methods when handling refrigerant handling or servicing the unit. Review the factory literature and safety warnings prior to servicing.**
- When repairing system leaks, always use a nitrogen (inert) gas to protect the refrigerant system and pressure check the repair before re-charging. Always replace the filter-dryers when performing any repair to the refrigeration system with one capable of acid removal. After completing the repairs, evacuate the system to 350 - 500 microns and weigh in the refrigerant to the amount specified on the unit rating label.
- Charging charts are valid for a variety of indoor, return air conditions and are most influenced by the outdoor ambient temperature, outdoor fan operation and the unit operating voltage. Before using these charts, make sure the unit is in a stable operating mode. As shown in the charging charts (Figures 6 - 12, pages 14 - 17), the ideal system sub-cooling can vary over the range of operation. Reference the charts to determine the ideal amount of sub-cooling for a given liquid pressure. Units charged to other values will not perform at the rated unit efficiency (EER) or rated Coefficient of Performance (COP) in heating mode.
- To inspect a systems operation using quality instruments, match the measured liquid temperature to the units chart. The measured liquid pressure reading should be within 3% of the charts value for most installations.
- For systems that are operating with more than a 5% deviation, inspect the unit for the proper voltage and phase balance and the refrigeration system for leaks.
- Units that are operating at less then 95% of the nominal voltage or with a 2% phase imbalance may see a more significant deviation than the amount stated above.
- **DO NOT** use the charts in systems that have a fan cycling under low-ambient control. Refer to the low-ambient kit instructions for more information. (If applicable)

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
137	233	98														
139	233	103	254	108												
141	233	108	254	112	275	117										
143	233	114	254	117	275	121	296	126								
145	234	118	255	122	276	126	297	130	318	135						
147			255	126	276	130	297	134	318	138	339	143				
149					277	134	298	138	319	142	340	146	361	151		
151							298	141	320	145	341	149	362	154	382	159
153							299	145	320	149	341	153	362	157	383	161
155									321	153	342	157	363	161	384	164
157											342	160	363	165	384	169
159													364	168	385	172
161															385	176
163																

Table 3. Charging Table for T4BD-018 Series (1.5 Ton Units) - Orifice Matches

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
131	235	134														
133	236	139	258	136												
135	236	143	259	140	281	138										
137	237	146	259	145	281	142	303	140								
139	238	149	260	148	282	146	304	144	326	142						
141			261	151	283	149	304	148	326	146	349	144				
143					283	153	305	151	327	150	349	148	371	146		
145							306	155	328	153	350	151	372	150	394	148
147							306	159	328	157	350	155	372	153	394	152
149									329	161	351	159	373	157	395	155
151											351	163	373	161	396	159
153													374	164	396	163
155															397	166
157																

Table 4. Charging Table for T4BD-024 Series (2 Ton Units) - Orifice Matches

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
131	247	121														
133	247	126	269	127												
135	248	131	270	132	292	133										
137	248	136	270	136	293	137	315	138								
139	249	141	271	141	293	141	316	142	337	143						
141			272	145	294	145	316	145	339	146	360	148				
143					295	149	317	149	340	149	362	150	384	152		
145							318	153	340	153	363	153	385	154	407	156
147							319	157	341	157	364	157	386	157	408	158
149									342	161	364	161	387	161	410	160
151											365	164	388	164	410	165
153													388	168	411	168
155															412	172
157																

Table 5. Charging Table for T4BD-030 Series (2.5 Ton Units) - Orifice Matches

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
130	266	150														
132	267	154	290	153												
134	268	158	291	156	314	155										
136	269	161	292	160	315	159	337	158								
138	270	165	293	164	316	162	339	161	361	161						
140			294	167	317	166	340	165	362	164	385	164				
142					318	170	341	168	364	167	386	167	408	167		
144							342	172	365	171	387	169	410	169	432	170
146							343	176	366	174	389	173	411	172	433	172
148									367	178	390	177	412	175	435	175
150											391	180	414	179	436	178
152													415	183	437	181
154															439	185
156																

Table 6. Charging Table for T4BD-036 Series (3 Ton Units) - Orifice Matches

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
133	239	146														
135	239	151	261	147												
137	239	156	262	151	284	147										
139	240	160	262	155	285	151	307	149								
141	241	165	263	160	285	155	307	152	329	150						
143			264	164	286	160	308	156	330	153	352	152				
145					287	164	309	160	331	157	353	155	374	155		
147							309	164	331	161	353	158	375	157	396	157
149							310	168	332	165	354	162	376	160	397	159
151									333	169	355	166	377	163	398	162
153											355	169	377	166	399	164
155													378	170	400	167
157															401	171
159																

Table 7. Charging Table for T4BD-042 Series (3.5 Ton Units) - Orifice Matches

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
124	237	144														
126	237	150	260	145												
128	237	156	260	151	282	147										
130	240	157	261	156	283	152	305	149								
132	241	160	263	158	284	157	306	153	328	151						
134			264	162	285	160	307	157	329	155	351	153				
136					286	164	308	161	330	159	352	157	373	156		
138							309	165	331	163	353	160	374	159	396	158
140							310	169	332	167	354	164	376	162	397	161
142									333	171	354	169	376	166	398	164
144											355	173	377	170	399	167
146													378	174	400	172
148															401	176
150																

Table 8. Charging Table for T4BD-048 Series (4 Ton Units) - Orifice Matches

Suct. Press.	OUTDOOR TEMPERATURE (°F)															
	70		75		80		85		90		95		100		105	
	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.	Liq. Press.	Dis. Temp.
117	248	145														
119	249	150	272	148												
121	250	155	273	153	295	152										
123	252	158	274	158	296	156	318	155								
125	254	162	275	162	297	161	319	159	341	159						
127			277	166	299	165	320	164	342	163	364	163				
129					300	169	322	168	344	167	365	166	387	166		
131							323	172	345	171	367	170	389	170	410	170
133							325	176	346	175	368	174	390	173	412	173
135									348	179	370	178	392	177	414	176
137											371	183	393	181	415	180
139													394	186	416	185
141															417	189
143																

Table 9. Charging Table for T4BD-060 Series (5 Ton Units) - Orifice Matches

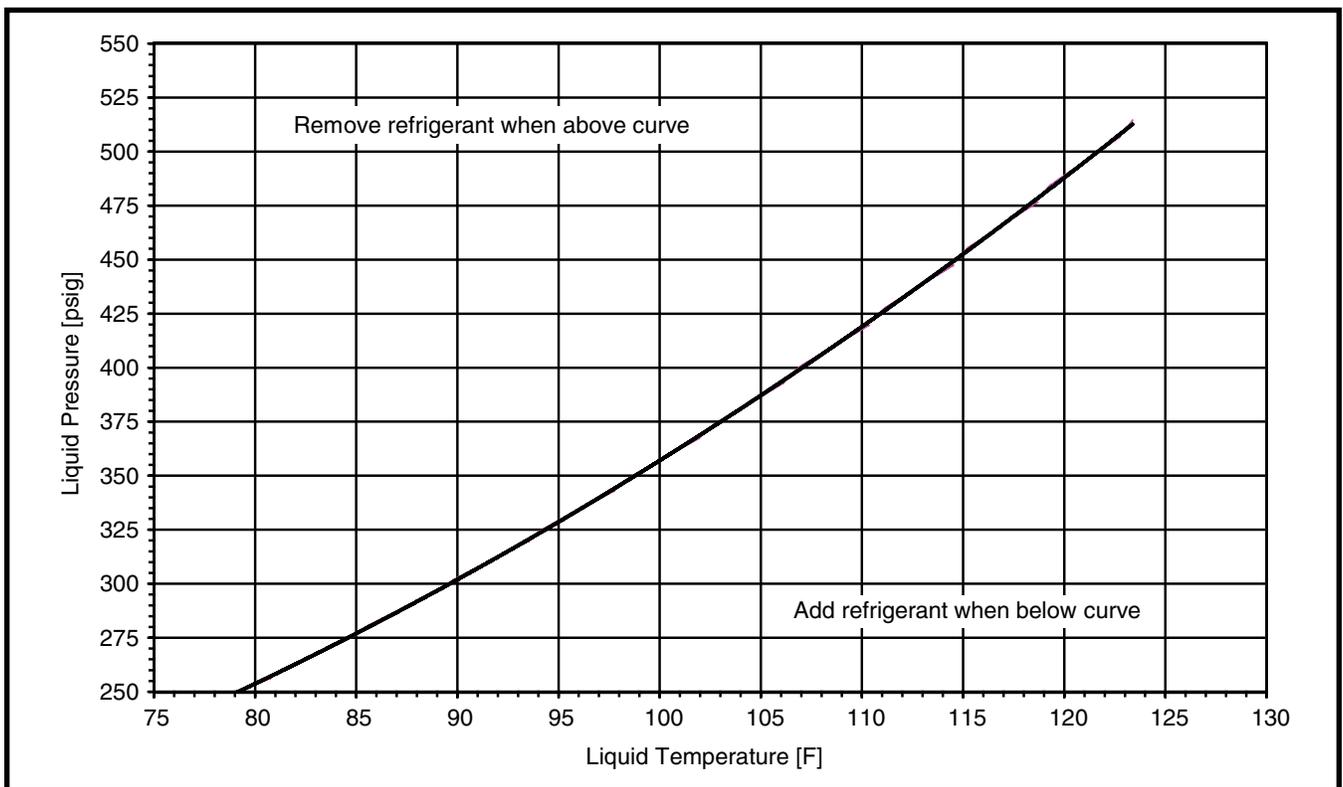
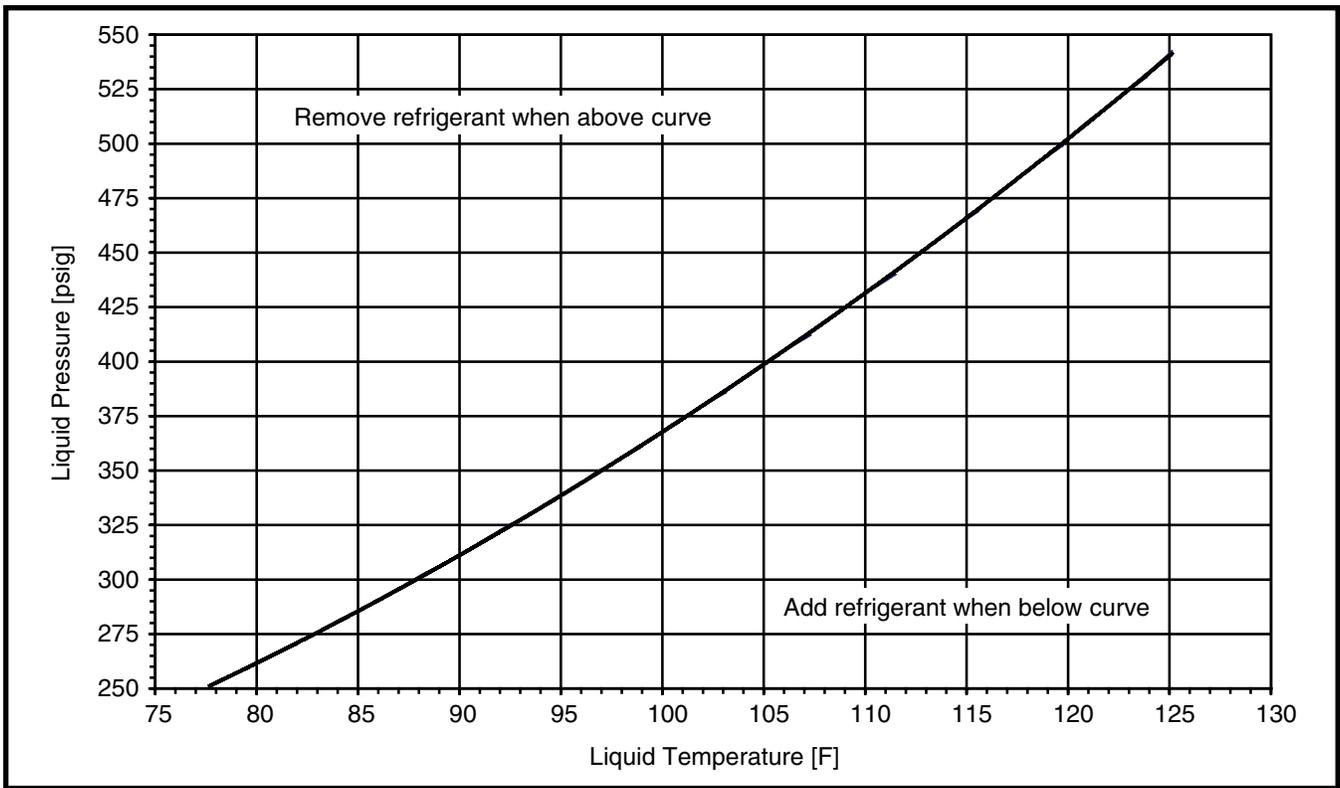
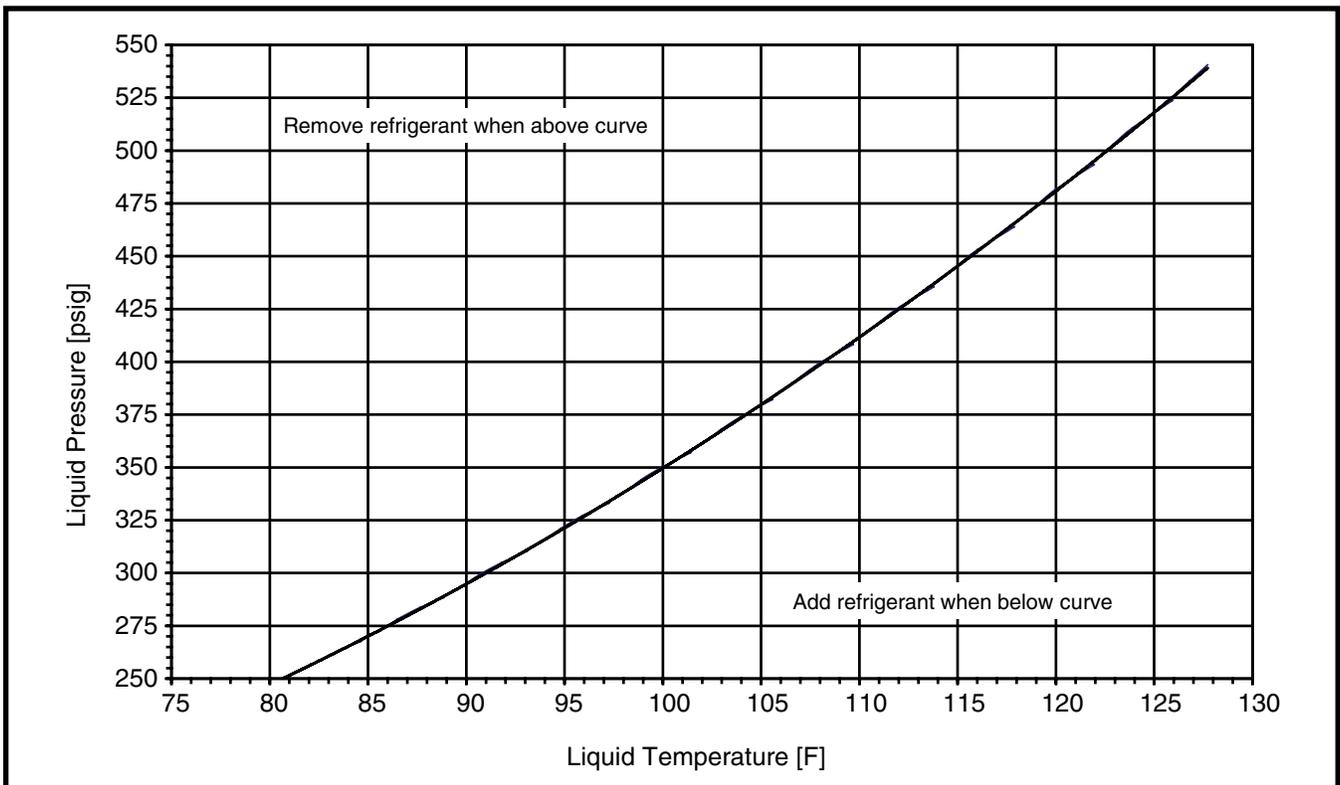


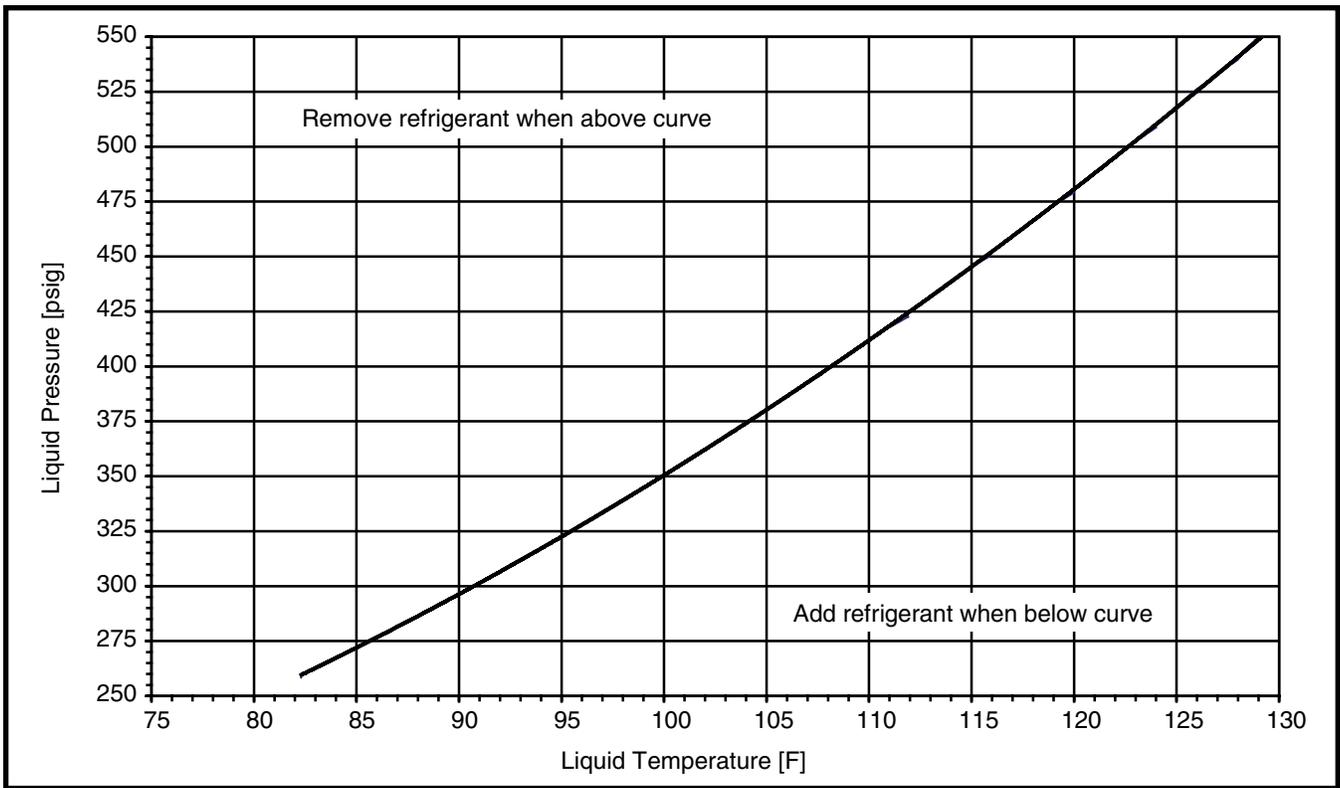
Figure 6. Charging Chart for T4BD-018 Series (1.5 Ton Units) - TXV Matches



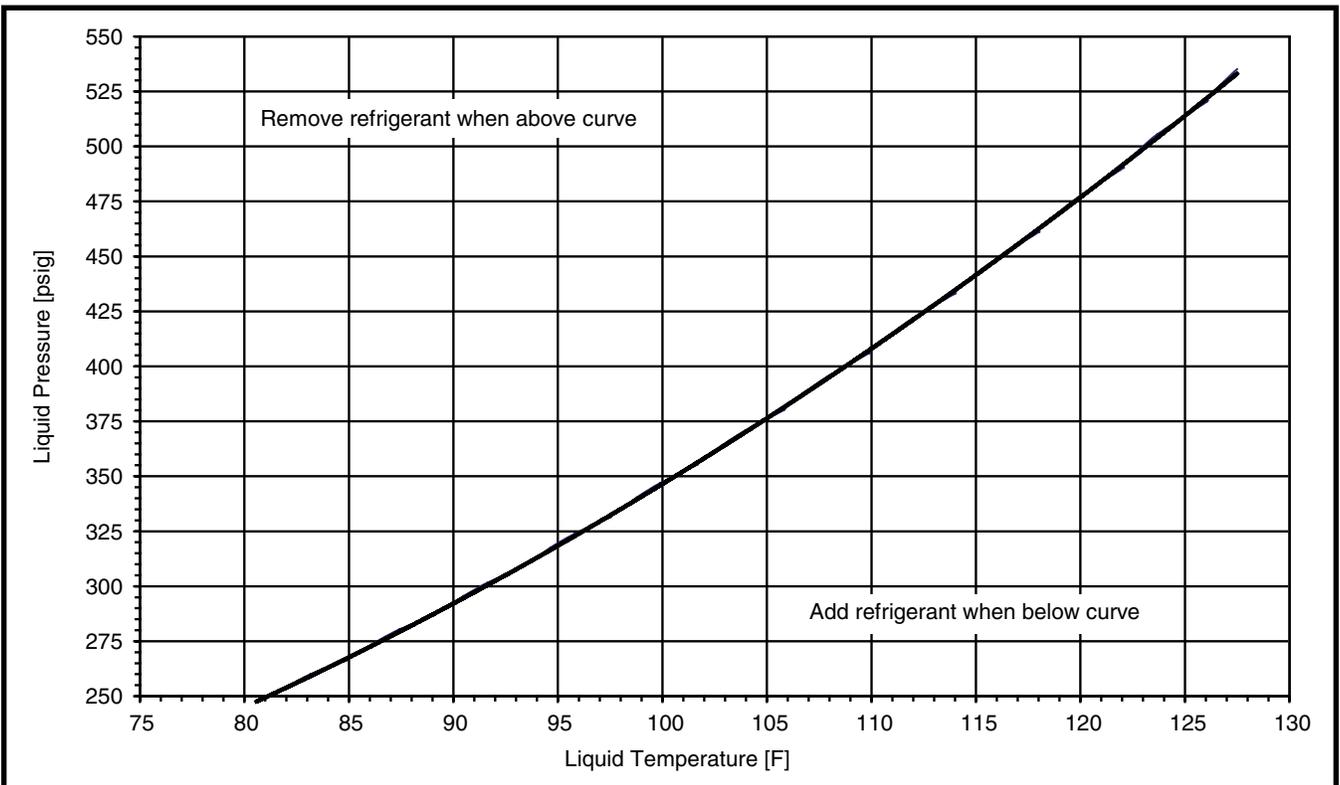
**Figure 7. Charging Chart for T4BD-024 Series (2 Ton Units) - TXV Matches**



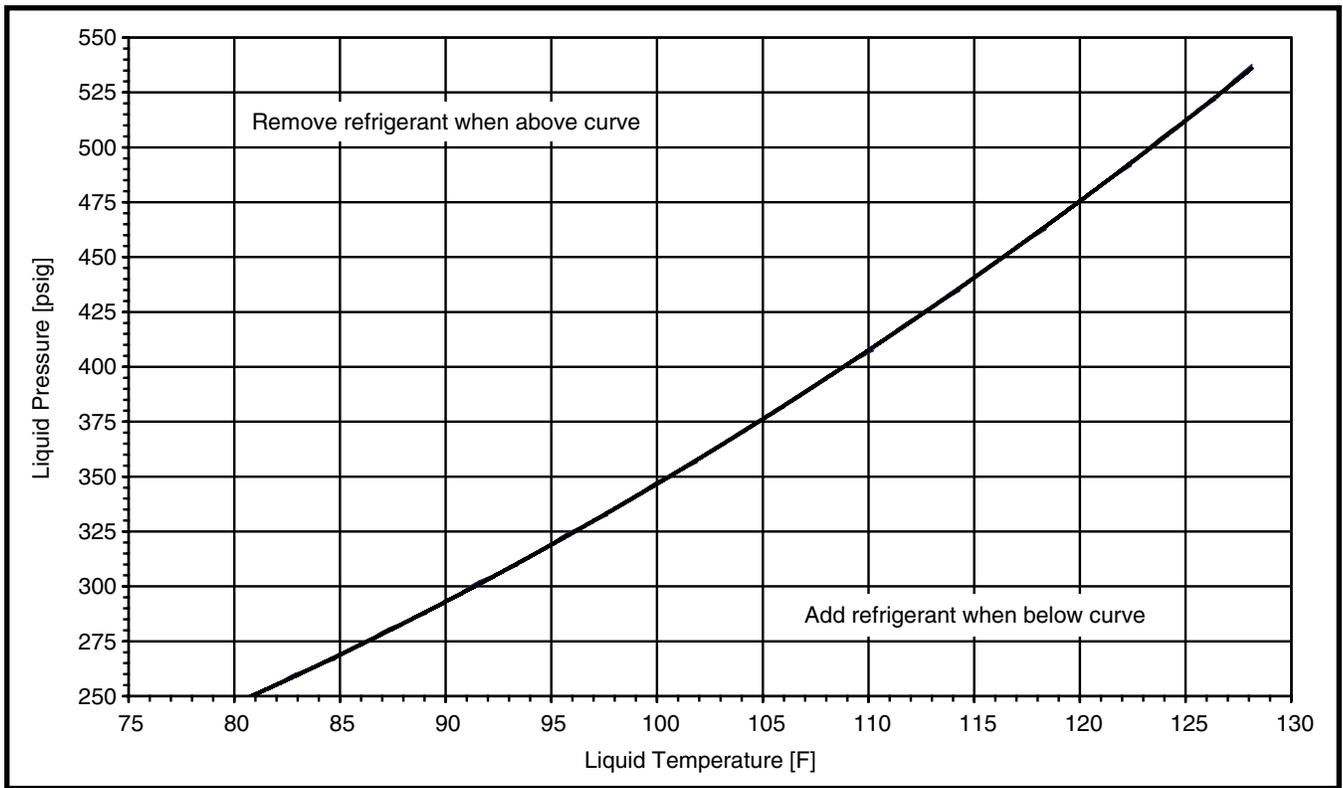
**Figure 8. Charging Chart for T4BD-030 Series (2.5 Ton Units) - TXV Matches**



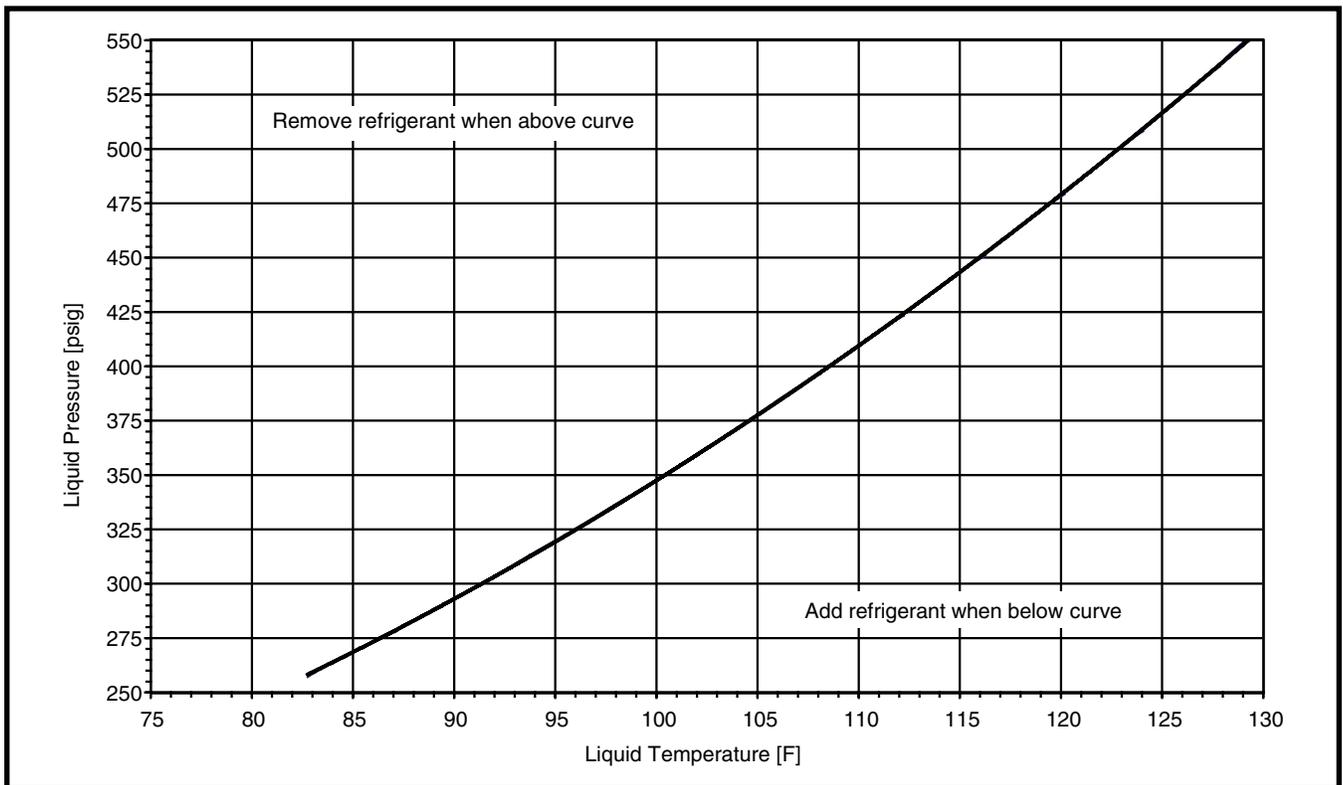
**Figure 9. Charging Chart for T4BD-036 Series (3 Ton Units) - TXV Matches**



**Figure 10. Charging Chart for T4BD-042 Series (3.5 Ton Units) - TXV Matches**



**Figure 11. Charging Chart for T4BD-048 Series (4 Ton Units) - TXV Matches**



**Figure 12. Charging Chart for T4BD-060 Series (5 Ton Units) - TXV Matches**

## T4BD HEAT MODE VERIFICATION CHARTS - HEATING ONLY

### Application Notes on the use of Heating-mode charge verification charts:

#### LEGEND

-  Shaded boxes indicate flooded conditions.
-  Rated design values. Suction pressure will vary from design value if outdoor air flow, entering dry bulb, or entering wet bulb temperatures vary.

- **Read all notes and warnings for the Cooling-mode charging charts prior to using these Heating-mode charge verification charts. Always use safe and environmentally sound methods when handling refrigerant handling or servicing the unit. Review the factory literature and safety warnings prior to servicing.**
- When repairing system leaks, always use a nitrogen (inert) gas to protect the refrigerant system and pressure check the repair before re-charging. Always replace the filter-dryers when performing any repair to the refrigeration system with one capable of acid removal. After completing the repairs, evacuate the system to 350 - 500 microns and weigh in the refrigerant to the amount specified on the unit rating label.
- Before using the heat mode verification tables (Tables 10 - 16, pages 19 - 21), determine the outdoor ambient temperature and the return air temperature to the unit. Locate the appropriate location on the units verification chart based on those measurements to determine the ideal discharge pressure and temperature. Verify the outdoor fan and compressor are running and the outdoor coil is free from frost accumulation. Also verify the system is not operating in defrost mode before inspecting the system.
- Always use quality instruments that are in good working order to measure the actual operating point of the refrigeration system. The discharge temperature should be within 2 degrees of the ideal value and the pressure should be within 2%.
- The most reliable way of verifying the system is at the correct charge is to evacuate the system and weigh in the charge to the amount shown on the rating label. However, if an inspection with these verification charts does not line up with the values shown and the ambient temperature is above 50° F, then a more accurate way to inspect the system for proper charge is with the cooling mode charging charts. Switch the unit into cooling mode and allow it to operate and stabilize for a few minutes then inspect the unit operation with the cooling mode charts and procedures.

#### NOTES:

1. All pressures are listed psig and all temperatures in °F
2. Discharge temperatures greater than charted values indicate an undercharged system.

#### Before changing the unit charge, always inspect the following items first:

1. Inspect the liquid line temperature on the inlet and outlet of the filter dryers. If it is the factory dryer and in good condition there should be no temperature difference. If the temperature difference is larger than 5°, replace the filter dryer with one that is bi-directional and has acid removal capability. Refer to the unit RPL for the recommended part number and size.
2. Inspect the units input voltage. Units operating at less than 95% of the nominal voltage may deviate more from the chart than previously stated.
3. Inspect the input voltage for a phase imbalance. Units with greater than a 2% disparity will not operate at the rated performance.
4. Verify that the unit filters are installed and are clean. The pressure drop across the filters should not exceed 0.08 in-W.C.
5. Inspect the indoor coil, indoor blower and blower motor for cleanliness, clogging, and proper operation.
6. Inspect the system for leaks. If any leaks are detected, repair them immediately. Re-inspect the return air and ambient temperatures and verify that the correct system point on the verification chart was selected.

**DO NOT** use the charts in systems that have the fan cycling under a low-ambient control. Low-ambient controls are for cooling operation. In heating mode, the low ambient control should be disabled. Unless the unit is in defrost mode, the outdoor fan should always operate in conjunction with the compressor.

**IMPORTANT NOTE: If the unit is equipped with a liquid valve with an outdoor restrictor (Figure 2 page 5), then it is not possible to measure the liquid pressure. To approximate the liquid pressure, subtract 7 psig from the discharge pressure.**

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.			
30	188	101	47	224	109	63	261	116	80	297	124	98	332	139	117	387	159	137	443	179
31	195	99	48	230	107	64	266	114	81	301	122	99	339	136	118	394	155	138	450	173
32	202	97	49	236	105	65	270	112	82	305	120	100	346	133	119	401	150	139	457	167
33	209	95	50	242	103	66	275	110	83	308	118	101	353	130	120	408	146	140	464	161
34	216	93	51	248	101	67	280	108	84	312	116	102	360	127	121	415	141	141	471	155
35	223	91	52	254	99	68	285	106	85	316	114	103	367	124	122	422	137	142	478	149
36	230	89	53	260	97	69	290	104	86	319	112	104	374	122	123	429	132	143	485	143

Table 10. Charging Table for T4BD-018 Series (1.5 Ton Units)

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.			
30	208	106	46	240	114	63	273	121	79	306	129	95	334	141	111	381	158	127	429	175
31	215	104	47	246	112	64	278	119	80	309	127	96	341	138	112	388	154	128	436	169
32	222	102	48	252	110	65	283	117	81	313	125	97	348	136	113	395	149	129	443	163
33	229	100	49	258	108	66	287	115	82	317	123	98	355	133	114	402	145	130	450	157
34	236	98	50	264	106	67	292	113	83	320	121	99	362	130	115	409	140	131	457	151
35	243	96	51	270	104	68	297	111	84	324	119	100	369	127	116	416	136	132	464	145
36	250	94	52	276	102	69	302	109	85	328	117	101	376	124	117	423	131	133	471	138

Table 11. Charging Table for T4BD-024 Series (2 Ton Units)

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.			
29	205	110	45	248	118	60	292	127	76	335	136	92	375	149	108	433	168	124	491	187
30	212	108	46	254	116	61	297	125	77	339	134	93	382	146	109	440	163	125	498	180
31	219	106	47	260	114	62	301	123	78	343	132	94	389	144	110	447	159	126	505	174
32	226	104	48	266	112	63	306	121	79	346	130	95	396	141	111	454	154	127	512	168
33	233	102	49	272	110	64	311	119	80	350	128	96	403	138	112	461	150	128	519	162
34	240	100	50	278	108	65	316	117	81	354	126	97	410	135	113	468	145	129	526	156
35	247	98	51	284	106	66	320	115	82	357	124	98	417	132	114	475	141	130	533	150

Table 12. Charging Table for T4BD-030 Series (2.5 Ton Units)

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.
28	236	106	44	250	114	59	264	122	75	277	129	91	305	144	107	370	165	123	435	186
29	243	104	45	256	112	60	268	120	76	281	127	92	312	141	108	377	161	124	442	180
30	250	102	46	261	110	61	273	118	77	285	125	93	319	138	109	384	156	125	449	174
31	257	100	47	267	108	62	278	116	78	288	123	94	326	135	110	391	152	126	456	168
32	264	98	48	273	106	63	283	114	79	292	121	95	333	133	111	398	147	127	463	162
33	271	96	49	279	104	64	287	112	80	296	119	96	340	130	112	405	143	128	470	155
34	278	94	50	285	102	65	292	110	81	299	117	97	347	127	113	412	138	129	477	149

Table 13. Charging Table for T4BD-036 Series (3 Ton Units)

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.
32	200	114	48	239	123	63	277	131	78	316	139	95	351	152	112	406	169	130	461	185
33	207	112	49	245	121	64	282	129	79	320	137	96	358	149	113	413	164	131	468	179
34	214	110	50	251	119	65	287	127	80	323	135	97	365	146	114	420	160	132	475	173
35	221	108	51	257	117	66	292	125	81	327	133	98	372	144	115	427	155	133	482	167
36	228	106	52	263	115	67	297	123	82	331	131	99	379	141	116	434	151	134	489	161
37	235	104	53	268	113	68	301	121	83	334	129	100	386	138	117	441	146	135	496	155
38	242	102	54	274	111	69	306	119	84	338	127	101	393	135	118	448	142	136	503	148

Table 14. Charging Table for T4BD-042 Series (3.5 Ton Units)

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.
32	234	122	46	256	126	60	279	130	73	301	133	89	338	146	107	413	167	126	488	189
33	241	120	47	262	124	61	283	128	74	305	131	90	345	143	108	420	163	127	495	183
34	248	118	48	268	122	62	288	126	75	308	129	91	352	140	109	427	158	128	502	176
35	255	116	49	274	120	63	293	124	76	312	127	92	359	138	110	434	154	129	509	170
36	262	114	50	280	118	64	298	122	77	316	125	93	366	135	111	441	149	130	516	164
37	269	112	51	286	116	65	303	120	78	319	123	94	373	132	112	448	145	131	523	158
38	276	110	52	292	114	66	307	118	79	323	121	95	380	129	113	455	140	132	530	152

Table 15. Charging Table for T4BD-048 Series (4 Ton Units)

OUTDOOR TEMPERATURE (DEG. F)																					
Suc. Press	0			10			20			30			40			50			60		
	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Disch. Press.	Disch. Temp.	
30	296	161	43	320	162	55	345	163	68	369	164	83	401	173	101	463	189	119	526	206	
31	303	159	44	326	160	56	350	161	69	373	162	84	408	170	102	470	185	120	533	200	
32	310	157	45	332	158	57	354	159	70	377	160	85	415	167	103	477	180	121	540	194	
33	317	155	46	338	156	58	359	157	71	380	158	86	422	164	104	484	176	122	547	187	
34	324	153	47	344	154	59	364	155	72	384	156	87	429	161	105	491	171	123	554	181	
35	331	151	48	350	152	60	369	153	73	388	154	88	436	159	106	498	167	124	561	175	
36	338	149	49	356	150	61	374	151	74	391	152	89	443	156	107	505	162	125	568	169	

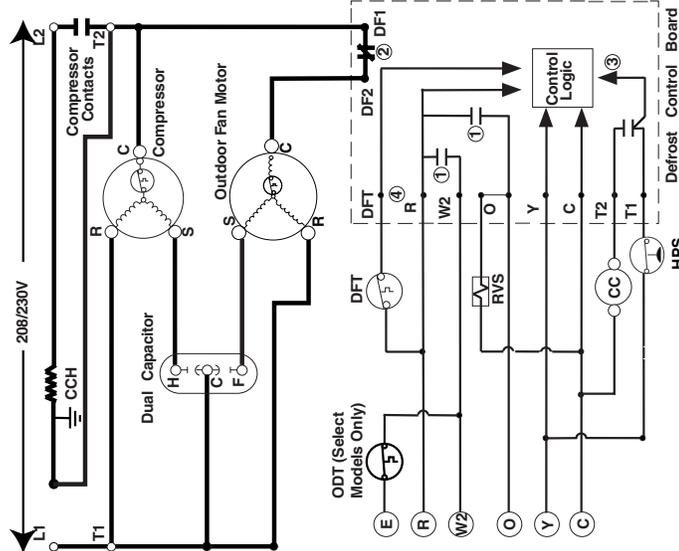
Table 16. Charging Table for T4BD-060 Series (5 Ton Units)

# ELECTRICAL DIAGRAMS & TABLES

## WIRING DIAGRAM

### Split System Heat Pump (Outdoor Section)

- NOTES:**
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150 volts to ground
  4. For replacement wires use conductors suitable for 105° C.
  5. For ampacities and overcurrent protection, see unit rating plate.
  6. Connect to 24 vac/40va/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional relay/transformer kits.

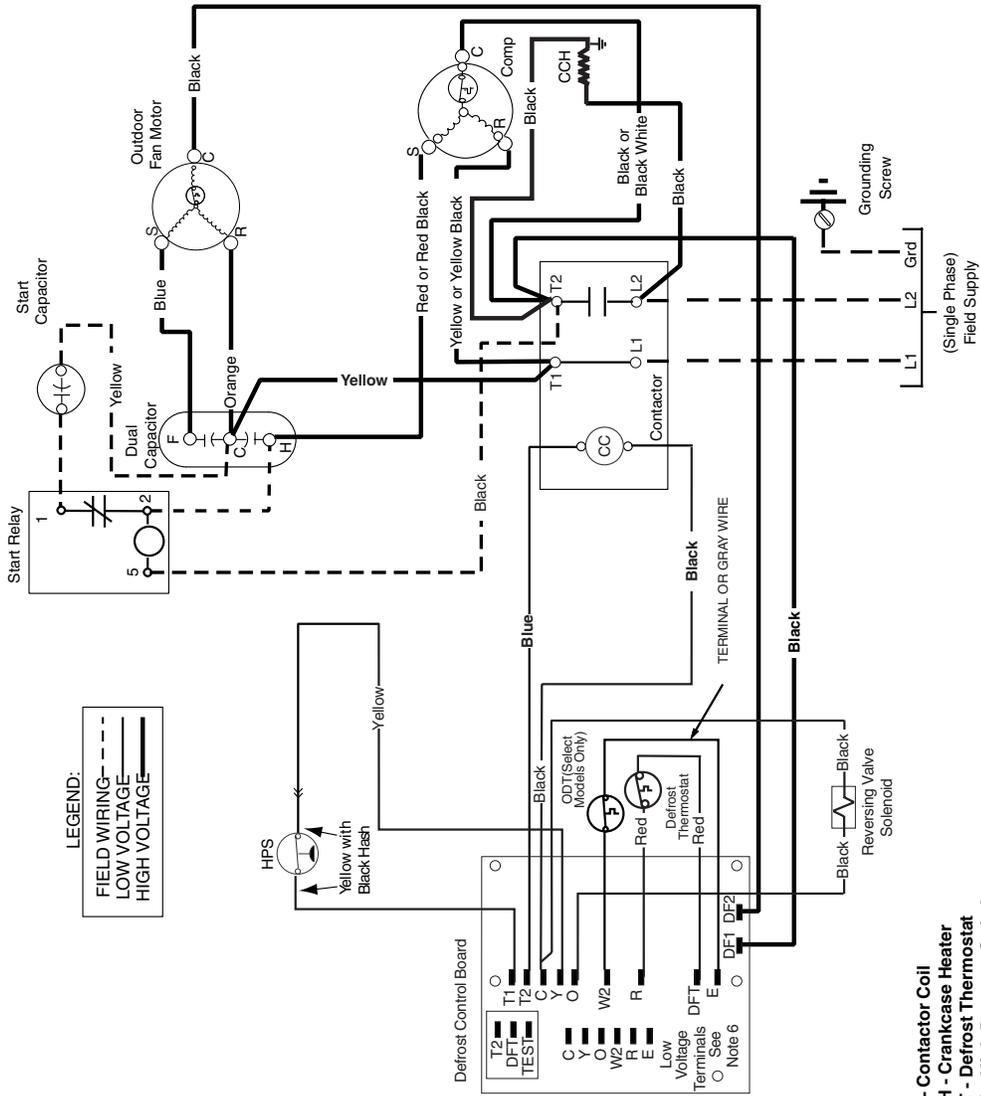


#### Defrost Board Operation:

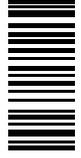
- 1) Closing during defrost. Rating: 1 Amp. Max.
- 2) Opens during defrost. Rating: 2HP at 230 Vac Max.
- 3) Closed when "y" is on. Open when "y" is off. Provides "off" delay time of 5 min. when "y" opens.
- 4) With DFT closed and "y" closed, compressor run time is accumulated. Opening of DFT during defrost or interval period resets the interval to 0.

### Single Phase

1. Couper le courant avant de faire leretien.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150 volt a la terre.



- CC - Contactor Coil**  
**CCH - Crankcase Heater**  
**DFT - Defrost Thermostat**  
**HPS - High Pressure Switch**  
**RVS - Reversing Valve Solenoid**  
**\* - Hard Start Kit Field Installed**  
**ODT - Outdoor Thermostat**



710507-D  
 (Replaces 710507-C)

05/11

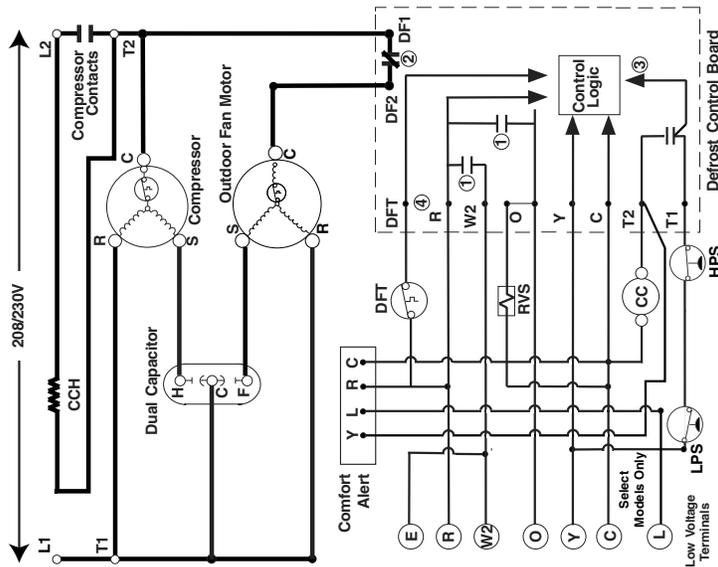
Figure 13. T4BD Wiring Diagram - Single Phase Models

# WIRING DIAGRAM

## Split System Heat Pump (Outdoor Section)

### NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150 volts to ground.
4. For replacement wires use conductors suitable for 105° C.
5. For ampacities and overcurrent protection, see unit rating plate.
6. Connect to 24 vac/40vac/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional relay/transformer kits.

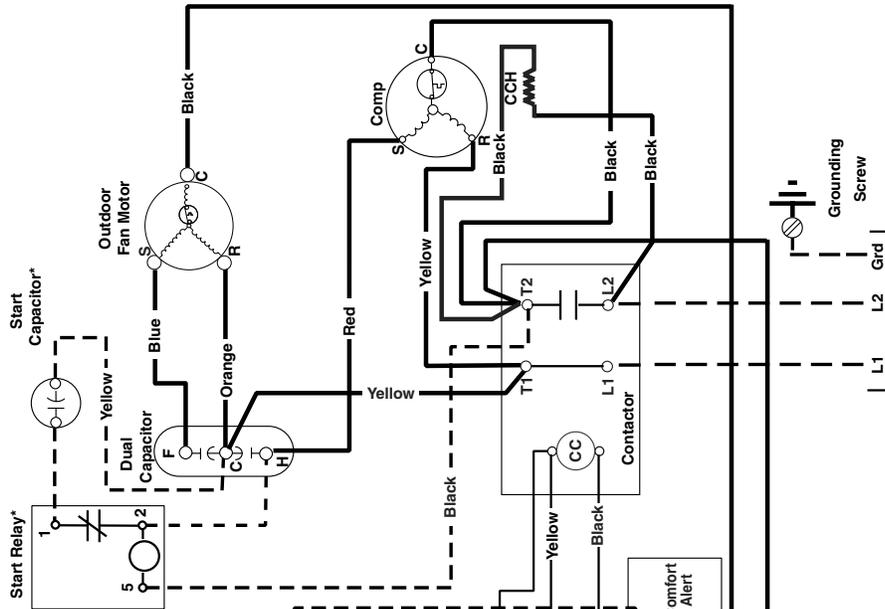


### Defrost Board Operation:

- ① Closing during defrost. Rating: 1 Amp. Max.
- ② Opens during defrost. Rating: 2 HP at 230 Vac Max.
- ③ Closed when "y" is on. Open when "y" is off. Provides "off" delay time of 5 min. when "y" opens.
- ④ With DFT closed and "y" closed, compressor run time is accumulated. Opening of DFT during defrost or interval period resets the interval to 0.

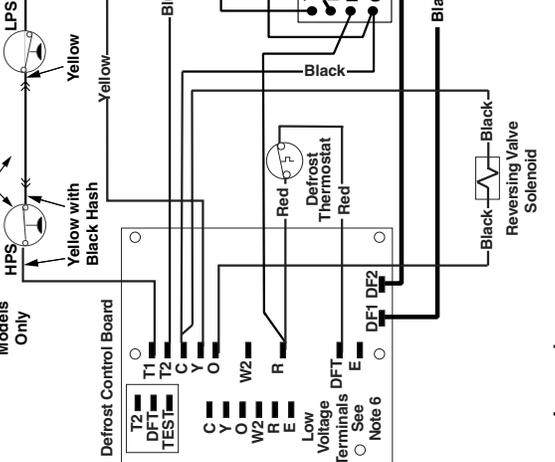
## Single Phase

1. Couper le courant avant de faire le rattrapage.
2. Employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150 volt a la terre.



Status LED	LED Description
Green "POWER"	Module has power
Red "TRIP"	Thermostat demand signal Y is present, but the compressor is not running
Yellow "ALERT" Flash Code 1	Long Run Time Compressor is running extremely long run cycles
Yellow "ALERT" Flash Code 2	System Pressure Trip Discharge or suction pressure out of limits or compressor overloaded
Yellow "ALERT" Flash Code 3	Short Cycling Compressor is running only briefly
Yellow "ALERT" Flash Code 4	Locked Rotor
Yellow "ALERT" Flash Code 5	Open Start Circuit Current only in run circuit
Yellow "ALERT" Flash Code 6	Open Run Circuit Current only in start circuit
Yellow "ALERT" Flash Code 7	Welded Contactor Compressor always runs
Yellow "ALERT" Flash Code 8	Low Voltage Control circuit < 17 VAC
Yellow "ALERT" Flash Code 9	

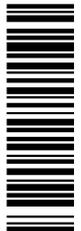
Used in R410a Models Only  
Select Models Only  
HPS  
Yellow with Black Hash  
Yellow



### Legend

- Field Wiring (dashed line)
- Factory Wiring (solid line)
- Low Voltage (circle)
- High Voltage (square)

- CC - Contactor Coil
- CCH - Crankcase Heater
- DFT - Defrost Thermostat
- HPS - High Pressure Switch
- LPS - Low Pressure Switch
- RVS - Reversing Valve Solenoid
- \* - Hard Start Kit Field Installed



710533E  
(Replaces 710533D)

06/10

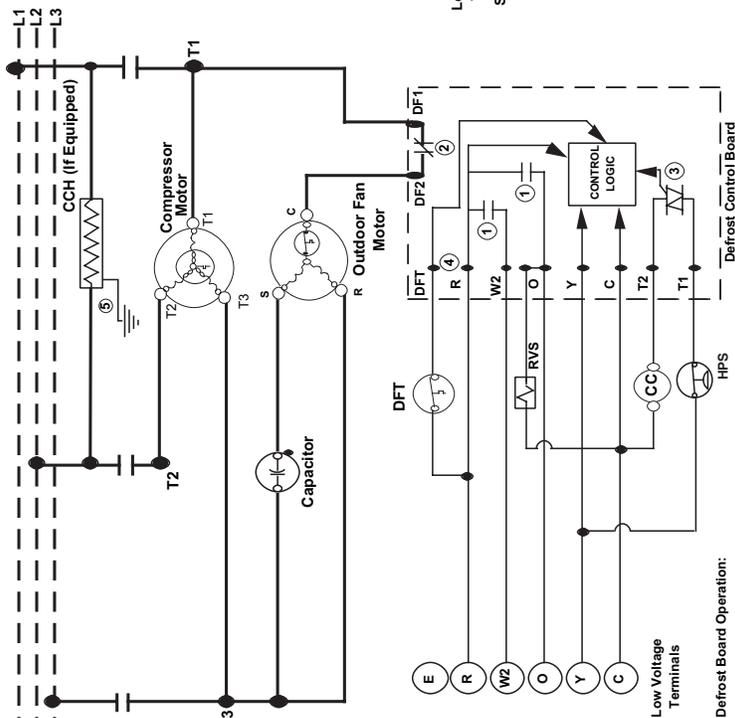
Figure 14. T4BD Wiring Diagram - Single Phase Models with Comfort Alert

# WIRING DIAGRAM

## Split System Heat Pump

### NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. Not suitable on systems that exceed 150 volts to ground.
4. For replacement wires use conductors suitable for 105deg. C
5. For supply wire ampacities and overcurrent protection, see unit data label.
6. Connect to 24 vac/40va/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional Relay/Transformer Kits.



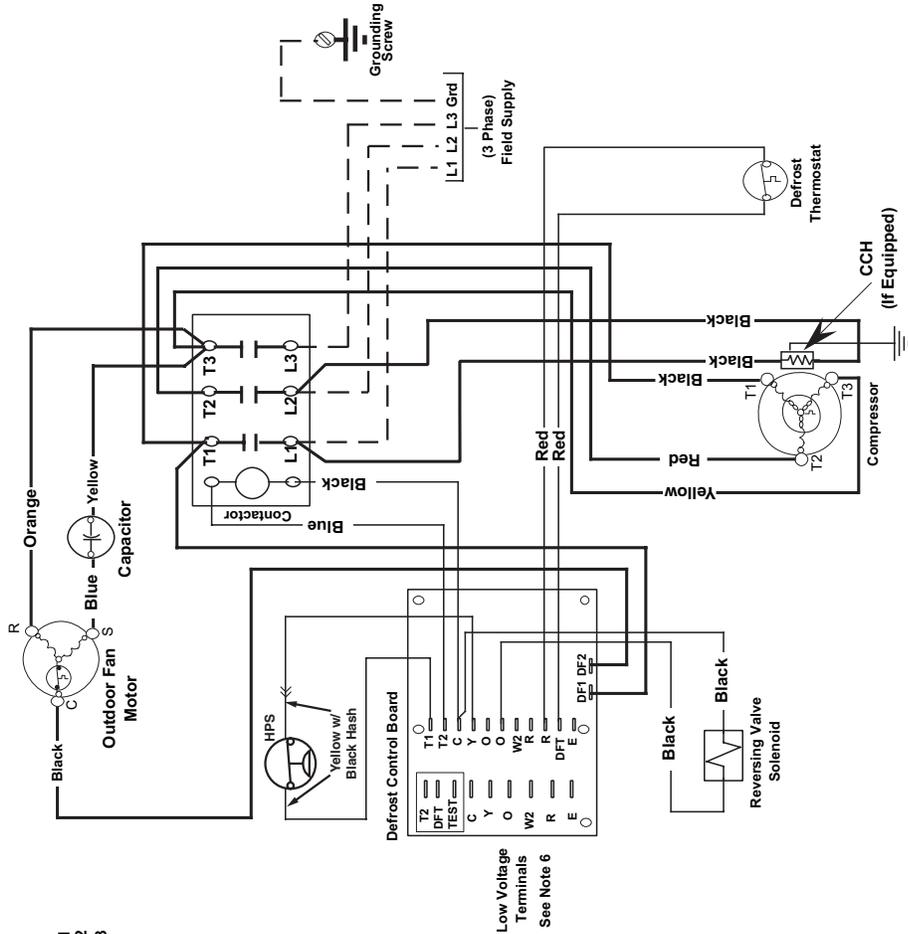
- Defrost Board Operation:
- ① Closes during defrost. Rating: 1 Amp. Max.
  - ② Opens during defrost. Rating: 2 HP. at 230 Vac Max.
  - ③ Closed when "Y" is on. Open when "Y" is off. Provides "off" delay time of 5 min. when "Y" opens.
  - ④ With DFT closed and "Y" closed, compressor run time is accumulated. Opening of DFT during defrost or interval period resets the interval to 0.
  - ⑤ Ground on location provided inside compressor terminal box.

### LEGEND:



## Three Phase

1. Couper le courant avant de faire le retrait.
2. Employez uniquement des conducteurs en cuivre
3. Ne convient pas aux installations de plus de 150 volt a la terre.



7106870  
05/07

Figure 15. T4BD Wiring Diagram - Three Phase, 208/230V Models

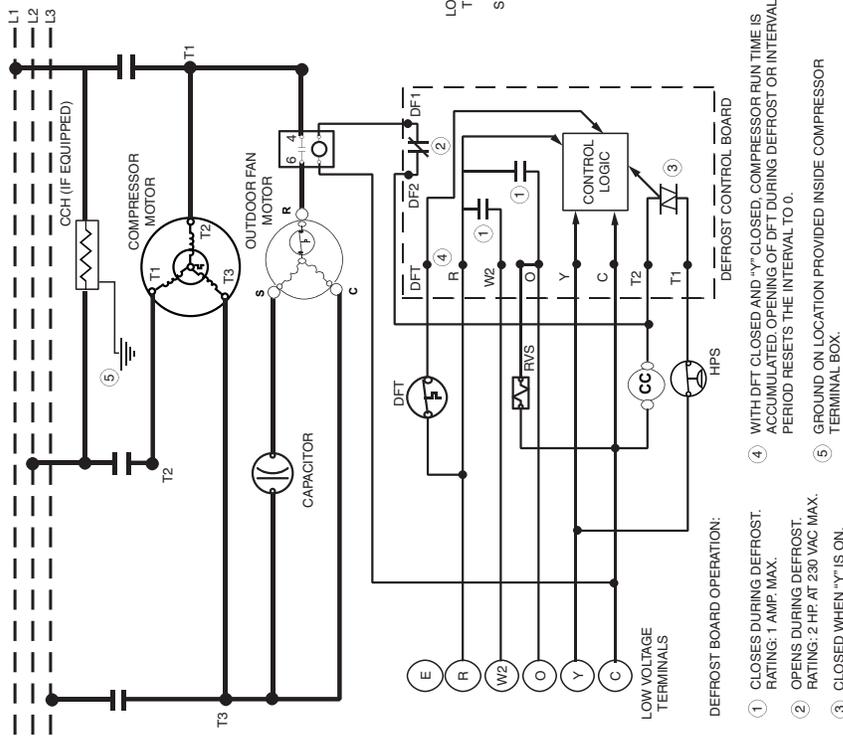
# WIRING DIAGRAM

## Split System Heat Pump

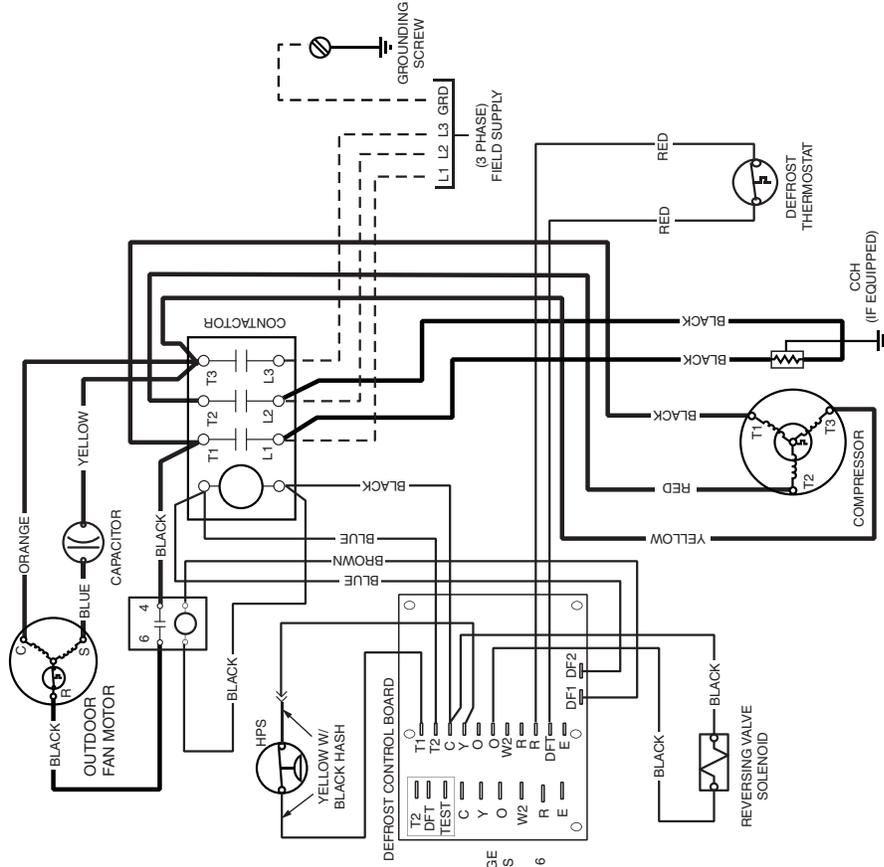
### NOTES:

1. Disconnect all power before servicing.
2. For supply connections use copper conductors only.
3. For replacement wires use conductors suitable for 105deg. C
4. For supply wire ampacities and overcurrent protection, see unit data label.
5. Connect to 24 vac/40va/class 2 circuit. See furnace/air handler installation instructions for control circuit and optional Relay/Transformer Kits.

1. Couper le courant avant de faire leretien.
2. Employez uniquement des conducteurs en cuivre



## Three Phase 460 V



LEGEND:  
 FIELD WIRING - - -  
 LOW VOLTAGE - - -  
 HIGH VOLTAGE ———



7107360

05/07

Figure 16. T4BD Wiring Diagram - Three Phase, 460V Models

## COMFORT ALERT TROUBLESHOOTING

Status LED	Status LED Description	Status LED Troubleshooting Information
POWER (Green LED)	Module has power	Supply voltage is present at module terminals
TRIP (Red LED)	Thermostat demand signal Y is present, but compressor is not running	<ul style="list-style-type: none"> <li>• Compressor protector is open</li> <li>• Check for high head pressure</li> <li>• Check compressor supply voltage</li> <li>• Outdoor unit power disconnect is open</li> <li>• Compressor circuit breaker or fuse(s) is open</li> <li>• Broken wire or connector is not making contact</li> <li>• Low pressure switch open if present in system</li> <li>• Compressor contactor has failed open</li> </ul>
ALERT Flash Code 1 (Yellow LED)	Long Run Time Compressor is running extremely long run cycles	<ul style="list-style-type: none"> <li>• Low refrigerant charge</li> <li>• Evaporator blower is not running                             <ul style="list-style-type: none"> <li>— Check blower relay coil and contacts</li> <li>— Check blower motor capacitor</li> <li>— Check blower motor for failure or blockage</li> <li>— Check evaporator blower wiring and connectors</li> <li>— Check indoor blower control board</li> <li>— Check thermostat wiring for open circuit</li> </ul> </li> <li>• Evaporator coil is frozen                             <ul style="list-style-type: none"> <li>— Check for low suction pressure</li> <li>— Check for excessively low thermostat setting</li> <li>— Check evaporator airflow (coil blockages or return airfilter)</li> <li>— Check ductwork or registers for blockage</li> </ul> </li> <li>• Faulty metering device                             <ul style="list-style-type: none"> <li>— Check TXV bulb installation (size, location and contact)</li> <li>— Check if TXV/fixed orifice is stuck closed or defective</li> </ul> </li> <li>• Condenser coil is dirty</li> <li>• Liquid line restriction (filter drier blocked if present in system)</li> <li>• Thermostat is malfunctioning                             <ul style="list-style-type: none"> <li>— Solenoid plug not connected</li> <li>— Y2 not wired at Comfort Alert</li> <li>— Check thermostat sub-base or wiring for short circuit</li> <li>— Check thermostat installation (location, level)</li> </ul> </li> <li>• Comfort Alert failure</li> </ul>
ALERT Flash Code 2 (Yellow LED)	System Pressure Trip	<ul style="list-style-type: none"> <li>• High head pressure                             <ul style="list-style-type: none"> <li>— Check high pressure switch if present in system</li> <li>— Check if system is overcharged with refrigerant</li> <li>— Check for non-condensable in system</li> </ul> </li> </ul>
	Discharge or suction	<ul style="list-style-type: none"> <li>• Condenser coil poor air circulation (dirty, blocked, damaged)</li> </ul>
	Pressure out of limits	<ul style="list-style-type: none"> <li>• Condenser fan is not running                             <ul style="list-style-type: none"> <li>— Check fan capacitor</li> <li>— Check fan wiring and connectors</li> <li>— Check fan motor for failure or blockage</li> </ul> </li> </ul>
	Compressor overloaded	<ul style="list-style-type: none"> <li>• Return air duct has substantial leakage</li> <li>• If low pressure switch present in system, check Flash Code 1 information</li> </ul>
ALERT Flash Code 3 (Yellow LED)	Short Cycling / Compressor is running only briefly	<ul style="list-style-type: none"> <li>• Thermostat demand signal is intermittent</li> <li>• Low line voltage (contact utility if voltage at disconnect is low)</li> <li>• Excessive liquid refrigerant in compressor</li> <li>• Compressor bearings are seized</li> </ul>
ALERT Flash Code 4 (Yellow LED)	Locked Rotor	<ul style="list-style-type: none"> <li>• Run capacitor has failed</li> <li>• Low line voltage (contact utility if voltage at disconnect is low)</li> <li>• Check wiring connections</li> <li>• Excessive liquid refrigerant in compressor</li> <li>• Compressor bearings are seized</li> <li>• Measure compressor oil level</li> </ul>
ALERT Flash Code 5 (Yellow LED)	Open Circuit	<ul style="list-style-type: none"> <li>• Outdoor unit power disconnect is open</li> <li>• Compressor circuit breaker or fuse(s) is open</li> <li>• Compressor contactor has failed open                             <ul style="list-style-type: none"> <li>— Check compressor contactor wiring and connectors</li> <li>— Check for compressor contactor failure (burned, pitted or open)</li> <li>— Check wiring and connectors between supply and compressor</li> <li>— Check for low pilot voltage at compressor contactor coil</li> <li>— High pressure switch is open and requires manual reset</li> </ul> </li> <li>• Open circuit in compressor supply wiring or connections</li> <li>• Unusually long compressor protector reset time due to extreme ambient temperature</li> <li>• Compressor windings are damaged                             <ul style="list-style-type: none"> <li>— Check compressor motor winding resistance</li> </ul> </li> </ul>

**Table 17. LED Diagnostics**

## COMFORT ALERT TROUBLESHOOTING - CONTINUED

Status LED	Status LED Description	Status LED Troubleshooting Information
ALERT Flash Code 6 (Yellow LED)	Open Start Circuit Current only in run circuit	<ul style="list-style-type: none"> <li>• Run capacitor has failed</li> <li>• Open circuit in compressor start wiring or connections                             <ul style="list-style-type: none"> <li>— Check wiring and connectors between supply and the compressor <b>S</b> terminal</li> </ul> </li> <li>• Compressor start winding is damaged                             <ul style="list-style-type: none"> <li>— Check compressor motor winding resistance</li> </ul> </li> </ul>
ALERT Flash Code 7 (Yellow LED)	Open run circuit Current only in start circuit	<ul style="list-style-type: none"> <li>• Open circuit in compressor run wiring or connections                             <ul style="list-style-type: none"> <li>— Check wiring and connectors between supply and the compressor <b>R</b> terminal</li> </ul> </li> <li>• Compressor run winding is damaged                             <ul style="list-style-type: none"> <li>— Check compressor motor winding resistance</li> </ul> </li> </ul>
ALERT Flash Code 8 (Yellow LED)	Welded Contactor Compressor always runs	<ul style="list-style-type: none"> <li>• Compressor contactor has failed closed</li> <li>• Thermostat demand signal not connected to module</li> </ul>
ALERT Flash Code 9 (Yellow LED)	Low Voltage Control circuit < 17VAC	<ul style="list-style-type: none"> <li>• Control circuit transformer is overloaded</li> <li>• Low line voltage (contact utility if voltage at disconnect is low)</li> <li>• Check wiring connections</li> </ul>

\* Flash code number corresponds to a number of LED flashes, followed by a pause and then repeated. Trip and alert LED's flashing at same time means control circuit voltage is too low for operation.

**Table 17. LED Diagnostics - Continued**

Miswired Module Indication	Recommended Troubleshooting Action
Green LED is not on, module does not power up	<ul style="list-style-type: none"> <li>• Determine if both <b>R</b> &amp; <b>C</b> module terminals are connected.</li> <li>• Verify voltage is present at module's <b>R</b> &amp; <b>C</b> terminals.</li> </ul>
Green LED intermittent, module powers up only when compressor runs	<ul style="list-style-type: none"> <li>• Determine if <b>R</b> &amp; <b>Y</b> terminals are wired in reverse.</li> <li>• Verify modules <b>R</b> &amp; <b>C</b> terminals have a constant source.</li> </ul>
Trip LED is on, but system and compressor check OK	<ul style="list-style-type: none"> <li>• Verify <b>Y</b> terminal is connected to 24VAC at contactor coil.</li> <li>• Verify voltage at contactor coil falls below 0.5VAC when off.</li> <li>• Verify 24VAC is present across <b>Y</b> &amp; <b>C</b> when thermostat demand signal is preset. If not, <b>R</b> &amp; <b>C</b> are reversed wired.</li> </ul>
TRIP LED & ALERT LED flashing together	<ul style="list-style-type: none"> <li>• Verify <b>R</b> &amp; <b>C</b> terminals are supplied with 19 - 28VAC.</li> </ul>
ALERT Flash CODE 3 displayed incorrectly (Compressor short cycling)	<ul style="list-style-type: none"> <li>• Verify <b>Y</b> terminal is connected to 24VAC at contactor coil.</li> <li>• Verify voltage at contactor coil falls below 0.5VAC when off.</li> </ul>
ALERT Flash Code 5, 6, or 7 displayed incorrectly (Open Circuit, Open Start Circuit or Open Run Circuit)	<ul style="list-style-type: none"> <li>• Verify the compressor run and start wires are routed through the module's current sensing holes.</li> <li>• Verify the <b>Y</b> terminal is connected to 24VAC at contactor coil.</li> <li>• Verify voltage at contactor coil falls below 0.5VAC when off.</li> </ul>
ALERT Flash Code 6 (Open Start Circuit) displayed for Code 7 (Open Run Circuit) or vice-versa	<ul style="list-style-type: none"> <li>• Verify the compressor run and start wires are routed through the correct module sensing holes.</li> </ul>
ALERT Flash Code 8 displayed incorrectly (Welded Contactor)	<ul style="list-style-type: none"> <li>• Determine if module's <b>Y</b> terminal is connected.</li> <li>• Verify <b>Y</b> terminal is connected to 24VAC at contactor coil.</li> <li>• Verify 24VAC is present across <b>Y</b> &amp; <b>C</b> when thermostat demand signal is present. If not, <b>R</b> &amp; <b>C</b> are reversed wired.</li> <li>• Verify voltage at contactor coil falls below 0.5VAC when off.</li> <li>• Review Thermostat Demand Wiring (page 10) for <b>Y</b> &amp; <b>C</b> wiring.</li> </ul>

**Table 18. Module Wiring Troubleshooting**

## INSTALLATION / PERFORMANCE CHECK LIST

<b>INSTALLATION ADDRESS:</b>		
CITY _____	STATE _____	
UNIT MODEL # _____		
UNIT SERIAL # _____		
Unit Installed Minimum clearances per Figure 1 (page 3)?	YES	NO
<b>INSTALLER NAME:</b>		
CITY _____	STATE _____	
Has the owner's information been reviewed with the customer?	YES	NO
Has the Literature Package been left with the unit?	YES	NO

REFRIGERATION SYSTEM		
Was unit given 24 hr warm up period for crankcase heaters?	YES	NO
Stage-1 Liquid Pressure (high side) _____		
Stage-1 Suction Pressure (low side) _____		

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage: _____ VOLTS		
L1-L2 Volts: _____ VOLTS		
L1-L3 Volts: _____ VOLTS		
L2-L3 Volts: _____ VOLTS		
Avg. Volts: _____ VOLTS		
Max. deviation of voltage from avg. volts: _____ VOLTS		
% Volt imbalance: _____ VOLTS		
Blower Motor HP: _____ Sheave Setting _____ # Turns		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct? (If Applicable)	YES	NO

### REPLACEMENT PARTS

Replacement parts are available through your distributor. Please have the complete model and serial number of the unit when ordering replacement parts.

**Electrical:**

- |                   |                            |
|-------------------|----------------------------|
| Capacitors        | Temperature Limit Switches |
| Compressors       | Thermostats                |
| Contactors        | Time Delay Relays          |
| Pressure Switches | Transformers               |
| Relays            |                            |

**Motors:**

- Blower Motor
- Fan Motor

**Components:**

- |                  |               |
|------------------|---------------|
| Blower Assembly  | Fan Grille    |
| Cabinet Panels   | Filter/Driers |
| Expansion Valves |               |

