

# INSTALLATION INSTRUCTIONS

## T4BE - 018, 024, 030, 036, 042, 048, & 060 (1.5, 2, 2.5, 3, 3.5, 4, & 5 Ton) Series SINGLE PHASE MODELS

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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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**This split system heat pumps is 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 C1) 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.

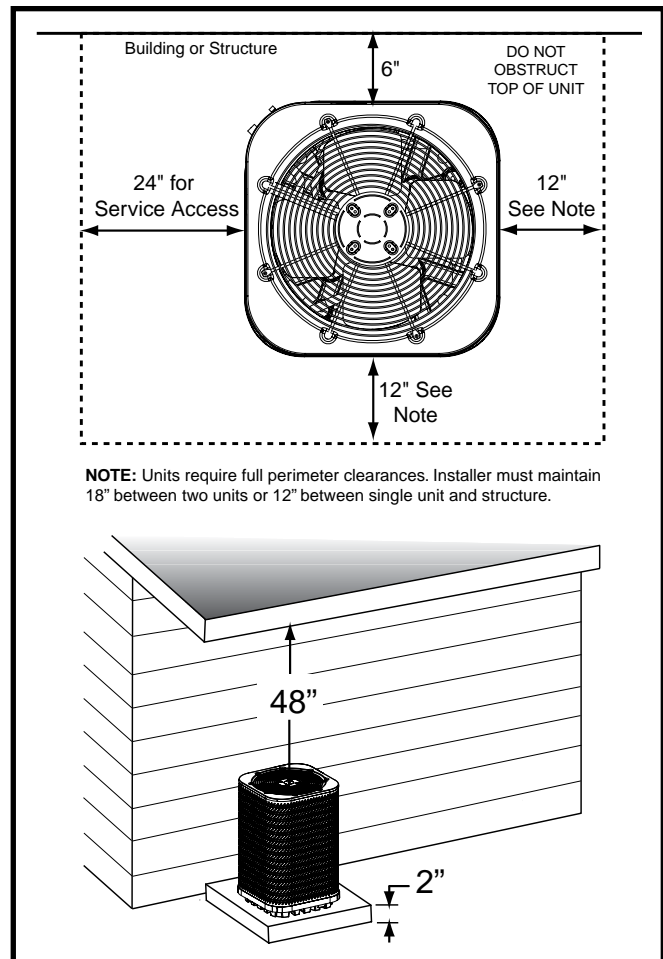


Figure 1. Clearance Requirements

## 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.

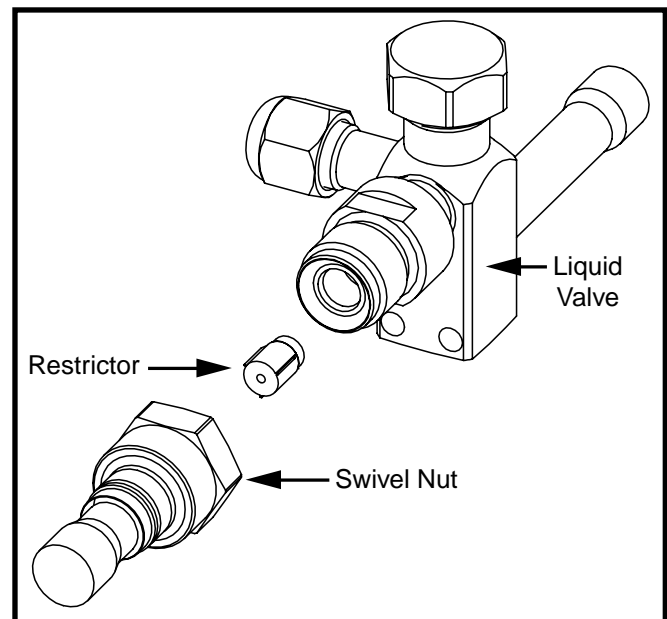
### **⚠ CAUTION:**

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

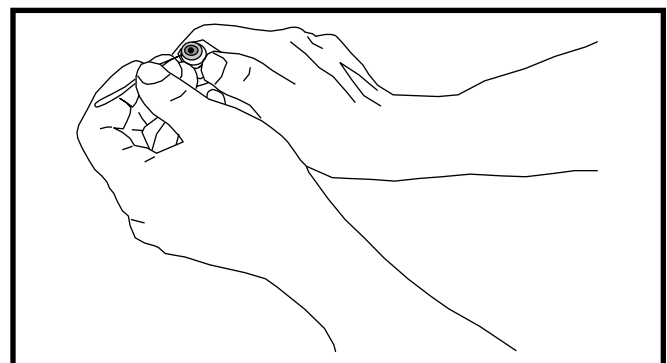
### **⚠ CAUTION:**

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.



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



**Figure 3. Removal of Orifice**

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.

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 **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!**

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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 ¼ turn using two wrenches. The movement of the two lines will show how much the nut is tightened.

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**ELECTRICAL WIRING**

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 **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 12-14, pages 17-19). Inspect for loose connections.

**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 (Figures 12-14, pages 17-19) 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 6). 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.

**Grounding**

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 **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!**

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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.

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.

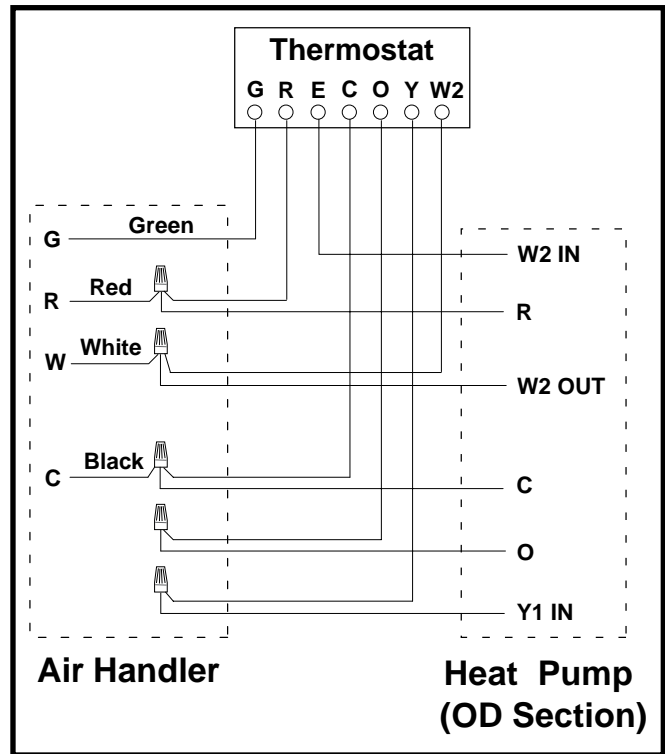
**Table 1. Copper Wire Size**

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**

### 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 4.
- 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



**Figure 4. Typical Thermostat Connections**

information.

### CoreSense™ Diagnostics Module (Select Models Only)

The CoreSense™ Diagnostics Module (Figure 5, page 7) 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 using the compressor as a sensor, CoreSense Diagnostics helps the service technician more accurately troubleshoot system and compressor fault conditions.

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. Alert identification codes are also listed in Table 3 (page 7).

### Compressor Protection

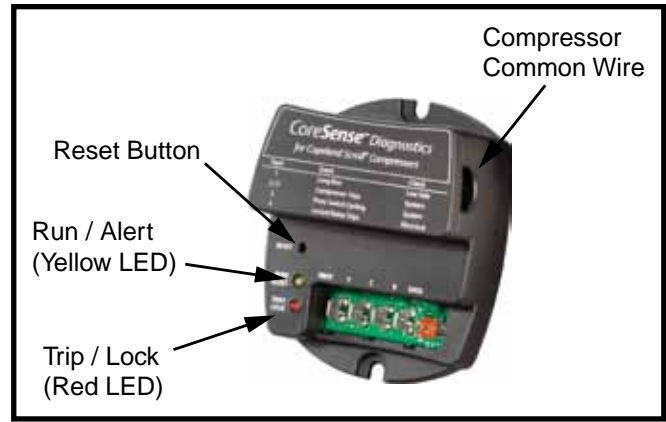
The CoreSense™ Diagnostics module utilizes proprietary algorithms to protect the compressor and system from repeated trips of system pressure controls and the compressor internal overload. The protection terminal of the module should be wired in series with the system low pressure and high pressure cutouts, as well as the compressor contactor. When the module detects a series of trips as described below, it will activate a lockout feature that opens the normally closed protection contacts in the module, thereby cutting power to the contactor and shutting off the compressor.

## Resetting Alert Codes

When the CoreSense™ Diagnostics module has detected a series of adverse conditions that have caused it to lockout the compressor, and after the issue has been resolved, it is necessary to manually reset the module in order to clear the present alert code.

The primary way of clearing the code and resetting the alert is to press the reset button located on the module.

**NOTE:** Pressing the reset will require a pin or a mini electronics screwdriver. This button must be pressed and held for a minimum of one second for the module to be reset. Pressing the reset button clears the immediate lock code and the seven day operating history. It will not clear the permanent module history. In the case of the three-wire module, the codes can be reset or cleared by cycling power to the module. This can be done by disengaging the Common (C) terminal. This will not clear the seven day operating history.



**Figure 5. CoreSense™ Diagnostics Module**

ALERT CODE	ALERT CONDITION	LOCK LEVEL	LOCK INDICATION
<b>Normal Run</b> Solid Yellow	Normal operation, no trip	N/A	N/A
<b>Code1</b> Yellow Flash 1	Long run time. Compressor is on running for more than 18 hours. (Code1 is disabled in Heat Pump Mode)	N/A	N/A
<b>Code2</b> Yellow Flash 2	Compressor (pressure) trip. Compressor runs for 12 sec to 15 min followed by a compressor trip condition lasting for more than 7 min.	4x consecutive	Red: Flash2 Yellow: Off
<b>Code3</b> Yellow Flash 3	Pressure switch cycling. Compressor runs for 12 sec to 15 min followed by a compressor trip lasting between 35 sec to 7 min.	4x consecutive or 10x total	Red: Flash3 Yellow: Off
<b>Code4</b> Yellow Flash 4	Locked rotor. Compressor trips within a compressor run time of 12 sec and does not start within 35 sec.	10x consecutive	Red: Flash4 Yellow: Off
<b>Code5</b> Yellow Flash 5	Compressor (moderate run) trip. Compressor runs for 15 min to 18 hrs followed by a compressor trip lasting longer than 7 min.	4x consecutive or 10x total	Red: Flash5 Yellow: Off
<b>Code9</b> Red Flash 9	The current to the PROT terminal is greater than 2A.	Current >2A for 40ms	Red: Flash9 Yellow: Off
<b>Trip</b> Solid Red	Demand is present, but compressor is not running.	N/A	N/A

**Table 3. LED Diagnostics for CoreSense™ Diagnostics Module**

## 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

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#### **WARNING:**

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**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.**

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### Air Circulation - Indoor Blower

1. Set the thermostat system mode on OFF and the fan mode to ON.
2. 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.
3. Set the thermostat fan mode to AUTO and verify the blower stops running.

### 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 it's 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 Control Board Test Pins

- Placing a jumper between the test pins for less than 1 second will bypass the Anti-Short Cycle Timer.
- Placing a jumper between the test pins for more than 1 second will force the unit into a defrost cycle. As soon as the jumper is removed, the defrost cycle will end as determined by the typical criteria.

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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:**

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

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

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**REFRIGERANT CHARGING**

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**⚠ WARNING:**

**This split system heat pump is 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.**

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 assemblies of this equipment and listed airflows for the indoor coil. 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 5 - 11 (pages 10 - 13) and Tables 4 - 10 (pages 15 - 16) 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 4 - 10, pages 14-16) are provided for quick reference when the unit is in heating mode and for the inspection of the liquid line pressures and temperatures.

- 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.

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**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 from Figures 5 - 11 (pages 10 - 13).
  - 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.

## REFRIGERANT CHARGING CHARTS - COOLING ONLY

### Application notes for using charging charts

- 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 5 - 11, pages 10 - 13), 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)

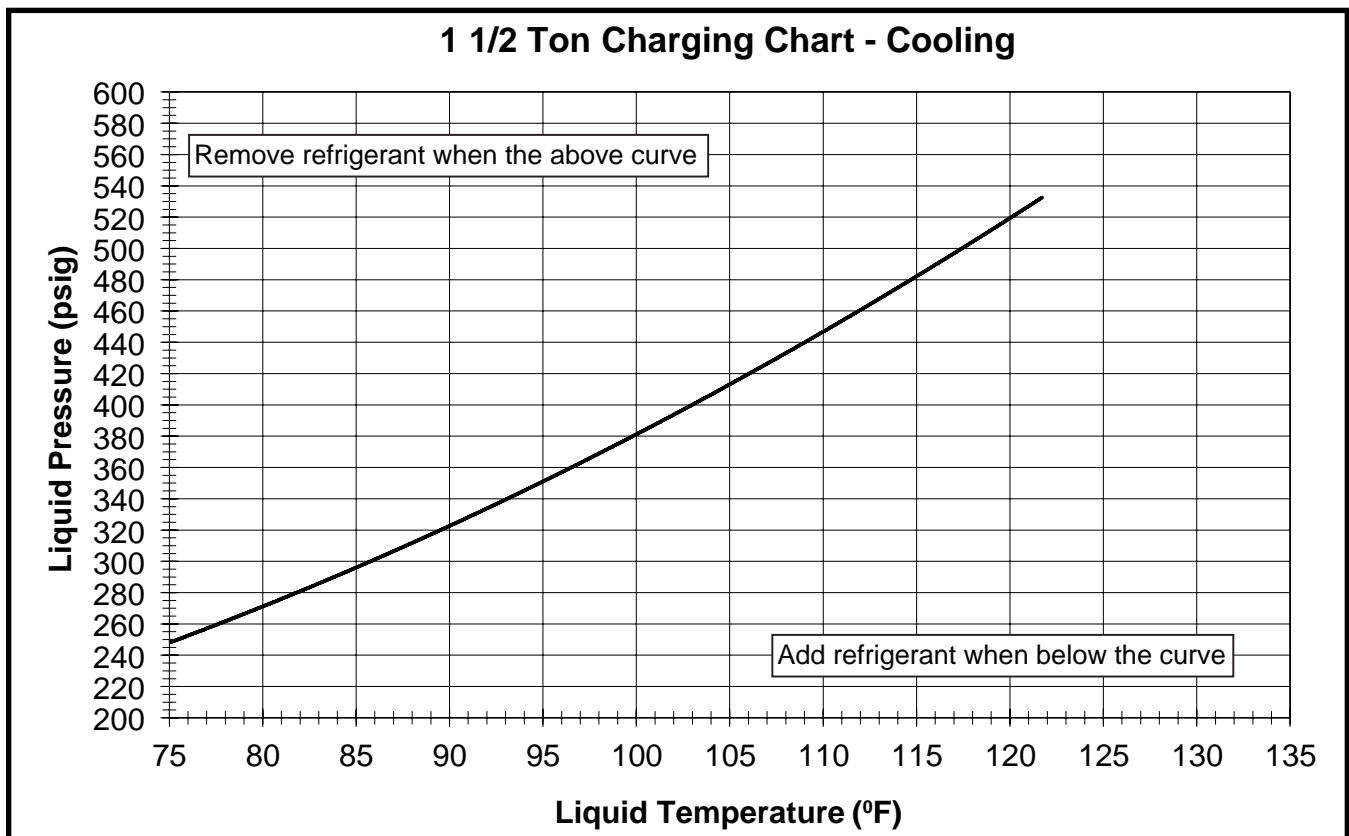


Figure 5. Charging Chart for 1.5 Ton Units (TXV Matches)

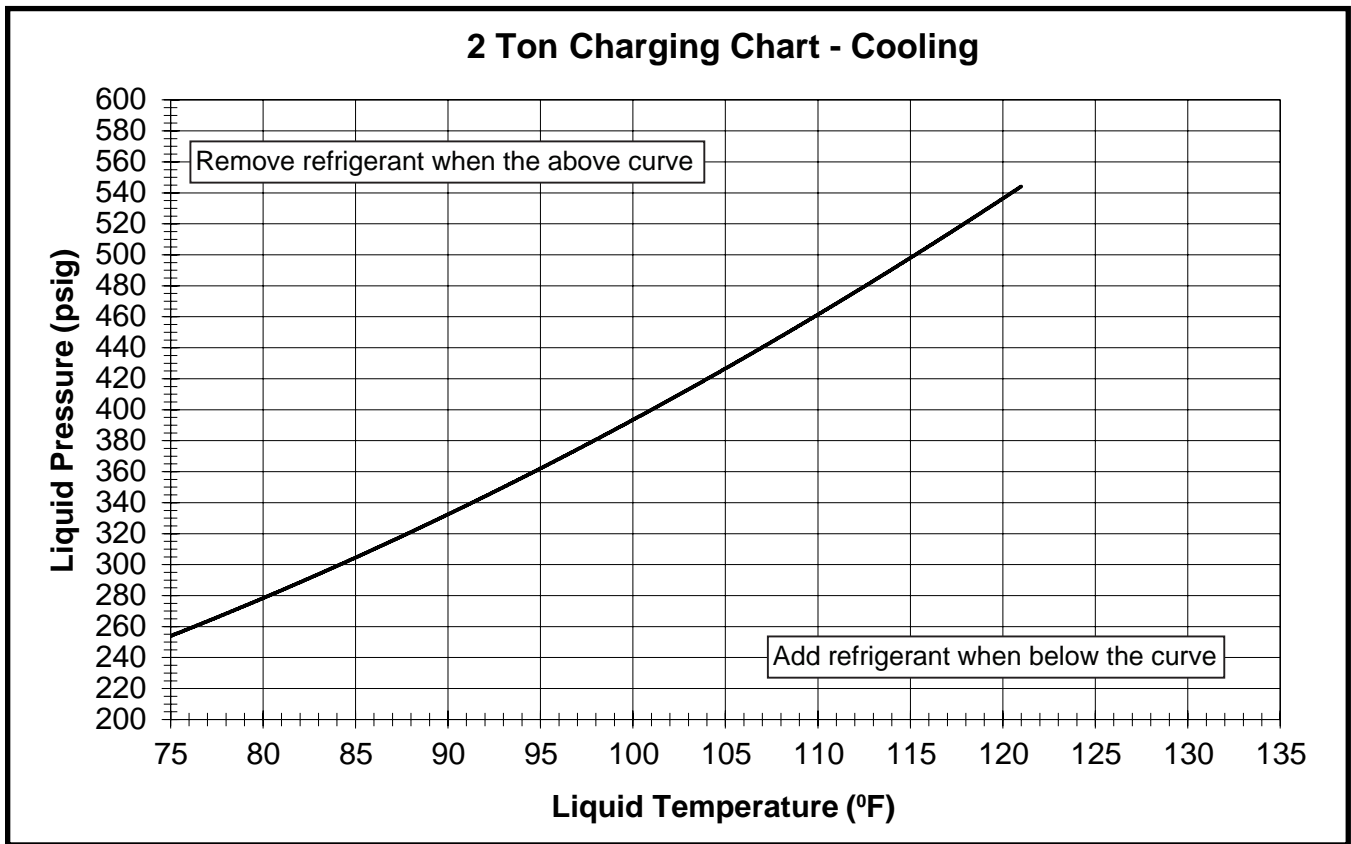


Figure 6. Charging Chart for 2 Ton Units (TXV Matches)

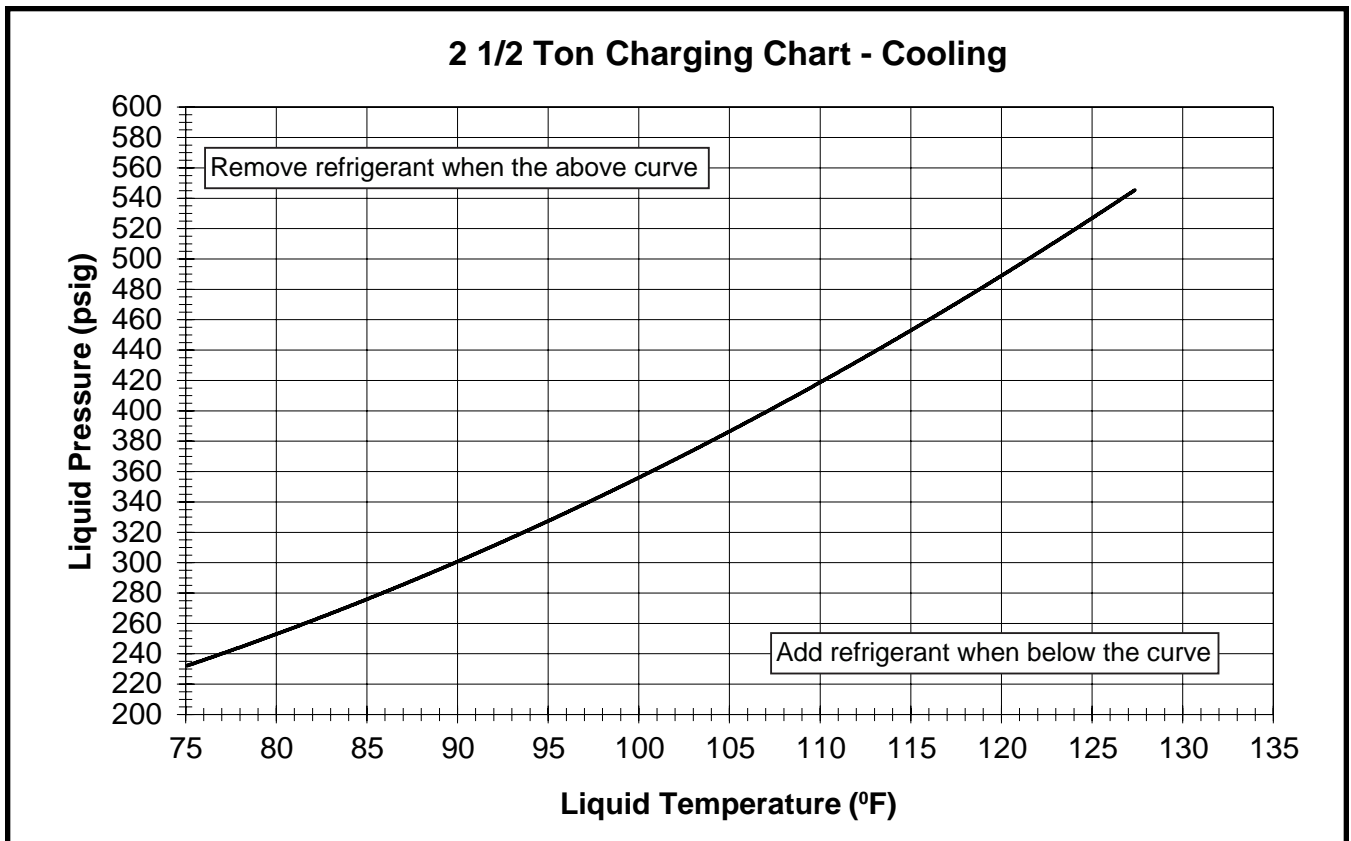


Figure 7. Charging Chart for 2.5 Ton Units (TXV Matches)

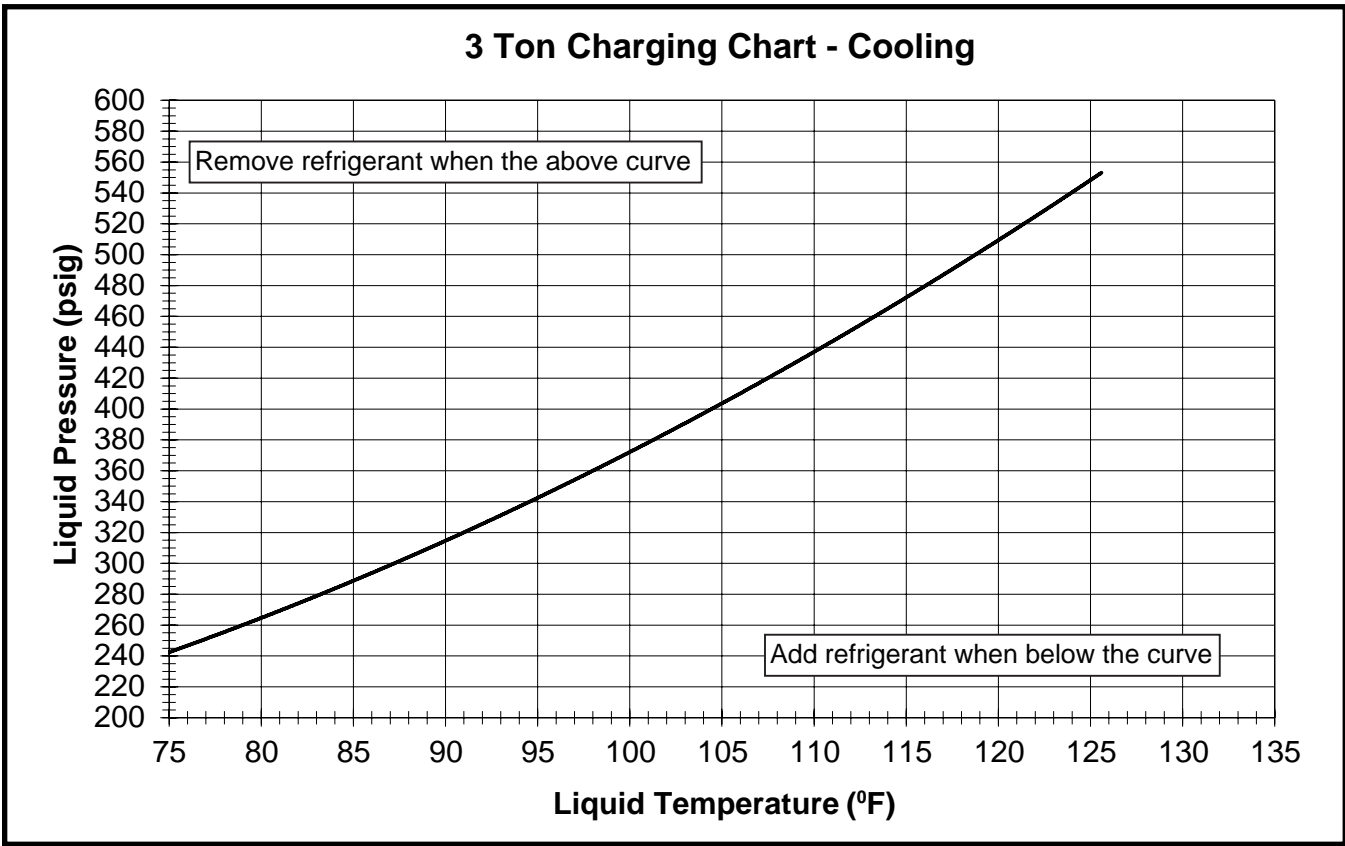


Figure 8. Charging Chart for 3 Ton Units (TXV Matches)

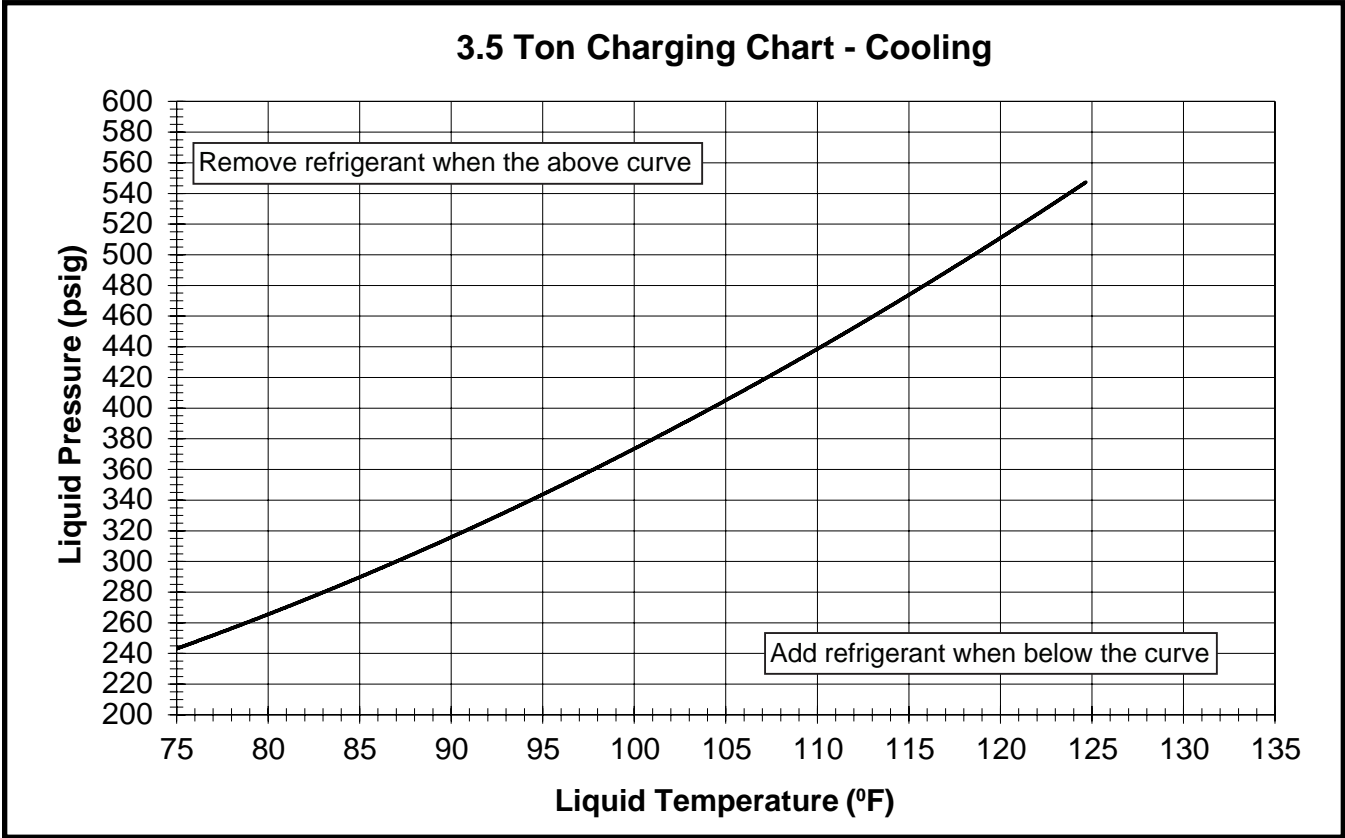


Figure 9. Charging Chart for 3.5 Ton Units (TXV Matches)

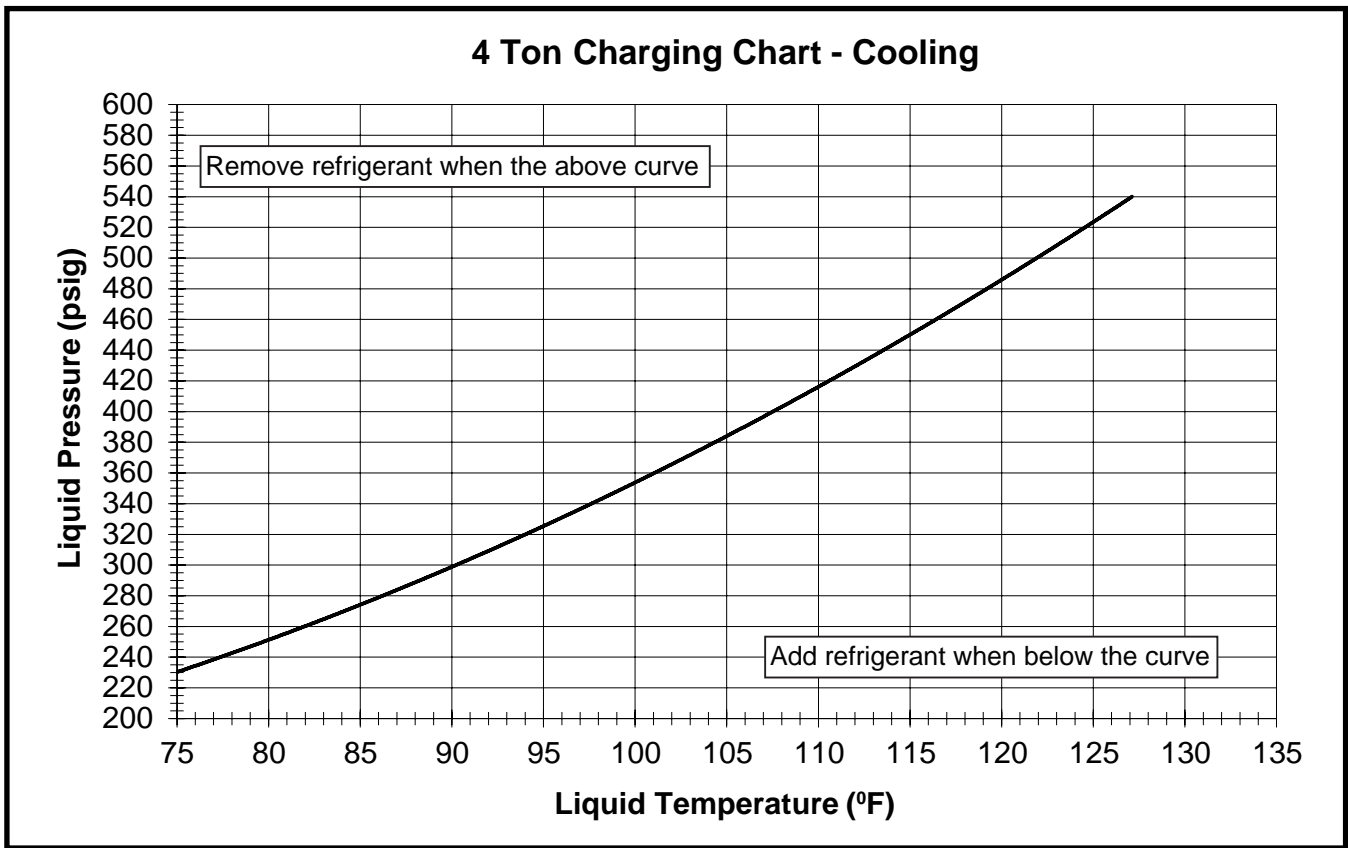


Figure 10. Charging Chart for 4 Ton Units (TXV Matches)

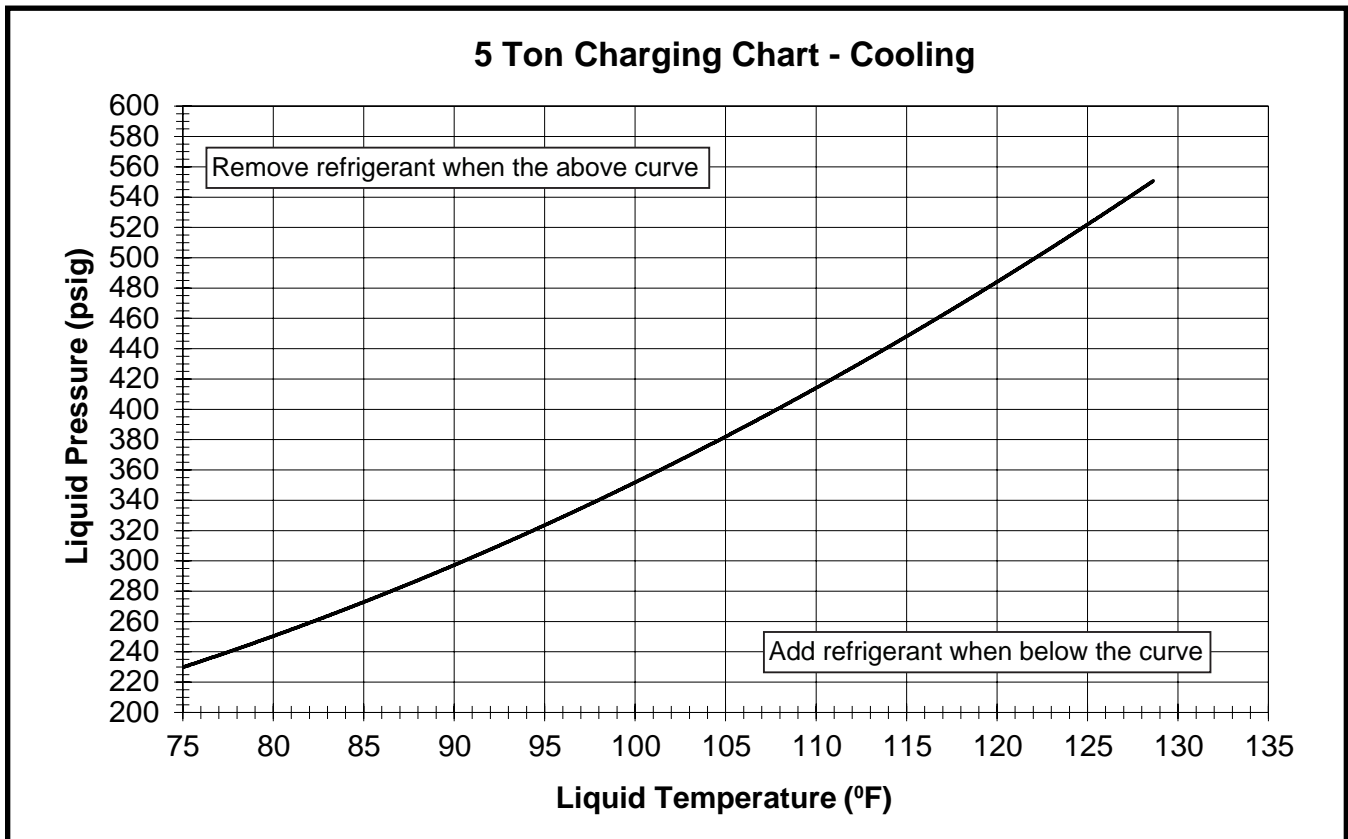




Figure 11. Charging Chart for 5 Ton Units (TXV Matches)

## HEAT MODE VERIFICATION TABLES - HEATING ONLY

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

#### 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 4 - 10, pages 15 - 16), 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 4), 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.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	
32	201	202	112	48	226	227	119	63	252	252	126	79	277	278	133	97	289	289	141	116	310	310	150	135	331	332	158	
33	208	209	110	49	232	233	117	64	256	257	124	80	281	281	131	98	296	296	138	117	317	317	145	136	338	339	152	
34	215	216	108	50	238	239	115	65	261	262	122	81	284	285	129	99	303	303	136	118	324	324	141	137	345	346	146	
35	222	223	106	51	244	245	113	66	266	267	120	82	288	289	127	100	310	310	133	119	331	331	136	138	352	353	139	
36	229	230	104	52	250	251	111	67	271	271	118	83	292	292	125	101	317	317	130	120	338	338	132	139	359	360	133	
37	236	237	102	53	256	256	109	68	276	276	116	84	295	296	123	102	324	324	127	121	345	345	127	140	366	367	127	
38	243	244	100	54	262	262	107	69	280	281	114	85	299	300	121	103	331	331	124	122	352	352	123	141	373	374	121	

Table 4. Heat Mode Verification Table for 1.5 Ton Units

OUTDOOR TEMPERATURE (DEG. F)																												
0					10				20				30				40				50				60			
Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	
31	224	225	126	46	241	243	131	62	258	260	137	77	276	277	143	93	292	293	151	111	331	332	164	129	370	372	176	
32	231	232	124	47	247	248	129	63	263	264	135	78	279	280	141	94	299	300	149	112	338	339	159	130	377	379	170	
33	238	239	122	48	253	254	127	64	268	269	133	79	283	284	139	95	306	307	146	113	345	346	155	131	384	386	164	
34	245	246	120	49	259	260	125	65	273	274	131	80	287	288	137	96	313	314	143	114	352	353	150	132	391	393	158	
35	252	253	118	50	265	266	123	66	278	279	129	81	290	291	135	97	320	321	140	115	359	360	146	133	398	400	152	
36	259	260	116	51	271	272	121	67	282	284	127	82	294	295	133	98	327	328	137	116	366	367	141	134	405	407	146	
37	266	267	114	52	277	278	119	68	287	288	125	83	298	299	131	99	334	335	134	117	373	374	137	135	412	414	139	

Table 5. Heat Mode Verification Table for 2 Ton Units

OUTDOOR TEMPERATURE (DEG. F)																												
0					10				20				30				40				50				60			
Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	
37	225	229	115	49	240	244	122	61	254	259	129	74	269	273	136	90	283	287	145	111	319	324	157	132	356	360	169	
38	232	236	113	50	246	250	120	62	259	264	127	75	273	277	134	91	290	294	142	112	326	331	152	133	363	367	163	
39	239	243	111	51	252	256	118	63	264	268	125	76	276	281	132	92	297	301	139	113	333	338	148	134	370	374	156	
40	246	250	109	52	257	262	116	64	269	273	123	77	280	284	130	93	304	308	137	114	340	345	143	135	377	381	150	
41	253	257	107	53	263	268	114	65	274	278	121	78	284	288	128	94	311	315	134	115	347	352	139	136	384	388	144	
42	260	264	105	54	269	274	112	66	278	283	119	79	287	292	126	95	318	322	131	116	354	359	134	137	391	395	138	
43	267	271	103	55	275	279	110	67	283	287	117	80	291	295	124	96	325	329	128	117	361	366	130	138	398	402	132	

Table 6. Heat Mode Verification Table for 2.5 Ton Units

OUTDOOR TEMPERATURE (DEG. F)																												
0					10				20				30				40				50				60			
Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	
32	224	233	123	47	238	247	126	61	251	260	130	76	264	273	133	91	275	284	142	108	306	315	157	125	337	346	172	
33	231	240	121	48	244	253	124	62	256	265	128	77	268	277	131	92	282	291	139	109	313	322	152	126	344	353	165	
34	238	247	119	49	249	259	122	63	261	270	126	78	272	281	129	93	289	298	136	110	320	329	148	127	351	360	159	
35	245	254	117	50	255	264	120	64	265	274	124	79	275	284	127	94	296	305	134	111	327	336	143	128	358	367	153	
36	252	261	115	51	261	270	118	65	270	279	122	80	279	288	125	95	303	312	131	112	334	343	139	129	365	374	147	
37	259	268	113	52	267	276	116	66	275	284	120	81	283	292	123	96	310	319	128	113	341	350	134	130	372	381	141	
38	266	275	111	53	273	282	114	67	280	289	118	82	286	295	121	97	317	326	125	114	348	357	130	131	379	388	135	

Table 7. Heat Mode Verification Table for 3 Ton Units

OUTDOOR TEMPERATURE (DEG. F)																											
0				10				20				30				40				50				60			
Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.
34	224	234	124	48	244	254	127	63	264	273	130	77	283	293	133	93	298	307	143	109	330	340	159	126	362	372	175
35	231	241	122	49	250	259	125	64	268	278	128	78	287	297	131	94	305	314	140	110	337	347	154	127	369	379	169
36	238	248	120	50	256	265	123	65	273	283	126	79	291	300	129	95	312	321	137	111	344	354	150	128	376	386	163
37	245	255	118	51	262	271	121	66	278	288	124	80	294	304	127	96	319	328	134	112	351	361	145	129	383	393	157
38	252	262	116	52	268	277	119	67	283	292	122	81	298	308	125	97	326	335	131	113	358	368	141	130	390	400	150
39	259	269	114	53	273	283	117	68	288	297	120	82	302	311	123	98	333	342	128	114	365	375	136	131	397	407	144
40	266	276	112	54	279	289	115	69	292	302	118	83	305	315	121	99	340	349	126	115	372	382	132	132	404	414	138

Table 8. Heat Mode Verification Table for 3.5 Ton Units

OUTDOOR TEMPERATURE (DEG. F)																											
0				10				20				30				40				50				60			
Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.
29	214	225	107	44	233	244	114	59	252	263	122	74	271	282	129	89	281	292	139	104	307	318	150	120	332	343	161
30	221	232	105	45	239	250	112	60	257	268	120	75	275	286	127	90	288	299	136	105	314	325	146	121	339	350	155
31	228	239	103	46	245	256	110	61	261	272	118	76	278	289	125	91	295	306	133	106	321	332	141	122	346	357	149
32	235	246	101	47	251	261	108	62	266	277	116	77	282	293	123	92	302	313	130	107	328	339	137	123	353	364	143
33	242	253	99	48	256	267	106	63	271	282	114	78	286	297	121	93	309	320	127	108	335	346	132	124	360	371	137
34	249	260	97	49	262	273	104	64	276	287	112	79	289	300	119	94	316	327	124	109	342	353	128	125	367	378	131
35	256	267	95	50	268	279	102	65	281	292	110	80	293	304	117	95	323	334	122	110	349	360	123	126	374	385	124

Table 9. Heat Mode Verification Table for 4 Ton Units

OUTDOOR TEMPERATURE (DEG. F)																											
0				10				20				30				40				50				60			
Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Press.	Disch. Temp.
26	239	259	148	40	254	273	147	53	269	288	146	67	283	303	145	81	297	316	151	97	332	352	165	112	368	388	180
27	246	266	146	41	260	279	145	54	273	293	144	68	287	307	143	82	304	323	148	98	339	359	161	113	375	395	173
28	253	273	144	42	266	285	143	55	278	298	142	69	291	310	141	83	311	330	146	99	346	366	156	114	382	402	167
29	260	280	142	43	272	291	141	56	283	302	140	70	294	314	139	84	318	337	143	100	353	373	152	115	389	409	161
30	267	287	140	44	278	297	139	57	288	307	138	71	298	318	137	85	325	344	140	101	360	380	147	116	396	416	155
31	274	294	138	45	283	303	137	58	293	312	136	72	302	321	135	86	332	351	137	102	367	387	143	117	403	423	149
32	281	301	136	46	289	309	135	59	297	317	134	73	305	325	133	87	339	358	134	103	374	394	138	118	410	430	143

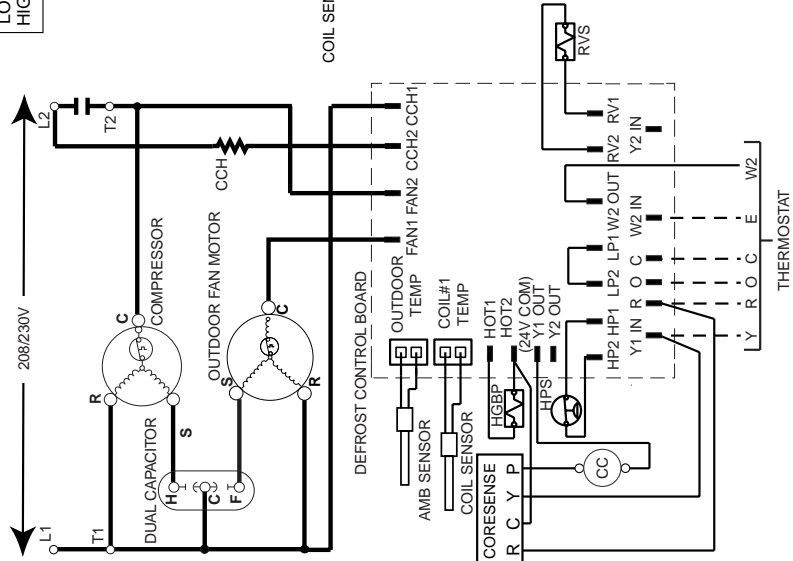
Table 10. Heat Mode Verification Table for 5 Ton Units



# 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.



- AMB Sensor - Ambient Sensor
- CC - Contactor Coil
- CCH - Crankcase Heater
- HGBP - High Pressure Switch
- HPS - Hot Gas By Pass Valve
- RVS - Reversing Valve Solenoid
- \* HARD START KIT (OPTIONAL)

# WIRING DIAGRAMS

## Single Phase

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

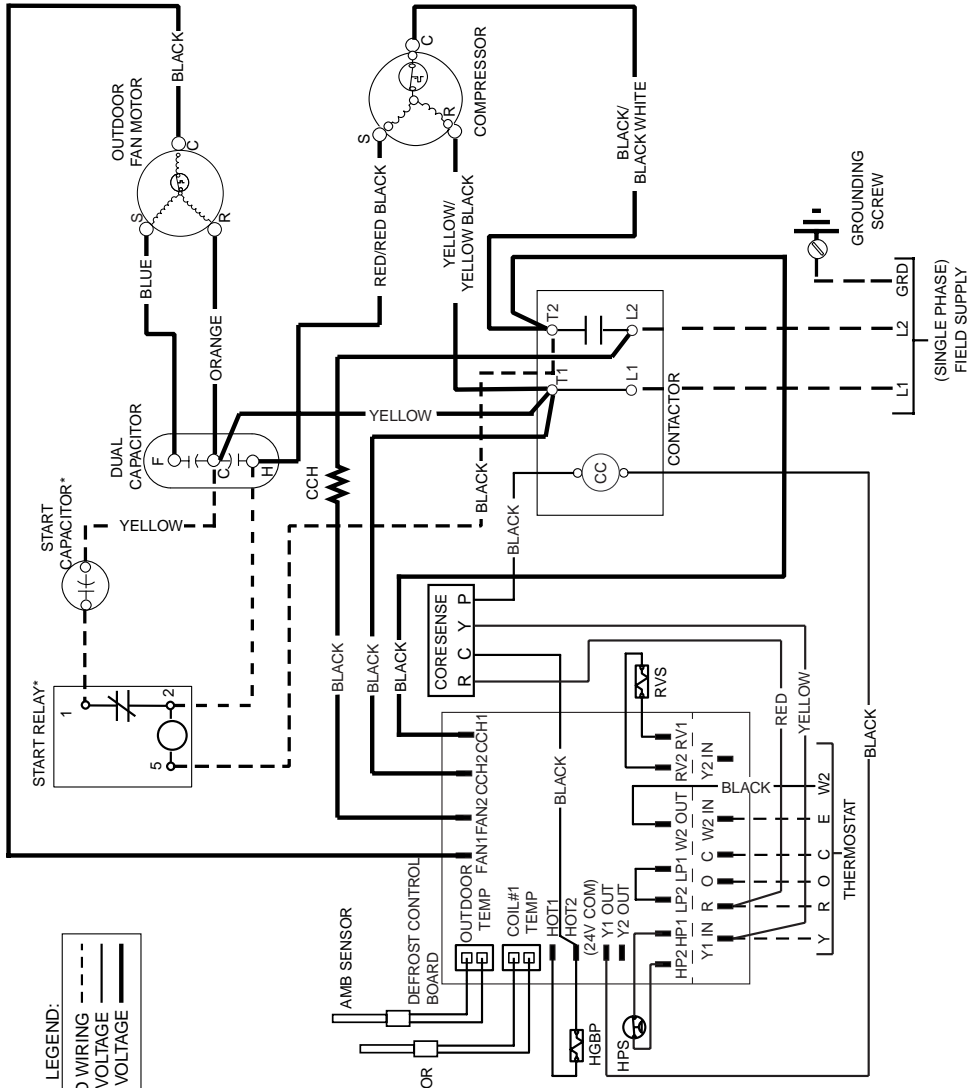
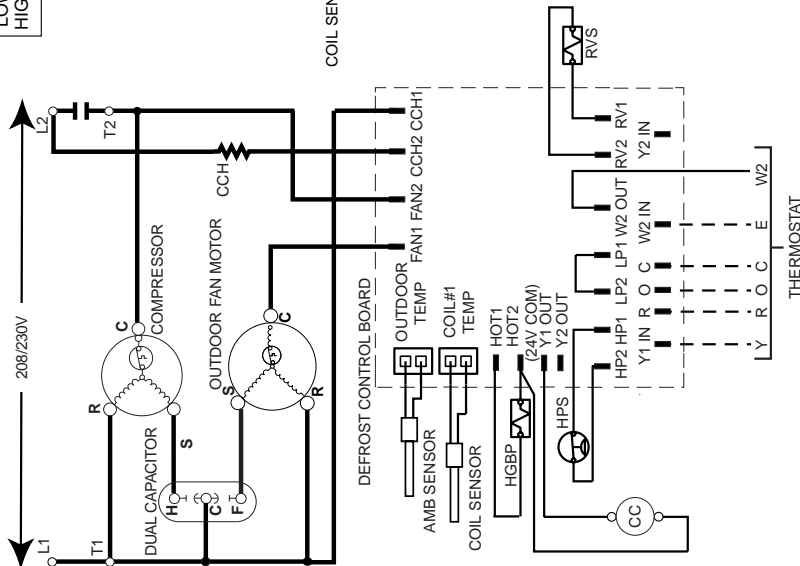


Figure 12. Wiring Diagram for 1.5 - 5 Ton Models (Units Equipped With CoreSense™ Diagnostic Module)

# WIRING DIAGRAM

## Split System Heat Pump (Outdoor Section)

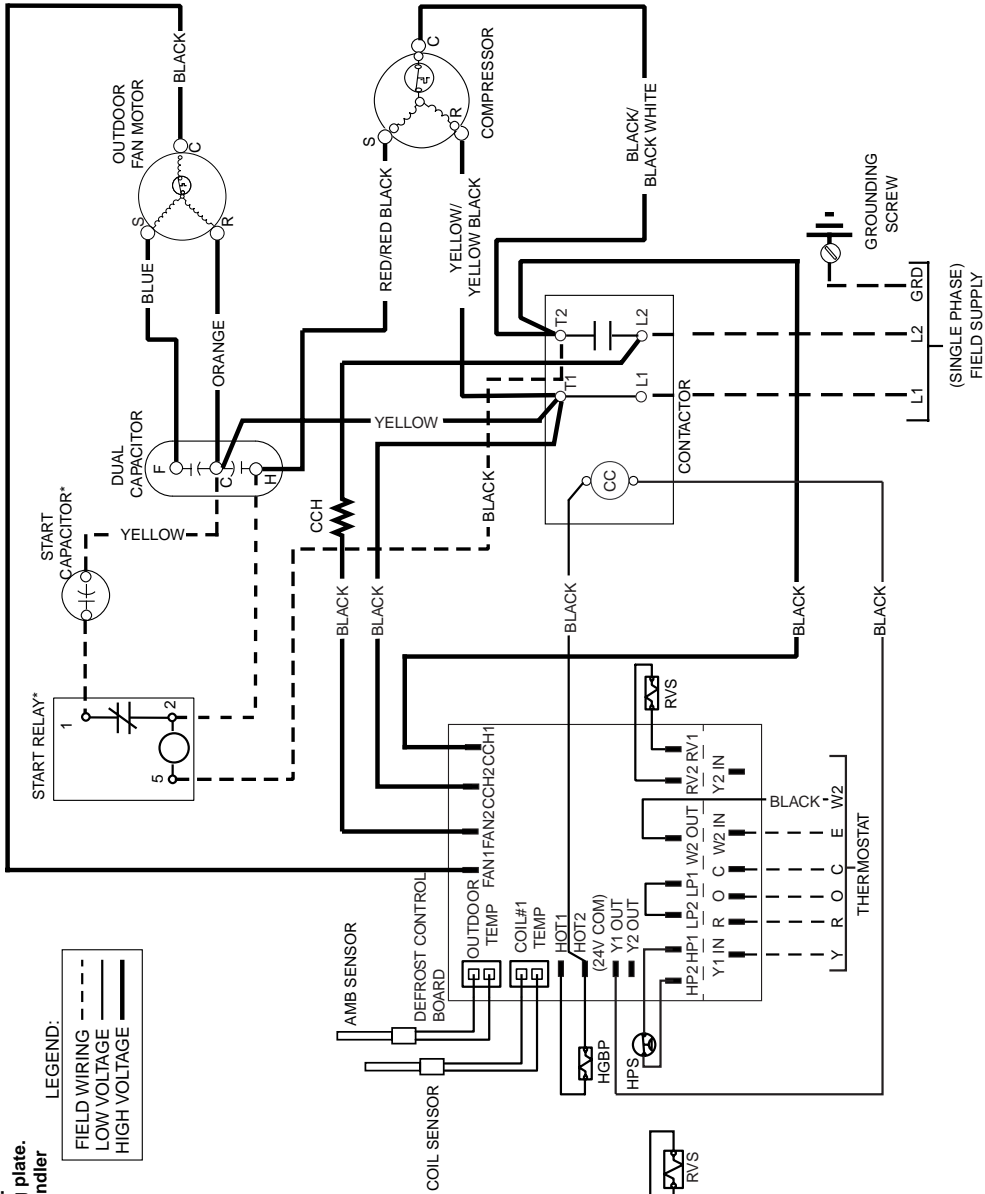
- NOTES:**
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150 volts to ground.
  4. For replacement wires use conductors suitable for 105 °C.
  5. For ampacities and overcurrent protection, see unit rating plate.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



- AMB SENSOR - Ambient Sensor
- CC - Contactor Coil
- CCH - Crankcase Heater
- HPS - High Pressure Switch
- HGBP - Hot Gas By Pass Valve
- RVS - Reversing Valve Solenoid
- \* HARD START KIT (OPTIONAL)

## Single Phase

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



(SINGLE PHASE)  
FIELD SUPPLY



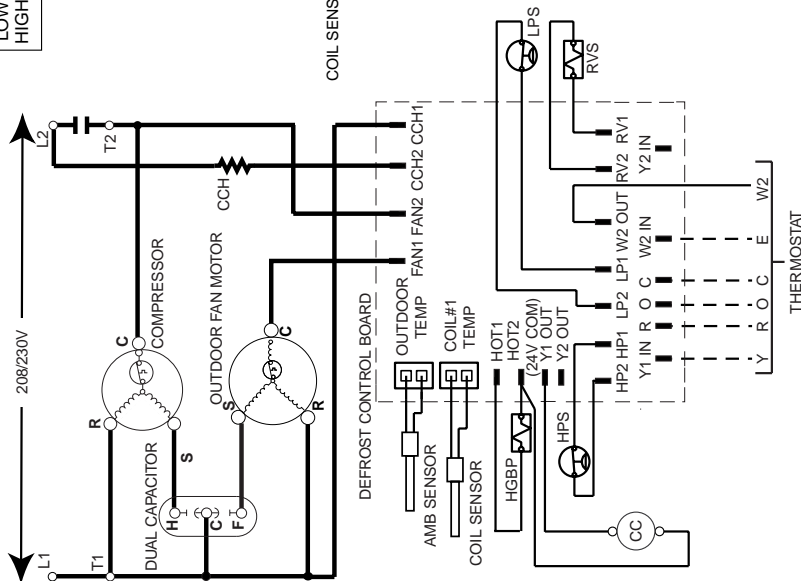
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Figure 13. Wiring Diagram for 1.5 - 5 Ton Models  
(Units NOT Equipped With CoreSense™ Diagnostic Module)

# WIRING DIAGRAM

## Split System Heat Pump (Outdoor Section)

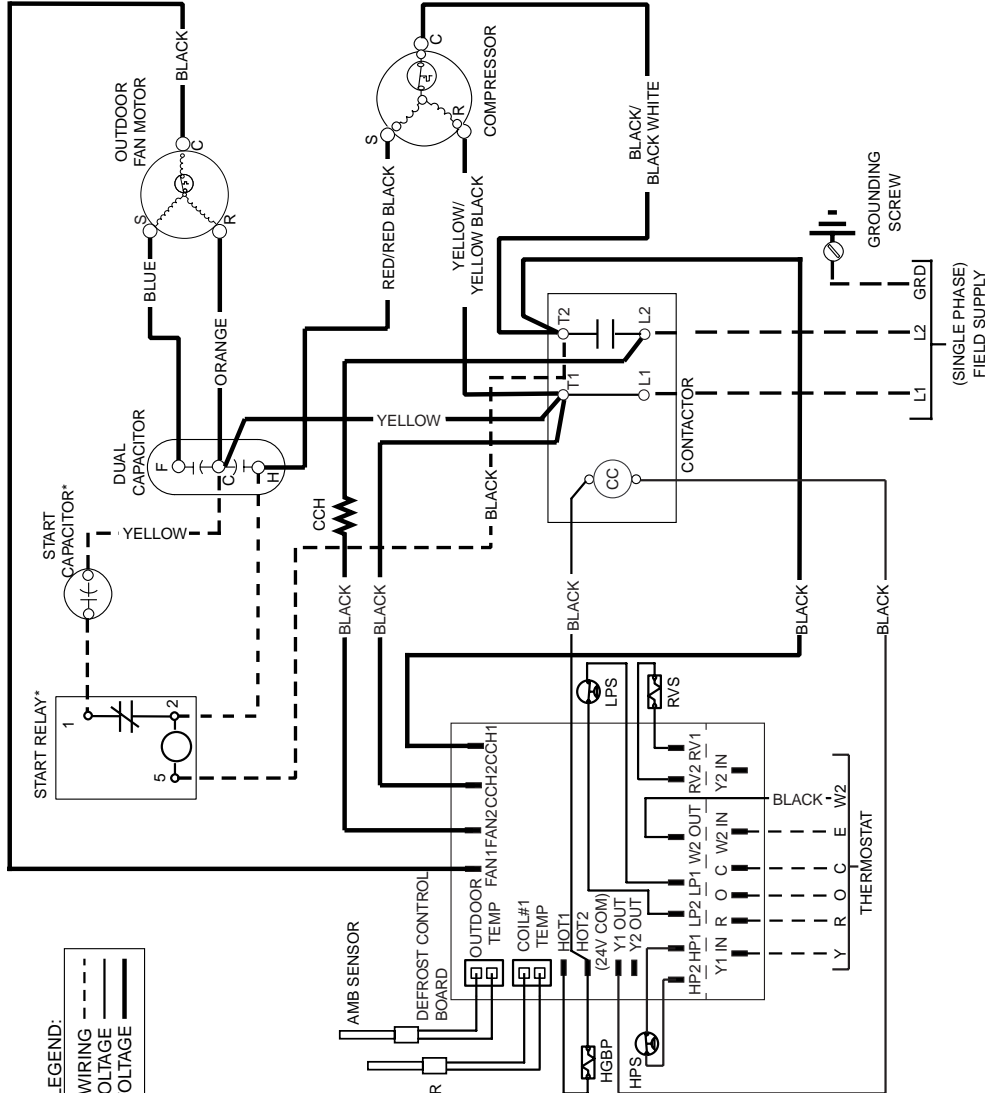
- NOTES:**
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150 volts to ground
  4. For replacement wires use conductors suitable for 105° C.
  5. For ampacities and overcurrent protection, see unit rating plate.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



- AMB SENSOR - Ambient Sensor
- CC - Contactor Coil
- CCH - Crankcase Heater
- HPS - High Pressure Switch
- HGBP - Hot Gas By Pass Valve
- LPS - Low Pressure Switch
- RVS - Reversing Valve Solenoid
- \* HARD START KIT (OPTIONAL)

## Single Phase

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



(SINGLE PHASE)  
FIELD SUPPLY



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Figure 14. Wiring Diagram for 1.5 - 5 Ton Models  
(Units Equipped with Low Pressure Switch)

## 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 |               |



Specifications & illustrations subject to change without notice or incurring obligations.  
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