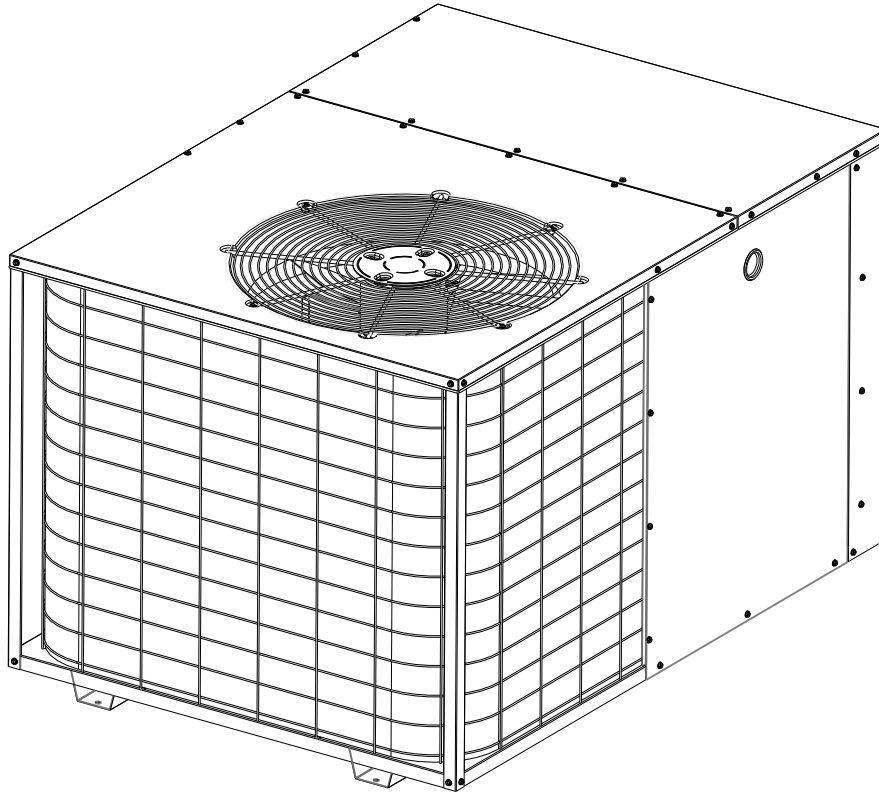


**USER'S MANUAL & INSTALLATION INSTRUCTIONS****Single Package Heat Pump - 2 Stage, R-410A****IMPORTANT**

Please read this information thoroughly and become familiar with the capabilities and use of your appliance before attempting to operate or maintain this unit. Keep this literature where you have easy access to it in the future. If a problem occurs, check the instructions and follow recommendations given. If these suggestions don't eliminate your problem, call your Servicing Contractor.

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.

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

## USER INFORMATION

<b>About the Heat Pump</b> .....	<b>3</b>
Operating Instructions .....	<b>3</b>
Cooling Operation .....	3
Heating Operation.....	3
Emergency Heat .....	3
Defrost .....	3
System Shutdown.....	3

## INSTALLER INFORMATION

<b>Safety Information</b> .....	<b>4</b>
<b>General Information</b> .....	<b>4</b>
Before You Install this Unit .....	4
Locating the Heat pump .....	4
Air Duct System .....	5
Unconditioned Spaces.....	5
Condensate Drainage.....	5
<b>Heat Pump Installation</b> .....	<b>5</b>
Unpacking the Unit .....	5
Minimum Clearances .....	5
Service Access Clearance .....	5
Clearances to Combustibles .....	5
Installing Return & Supply Air Fittings .....	6
Return Duct .....	6
Supply Duct .....	6
Locating & Installing the Return Air Assembly.....	6
Locating & Installing the Supply Dampers.....	7
Connecting the Return & Supply Air Flexible Ducts .....	7
<b>Electrical Connections</b> .....	<b>8</b>
Pre - Electrical Checklist.....	8
Line Voltage .....	8
Grounding.....	8
Overcurrent Protection .....	9
2 - Speed Outdoor Fan Motor.....	9
Blower Speed .....	9
Ambient Sensor Mounting .....	9
Demand Defrost Control.....	11
Electric Heat Package .....	11
Thermostat Connections .....	11
<b>Startup &amp; Adjustments</b> .....	<b>12</b>
Pre - Start Checklist .....	12
Start - Up Procedure .....	12
Air Circulation .....	12
System Heating .....	12
System Cooling.....	12
Short Cycle Protection.....	12
Emergency Heat .....	12

Forced Defrost Mode (Field Test) .....	12
Anti Short Cycle Timer Test .....	12
Heating Mode .....	12
Cooling Mode.....	13

### Adjustment of Refrigerant Charge..... 13

Charging an R410A Unit in AC Mode with Outdoor Temp above 65° F .....	13
Charging an R410A Unit in Heat Mode .....	13

### Unit Maintenance..... 13

### Refrigerant Charging Charts for Cooling Mode of Operation .....

Figure 11 - 2 Ton Units .....	14
Figure 12 - 3 Ton Units .....	14
Figure 13 - 4 Ton Units .....	15
Figure 14 - 5 Ton Units .....	15

### Refrigerant Charging Tables for Heating Mode of Operation.....

Table 2 - Chart for 2 & 3 Ton Units.....	16
Table 3 - Chart for 4 & 5 Ton Units.....	17

### Wiring Diagrams .....

Figure 15 - 2 & 3 Ton Units .....	18
Figure 16 - 4 & 5 Ton Units .....	19

### Component Functions .....

Low Pressure Switch .....	20
High Pressure Switch .....	20

## IMPORTANT SAFETY INFORMATION

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.

### Warranty Information

A warranty certificate with full details is included with the heat pump. Carefully review these responsibilities with your dealer or service company. The manufacturer will not be responsible for any costs found necessary to correct problems due to improper setup, improper installation, adjustments, improper operating procedure on the part of the user, etc. Some specific examples of service calls which are not included in the limited warranty are:

1. Correcting wiring problems in the electrical circuit supplying the heat pump.
2. Resetting circuit breakers or other switches.
3. Adjusting or calibrating of thermostat.

## USER INFORMATION

### ABOUT THE HEAT PUMP

Your heat pump is a unique, all weather comfort-control appliance that will heat and cool your home year round and provide energy saving comfort. It's an unknown fact that heat is always in the air, even when the outside temperature is below freezing. The heat pump uses this basic law of physics to provide energy saving heat during the winter months. For example, if the outdoor temperature is 47° F (8° C), your heat pump can deliver approximately 3.5 units of heat energy per each unit of electrical energy used, as compared to a maximum of only 1 unit of heat energy produced with conventional heating systems.

In colder temperatures, the heat pump performs like an air conditioner run in reverse. Available heat energy outside the home is absorbed by the refrigerant and exhausted inside the home. This efficient process means you only pay for "moving" the heat from the outdoors to the indoor area. You do not pay to generate the heat, as is the case with more traditional furnace designs.

During summer, the heat pump reverses the flow of the heat-absorbing refrigerant to become an energy-efficient, central air conditioner. Excess heat energy inside the home is absorbed by the refrigerant and exhausted outside the home.

### Operating Instructions

#### Cooling Operation

1. Set the thermostat's system mode to COOL or AUTO and change the fan mode to AUTO. See Figure 1
2. Set the temperature selector to the desired temperature level. The outdoor fan, compressor, and blower motor will all cycle on and off to maintain the indoor temperature at the desired cooling level.

#### Heating Operation

1. Set the thermostat's system mode to HEAT or AUTO and change the fan mode to AUTO. See Figure 1.
2. Set the temperature selector to the desired temperature level. The compressor, outdoor fan, and blower motor will cycle on and off to maintain the indoor temperature at the desired heating level.

**NOTE:** If the temperature level is re-adjusted, or the system mode is reset, the fan and compressor in the outdoor unit may not start immediately. A protective timer circuit holds the compressor and the outdoor fan off for approximately three

minutes following a previous operation or the interruption of the main electrical power.

#### Emergency Heat

Some thermostats may include a system mode called EM HT or AUX HT, etc. This is a back-up heating mode that should only be used if a problem is suspected. With the mode set to EM HT, etc., the compressor and outdoor fan will be locked off and supplemental heat (electric resistance heating) will be used as a source of heat. Sustained use of electric resistance heat in place of the heat pump will result in an increase in electric utility costs.

#### Defrost

During cold weather heating operation, the outdoor unit will develop a coating of snow and ice on the heat transfer coil. This is normal and the unit will defrost itself. This unit features Demand Defrost that monitors ambient and coil temperatures to regulate the defrost function accordingly.

At the beginning of the defrost cycle, both the outdoor condenser fan and compressor will turn off. After approximately 30 seconds, the compressor will turn on and begin to heat the outdoor coil causing the ice and snow to melt. **NOTE:** While the ice and snow is melting, some steam may rise from the outdoor unit as the warm coil causes the melting frost to evaporate. When defrost is completed, the outdoor fan motor will start, and the compressor will turn off again. In approximately 30 seconds the compressor will start up again and continue normal operation.

#### System Shutdown

Change the thermostat's system mode to OFF and the fan mode to AUTO (See Figure 1). **NOTE:** The system will not operate, regardless of the temperature selector setting.

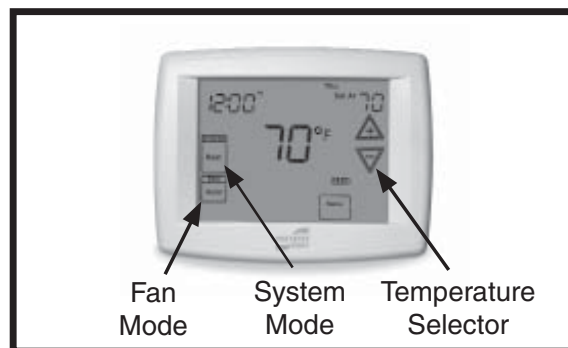


Figure 1. Digital Thermostat

## INSTALLER INFORMATION

### SAFETY INFORMATION

#### **WARNING:**

**The information listed below must be followed during the installation, service, and operation of this unit. Unqualified individuals should not attempt to interpret these instructions or install this equipment. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.**

- 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.
- This equipment contains liquid and gaseous refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.
- 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.
- Install this unit only in a location and position as specified on page 4. This unit is designed only for outdoor installations and should be located with consideration of minimizing the length of the supply and return ducts. Consideration should also be given to the accessibility of fuel, electric power, service access, noise, and shade.
- 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.

### GENERAL INFORMATION

Single packaged heat pumps are ready for easy and immediate installation and can be readily connected into the high static duct system of a home. This unit is completely assembled, wired, and run tested at the factory. **This heat pump is designed for outdoor installation only.** The only connections needed for installation are the supply and return ducts, the line voltage, and thermostat wiring. Use of components other than those specified may invalidate ARI Certification, Code Agency Listing, and limited warranty on the air conditioner.

#### **Before You Install this Unit**

- √ 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. If there is any question concerning the power supply, contact the local power company.
- √ 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.
- Choose an appropriate location that minimizes the length of the supply and return air ducts.
- Overhead obstructions, 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 3 (page 6) for minimum clearances to obstructions.
- Consideration should also be given to availability of electric power, service access, noise, and shade.

## Air Duct System

Air ducts must be installed in accordance with the standards of the National Fire Protection Association "Standard for Installation of Air Conditioning and Ventilation Systems" (NFPA 90A), "Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems" (NFPA 90B), these instructions, and all applicable codes. NFPA publications are available by writing to: National Fire Protection Association, Batterymarch Park, Quincy, ME 02269 or visit [www.NFPA.org](http://www.NFPA.org) on the web.

- Design the duct work according to methods described by the Air Conditioning Contractors of America (ACCA).
- The supply duct system, including the number and type of registers, will have much more effect on the performance of the system than any other factor. The duct must be sufficiently large to conduct an adequate amount of air to each register. See Figure 4 (page 6).
- Duct work should be attached directly to the unit flanges for horizontal applications.
- If roof curb is installed, the ducts must be attached to the curb hangers, not the unit.
- For highly resistive duct systems it may be necessary to add an additional return air duct and or supply to achieve maximum performance and prevent coil icing and refrigerant flood back

### Unconditioned Spaces

All duct work passing through unconditioned space must be properly insulated to minimize duct losses and prevent condensation. Use insulation with an outer vapor barrier. Refer to local codes for insulation material requirements.

**The heat pump system will not cool or heat the home if air is lost to the outside through leaks in the duct system. Ducts that are collapsed or restricted by foreign objects will also prevent adequate air flow.**

### **Condensate Drainage**

A 3/4" condensate fitting extends out of the side of the unit (Figure 2). The drain trap, shipped in the electrical compartment, must be installed to prevent water from collecting inside the unit.

1. Thread the elbow provided with the unit into the drain connection until hand tight.
2. Connect the condensate tubing onto the fitting, forming a trap near the drain connection.
3. Route the condensate tube from the trap to a suitable drain. **NOTE:** For proper drainage, make sure the trap is level to the ground and tubing outlet is below trap level.

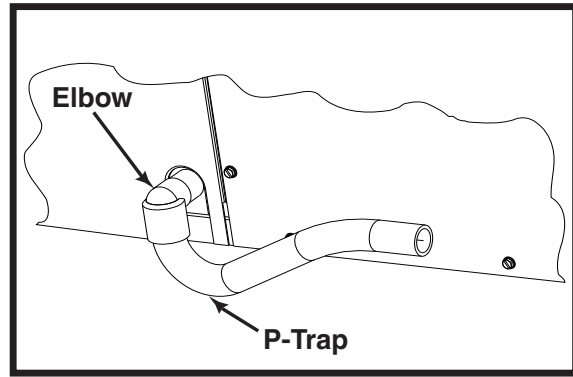


Figure 2. Drain Trap

## HEAT PUMP INSTALLATION

### Unpacking the Unit

It is recommended that the unit be unpacked at the installation site to minimize damage due to handling.

## CAUTION:

**Do not tip the unit on its side. Oil may enter the compressor cylinders and cause starting trouble. If unit has been set on its side, restore to upright position and do not run for several hours. Then run unit for a few seconds. Do this three or four times with five minutes between runs.**

1. Remove the bands from around the unit.
2. Unfold the top and bottom cap flanges.
3. Carefully remove the top cap and tube.

### Minimum Clearances

Minimum clearances MUST be maintained from adjacent structures to provide room for proper servicing and air circulation. DO NOT install unit in a confined or recessed area that will allow discharge air from the unit to re-circulate into the condenser air inlet, through the coil. See Figure 3 (page 6).

### Service Access Clearance:

Blower access panel side .....	24"
Electrical compartment access panel side ...	12"
Clearance between overhang and top of unit .....	72"
Clearance around condenser coil area to wall or shrubs (excludes duct panel side) ..	12"

### Clearances to Combustibles:

Combustible Base (Wood or Class A, B, or C roof Covering material) .....	0"
Supply and Return Air Ducts.....	0"
Duct Connection side .....	0"

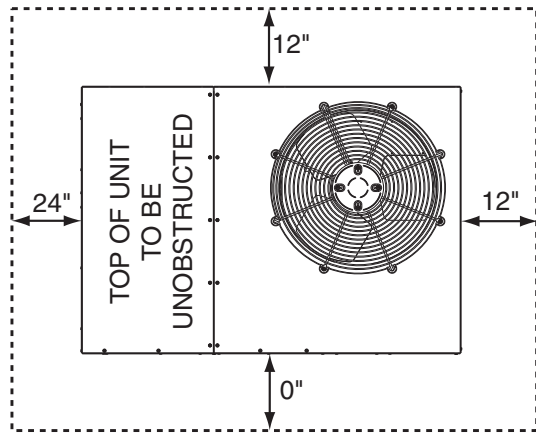


Figure 3. Minimum Unit Clearances

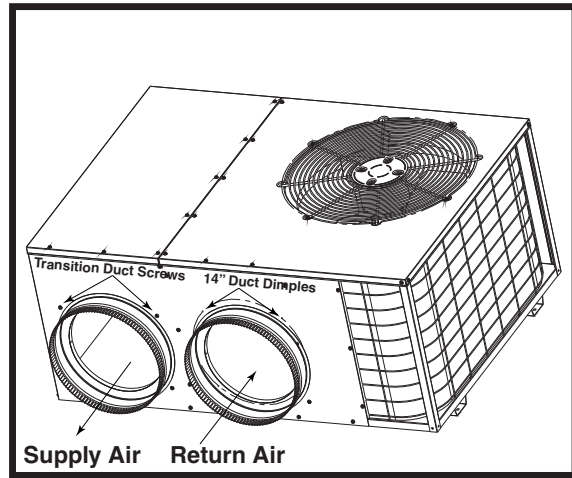


Figure 4. Return and Supply Air Fittings

### Installing Return & Supply Air Fittings

The supply and return fittings are included with the unit and located in the supply duct. They attach to the unit openings (Figure 4) with a flange and bead arrangement and may be, secured with two sheet metal screws. **NOTE:** For easier access, install fittings before positioning unit in final location.

#### Return Duct

1. Align the slots with the holes in the collar and install two screws.
2. Position the collar over the opening and align the four notches in the collar with the four dimples in the panel.
3. Using self-drilling screws (10-16x.5) attach the collar to the rear panel.

#### Supply Duct

1. Position the supply duct collar so the edge of the unit opening fits between the flange and the bead.

2. Overlap the collar ends keeping the small screw holes underneath.
3. Align the holes in the crimped area and install one screw. **NOTE:** It may be necessary to loosen the four screws that hold the transition duct in order to install the supply fitting. Retighten when installation is complete.
4. Tap collar (if necessary) to ensure engagement with unit opening and install second screw.
5. Tighten first screw and rotate collar clockwise so joint is near three o'clock position.

### Locating & Installing the Return Air Assembly

To simplify installation, locate and install the return air assembly first. If desired, the return opening can be located inside a closet with louvered doors that has an open area equal to or greater than the 12" x 20" grille furnished. The return air grille can be placed in the wall of a closet and the air ducted into the filter box through a boxed-in area at the closet floor level. **Make sure the filter is readily accessible.**

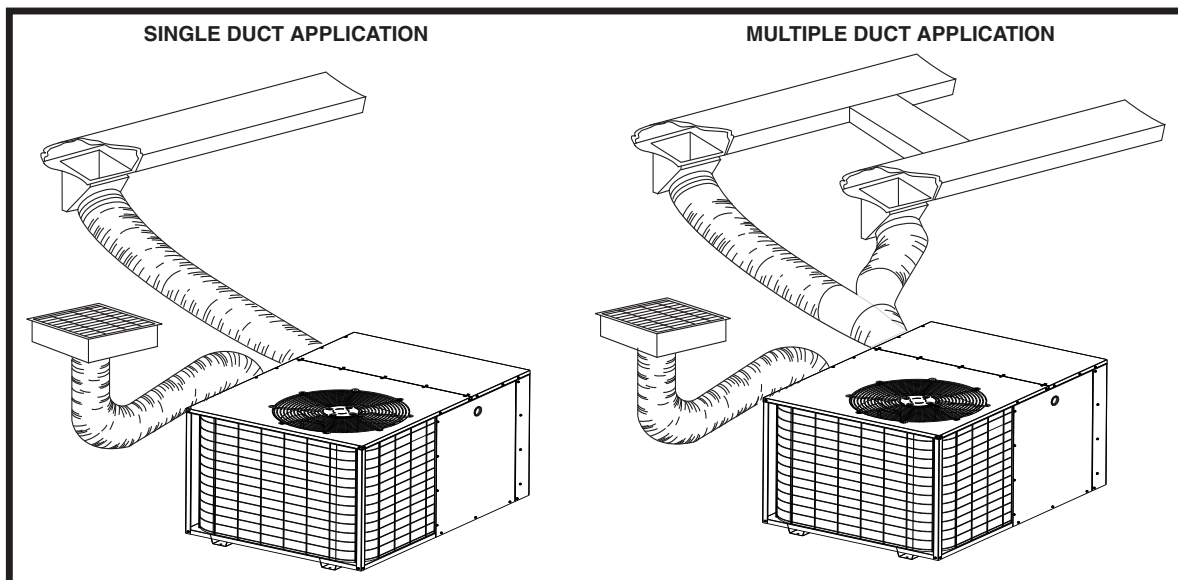
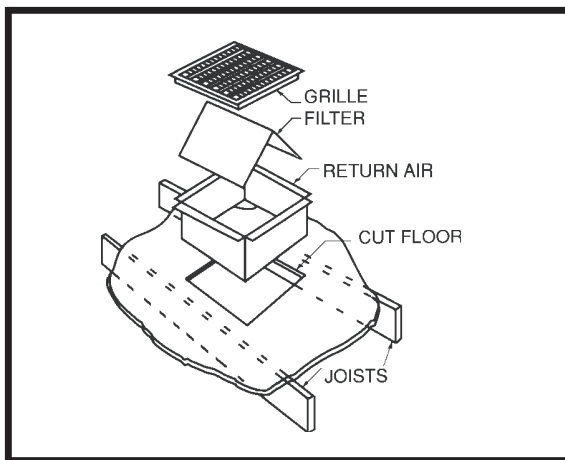


Figure 5. Typical Duct Applications

**NOTE:** The return air box with grille and filter (Figure 6) should not be located in heavy traffic areas like hallways or center of rooms. A good spot is in a corner or under a table, if a minimum two inch clearance is available.

1. Start the installation from under the home by cutting a small hole in the subfloor. Determine how the floor joist location will affect cutting the opening needed for the return air box. **NOTE:** Floor joists are generally located on 16" centers, leaving 14-3/8" between joists.
2. After measuring the return air box (approximately 12-1/4" x 20-1/4"), cut the hole through the floor so that the box will fit between the floor joists. Care should be taken when cutting through carpeting to avoid snags. **NOTE:** In most installations it will be necessary to cut a similar hole in the fiberboard directly under the hole in the floor. However, if the floor is more than ten inches deep, it will only be necessary to cut a hole for the collar on the return air box or for the insulated duct.
3. Set the box into the opening and fasten with screws or nails.
4. Put the filter and return air grille in place.

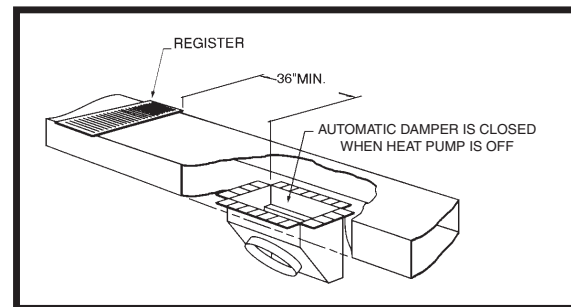


**Figure 6. Return Air Box**

### Locating & Installing the Supply Damper(s)

When locating the supply damper(s), carefully check floor joists and frame members that could interfere with the installation of the damper or flexible duct. Ideally, the damper (Figure 7) should be located in the bottom of the main duct, forward of center of the home, at least three feet from the nearest register. The round supply opening in the slanted side of the damper should face the side of the home where the heat pump is located.

1. Locate the center of the heat duct by cutting a small hole in the fiberboard below the duct at the desired location.
2. Cut a hole approximately 3/4" larger than the damper opening in the fiberboard.
3. Cut a 9-1/8" x 13-1/8" hole in the duct and bend over all tabs flat on the inside of the heat duct.
4. Insert the damper into the duct and bend over all tabs flat on the inside of the heat duct.
5. Seal the opening between the fiberboard and damper or flexible duct.



**Figure 7. Supply Damper**

### Connecting the Return and Supply Air Flexible Ducts

- The return duct for all units is 14" diameter.
- The supply duct for all units is 12" diameter.
- The flexible ducts can be connected to the corresponding fittings with the clamps provided with the ducts. **NOTE:** To prevent a loss in cooling capacity, make sure all connections are tight.
- The flexible ducts may be cut to the required length, see instructions packed with duct. **Keep all ducts as short and straight as possible. Avoid sharp bends.**
- Ducts may be spliced with sheet metal sleeves and clamps.
- Once the inner duct is connected to the proper fitting, the insulation and plastic sleeve should be pulled over the connection and clamped.
- Homes with multiple supply ducts (or special applications), a Y fitting is available to divide the supply air so it can be ducted to different areas of the home for more efficient cooling. **NOTE:** For maximum performance, insulate the Y fitting

## ELECTRICAL CONNECTIONS

### **WARNING:**

**To avoid electric shock, personal injury, or death, turn off the electric power at the disconnect or the main service panel before making any electrical connections.**

- 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 15 - 16, pages 18 - 19). Inspect for loose connections.

#### **Line Voltage**

- It is recommended that the line voltage to the unit be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the 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. See unit data label for proper incoming field wiring. Any other wiring methods must be acceptable to authority having jurisdiction.
- 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. Extend leads through power wiring hole (Figure 8). Connect **L1** and **L2** directly to the contactor.
- Use only copper wire for the line voltage power supply to this unit. 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.

- See the unit wiring label for proper high and low voltage wiring. Make all electrical connections in accordance with all applicable codes and ordinances.

### **CAUTION:**

**Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

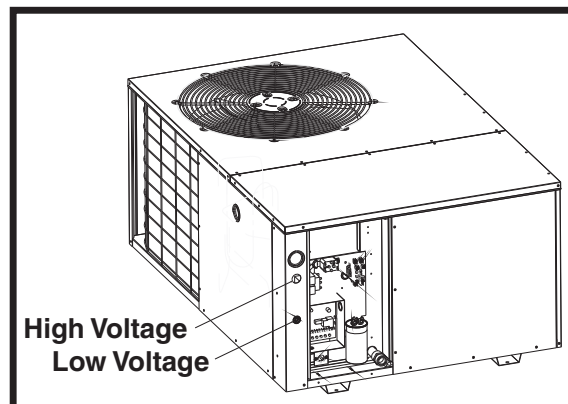
- Units are shipped from the factory wired for 240 volt transformer operation. For 208V operation, remove the lead from the transformer terminal marked 240V and connect it to the terminal marked 208V.

#### **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.



**Figure 8. Power Entry**



### Overcurrent Protection

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. Generally, the best fuse or breaker for any heat pump is the smallest size that will permit the equipment to run under normal usage and provide maximum equipment protection. Properly sized fuses and breakers also prevent nuisance trips during unit startup. **If a fuse blows or a breaker trips, always determine the reason. Do not arbitrarily install a larger fuse or breaker and do not, in any case, exceed the maximum size listed on the data label of the unit.**

### 2-Speed Outdoor Fan Motor (Select Models)

If the unit utilizes a 2-speed condenser fan motor, this motor will operate on low speed when in low cooling/heating, and on high speed when in high cooling/heating.

### Blower Speed

For optimum system performance and comfort, it may be necessary to change the factory speed setting. See Table 4 (page 20) for factory settings. **NOTE:** Q5RF models have High Efficiency Motors with 5 speed taps.

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## WARNING:

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**To avoid electric shock, personal injury, or death, turn off the electric power at the disconnect or the main service panel before making any electrical connections.**

---

1. Disconnect all electrical power to the unit and remove the service panel.
- 

## CAUTION:

---

**Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

---

2. Locate the orange, black and red wires terminated to the blower motor. The orange wire controls the low speed cooling and heating operations, the black wire controls high speed cooling and heating operations and the red wire controls the electric heating operation.

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## CAUTION:

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**To avoid personal injury or property damage, make certain that the motor leads cannot come into contact with any metal components of the unit.**

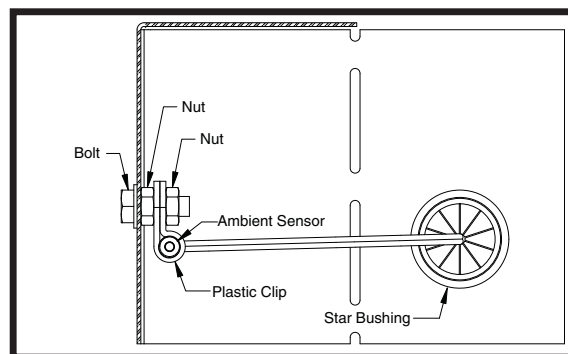
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3. Verify the required speed from the airflow data found in Table 4. Place appropriate wire on the appropriate motor speed tap for the required airflow.
4. Check all factory wiring per the unit wiring diagram and inspect the factory wiring connections to be sure none loosened during shipping or installation.

### Ambient Sensor Mounting

For optimum performance of the heat pump system, the ambient sensor (Figure 9) must be mounted on the outside of the unit.

1. Remove the mounting bracket and all hardware included in the packet.
2. Remove star bushing from 7/8" hole in corner panel of the unit.
3. Route the ambient sensor through the 7/8" hole in the corner panel of the unit, and then through the 7/8" hole in the mounting bracket.
4. Route the sensor through the star bushing. Use the star bushing to secure the mounting bracket to the unit.
5. Secure the ambient sensor inside the plastic clip and secure it to the mounting bracket with the screw and nut provided.
6. Install one spacer next between the plastic clip and mounting bracket.
7. Bend the mounting bracket into position. Install the mounting bracket to the unit using the screw in the corner panel.



**Figure 9. Ambient Sensor Mounting**

### Demand Defrost Control

The demand defrost board controls the defrost cycle in response to ambient temperature, outdoor coil temperature and accumulated compressor run time. The heat pump is allowed to operate in the heating mode until the combination of outdoor ambient and outdoor coil temperatures indicate that defrosting is necessary, based on the programmed defrost curve. There are four preprogrammed defrost curves on the board. A jumper pin is used to switch between the different curves. The factory default setting is program two. This is the recommended setting for most standard applications. For differences between the defrost curves, see Table 1.

The standard defrost cycle will terminate after 13 minutes and 39 seconds or when the coil temperature reaches its terminate temperature, whichever comes first.

The defrost board is equipped with a 5 minute Anti-Short Cycle Delay (ASCD). The compressor will not turn on until the minimum 5 minute off time is reached.

The control contains a forced - defrost feature, which puts the system into defrost mode every 6 hours and 4 minutes, unless the coil temperature is above the selected terminate temperature.

The system can be manually forced into defrost mode at any time by shorting the **TEST** terminals on the demand defrost board together for more than 9 seconds. The coil temperature sensor does not need to be cold when the unit is forced into defrost. After the **TEST** input is removed, the defrost mode will terminate in 13.7 minutes or when the coil temperature is above the terminate set-point or when the **Y** input is removed, whichever occurs first.

**NOTE:** If a demand curve is selected which has a 30 second compressor time delay in defrost, the delays reduced to 10 seconds in TEST mode.

Jumper Position	Minimum Time Between Defrosts (min)	Terminate Temp(° F)
1	20	40
2	20	40
3	20	32
4	20	75

Table 1. Demand Defrost Curve Profiles

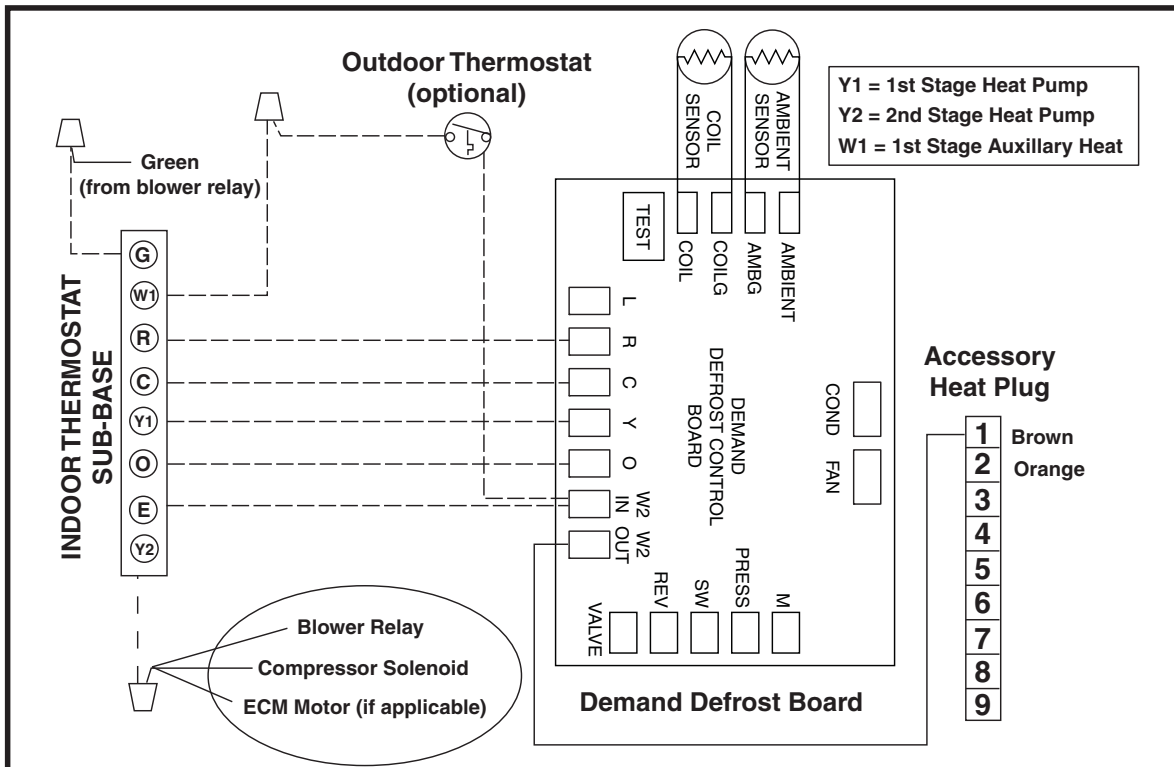
### Electric Heat Package (optional)

This heat pump is shipped without an auxiliary electric heat kit installed. If electric heat is desired, an accessory Heater Kit must be field installed. See Specifications Sheet for available kits and their application.

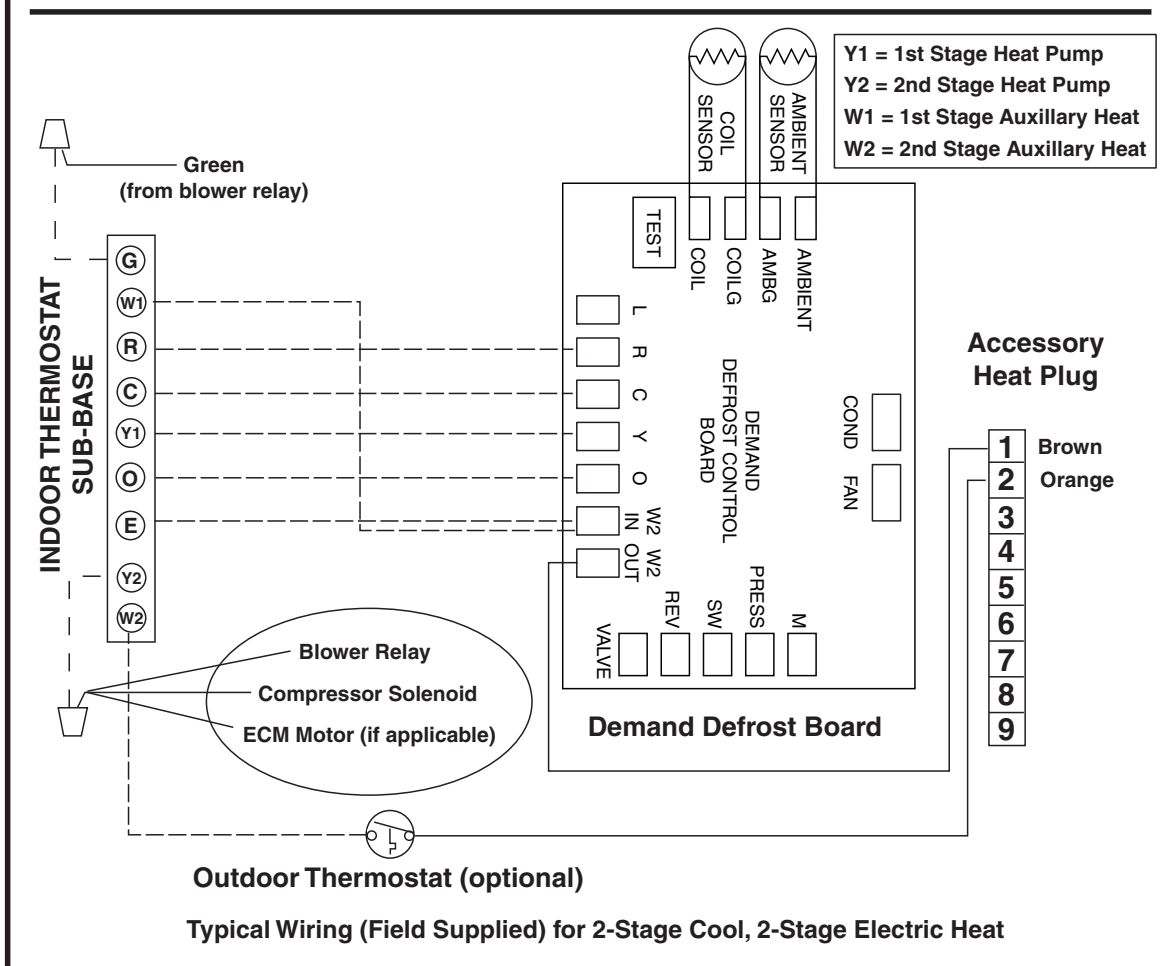
- Select the correct size heat package for the installation.
- Follow installation instructions provided with each heater kit.
- Installation is most easily accomplished before making duct or electrical connections.
- Refer to Table 4 (page 20) for blower speeds.

### Thermostat Connections

- The Q5RF heat pump is a two stage cooling and heating appliance that requires a 2-stage Cooling/Heating thermostat. The heat-cool thermostat prevents simultaneous operation of the heating and cooling units and is equipped with an ON-AUTO fan mode that allows the home owner to operate the indoor blower when only air circulation is desired.
- The control circuit wiring must comply with the current provisions of the NEC (ANSI/NFPA 70) and with applicable local codes having jurisdiction. Thermostat connections should be made in accordance with the instructions supplied with the thermostat and the indoor equipment.
- The low voltage wires must be properly connected to the units low voltage terminal block.
  1. Route 24V control wires through the sealing grommet (Figure 8, page 8) near the power entrance.
  2. Connect the control wires to the defrost board and blower relay wire (Figure 10, page 11).
- Several thermostat options are available depending on the accessories installed with the unit. Select a thermostat that operates in conjunction with the installed accessories.
- 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 information.



Typical Wiring (Field Supplied) for 2-Stage Cool, 1 Stage Electric Heat



Outdoor Thermostat (optional)  
Typical Wiring (Field Supplied) for 2-Stage Cool, 2-Stage Electric Heat

Figure 10. Typical Heat Pump Thermostat Connections

## STARTUP & ADJUSTMENTS

### Pre-Start Checklist

The following check list should be observed prior to starting the unit.

- √ Is the unit level? Unit should be level or slightly slanted toward the drain for proper condensate drainage.
- √ Is the unit installed with the proper clearances as listed in Figure 3 (page 6)?
- √ Is the wiring correct according to the wiring diagram and electrical codes?
- √ Are all the wiring connections tight? Check the condenser fan to make sure it turns freely.
- √ Is the overcurrent protection properly sized?
- √ Is the thermostat wired correctly? Is it installed in a proper location?

### Start-Up Procedure

The control circuit consists of an anti-short cycle timer that will not let the compressor re-start before 5 minutes have elapsed.

1. Set the system mode to OFF and the temperature mode to its highest setting.
2. Turn power on at the disconnect switch.
3. Set the system mode to ON or COOL.
4. Set the temperature mode below room temperature. Verify that the indoor blower, outdoor fan, and compressor energize and the cooling function starts.
5. Verify the discharge air grilles are adjusted and the system air is balanced.
6. Verify the duct work has no air leaks.
7. Verify the condensate drain is installed correctly and functions properly.
8. Set the temperature mode above room temperature. The unit should stop.
9. Instruct the homeowner on unit and thermostat operation and filter servicing.

### Air Circulation

Leave the thermostat system mode on OFF, and set the fan mode to ON. Blower should run continuously. Check the air delivery at the supply registers and adjust register openings for balanced air distribution. Examine ductwork for leaks or obstruction if insufficient air is detected.

Set the thermostat fan mode to AUTO. The blower should stop running.

### System Heating

Set the thermostat system mode to HEAT and the fan mode to AUTO. Change the thermostat temperature selector above the existing room temperature and check for the discharge of warm air at the supply registers.

### System Cooling

Set the thermostat's system mode to COOL and the fan mode to AUTO. Change the thermostat

temperature selector below the existing room temperature. Allow the cooling system to operate for several minutes and check for the discharge of cool air at the supply registers.

### Short Cycle Protection

The control circuit is equipped with a time-delay feature for protection against short cycling. With the system operating in the cooling mode, gradually raise the thermostat temperature setting until the whole system de-energizes. Immediately lower the thermostat temperature to the original setting and verify that the indoor blower is energized. After approximately 5 minutes the compressor and the outdoor fan will energize.

### Emergency Heat

1. Set the thermostat's system mode to EM HT and the fan mode to either AUTO (intermittent air) or to ON (continuous air).
2. Set the thermostat's temperature selector above the existing room temperature and check the following:
  - The thermostat auxiliary heat light (RED) is on.
  - The AC compressor and the fan should not run; low voltage circuit remains energized.
  - The blower runs according to the thermostat's fan mode setting.

### Forced Defrost Mode (Field Test)

- When the **TEST** terminals are shorted with the **Y** input active and pressure switches closed, the ACS D will be eliminated and the compressor contactor output energizes within 2 seconds. When the **TEST** terminals are shorted for more than 9 seconds with the **Y** input active, the control will be placed into a forced defrost mode.

**NOTE:** The coil temperature sensor does not need to be cold when the unit is forced into defrost.

- After the **TEST** input is removed, the defrost mode will terminate in 13.7 minutes or less or when the coil temperature is above the terminate set point or when the thermostat **Y** input is removed, whichever occurs first.

### Anti Short Cycle Timer Test

The 5 minute time delay feature can be bypassed by shorting the **TEST** pins together.

### Heating Mode

When the **TEST** pins are shorted together for more than 1 second, the control will switch between defrost mode and heating mode as described in the Forced Defrost Mode procedure section.

### Cooling Mode

When the **TEST** pins are shorted together for more than 1 second, the Anti Short Cycle Timer will be bypassed.

### Adjustment of Refrigerant Charge

---

## **CAUTION:**

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**This heat pump contains liquid and gaseous refrigerant under pressure. Adjustment of refrigerant charge should only be attempted by qualified, trained personnel thoroughly familiar with the equipment and safe responsible refrigerant handling procedures. Under no circumstances should the homeowner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.**

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- The unit must be charged while both first and second stages are operating.
- To achieve rated capacity and efficiency the compressor must be exposed to refrigerant for at least 24 hours prior to running and then must be run for a minimum of 12 hours. See Refrigerant Charging Charts (Figures 11 - 14, pages 14 & 15) for Charging in Cooling Mode.

### Charging an R-410A Unit in AC Mode with Outdoor Temperatures Above 65F

1. With the system operating at steady-state, measure the liquid refrigerant pressure in psig at the service valve.
  2. Measure the liquid refrigerant temperature (° F) at the service valve.
  3. For the temperature measured, determine the required liquid refrigerant pressure from the appropriate charging charts.
- If the pressure measured in step 1 is greater than the required liquid refrigerant pressure determined in step 4, 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 4, then there is too little charge in the system. Add refrigerant and repeat steps 1 through 3 until the system is correctly charged.

### Charging an R-410A Unit in Heating Mode

1. Evacuate the refrigerant system.
2. Weigh in the proper charge as shown on the unit rating plate and use the Heating Charging Tables 2 & 3 (pages 16 & 17) as a guide. Tables reflect conditions at high speed operation. Unit charge **MUST** be verified in cooling season.
3. Verify the unit is operating properly according to the System Heating section on page 12.

### UNIT 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 condensate drain and 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.
- 

## **CAUTION:**

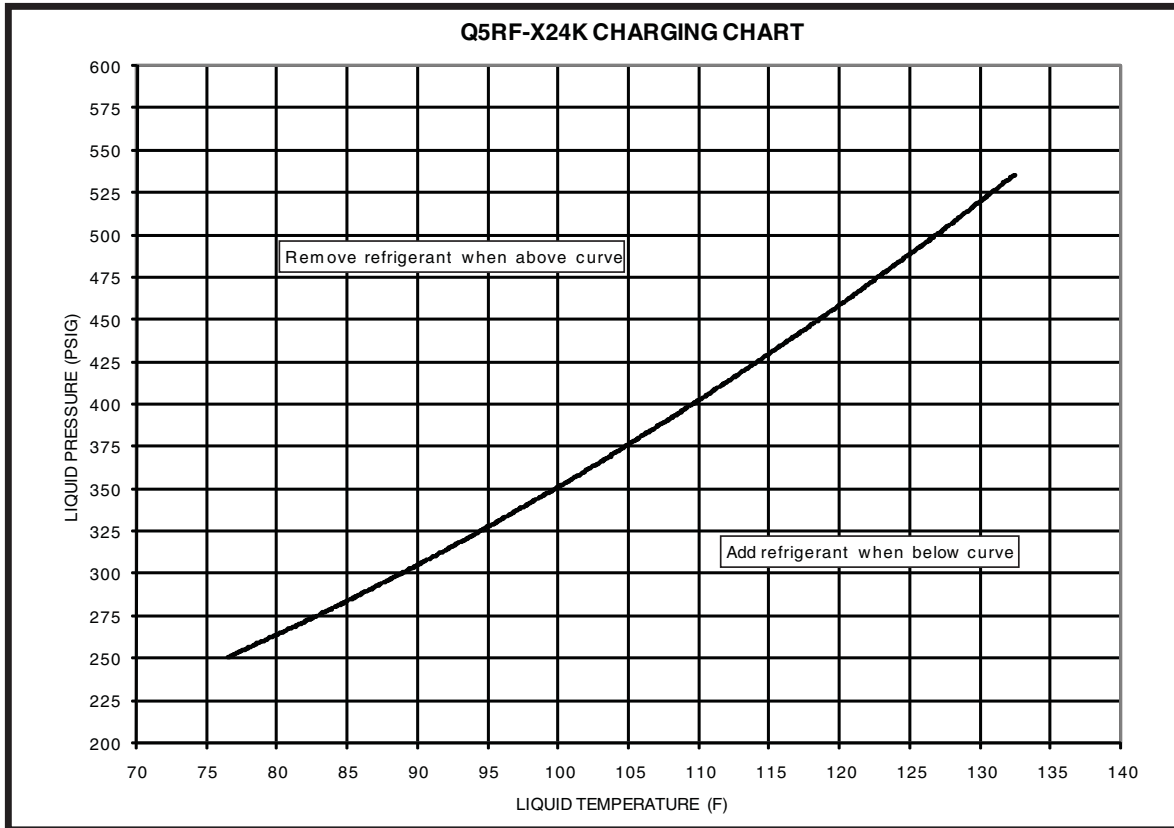
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**The unit should never be operated without a filter in the return air system. Replace disposable filters with the same type and size.**

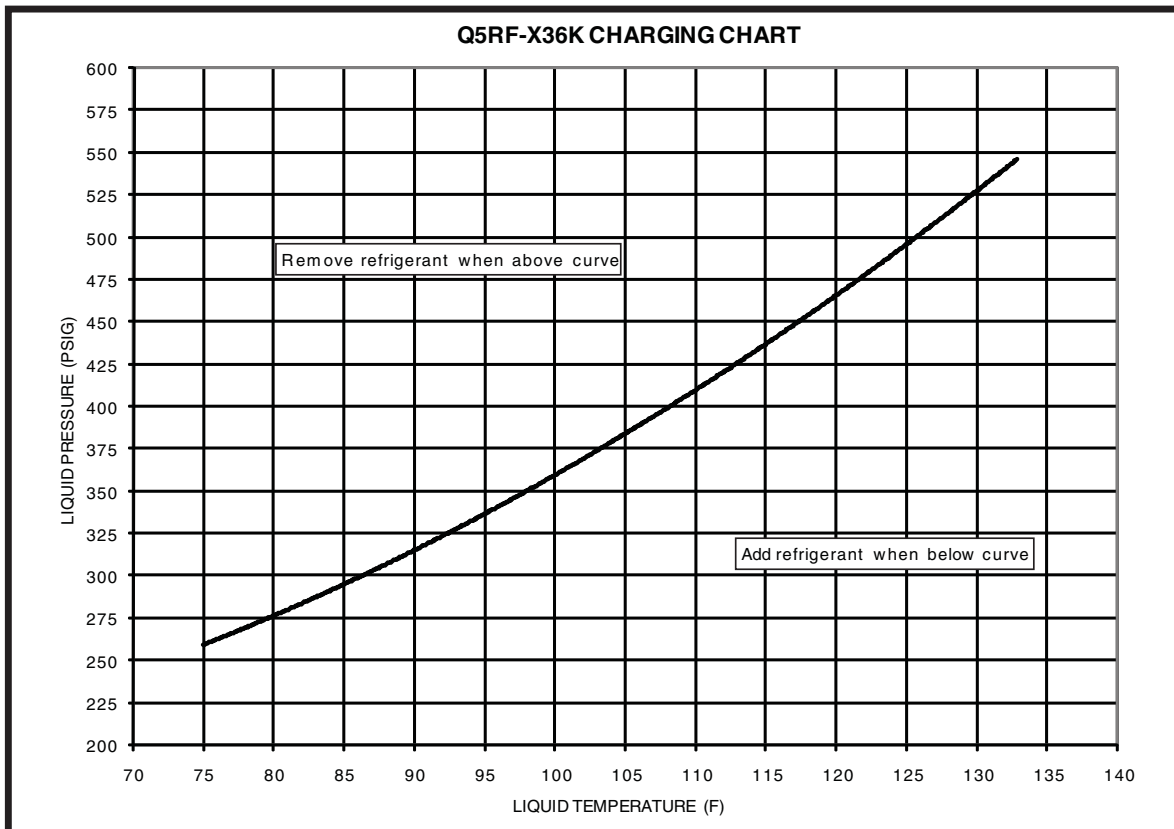
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- Do not attempt to add additional oil to motors unequipped with oil tubes. The compressor is hermetically sealed at the factory and does not require lubrication.

## Refrigerant Charging Charts for Cooling Mode of Operation

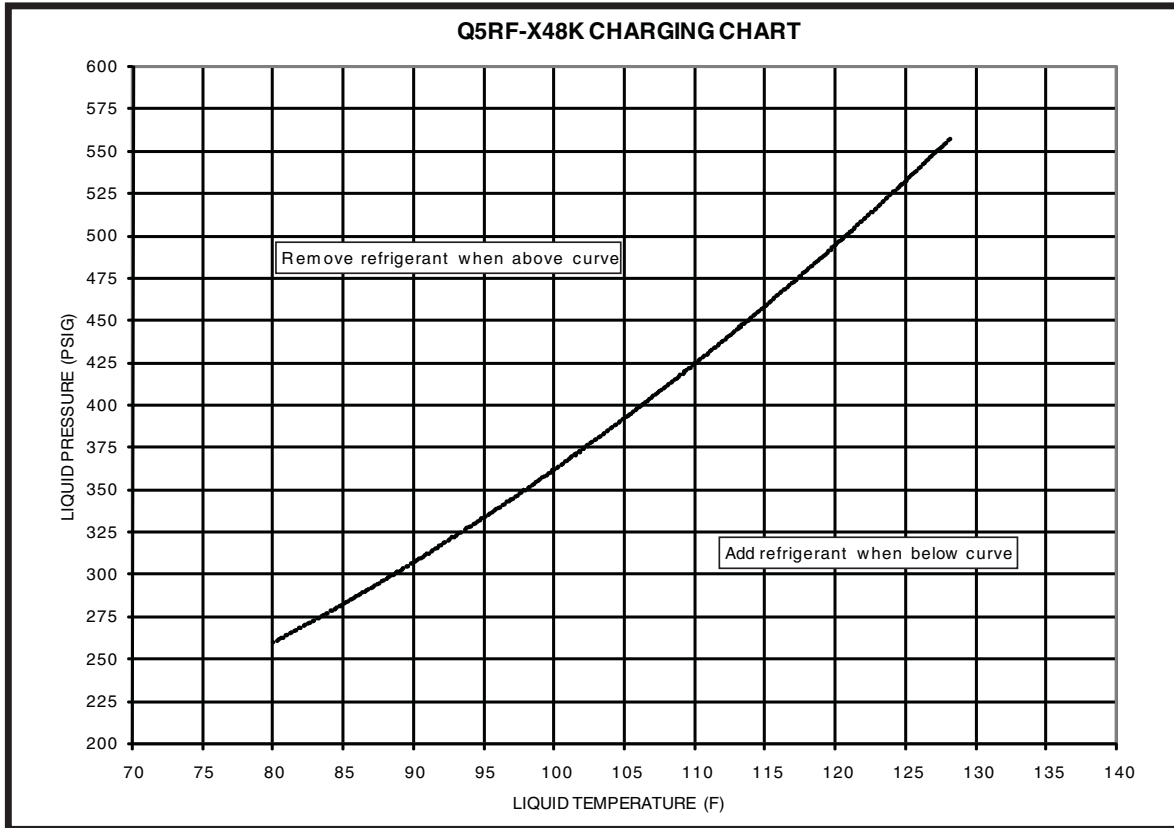


**Figure 11. Charging Chart for 2 ton Units**

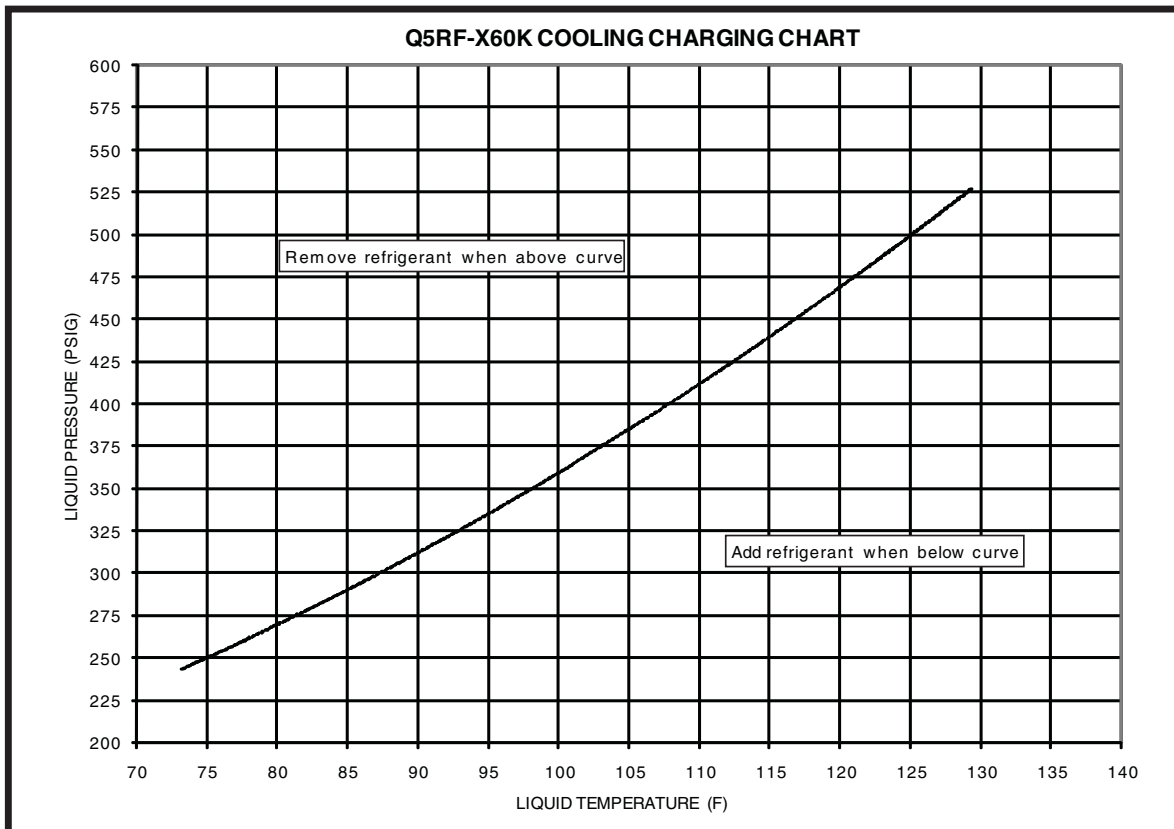


**Figure 12. Charging Chart for 3 ton Units**

## Refrigerant Charging Charts for Cooling Mode of Operation - Continued



**Figure 13. Charging Chart for 4 ton Units**



**Figure 14. Charging Chart for 5 ton Units**

**Refrigerant Charging Chart Legend for Heating Mode of Operation:**

 Shaded boxes indicate flooded conditions.

 Rated design values. The suction pressure will vary from design value if outdoor air flow, entering dry bulb, or entering wet bulb temperatures vary.

1. All pressures are listed psig and all temperatures in °F

2. Discharge temperatures greater than charted values indicate an undercharged system.

Q5RF-X24K																			
OUTDOOR TEMPERATURE (DEG. F)																			
0		10			20			30			40			50			60		
Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.		
37	205	126	52	226	128	67	247	131	82	268	133	97	283	145	112	314	167	189	
38	212	124	53	232	126	68	252	129	83	272	131	98	290	142	113	321	163	183	
39	219	122	54	238	124	69	257	127	84	275	129	99	297	139	114	328	158	177	
40	226	120	55	244	122	70	261	125	85	279	127	100	304	137	115	335	154	171	
41	233	118	56	249	120	71	266	123	86	283	125	101	311	134	116	342	149	165	
42	240	116	57	255	118	72	271	121	87	286	123	102	318	131	117	349	145	158	
43	247	114	58	261	116	73	276	119	88	290	121	103	325	128	118	356	140	152	

Q5RF-X36K																			
OUTDOOR TEMPERATURE (DEG. F)																			
0		10			20			30			40			50			60		
Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.		
37	188	102	50	224	114	63	261	127	77	297	139	92	321	159	109	357	186	213	
38	195	100	51	230	112	64	265	125	78	301	137	93	328	156	110	364	181	207	
39	202	98	52	236	110	65	270	123	79	304	135	94	335	153	111	371	177	201	
40	209	96	53	242	108	66	275	121	80	308	133	95	342	150	112	378	172	195	
41	216	94	54	248	106	67	280	119	81	312	131	96	349	147	113	385	168	188	
42	223	92	55	254	104	68	284	117	82	315	129	97	356	144	114	392	163	182	
43	230	90	56	260	102	69	289	115	83	319	127	98	363	142	115	399	159	176	

**Table 2. Refrigerant Charging Tables for Heating Mode of Operation - 2 & 3 Ton Units**



**Refrigerant Charging Chart Legend for Heating Mode of Operation:**

 Shaded boxes indicate flooded conditions.

 Rated design values. The suction pressure will vary from design value if outdoor air flow, entering dry bulb, or entering wet bulb temperatures vary.

1. All pressures are listed psig and all temperatures in °F

2. Discharge temperatures greater than charted values indicate an undercharged system.

**Q5RF-X48K**

OUTDOOR TEMPERATURE (DEG. F)

Suc. Press.	0			10			20			30			40			50			60		
	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	
29	263	160	45	268	157	61	272	155	77	276	153	91	286	158	104	323	170	116	361	181	
30	270	158	46	273	155	62	277	153	78	280	151	92	293	155	105	330	165	117	368	175	
31	277	156	47	279	153	63	282	151	79	284	149	93	300	152	106	337	161	118	375	169	
32	284	154	48	285	151	64	286	149	80	287	147	94	307	149	107	344	156	119	382	163	
33	291	152	49	291	149	65	291	147	81	291	145	95	314	146	108	351	152	120	389	157	
34	298	150	50	297	147	66	296	145	82	295	143	96	321	144	109	358	147	121	396	151	
35	305	148	51	303	145	67	301	143	83	298	141	97	328	141	110	365	143	122	403	144	

**Q5RF-X60KK**

OUTDOOR TEMPERATURE (DEG. F)

Suc. Press.	0			10			20			30			40			50			60		
	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	
31	205	104	46	229	113	61	253	123	76	277	132	92	304	148	107	358	169	122	412	191	
32	212	102	47	235	111	62	258	121	77	280	130	93	311	145	108	365	165	123	419	185	
33	219	100	48	241	109	63	262	119	78	284	128	94	318	142	109	372	160	124	426	179	
34	226	98	49	247	107	64	267	117	79	288	126	95	325	139	110	379	156	125	433	173	
35	233	96	50	253	105	65	272	115	80	291	124	96	332	137	111	386	152	126	440	167	
36	240	94	51	258	103	66	277	113	81	295	122	97	339	134	112	393	147	127	447	160	
37	247	92	52	264	101	67	282	111	82	299	120	98	346	131	113	400	143	128	454	154	

**Table 3. Refrigerant Charging Tables for Heating Mode of Operation - 4 & 5 Ton Units**

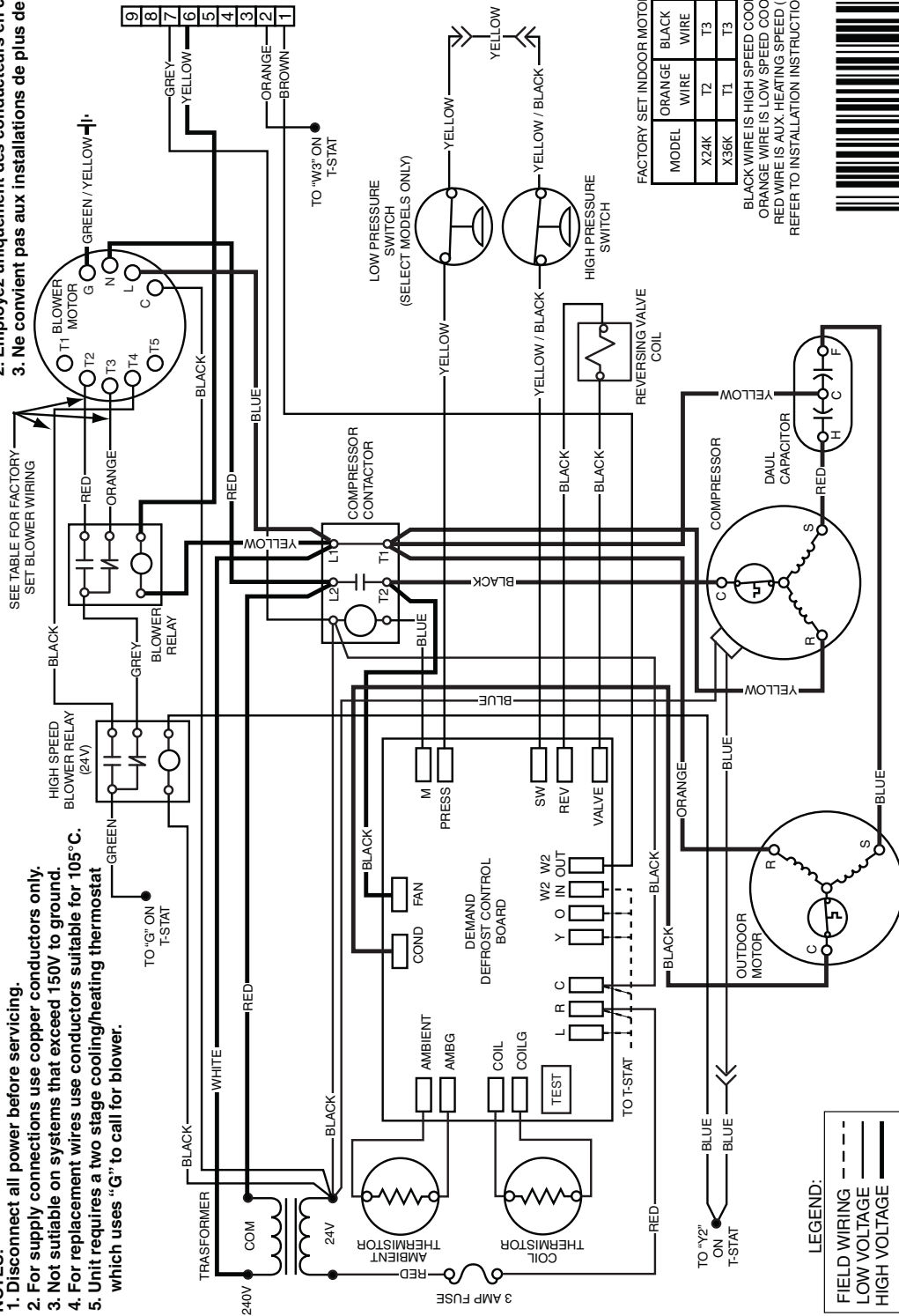
# WIRING DIAGRAM

## Q5RF/PPH2RF SERIES SMALL PACKAGE H/P W/DEMAND DEFROST 2 TON AND 3 TON

208/230V 60HZ/SINGLE PHASE

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

- NOTES:**
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150V to ground.
  4. For replacement wires use conductors suitable for 105°C.
  5. Unit requires a two stage cooling/heating thermostat which uses "G" to call for blower.



7110650  
0110

Figure 15. Q5RF/PPH2RF Series Wiring Diagram - 2 & 3 Ton Units

# WIRING DIAGRAM

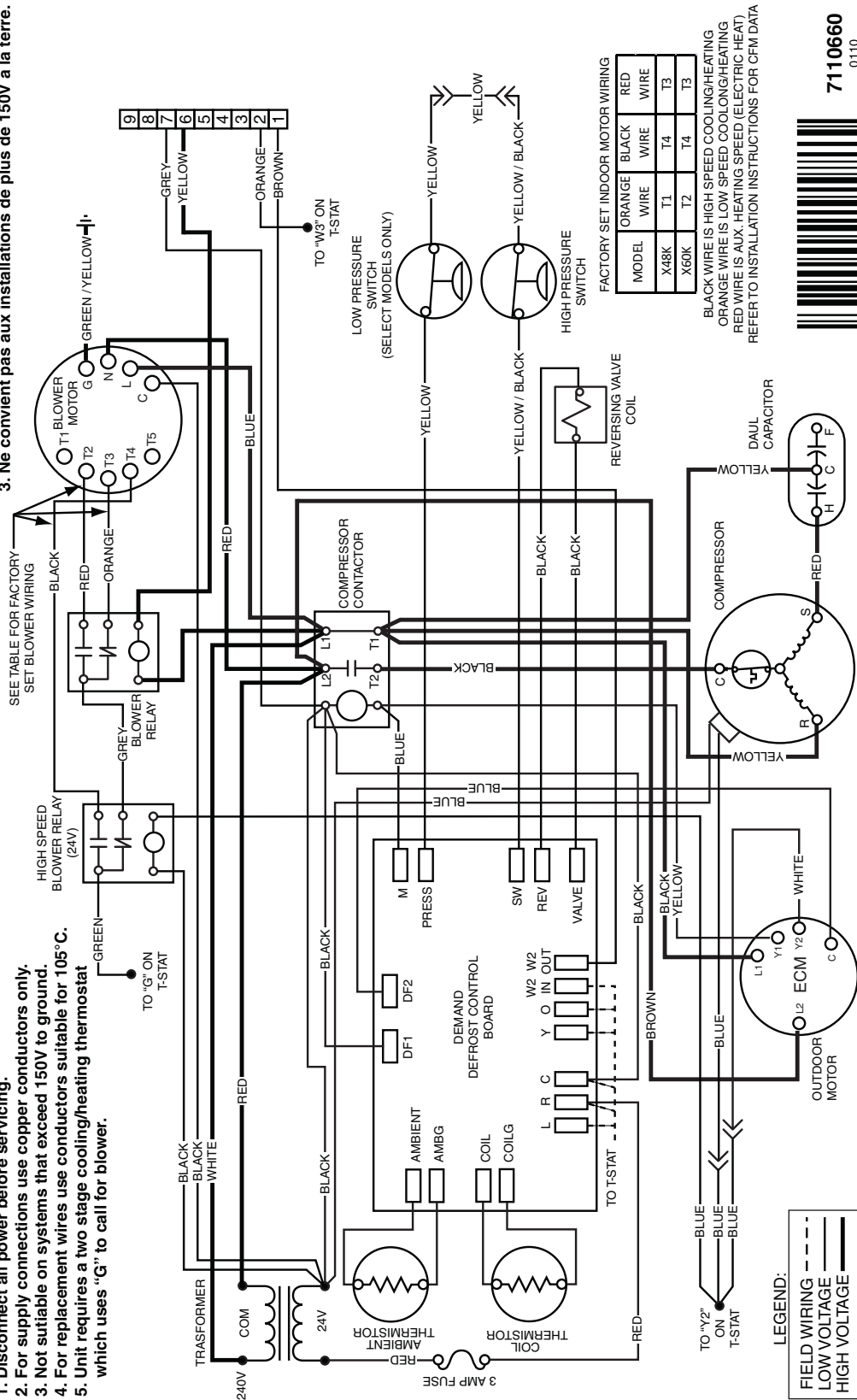
**Q5RF/PPH2RF SERIES SMALL PACKAGE H/P W/DEMAND DEFROST 4 TON AND 5 TON**

**208/230V**

**60HZ/SINGLE PHASE**

- NOTES:**
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150V to ground.
  4. For replacement wires use conductors suitable for 105°C.
  5. Unit requires a two stage cooling/heating thermostat which uses "G" to call for blower.

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



**7110660**  
0110

Figure 16. Q5RF/PPH2RF Series Wiring Diagram - 4 & 5 Ton Units

## COMPONENT FUNCTIONS

### Low Pressure Switch

The low pressure switch is factory installed and located in the suction line internal to the unit. The switch is designed to protect the compressor if a loss of charge occurs. Under normal conditions, the switch is closed.

If the suction pressure falls below 5 psig, then the switch will open and de-energize the unit. The switch will close again once the suction pressure increases above 20 psig. The low pressure switch interrupts the thermostat inputs to the unit.

**NOTE:** When the switch opens and then closes, there will be a 5 minute short cycling delay before the unit can energize.

### High Pressure Switch

The high pressure switch is factory installed and located in the compressor discharge line internal to the 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 650 psig, the switch will open and de-energize the unit. The switch will close again once the discharge pressure decreases to 460 psig. The high pressure switch interrupts the thermostat inputs to the unit. **NOTE:** When the switch opens and then closes, there will be a 5 minute short cycling delay before the unit can energize.

Model Q5RF	Wire Color/Speed Tap	Motor Speed	Air Flow (@ 0.3 in WC)
X24K	T1	Low	560
	Orange/T2	Medium/Low*	600
	Black/T3	Medium**	800
	Red/T4	Medium/High***	1,040
	T5	High	1,250
X36K	Orange/T1	Low*	600
	T2	Medium/Low	750
	Black/T3	Medium**	1,200
	Red/T4	Medium/High***	1,420
	T5	High	1,520
X48K	Orange/T1	Low*	1,030
	T2	Medium/Low	1,240
	Red/T3	Medium***	1,400
	Black/T4	Medium/High**	1,530
	T5	High	1,680
X60K	Orange/T1	Low	1,060
	T2	Medium/Low*	1,200
	Red/T3	Medium***	1,500
	Black/T4	Medium/High**	1,760
	T5	High	1,970

\* Denotes Factory Set Low Speed Cooling/ Heating

\*\* Denotes Factory Set High Speed Cooling/ Heating

\*\*\* Denotes Factory Set Electric Heating Speed

Table 4. Motor Lead Connection

**INSTALLER: PLEASE LEAVE THESE INSTALLATION INSTRUCTIONS WITH THE HOMEOWNER.**

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