

# INSTALLATION INSTRUCTIONS

## \*SH1QE4M1SP - 24K, 30K, 36K, 42K, & 48K (2, 2.5, 3, 3.5, & 4 TON) SERIES FOR MANUFACTURED HOUSING INSTALLATIONS

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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 & 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.

### **WARNING:**

#### **ELECTRICAL SHOCK OR FIRE HAZARD**

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

### **WARNING:**

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.

### **WARNING:**

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.

### **CAUTION:**

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

### **WARNING:**

The information listed below and the next page should be followed during the installation, service, and operation of this product. 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.
- 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.
- 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.
- This unit is designed for outdoor installations only and should be positioned as shown on [page 3](#).
- Use caution when handling this appliance or removing components. Personal injury can occur from sharp metal edges present in all sheet metal constructed equipment.

## 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.

Refer to the Quick Reference Data sheet for additional electrical, charging and unit information.

### Before You Install the Heat Pump

- ✓ The cooling load of the area to be conditioned needs to 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, poorly ventilated areas, and areas subject to accumulation of debris should be avoided. See Figure 1.
- 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 should 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 needs to be level and strong enough to support the unit's weight. The slab height needs to 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.

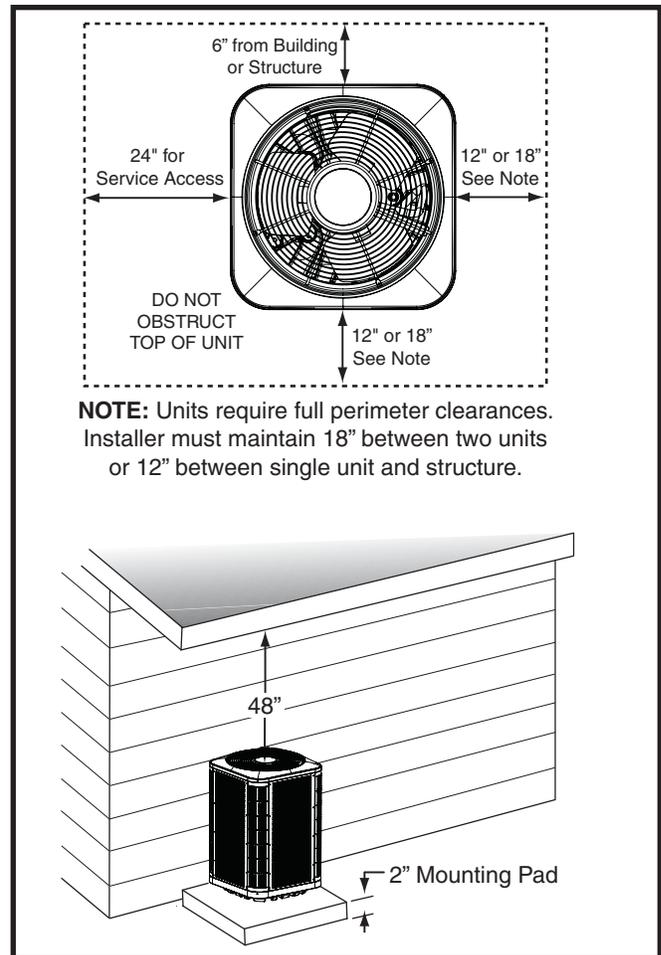


Figure 1. Clearance Requirements

## 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.

- 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 needed, a copper tubing bender is recommended. Avoid sharp bends and contact of the refrigerant lines with metal surfaces.

These units are equipped with single shot quick connect couplings. Together with the indoor section and line set, only 4 coupling connections are needed to provide a 100% sealed system.

1. Route the suction line and liquid line between indoor and outdoor sections, remove protector caps and plugs
2. Lubricate entire surface of the diaphragm "O" ring and threads of the male coupling using the lubricant supplied with the line set and a small brush.
3. Make sure that coupling halves are held in proper alignment with each other prior to starting the threads of female coupling nut onto the male half. Thread coupling halves together by hand until hand tight.

### 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!**

4. Using two wrenches, tighten the coupling halves until seated or a definite resistance is felt.
5. Using a marker, mark a line from the coupling union nut to the bulkhead then tighten an additional 1/6 turn. See [Table 1](#) for torque values. Repeat for all couplings.

COUPLING SIZE	TORQUE	MALE COUPLING	FEMALE COUPLING NUT	FEMALE COUPLING BODY
3/8" (10mm)	10-12 Ft-Lbs (14-16 Nm)	3/4"	11/16"	5/8"
3/4" (19mm)	35-45 Ft-Lbs (47-61 Nm)	1-1/8"	1-5/16"	1"
7.8" (22mm)	10-12 Ft-Lbs (14-16 Nm)	1-1/8"	1-5/16"	1"

**Table 1. Torque Values**

## ELECTRICAL WIRING

### WARNING:

#### **ELECTRICAL SHOCK OR FIRE HAZARD**

**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. Inspect for loose connections. See [Figure 10](#) (page 15).

#### **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 diagram ([Figure 10](#)) 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 2. 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

## **⚠ 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.

### 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 2.
- 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 3.
- The thermostat should be mounted about 5 feet above the floor on an inside wall. DO NOT install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat manufacturer's instruction sheet for detailed mounting and installation information.

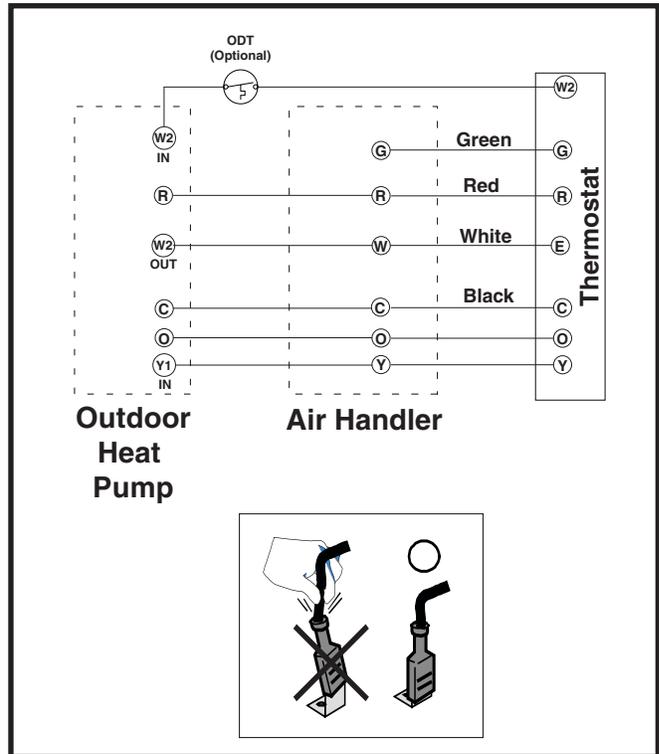
COPPER WIRE SIZE — AWG (1% VOLTAGE DROP)				
SUPPLY WIRE LENGTH-FEET				SUPPLY CIRCUIT AMPACITY
200	150	100	50	
6	8	10	14	15
4	6	8	12	20
4	6	8	10	25
4	4	6	10	30
3	4	6	8	35
3	4	6	8	40
2	3	4	6	45
2	3	4	6	50
2	3	4	6	55
1	2	3	4	60

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

**Table 2. Copper Wire Size**

THERMOSTAT WIRE GAUGE	MAXIMUM RECOMMENDED THERMOSTAT WIRE LENGTH (FT)
24	25
22	45
20	70
18	110

**Table 3. Thermostat Wire**



**Figure 2. Typical Thermostat Connections**

## START UP & ADJUSTMENTS

### Pre-Start Check List

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

### Start-Up Procedures

## ⚠ WARNING:

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

### Operating Temperatures

This equipment has been designed to operate within the temperatures specified in Table 4. Running the equipment in heating at higher than 70° F may require the use of a Heat Pump Mild Weather Control Kit or changing over to emergency or auxiliary heating.

### 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.

COOLING		HEATING	
MIN (° F)	MAX (° F)	MIN (° F)	MAX (° F)
60	115	-10	70

**Table 4. Heat Pump Operating Temperatures**

### 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.
  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.
- Verify the Status Indicator (on the control board) against the codes listed in Table 5 to determine proper diagnostic description.

STATUS INDICATOR	STATUS TYPE	DIAGNOSTIC DESCRIPTION
C 1	Operating Status	Cooling, 1st Stage
H 1	Operating Status	Heating, 1st Stage
SC	Operating Status	Anti Short Cycle Timer
DF	Operating Status	Defrost
--	Operating Status	Power on, no call for operation
D 1	Fault	Pressure switch, low
D 2	Fault	Pressure switch, high
D 3	Fault	Temperature Sensor, Ambient
D 4	Fault	Temperature Sensor, Coil
D 5	Fault	Board
DF (FLASHING)	Input Error	Forced defrost - test short applied longer than 11 minutes

**Table 5. Defrost Control Board Status Indicators**

## HEAT PUMP MAINTENANCE

### **WARNING:**

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.

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 needed.
- 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.

### **CAUTION:**

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

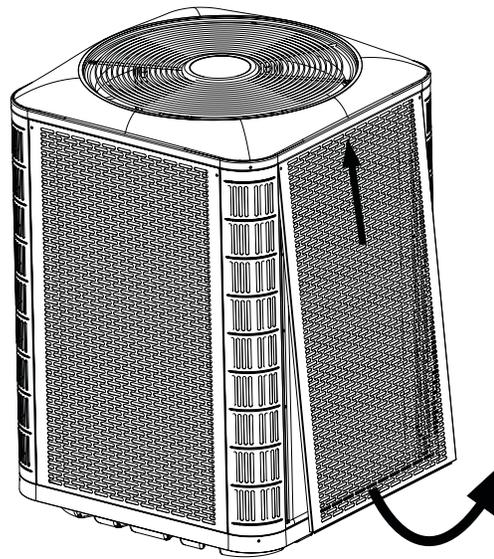
- Do not add additional oil to motors unequipped with oil tubes. The compressor is hermetically sealed at the factory and does not require lubrication.

#### **Panel Removal**

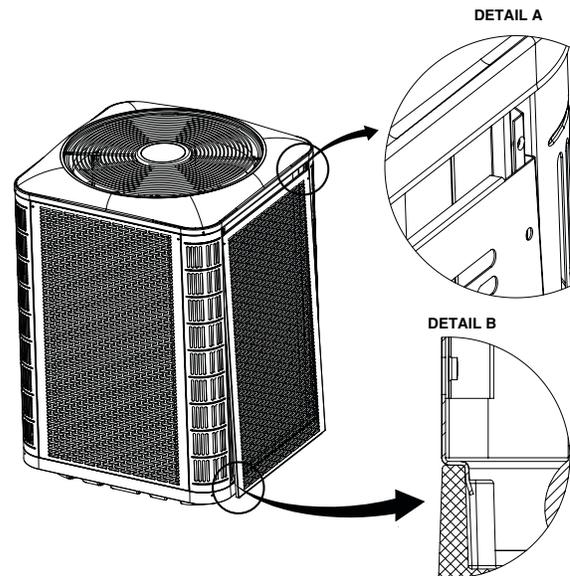
1. Remove screws securing the panel.
2. Slide the panel up towards the top pan in order to clear the bottom flange from the base pan. See [Figure 3](#).
3. Swing the bottom of the panel out and pull the panel down to remove it from the unit.

#### **Panel Installation**

1. Insert the top corners of side panel flanges into the corner post channels as shown in [Detail A](#) in [Figure 4](#).
2. Slide the panel up into the top pan. (You may need to push on the center of the panel at the top in order to clear the top pan edge).
3. Swing the panel in and push down until the panel is resting on the top edge of the base pan wall as shown in [Detail B](#).
4. Install screws into the panel to secure it to the unit.



**Figure 3. Panel Removal**



**Figure 4. Panel Installation**

## REFRIGERANT CHARGING

### **WARNING:**

**SH1QE4M1SP split system heat pumps are shipped charged with R410A refrigerant and ready for installation. If repairs make it necessary for evacuation and charging, it should only be attempted by qualified trained personnel thoroughly familiar with this equipment. Under no circumstances should the owner attempt to install and/or service this equipment. Failure to comply with this warning could result in property damage, personal injury, or death.**

- 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.
- Refrigerant charging charts are applicable only to matched assemblies of this equipment and listed airflows for the indoor coil. For correct system charging, refer to [Figure 5 \(page 9\)](#), [Figure 6 \(page 9\)](#), [Figure 7 \(page 10\)](#), [Figure 8 \(page 10\)](#), and [Figure 9 \(page 11\)](#).
- **Refer to the unit's Quick Reference Data sheet to determine if additional refrigerant will need to be weighed-in to attain the base refrigerant amount for the system match that is being installed. Please note that the charge additions provided in the QRD are estimates based on test data and should only be used as a starting point. Complete the steps in the charging procedure to obtain the final system charge.**
- Use of SH1QE4M1SP 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.
- 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.
- 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.

### Charging the Unit in AC Mode

*(With Outdoor Temperatures Above 65° 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 appropriate liquid refrigerant pressure from [Figure 5](#), [Figure 6](#), [Figure 7](#), [Figure 8](#), and [Figure 9](#).
  - If the pressure measured in Step 1 is greater than the 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 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.

### Charging Charts & Application Notes

*(Cooling Mode Only)*

- **This unit'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.
- The 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 charts the ideal system sub-cooling can vary over the range of operation. Reference [Figure 5 \(page 9\)](#), [Figure 6 \(page 9\)](#), [Figure 7 \(page 10\)](#), [Figure 8 \(page 10\)](#), and [Figure 9 \(page 11\)](#) 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)

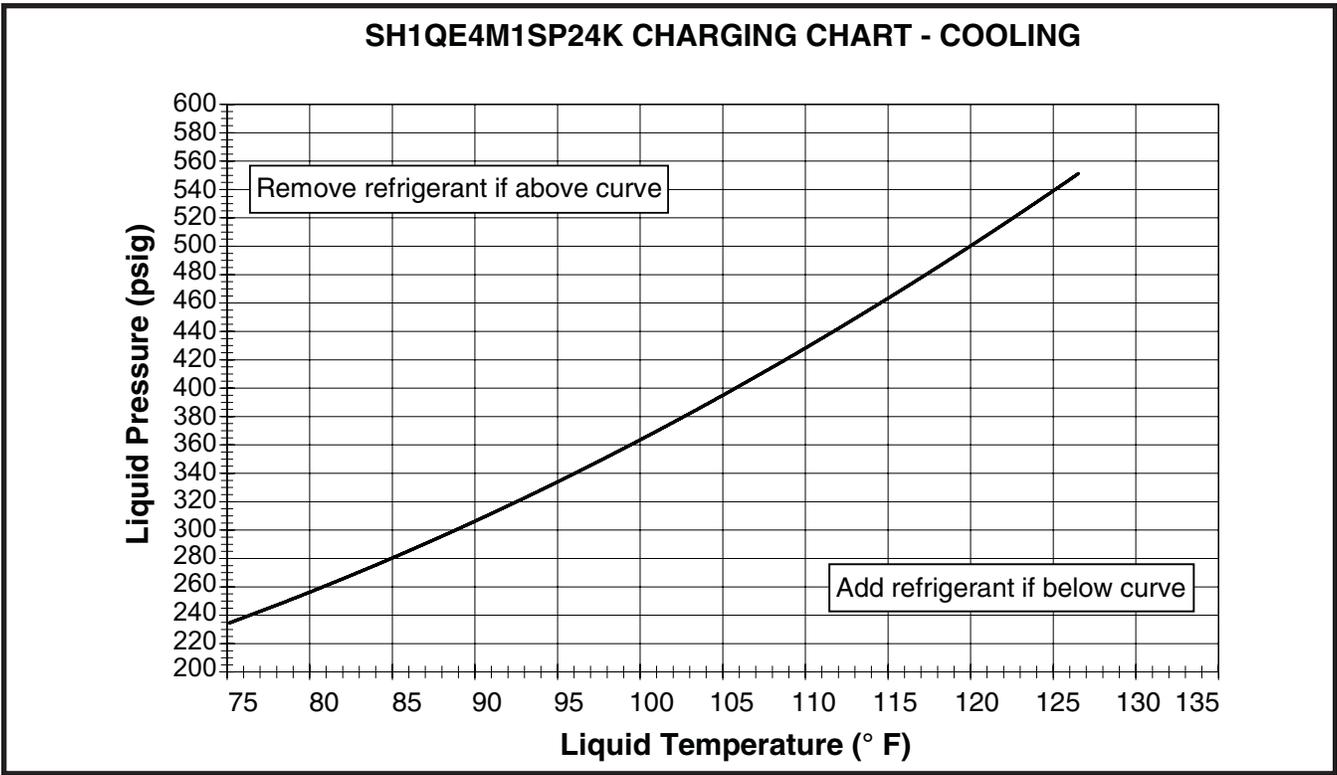


Figure 5. Charging Chart for 2 Ton Models  
(TXV Matches)

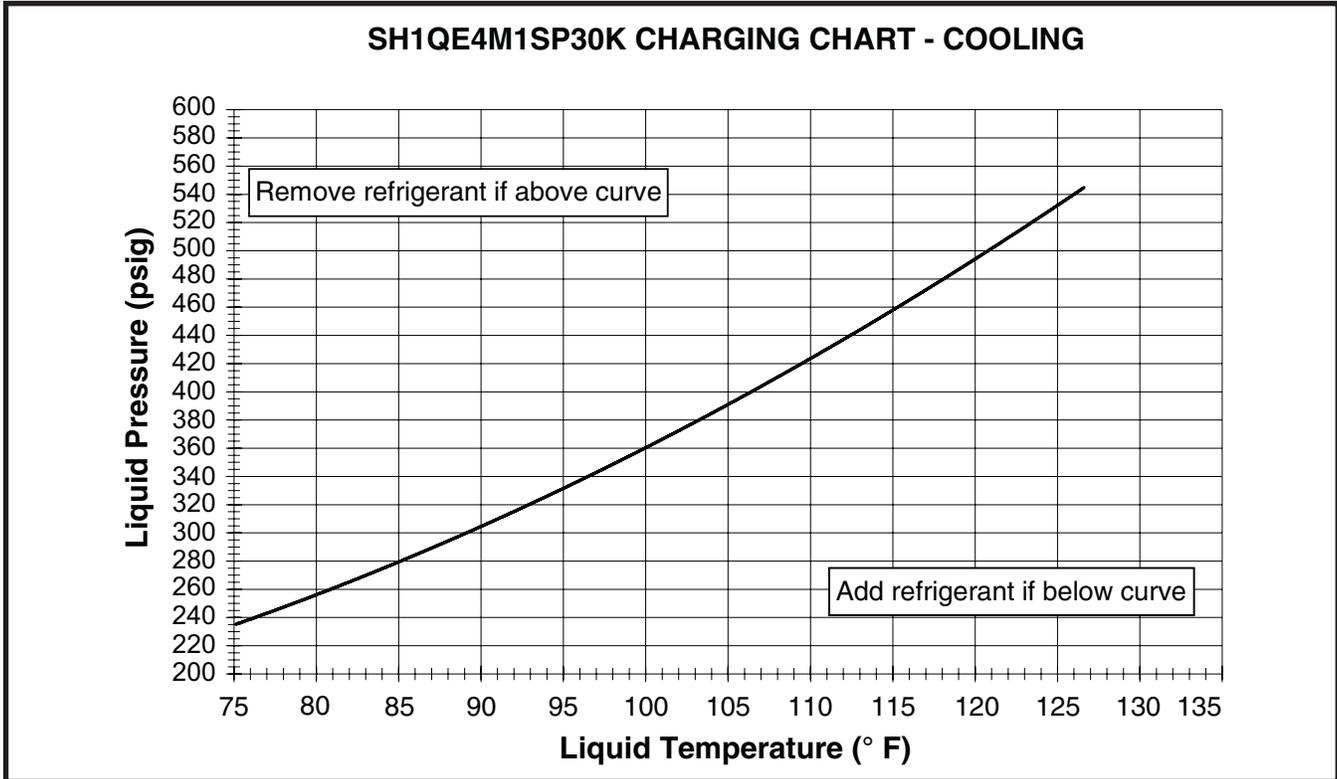


Figure 6. Charging Chart for 2.5 Ton Models  
(TXV Matches)

### SH1QE4M1SP36K CHARGING CHART - COOLING

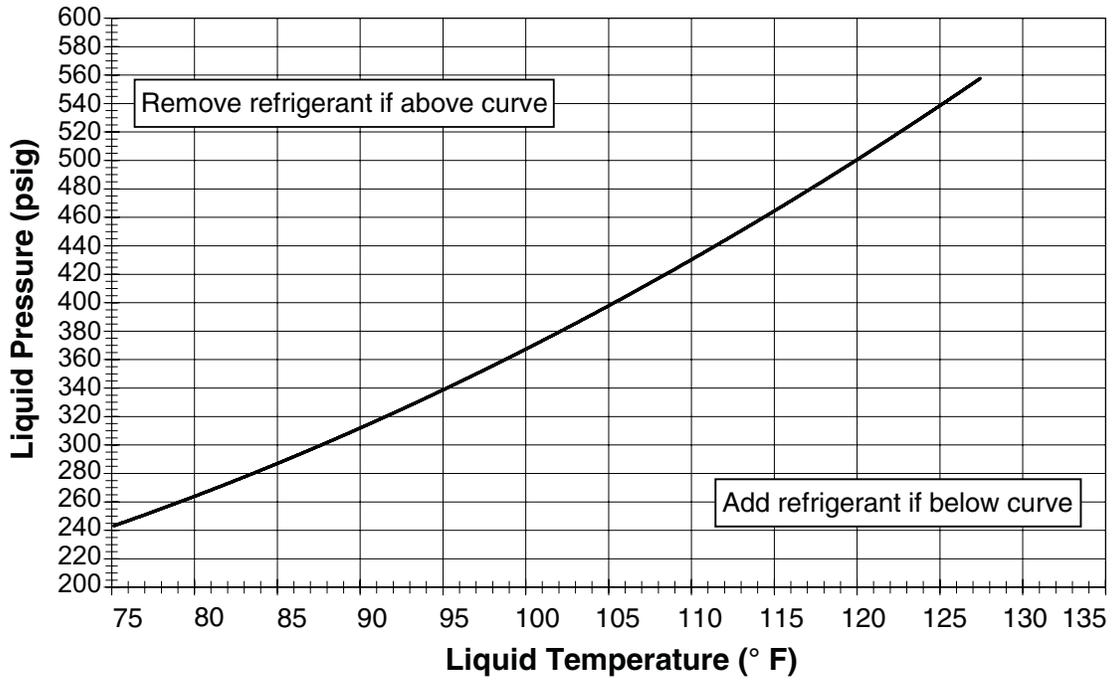


Figure 7. Charging Chart for 3 Ton Models  
(TXV Matches)

### SH1QE4M1SP42K CHARGING CHART - COOLING

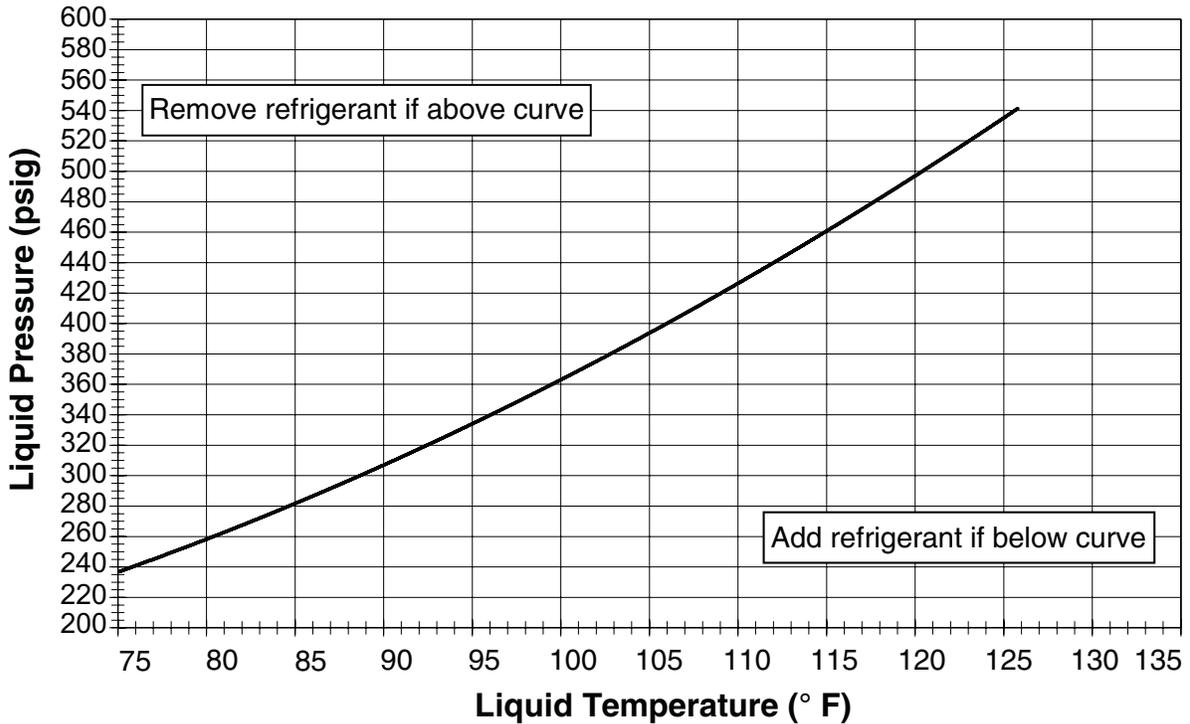


Figure 8. Charging Chart for 3.5 Ton Models  
(TXV Matches)

### SH1QE4M1SP48K CHARGING CHART - COOLING

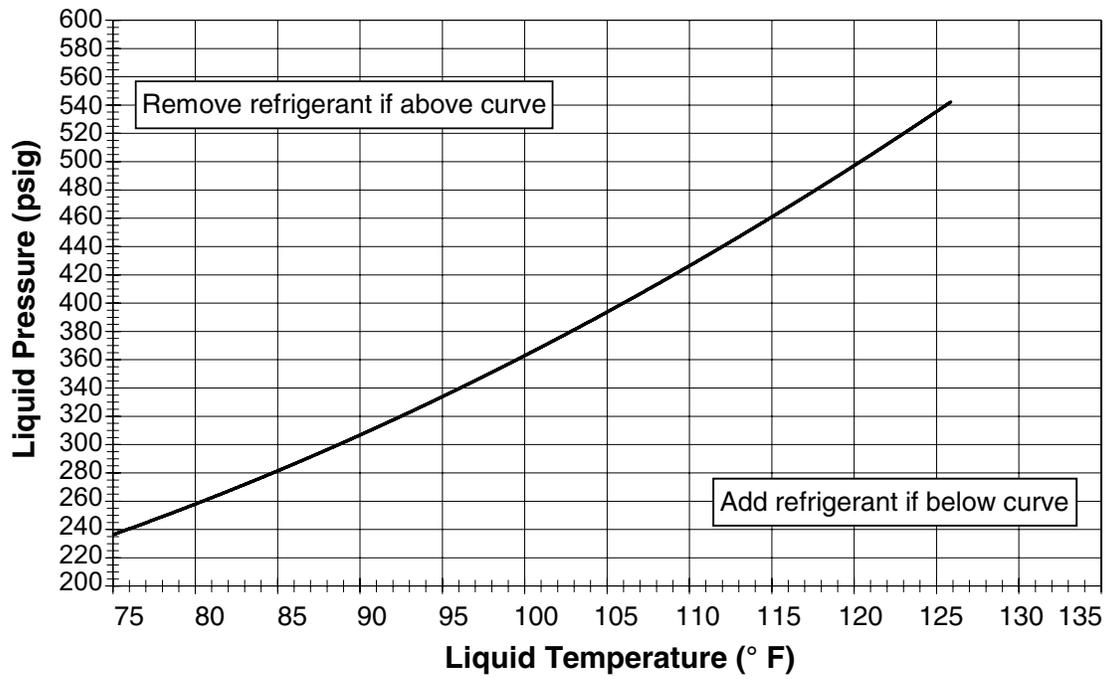


Figure 9. Charging Chart for 4 Ton Models  
(TXV Matches)

## LEGEND

-  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.

## NOTES:

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

## Heat Mode Verification Tables & Application Notes

*(Heat Mode Only)*

- **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.**
- Heat Mode Verification Tables are provided for quick reference when the unit is in heating mode and for the inspection of the liquid line pressures and temperatures. See [Table 6 \(page 13\)](#), [Table 7 \(page 13\)](#), [Table 8 \(page 13\)](#), [Table 9 \(page 14\)](#), and [Table 10 \(page 14\)](#).
- 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, 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. See [Table 6](#), [Table 7](#), [Table 8](#), [Table 9](#), and [Table 10](#). 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.

### **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.

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	200	207	98	52	220	228	108	67	240	248	118	83	260	268	128	99	270	278	138	117	293	301	148	135	316	324	158
38	207	214	96	53	226	234	106	68	245	253	116	84	264	272	126	100	277	285	135	118	300	308	143	136	323	331	152
39	214	221	94	54	232	239	104	69	250	257	114	85	268	275	124	101	284	292	132	119	307	315	139	137	330	338	146
40	221	228	92	55	238	245	102	70	254	262	112	86	271	279	122	102	291	299	129	120	314	322	134	138	337	345	140
41	228	235	90	56	244	251	100	71	259	267	110	87	275	283	120	103	298	306	126	121	321	329	130	139	344	352	133
42	235	242	88	57	249	257	98	72	264	272	108	88	279	286	118	104	305	313	123	122	328	336	125	140	351	359	127
43	242	249	86	58	255	263	96	73	269	276	106	89	282	290	116	105	312	320	121	123	335	343	121	141	358	366	121

Table 6. Verification Table for 2 Ton Models

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.
35	209	220	110	50	229	239	117	65	248	259	125	80	267	278	132	95	277	288	141	112	301	312	153	128	325	336	164
36	216	227	108	51	235	245	115	66	253	263	123	81	271	282	130	96	284	295	139	113	308	319	148	129	332	343	158
37	223	234	106	52	240	251	113	67	258	268	121	82	275	285	128	97	291	302	136	114	315	326	144	130	339	350	152
38	230	241	104	53	246	257	111	68	262	273	119	83	278	289	126	98	298	309	133	115	322	333	139	131	346	357	146
39	237	248	102	54	252	263	109	69	267	278	117	84	282	293	124	99	305	316	130	116	329	340	135	132	353	364	140
40	244	255	100	55	258	269	107	70	272	282	115	85	286	296	122	100	312	323	127	117	336	347	130	133	360	371	134
41	251	262	98	56	264	275	105	71	277	287	113	86	289	300	120	101	319	330	124	118	343	354	126	134	367	378	127

Table 7. Verification Table for 2.5 Ton Models

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.
35	212	221	113	49	231	240	122	63	251	260	131	77	270	279	140	92	281	290	149	108	306	315	158	125	332	341	168
36	219	228	111	50	237	246	120	64	255	265	129	78	274	283	138	93	288	297	146	109	313	322	154	126	339	348	162
37	226	235	109	51	243	252	118	65	260	269	127	79	278	287	136	94	295	304	143	110	320	329	149	127	346	355	156
38	233	242	107	52	249	258	116	66	265	274	125	80	281	290	134	95	302	311	140	111	327	336	145	128	353	362	149
39	240	249	105	53	255	264	114	67	270	279	123	81	285	294	132	96	309	318	137	112	334	343	140	129	360	369	143
40	247	256	103	54	261	270	112	68	275	284	121	82	289	298	130	97	316	325	135	113	341	350	136	130	367	376	137
41	254	263	101	55	267	276	110	69	279	288	119	83	292	301	128	98	323	332	132	114	348	357	131	131	374	383	131

Table 8. Verification Table for 3 Ton Models

OUTDOOR TEMPERATURE (DEG. F)																																		
SUC. PRESS.	0				SUC. PRESS.	10				SUC. PRESS.	20				SUC. PRESS.	30				SUC. PRESS.	40				SUC. PRESS.	50				SUC. PRESS.	60			
	LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.
30	210	217	119	45	234	241	123	61	258	265	128	77	281	289	132	92	298	305	142	108	330	337	156	123	363	370	171							
31	217	224	117	46	240	247	121	62	262	270	126	78	285	292	130	93	305	312	139	109	337	344	152	124	370	377	165							
32	224	231	115	47	246	253	119	63	267	274	124	79	289	296	128	94	312	319	136	110	344	351	147	125	377	384	158							
33	231	238	113	48	252	259	117	64	272	279	122	80	292	300	126	95	319	326	133	111	351	358	143	126	384	391	152							
34	238	245	111	49	257	265	115	65	277	284	120	81	296	303	124	96	326	333	130	112	358	365	138	127	391	398	146							
35	245	252	109	50	263	271	113	66	281	289	118	82	300	307	122	97	333	340	128	113	365	372	134	128	398	405	140							
36	252	259	107	51	269	276	111	67	286	294	116	83	303	311	120	98	340	347	125	114	372	379	129	129	405	412	134							

Table 9. Verification Table for 3.5 Ton Models

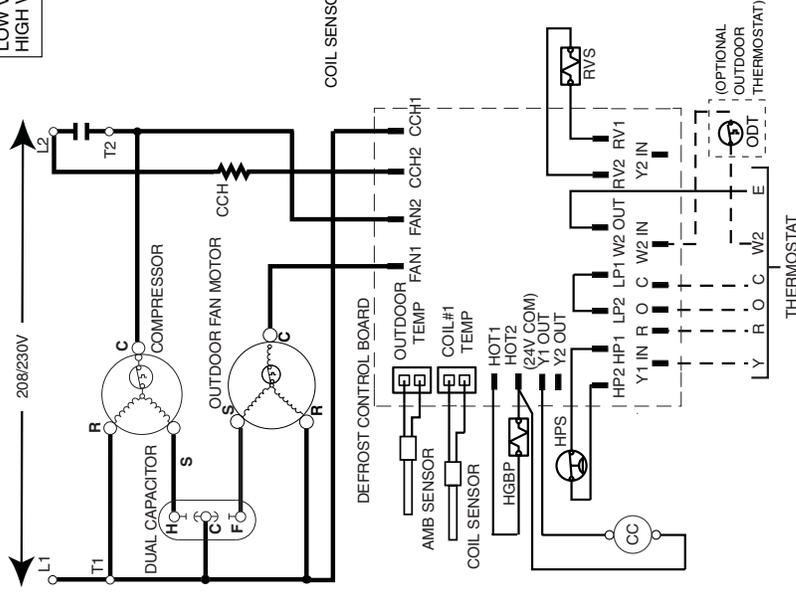
OUTDOOR TEMPERATURE (DEG. F)																																		
SUC. PRESS.	0				SUC. PRESS.	10				SUC. PRESS.	20				SUC. PRESS.	30				SUC. PRESS.	40				SUC. PRESS.	50				SUC. PRESS.	60			
	LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.		LIQUID PRESS.	DISCH. PRESS.	DISCH. TEMP.	DISCH. TEMP.
43	233	236	120	50	244	247	125	56	255	258	130	63	266	269	135	79	283	286	143	106	330	333	154	133	377	380	165							
44	240	243	118	51	250	253	123	57	260	263	128	64	270	273	133	80	290	293	140	107	337	340	149	134	384	387	159							
45	247	250	116	52	256	259	121	58	265	268	126	65	273	276	131	81	297	300	137	108	344	347	145	135	391	394	153							
46	254	257	114	53	262	265	119	59	269	273	124	66	277	280	129	82	304	307	134	109	351	354	140	136	398	401	146							
47	261	264	112	54	268	271	117	60	274	277	122	67	281	284	127	83	311	314	131	110	358	361	136	137	405	408	140							
48	268	271	110	55	273	277	115	61	279	282	120	68	284	288	125	84	318	321	129	111	365	368	131	138	412	415	134							
49	275	278	108	56	279	283	113	62	284	287	118	69	288	291	123	85	325	328	126	112	372	375	127	139	419	422	128							

Table 10. Verification Table for 4 Ton Models

# WIRING DIAGRAM

## Split System Heat Pump (Outdoor Section)

- NOTES:**
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150 volts to ground.
  4. For replacement wires use conductors suitable for 105° C.
  5. For ampacities and overcurrent protection, see unit rating plate.
  6. Connect to 24 vac/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  
**RVS** - Reversing Valve Solenoid  
**\* HARD START KIT (OPTIONAL)**

## Single Phase

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

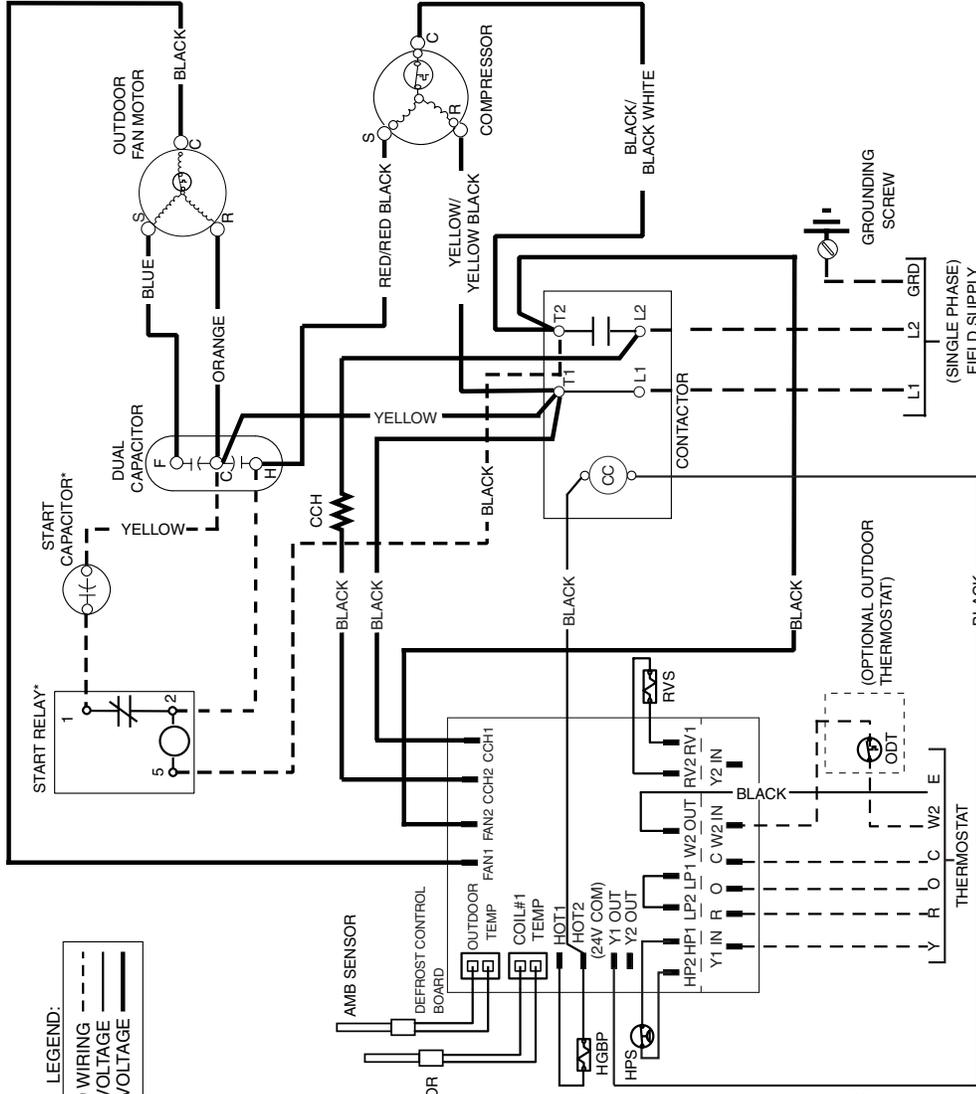


Figure 10. W.D. for 2 - 4 Ton Models

## INSTALLATION CHECKLIST

<b>INSTALLATION ADDRESS:</b>		
CITY:	STATE:	
UNIT MODEL #		
UNIT SERIAL #		
<b>INSTALLER NAME:</b>		
CITY _____	STATE _____	
Unit installed minimum clearances shown on <a href="#">page 3</a> ?	YES	NO
Has the owner's information been reviewed with the customer?	YES	NO
Has the literature package been left with the unit?	YES	NO

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage:..... VOLTS		
Max. deviation of voltage from avg. volts: ..... VOLTS		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct? (If Applicable)	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) .....		

### PROPOSITION 65 WARNING:

**WARNING: This product contains chemicals known to the state of California to cause cancer.**

**WARNING: This product contains chemicals known to the state of California to cause birth defects or other reproductive harm.**

### 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 |               |

