

# INSTALLATION INSTRUCTIONS

**\*SH3BE4M - 1SP18K, 1SP24K, 1SP30K, 1SP36K, 1SP42K, 1SP48K, & 2SX60K (1.5, 2, 2.5, 3, 3.5, 4, & 5 TON) SERIES, SINGLE PHASE MODELS WITH MICROCHANNEL COILS**

## 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 unit 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.**

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## IMPORTANT SAFETY INFORMATION

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

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### **WARNING:**

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

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

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

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

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### **WARNING:**

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

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### **CAUTION:**

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

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### **WARNING:**

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

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

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### **WARNING:**

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

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

## HEAT PUMP INSTALLATION

### General Information

\*SH3BE4M 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 must be calculated and a system of the proper capacity selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. The system must be wired and provided with circuit protection in accordance with local building codes. If there is any question concerning the power supply, contact the local power company.
- ✓ The indoor section (air handler, furnace, etc) should be installed before routing the refrigerant tubing. Refer to the indoor unit's installation instructions for installation details.
- ✓ All units are securely packed at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Verify coil fins are straight. If necessary, comb fins to remove flattened or bent fins. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ✓ Please consult your dealer for maintenance information and availability of maintenance contracts. Please read all instructions before installing the unit.

### Packaging Removal

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

### 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.
- The unit should not be placed under roofing or other overhangs which are not guttered; that would allow water or ice to fall into the units discharge opening.
- Consideration should be given to availability of electric power, service access, noise, and shade.

### Ground Installations

The unit should be installed on a solid base, that is level and located at least 2 inches above grade\*.

**\*Note:** It is recommended that poured concrete mounting bases are not be attached or adjacent to the building structure or foundation.

### Roof Installation

The unit may only be installed on a structure that is capable of supporting the total weight of the unit and its anchorage. The support for the base of the unit may not slope more than 1/8 inch per foot. The minimum clearance for the base of the unit to the roof-line is 2 inches\* for residential applications.

**Note on ground and roof clearances:** Heat pump and other applications should account for the accumulation of snow and raise the base of the unit accordingly. (At a minimum, a 6 inch clearance is required.)

### Accessory Mounting Kits

Kits for other mounting methods and accessories can be found in the technical sales literature for the unit. Or the literature library on NortekHVAC.com.

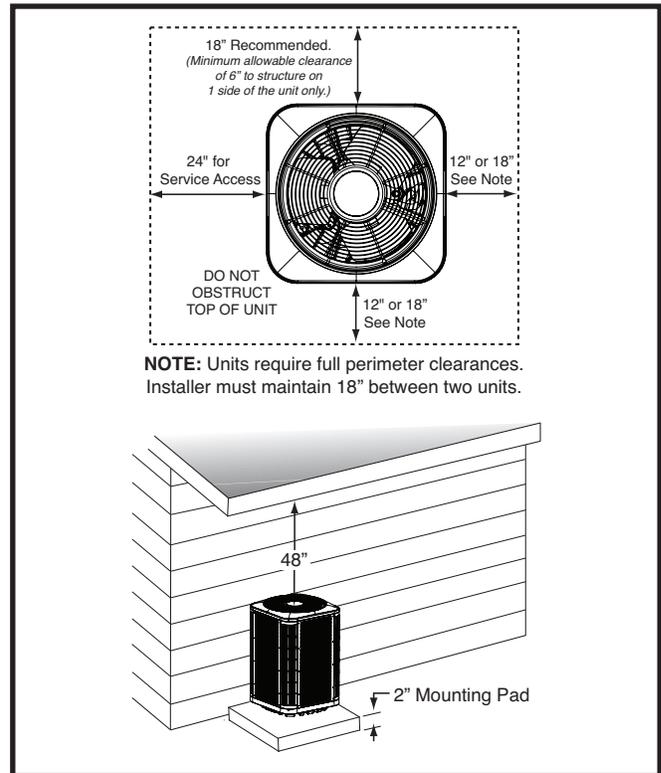


Figure 1. Clearance Requirements

### Installation/Verification of the System's Expansion Device

After outdoor and indoor unit placement has been determined, refer to the Quick Reference Data sheet for information on the appropriate expansion device to use for the equipment. Verify that the installed expansion device matches those requirements or install the correct expansion device. Note: Some outdoor units may include the correct indoor orifice expansion device for the installation application but is dependent upon the actual unit match. The correct expansion device or kit is available for all approved Nortek listed applications from the parts department.

### Connecting Refrigerant Tubing Between the Indoor & Outdoor Unit

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#### CAUTION:

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**When connecting refrigerant line-sets together, it is highly recommended that dry nitrogen be flowing through the joints during brazing to prevent internal oxidation and scaling. Copper oxides, internal to the system can damage the compressors bearings and seals, block small orifices and microchannels or otherwise damage components.**

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#### CAUTION:

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**When performing brazing operations always protect the system components and seals from the possibility of heat damage. Remove all caps, plugs and Schrader valve cores on piping system components just prior to assembly and brazing. Use good brazing practices to protect components from the heat and flame of the brazing torch.**

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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 required, a copper tubing bender is recommended. Avoid sharp bends and contact of the refrigerant lines with metal surfaces.
- A filter dryer is provided with the unit and must be installed in the liquid line of the system. If the installation replaces a system with a filter dryer already present in the liquid line, the filter dryer must be replaced with the one supplied with the unit. The filter dryer must be installed in strict accordance with the manufacturer's installation instructions.
- Optional equipment such as liquid line solenoid valves, low ambient, etc., should be installed in strict accordance with the manufacturer's installation instructions.
- After the completion of all brazing operations and when the components have been properly cooled, replace all the seals, Schrader cores and caps which had been previously removed. It is recommended that all seals be either lubricated with a light coat of refrigerant oil. Always verify that oil applied matches the oil type listed on the compressor nameplate. A thread sealant which is compatible with the system refrigerant and oil can be sparingly applied if desired.

### Outdoor Orifice Removal & Installation

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

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

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#### CAUTION:

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**If repairs are necessary to the refrigerant line-set or indoor setup after the initial installation, then when servicing, cover or seal openings to minimize the exposure of the refrigerant system to air to prevent accumulation of moisture and other contaminants.**

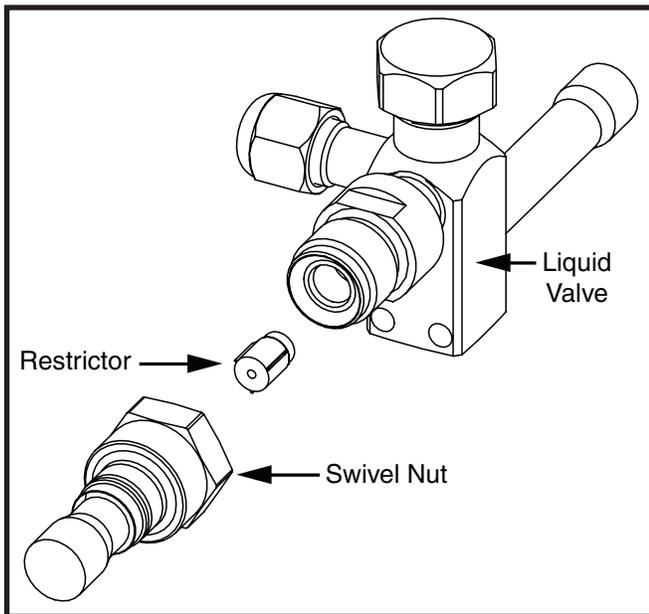
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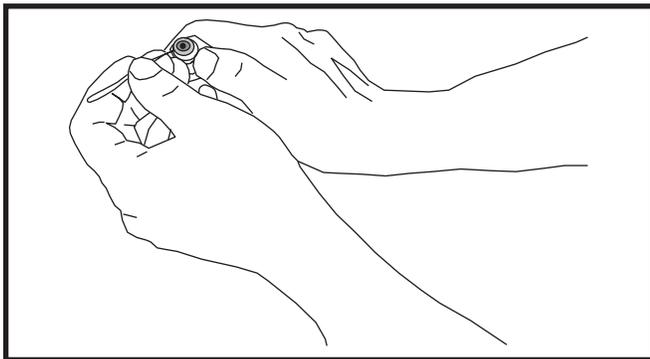
## ⚠ CAUTION:

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

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



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



**Figure 3. Removal of Orifice**

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## ⚠ CAUTION:

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

5. Realign the assembly nut on the valve body and hand tighten both components. Mark a line on both bodies and then tighten an additional ¼ turn using two wrenches. The movement of the two lines will show how much the nut is tightened.

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## ELECTRICAL WIRING

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### ⚠ WARNING:

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

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

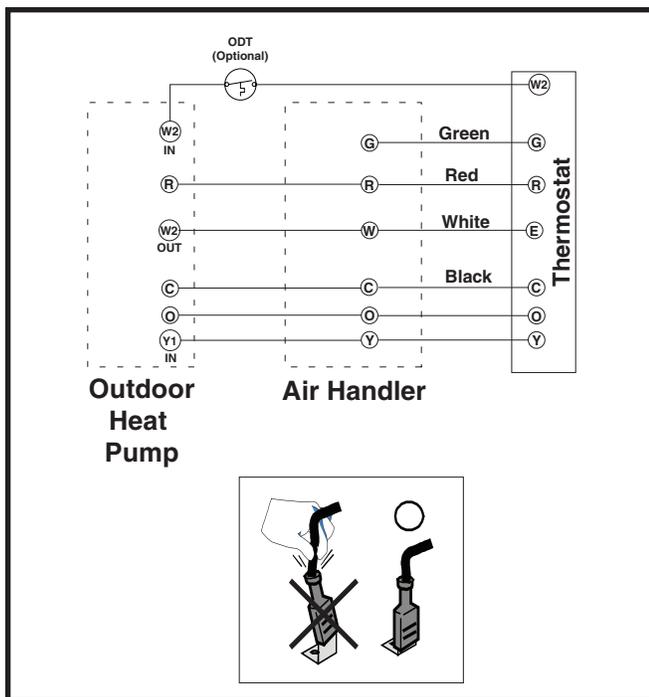
- All electrical connections must be in compliance with all applicable local codes and ordinances, and with the current revision of the National Electric Code (ANSI/NFPA 70).
- For Canadian installations the electrical connections and grounding shall comply with the current Canadian Electrical Code (CSA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

#### Pre-Electrical Checklist

- ✓ Verify that the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate.
- ✓ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. Refer to the unit wiring label for proper high and low voltage wiring.
- ✓ If replacing an existing unit, verify that the: current wiring, unit disconnect and circuit breaker is properly sized and rated for the new units requirements. Verify that information with the MCA and MOP values on the unit nameplate.
- ✓ Verify factory wiring is in accordance with the unit wiring diagram. Inspect for loose connections. See [Figure 8](#) (page 11), [Figure 9](#) (page 12) & [Figure 10](#) (page 13).

#### 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.



**Figure 4. Typical Thermostat Connections**

- 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 electrical connections for its incoming line voltage wiring, its safety ground wiring and the low voltage control circuit wiring. The outdoor unit requires both power and control circuit electrical connections. Refer to the wiring diagrams for identification and location of outdoor unit field wiring interfaces. See [Figure 8 \(page 11\)](#), [Figure 9 \(page 12\)](#) & [Figure 10 \(page 13\)](#). 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 (MCA) and maximum overcurrent protection (MOP) 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 in strict accordance of the NEC (ANSI/NFPA 70), applicable local codes, and the instructions provided with the equipment. 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 4](#).
- The outdoor unit is designed to operate from a 24 VAC Class II control circuit which is provided by the indoor unit. 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 outdoor unit's low voltage terminal block and as indicated on the units wiring diagram.

## START UP & ADJUSTMENTS

### Pre-Start Check List

- ✓ Verify that the outdoor unit is installed according to all instructions in this document.
- ✓ Verify that the indoor unit is appropriate for use with the refrigerant listed on the outdoor unit. And that it has the proper design pressure for the outdoor unit equipment type.
- ✓ Verify the indoor unit and thermostat have been installed in accordance with that equipment's instructions.
- ✓ Verify line voltage power leads are securely connected and that both indoor and outdoor units are properly grounded.
- ✓ Verify that the power supplied by branch circuits for both the indoor and outdoor equipment is:
  - the proper voltage for the equipment, and
  - that the overcurrent protection device is properly sized, and
  - that the supply wiring is the correct gauge.
- ✓ Verify that the low voltage and thermostat wiring are securely connected to the proper terminals for all equipment.
- ✓ Verify that the low voltage transformer has been properly connected with that unit's instructions.
- ✓ Verify that the refrigerant line-set has been properly routed between the units, connected appropriately, is properly secured and protected from damage, and that it has the correct piping insulation installed.
- ✓ Verify that the refrigerant system and lines are leak free by inspection with a leak detector or the soap-bubble method.

- √ Verify that any attached indoor ducting has been properly installed and sealed.
- √ Verify that the indoor condensate drain line and trap are properly installed and functioning.
- √ Verify that all removable panels have been re-installed, and all cabinet enclosures and fan guards are secure.
- √ Verify that the air filters are clean and properly installed.
- √ Verify that the thermostat is set to the stand-by, or off setting. And the fan switch is set to automatic or off.

### 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 1](#). 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 1. 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

- Verify the Status Indicator (on the control board) against the codes listed in [Table 2 \(page 8\)](#) to determine proper diagnostic description.
- Terminals 'R' and 'C' must have 18-30 VAC present between them for proper board operation.
- Board anti-short cycle timer can be bypassed by shorting the test terminals for less than 1 second while there is a call for heating or cooling.
- Forced defrost enabled when shorting the test terminals for more than three seconds while there is a call for heating or cooling. After short removed, defrost mode will be terminated when conditions are met.
- Forced defrost can be maintained for up to 11 minutes by continuously maintaining the short across the test terminals. If held for over 11 minutes, the unit will stop and a flashing 'dF' will be indicated on the board.
- A continuous display of a fault code will indicate that the fault is still active.
- A flashing fault code indicates that the fault has been corrected but remains in memory for troubleshooting purposes.
- Multiple fault codes are listed in order from the most recent to the oldest. Only ten codes will be stored in memory.
- Faults will remain in the board memory for seven days after the last fault is corrected.
- Faults can be cleared from memory by shorting the test terminal momentarily while there is not a call for heating or cooling.

STATUS INDICATOR	STATUS TYPE	DIAGNOSTIC DESCRIPTION
C1	Operating Status	Cooling, 1st Stage
C2	Operating Status	Cooling, 2nd Stage
H1	Operating Status	Heating, 1st Stage
H2	Operating Status	Heating, 2nd Stage
SC	Operating Status	Anti Short Cycle Timer
DF	Operating Status	Defrost
—	Operating Status	Power on, no call for operation
01	Fault	Pressure switch, low
02	Fault	Pressure switch, high
03	Fault	Temperature Sensor, Ambient
04	Fault	Temperature Sensor, Coil
05	Fault	Board
OF (FLASHING)	Input Error	Forced defrost - test short applied longer than 11 minutes

Table 2. 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 required.
- Inspect the outdoor coil at the beginning of each cooling season. Remove any debris. Clean the outdoor coil and louvers as necessary using a mild detergent and water. Rinse thoroughly with water.
- To access the coil and the internal components of the unit, refer to [Figure 5](#) for panel removal and [Figure 6](#) for panel installation.
- Inspect the electrical connections for tightness at the beginning of each heating and cooling season. Service as necessary.
- Do not attempt to add additional oil or grease to motors unequipped with oil tubes or grease fittings. Most outdoor unit motors are manufactured with sealed, permanently lubricated bearings that are designed for the life of the equipment without maintenance.
- The compressor is hermetically sealed and shipped from the factory with the proper oil charge for most installations. Lubricating oil should only be added by trained personnel and is typically only required for long line-sets or tall riser applications.

### 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 5](#).
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 6](#).
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. Insert screws into the panel to secure it to the unit.

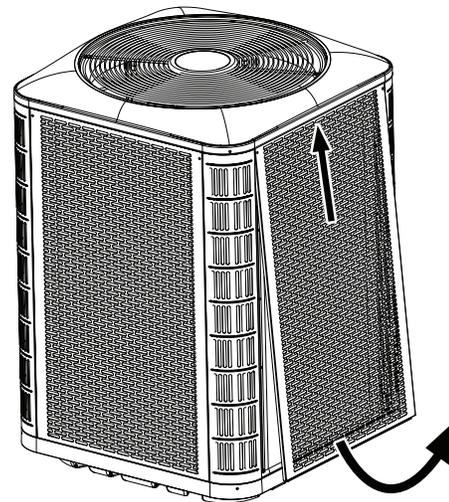


Figure 5. Panel Removal

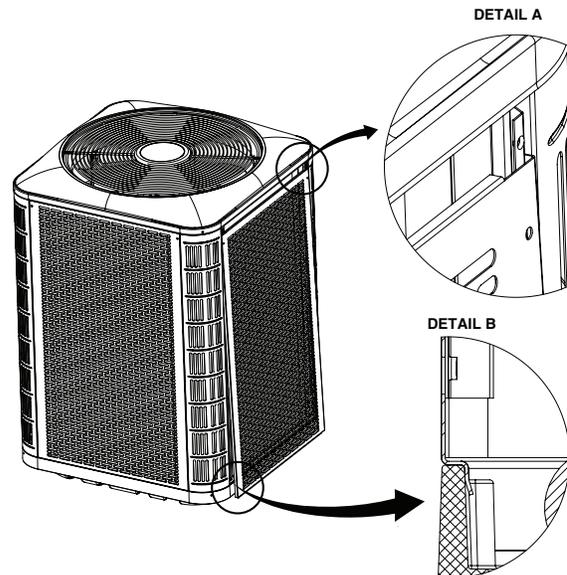


Figure 6. Panel Installation

## REFRIGERANT CHARGING

### **WARNING:**

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

After refrigerant line connections and expansion device installation 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.

- Refer to the Quick Reference Data sheet for additional charging information for this unit with the approved Nortek indoor units. For reference, these units are listed in the AHRI Directory with all approved combinations of indoor coils and units. Installing these outdoor units on systems that combine it with an indoor coil or unit not listed there, is not recommended. When approved combinations of indoor and outdoor units are installed, they should be set up to operate within the airflow and other operational parameters prescribed in all of the units provided instructions and technical specifications.
- Installation of this outdoor unit with other, non-listed indoor unit combinations may require different airflows, expansion devices, charge values and system setup from the instructions provided here and with this unit. Nortek does not recommend the use of this product in unlisted combinations, and the system performance and efficiency values of unlisted unit combinations may be different than the listed product combinations.
- Refer to the Quick Reference Data sheet for additional charging information. 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.

- A low-pressure switch is factory installed (certain models) and located internally on the suction line of the outdoor unit. The switch is designed to protect the compressor from a loss of charge by interrupting the thermostat inputs to the unit. If the suction pressure falls below 20 psig, the switch will open and de-energize the outdoor unit. The switch will close again when the suction pressure increases above 35 psig. When the switch opens and then closes, there is a 3 minute short cycling delay before the outdoor unit will energize. Under normal conditions the switch is closed.

### **Charging the Unit in AC mode**

*If the outdoor temperature is 65 degrees F or higher:*

After completing the refrigerant line connections, leak checking the system, and evacuating the indoor section and all line connections (using proper methods), perform the following steps:

1. Determine the recommended charge addition (if applicable) for the system being installed. This information is in the unit's QRD (Quick Reference Data sheet).
2. Calculate the amount of additional refrigerant needed for the line set length of the actual installation. This information is on the first page of the unit's QRD (Quick Reference Data sheet).
3. Weigh in the additional charge amounts determined by step 1 and 2 above.
4. Adjust the charge to match the superheat (for fixed orifice systems) or subcooling (for TXV systems). The charging tables are on the inside of the outdoor unit's electrical box cover panel. These tables provide superheat targets for fixed orifice systems and subcooling targets for TXV systems. The system should be charged so that the measured superheat/ subcooling are within 1 degree F of the target listed in the table.

#### **For fixed orifice systems:**

- If your measured superheat at the suction valve is **LESS THAN** the recommended superheat value in the table then **REMOVE** refrigerant.
- If your measured superheat at the suction valve is **GREATER THAN** the recommended superheat value in the table then **ADD** refrigerant.

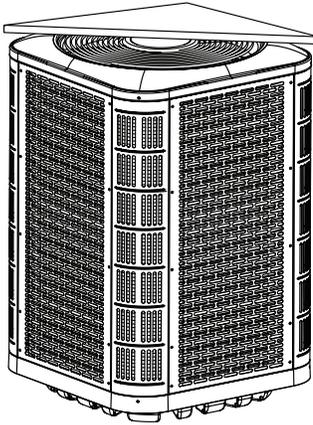
#### **For TXV systems:**

- If your measured subcooling at the liquid valve is **LESS THAN** the recommended subcooling value in the table then **ADD** refrigerant.
- If your measured subcooling at the liquid valve is **GREATER THAN** the recommended subcooling value in the table then **REMOVE** refrigerant.

*If the outdoor temperature is between 35 degrees F and 65 degrees F:*

After completing the refrigerant line connections, leak checking the system, and evacuating the indoor section and all line connections (using proper methods), perform the following steps:

1. Determine the recommended charge addition (if applicable) for the system being installed. This information is in the unit's QRD (Quick Reference Data sheet).
2. Calculate the amount of additional refrigerant needed for the line set length of the actual installation. This information is on the first page of the unit's QRD (Quick Reference Data sheet).
3. Weigh in the additional charge amounts determined by step 1 and 2 above.
4. Block off the discharge of the outdoor fan. **NOTE:** One half of the unit should be covered corner to corner as shown in [Figure 7](#).



**NOTE:** One half of the unit should be covered corner to corner.

**Figure 7. Blocked Off Outdoor Fan Discharge**

5. With the unit in cooling mode, adjust the charge to match the superheat (for fixed orifice systems) or subcooling (for TXV systems) by using the low ambient charging tables on the inside of the outdoor unit's electrical box cover panel. These tables provide superheat targets for fixed orifice systems and subcooling targets for TXV systems. The system should be charged so that the measured superheat/subcooling are within 1 degree F of the target listed in the table.

**For fixed orifice systems:**

- If your measured superheat at the suction valve is **LESS THAN** the recommended superheat value in the table then **REMOVE** refrigerant.
- If your measured superheat at the suction valve is **GREATER THAN** the recommended superheat value in the table then **ADD** refrigerant.

**For TXV systems:**

- If your measured subcooling at the liquid valve is **LESS THAN** the recommended subcooling value in the table then **ADD** refrigerant.
- If your measured subcooling at the liquid valve is **GREATER THAN** the recommended subcooling value in the table then **REMOVE** refrigerant

*If the outdoor temperature is below 35 degrees F:*

After completing the refrigerant line connections, leak checking the system, and evacuating the indoor section and all line connections (using proper methods), perform the following steps:

1. Determine the recommended charge addition (if applicable) for the system being installed. This information is in the unit's QRD (Quick Reference Data sheet).
2. Calculate the amount of additional refrigerant needed for the line set length of the actual installation. This information is on the first page of the unit's QRD (Quick Reference Data sheet).
3. Weigh in the additional charge amounts determined by steps 1 and 2 above.
4. Return to the system when the outdoor temperature is 35 degrees F or higher and follow the steps defined in step 4 of the "If the outdoor temperature is between 35 degrees and 65 degrees F" or "If the outdoor temperature is 65 degree F or higher" sections above as applicable.

# WIRING DIAGRAMS

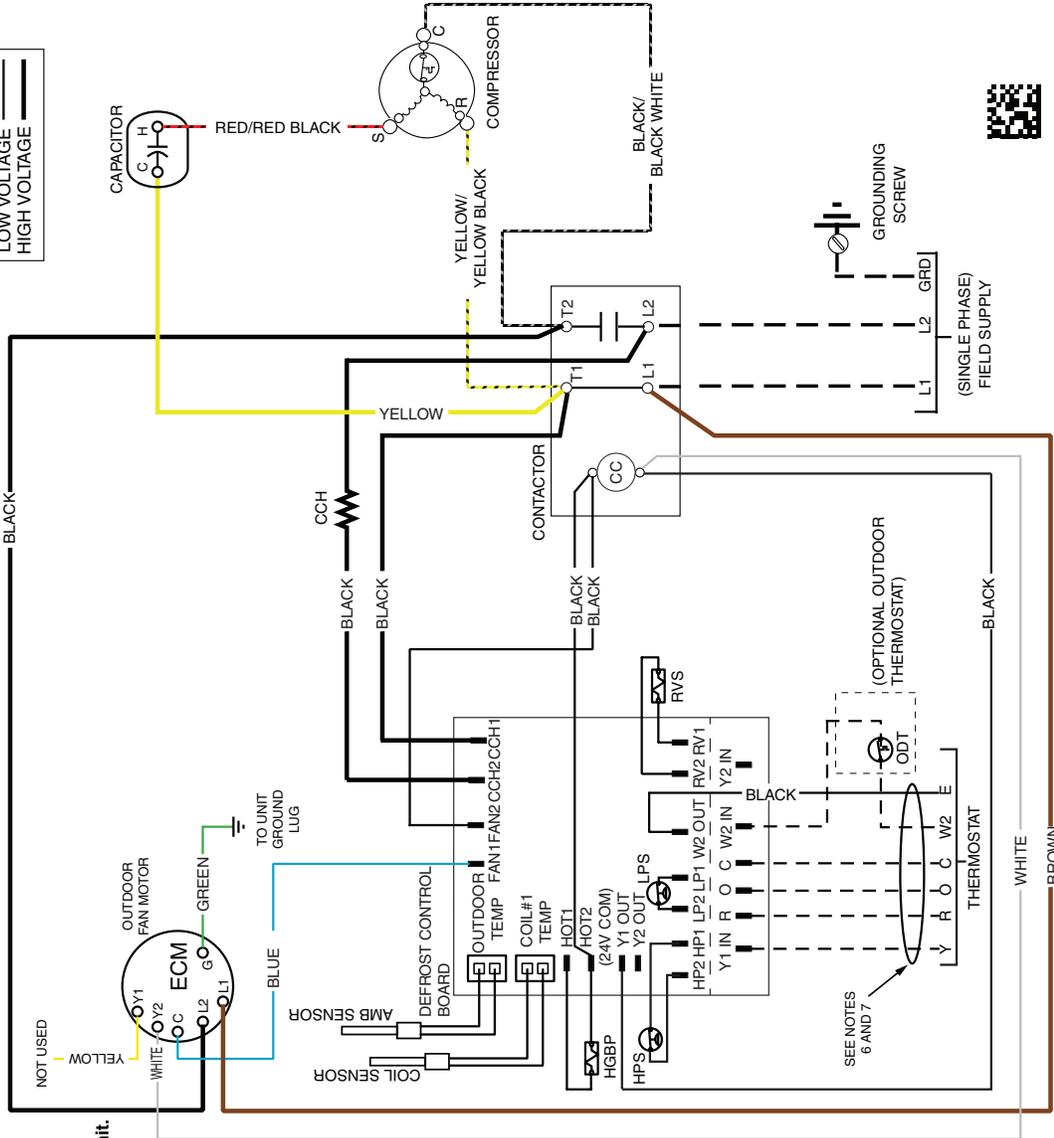
## WIRING DIAGRAM

### Split System Heat Pump (Outdoor Section) - Low Speed ECM Motor

### Single Phase

- 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.
  7. Caution: The Low Voltage wiring shall NOT be grounded to this unit.

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



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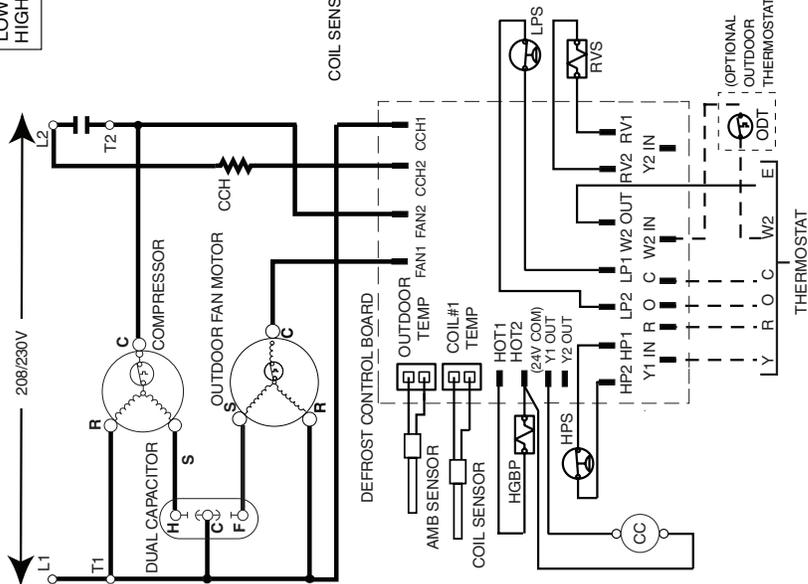
Figure 8. Wiring Diagram for \*SH3BE4M1SP (1.5 Ton)

- AMB - 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)
- LPS - Low Pressure Switch

# WIRING DIAGRAM

## Split System Heat Pump (Outdoor Section)

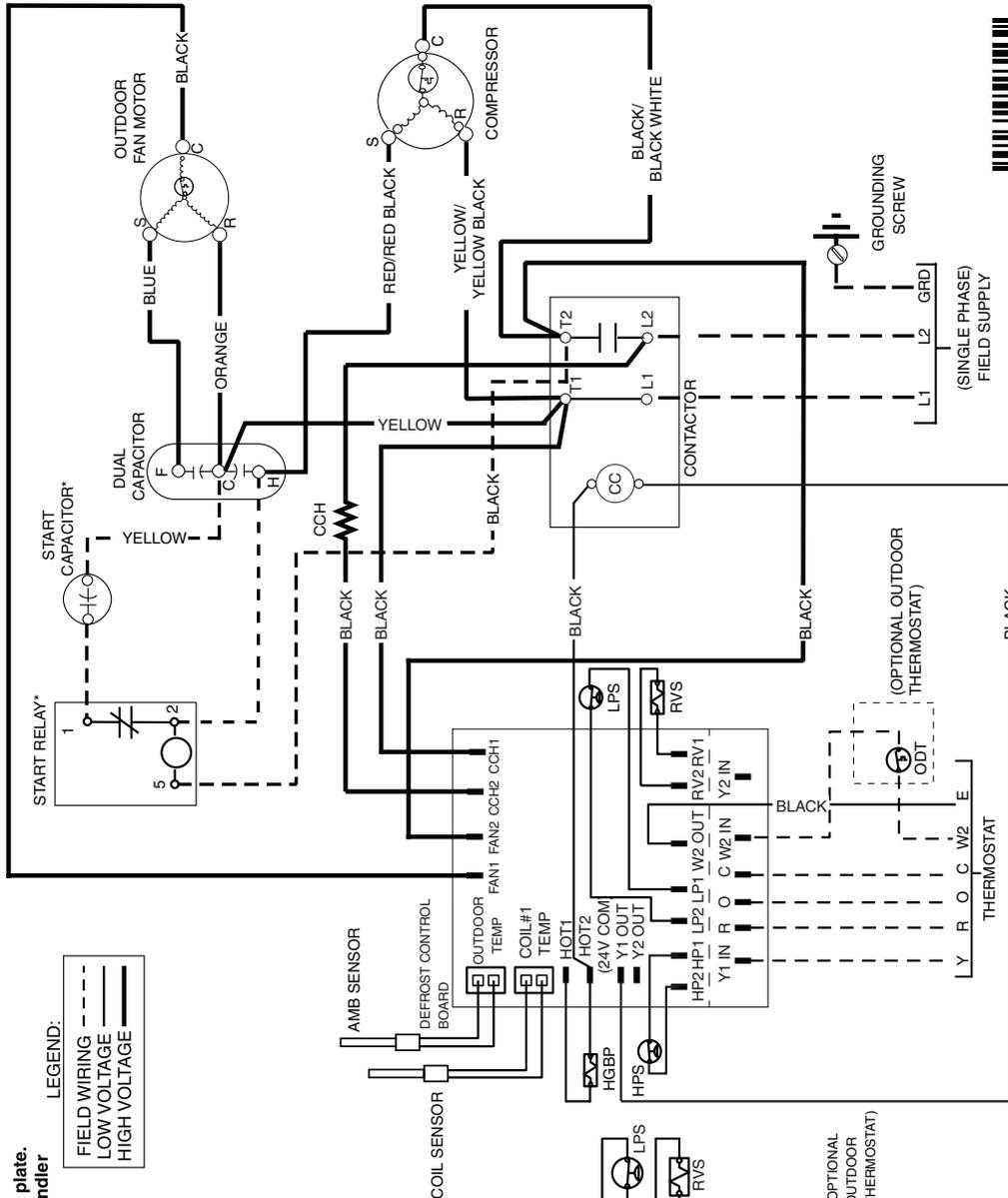
- NOTES:
1. Disconnect all power before servicing.
  2. For supply connections use copper conductors only.
  3. Not suitable on systems that exceed 150 volts to ground
  4. For replacement wires use conductors suitable for 105° C.
  5. For ampacities and overcurrent protection, see unit rating plate.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



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

## Single Phase

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



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Figure 9. Wiring Diagram for \*SH3BE4M1SP (2 Ton - 4 Ton)

# WIRING DIAGRAM

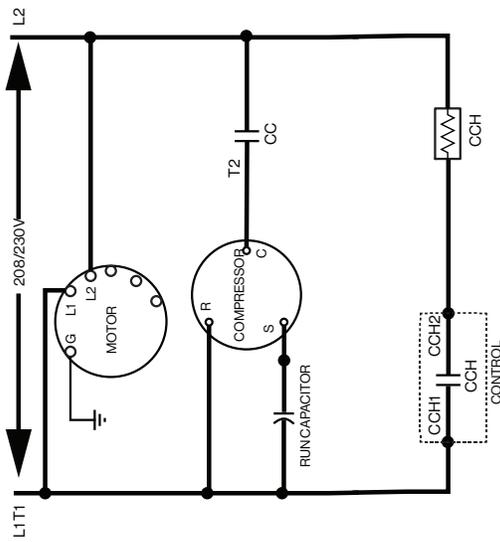
## Two Stage Split System Heat Pump (Outdoor Section) With ECM Fan Motor

208/230V

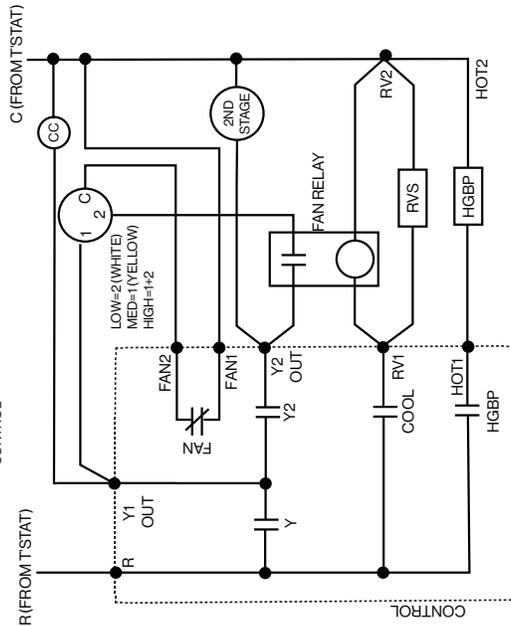
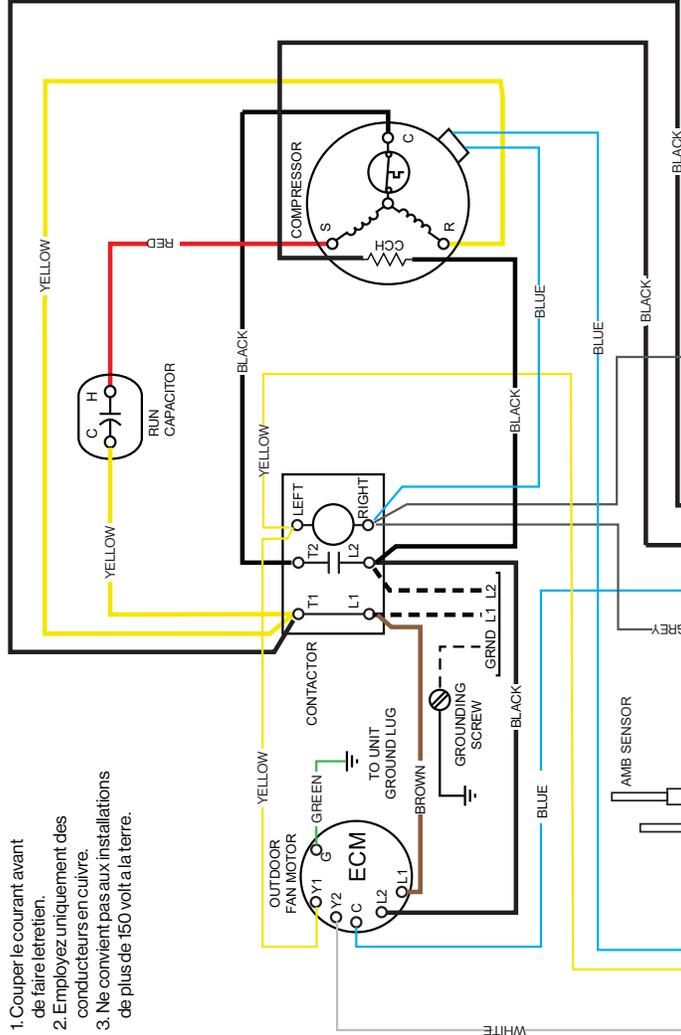
Single Phase / 60 Hz.

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/airhandler installation instructions for control circuit and optional relay/transformer kits.
7. Caution: The Low Voltage wiring shall NOT be grounded to this unit.



1. Couper le courant avant de faire l'entretien.
2. E'employez uniquement des conducteurs en cuivre.
3. Ne convient pas aux installations de plus de 150 volt a la terre.



- AMB- Ambient Sensor
- CC- Contactor Coil
- CCH- Crankcase Heater
- CSC- Compressor Solenoid Coil
- LPS- Low Pressure Switch
- HPS- High Pressure Switch
- HGBP- Hot Gas By Pass Valve
- RVS- Reversing Valve Solenoid

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



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Figure 10. Wiring Diagram for \*SH3BE4M2XP60K (5 Ton)





## INSTALLATION CHECKLIST

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

REFRIGERATION SYSTEM		
Was unit given 24 hr warm up period for crankcase heaters?	YES	NO
Stage-1 Liquid Pressure (High Side):		
Stage-1 Suction Pressure (Low Side):		

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage:		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct? (If Applicable)	YES	NO

### REPLACEMENT PARTS

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

#### ELECTRICAL:

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

#### MOTORS:

Blower Motor  
Fan Motor

#### COMPONENTS:

Blower Assembly	Fan Grille
Cabinet Panels	Filter/Driers
Expansion Valves	

