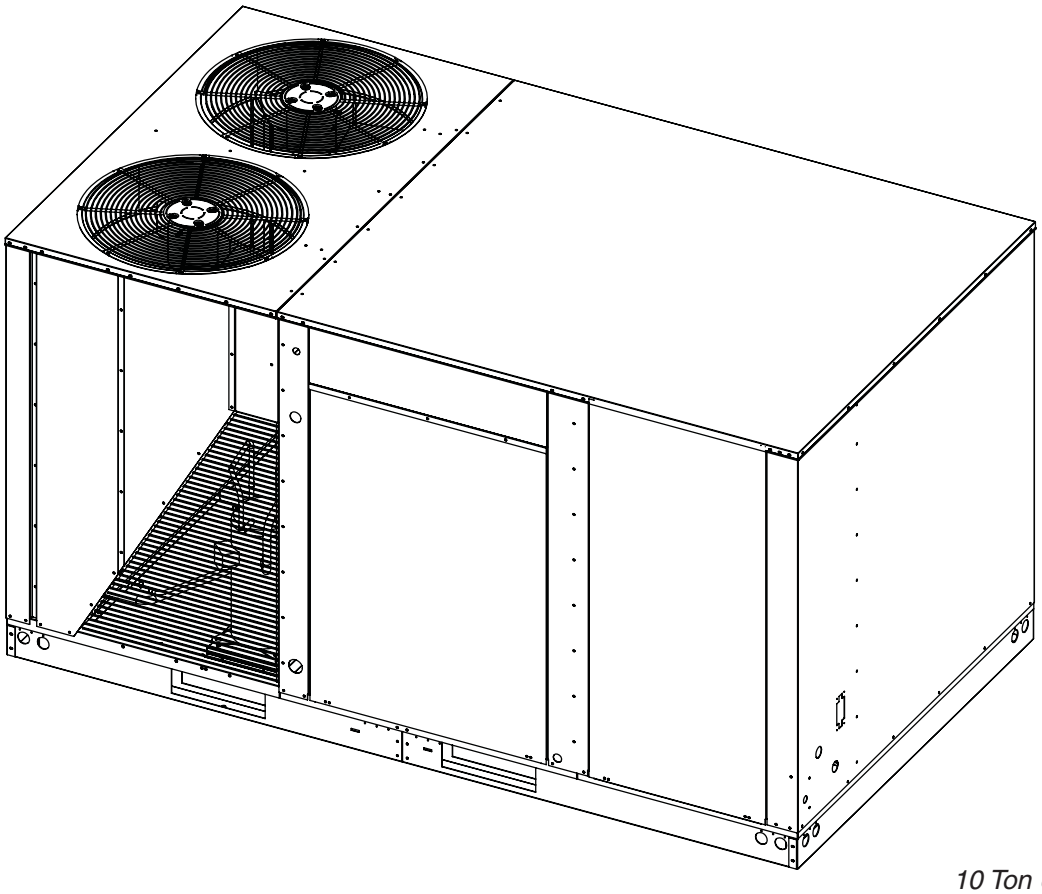
Installation Instructions

7 1/2 and 10 Ton Series

Single Package Electric Heat Pump Rooftop Unit



10 Ton Unit Shown

⚠ WARNING:

These instructions are intended primarily 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. Read all instructions carefully before starting the installation.

Read these instructions thoroughly before starting the installation. Follow all precautions and warnings contained within these instructions and on the unit.

Improper installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer or service agency.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

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

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SAFETY INFORMATION

Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored. **WARNING** indicates a potentially hazardous situation that if not avoided, could result in personal injury or death. **CAUTION** indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

It is the responsibility of the installer to ensure that the installation is made in accordance with all applicable local and national codes.

⚠ WARNING!

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. Unless otherwise noted in these instructions, only factory authorized kits or accessories may be used with this product. Non compliance may void the units warranty.

Literature, Labels, and Tags

When working with this equipment, follow all precautions in the literature, on tags, and on labels provided with the unit and/or approved field installed kits. The type of hazard and severity are described on each label or tag. Read all instructions for the unit and each accessory kit to be installed prior to beginning the installation

Pressures Within The System

This equipment contains liquid and gaseous refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.

REQUIREMENTS and CODES

Additional codes listed below are for reference purposes only and do not necessarily have jurisdiction over local or state codes. Local codes and regulations take precedence over any recommendations contained in these instructions. Always consult with local authorities before installing any appliance.

Duct Systems

- US and CANADA: Air Conditioning Contractors Association (ACCA) Manual Q, Sheet Metal and Air Conditioning Contractors National Association (SMACNA), or American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook

Electrical Connections

- US: National Electrical Code (NEC) ANSI/NFPA 70
- CANADA: Canadian Electrical Code CSA C22.1

General Installation

- US: Current edition of the NFGC and the NFPA 90B. For copies, contact the National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269; or American Gas Association, 400 N. Capitol, N.W., Washington DC 20001 or www.NFPA.org.
- CANADA: NSCNGPIC. For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3 Canada

Safety

- US: (NFGC) NFPA 54–1999/ANSI Z223.1 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B.
- CANADA: CAN/CGA-B149.1–and .2–M00 National Standard of Canada. (NSCNGPIC)

NFPA publications are available by writing:

National Fire Protection Association
Batterymarch Park
Quincy, ME 02269

GENERAL INFORMATION

Single Package Electric Heat Pump units are designed for outdoor rooftop or ground level slab installations. The units are shipped ready for downflow duct connections and are easily converted for horizontal flow connections with an accessory kit. All models are shipped from the factory with the following:

- R-410a Refrigerant
- Adjustable belt drive blower system
- Downflow duct connections
- 24V circuit breaker protection
- Factory wired accessory plugs for economizers and electric Heat Kits.

Unit dimensions are shown in Figure 10 (pages 16 & 17). Optional field installed 3 phase electric heater kits are available in 9, 18, 30 and 35KW capacities for Q6SP models. Use only NORDYNE heater kits listed in the technical service literature for these units. A three stage heat / two stage cool 24VAC thermostat is required when electric heat kits are installed.

Equipment Application

Before beginning the installation, verify that the unit model and unit voltage are correct for the job. This information is printed on the rating label. This unit is **NOT** to be used for temporary heating of buildings or structures under construction.

Equipment Check

All units have been securely packaged at the point of shipment. After unpacking the unit, carefully inspect it for apparent and concealed damage. Claims for damage should be filed with the carrier by the consignee. Refer to page 4 for packaging removal instructions.

Unit Location
The electric unit is designed only for outdoor installations. Choosing the location of the unit should be based on minimizing the length of the supply and return ducts. Consideration should also be given to availability of electric power, service access, noise, and shade. The unit installation shall avoid areas where condensate drainage may cause problems.

Clearances to Combustible Materials
See Figure 1 for required clearances to combustible materials. Refer to the unit data label for the model number.

⚠ WARNING!

Rooftop installations with vertical ducts must be provided with a 90 degree elbow installed in the supply duct to comply with UL (Underwriters Laboratories) codes for use with electric heat so the elements are not directly over a supply grille.

The electric unit is suitable for installation on combustible flooring or class A, B, or C roofing materials. A clearance of at least 36 inches to combustibles from all sides of the unit is required. **Where accessibility to combustibles clearances are greater than minimum unit clearances, accessibility clearances must take preference.** Sufficient clearance for unobstructed airflow through the outdoor coil must be maintained in order to achieve rated performance. See Figure 1 for minimum recommended clearances to obstructions.

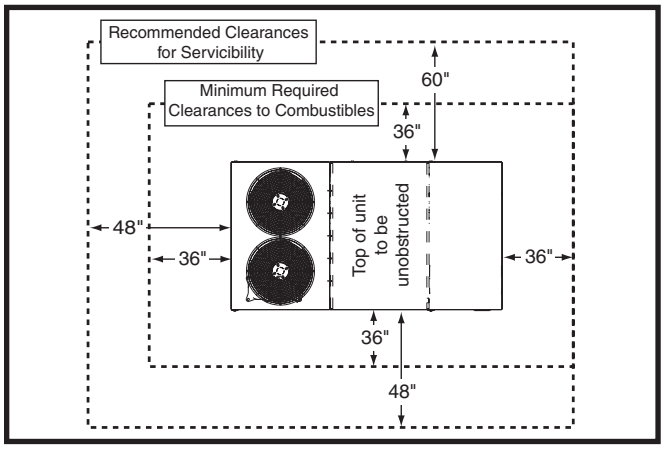


Figure 1. Minimum Clearances to Combustibles

Thermostat
A 2 stage heating / cooling 24VAC heat pump thermostat is required for these units. **NOTE: If "optional" electric heat is added a 3 Stage Heat / 2 Stage Cool 24VAC electric heat pump thermostat must be used.**

Air Filter Requirements
A suitable air filter must be installed in the unit or in the return air system. Refer to Specification & Electrical Data Table for recommended filter sizes. Air filter pressure drop must not exceed 0.08 inches WC.

This unit is supplied with air filters. Air filter(s) must be installed ahead of the evaporator coil of this unit. All return air to this unit must pass through the filters before entering this unit.

⚠ WARNING!

Never operate unit without a filter. A failure to follow this warning could result in a fire, personal injury, or death.

Condensate Drain
Condensate is removed from the unit through the 3/4" (19mm) PVC pipe located on the front side of the unit. Install a 3" (8cm) Min. trap between the drain line and an open vent of the same size for proper condensate removal. (See Figure 2) Refer to local codes and restrictions for proper condensate disposal requirements.

When connecting rigid drain line, hold any fittings with a wrench to prevent twisting. **Do not overtighten!**

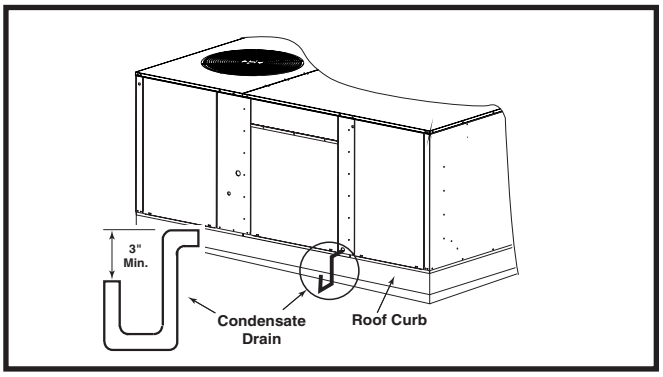


Figure 2. Condensate Drain

UNIT INSTALLATION

Minimum Clearance Requirements
Units are certified as combination Heating and Cooling equipment for outdoor installation only at the minimum clearances to combustible materials shown. Clearances shown (Figure 1) are for both Downflow and Horizontal discharge.

Packaging Removal
1. Remove top crate brackets and wooden cap assembly from top of unit (Figure 3, page 5).
2. Remove lower crate brackets, 4 side skids, and 2 end skids from each side of unit. **DO NOT remove base rails from unit.**
3. Rig unit and raise up approximately 4 feet off the ground. (Also see Rigging and Hoisting on page 5).
4. Remove crate brackets (Figure 4, page 5) securing long and short bottom boards to underside of unit. **NOTE:** Some screws are located in fork slots**.**
5. Remove long and short bottom boards from beneath unit.
6. Inspect unit thoroughly for shipping damage.
7. Carefully lower and position unit to it's permanent location.

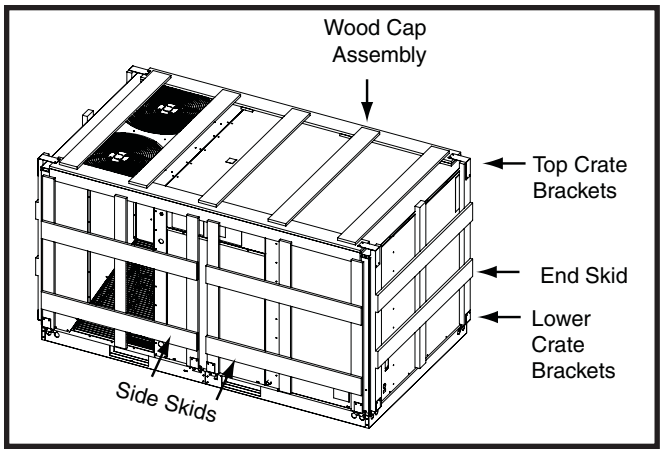


Figure 3. Side View

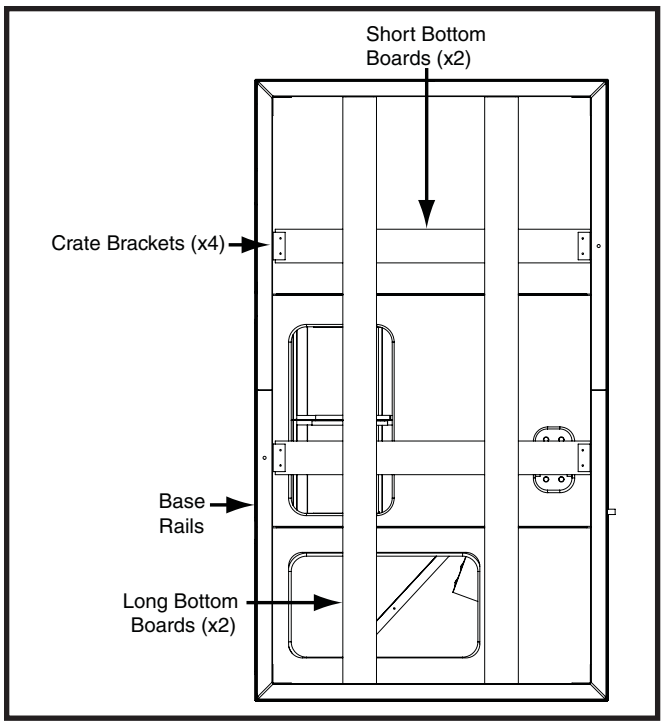


Figure 4. Bottom View

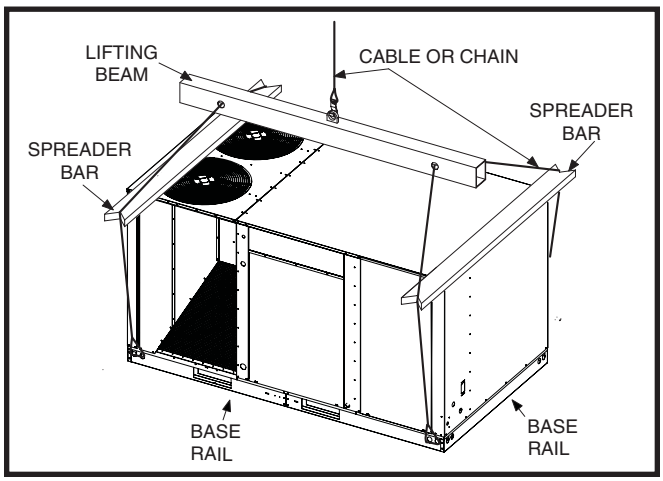


Figure 5. Rigging and Hoisting

⚠ WARNING:

To avoid the risk of property damage, personal injury, or death, it is the rigger's responsibility to ensure that whatever means are used to hoist the unit are safe and adequate:

- **The lifting equipment must be adequate for the load. See Table 1 (page 17) for unit weights.**
- **The unit must be lifted from the holes in the base rails using cables or chains as shown in Figure 5.**
- **Spreader bars (Figure 5) are required to protect the unit and ensure even loading.**
- **Keep the unit in an upright position at all times. The rigging must be located outside the units center of gravity. Refer to Physical Data Pages (Table 1) for center of gravity location.**
- **All panels must be securely in place during rigging and hoisting.**

⚠ WARNING:

PROPOSITION 65 WARNING: This product contains fiberglass wool, a product known to the state of California to cause cancer.

- **Disturbing the insulation of this product during installation, maintenance, or repair will expose you to fiberglass wool.**
- **Breathing this material may cause respiratory irritations or may cause lung cancer.**
- **Fiberglass wool may also cause eye irritation, skin sensitization, or other allergic responses in susceptible individuals.**

Units may be installed on wood flooring or on Class A, B, or C roof covering material when used with side supply and return air ducts. (Horizontal Discharge Kit required.) Units may be installed on wood flooring or on Class A, B, or C roof covering material when used with bottom discharge and return air ducts in conjunction with a roof curb. **If installing units on a combustible floor with downflow discharge, a roof curb is required.**

Units may be installed on non- combustible flooring when used with bottom supply and return air ducts.

Rooftop Mounting

For rooftop installations use the appropriate accessory roof curb (Figure 6, page 6) and follow all instructions included with it. Locate the unit according to local building codes and ordinances. The roof curb must be square and level to ensure proper condensate drainage and unit operation.

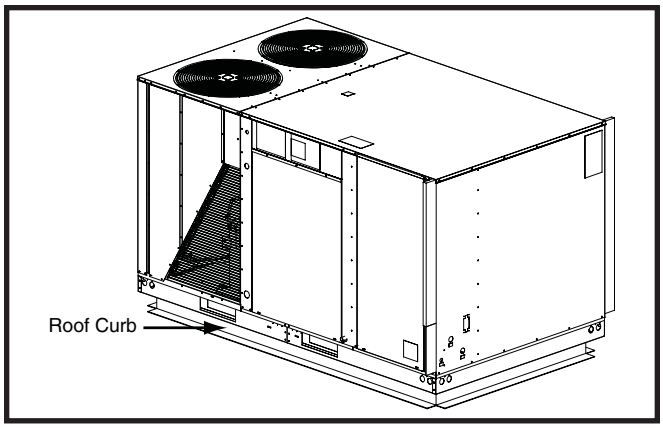


Figure 6. Roof Curb Installations

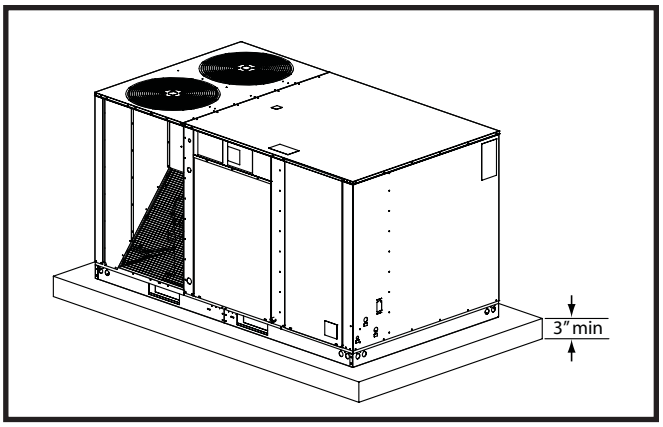


Figure 7. Concrete Pad Installations

- On bottom discharge applications, supply and return air ducts must be attached to the roof curb duct supports, not the unit. Install all ductwork before setting unit to curb or frame. **Note:** In downflow applications never drill or punch holes in unit base. Leakage may occur if unit bottom pan is punctured.
- If any brand other than a NORDYNE Roof Curb is to be used the frame support must be constructed using non-combustible materials.
- Units require full perimeter support under the unit. Supports must be made of steel or suitably treated wood materials. The unit must be square and level to ensure proper condensate drainage.
- The roof must be capable of handling the weight of the unit. See Table 1 (page 17) for unit weights. Reinforce the roof if required.
- Frame must be high enough to ensure prevention of any moisture from entering the unit. Recommended height to unit base is 8" (20cm) for both Downflow and Horizontal applications.
- Secure roof curb or frame to roof using acceptable mechanical methods per local codes.

⚠ WARNING!

Do not place combustible material on or against the unit cabinet. Do not place combustible materials, including gasoline and any other flammable vapors and liquids, in the vicinity of the unit.

Ground Level

If installing the unit at ground level, provide a concrete mounting pad (Figure 7) separate from the building foundation. The pad must be level to ensure proper condensate disposal and strong enough to support the unit's weight. Make sure the slab is a minimum of 3" (8cm) above grade and in an area that drains well.

Ductwork should be attached directly to flanges on panels supplied in horizontal duct conversion kits. Unit Base Rails provide full perimeter support under the unit. The unit must be square and level to ensure proper condensate drainage. Unit clearances must be in accordance with those shown in Figure 1 (page 4).

Unconditioned Spaces

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

CIRCULATING AIR SUPPLY

⚠ WARNING:

Do not allow combustion products to enter the return air ductwork or the circulating air supply. Failure to prevent the circulation of combustion products into the occupied space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.

All return ductwork must be secured to the unit with sheet metal screws. All joints must be taped and adequately sealed. When return air is provided through the bottom of the unit, the joint between the unit and the return air plenum must be air tight.

The roof curb or framing must provide sound physical support of the unit with no gaps, cracks, or sagging between the unit and the curb or frame.

Return air and circulating air ductwork must not be connected to any other heat producing device such as a fireplace insert, stove, etc. This may result in fire, explosion, property damage, personal injury, or death from carbon monoxide poisoning.

- This unit is designed only for use with a supply and return duct. Any exterior ducts, joints, or openings in the building roof or walls must be weatherized with conventional flashing and sealing compounds.
- Air ducts should be installed in accordance with all applicable local codes and the standards of the National Fire Protection Association "Standard for Installation of Air Conditioning Systems" (NFPA 90A).
- Design the ductwork according to methods described by the Air Conditioning Contractors of America (ACCA) Manual Q.
- It is recommended that the outlet duct be equipped with a removable access panel. This opening should be accessible when the unit is installed in service and shall be of a size such that the smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover for the opening shall be attached in such a manner as to prevent leaks.
- If outside air is used as return air for ventilation or to improve indoor air quality, the system must be designed so that the return air to the unit is not less than 50° F (10° C) during heating operation. If a combination of indoor and outdoor air is used, the ducts and damper system must be designed so that the return air supply to the unit is equal to the return air supply under normal, indoor return air applications.

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

Acoustical Ductwork
Certain installations may require acoustical lining inside the supply ductwork. Acoustical insulation must be in accordance with the current revision of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) application standard for duct liners. Duct lining must be UL classified batts or blankets with a fire hazard classification of FHC-25/50 or less.

Fiber ductwork may be used in place of internal duct liners if the fiber ductwork is in accordance with the current revision of the SMACNA construction standard on fibrous glass ducts.

Fibrous ductwork and internal acoustical lining must be NFPA Class 1 air ducts when tested per UL Standard 181 for Class 1 ducts.

Downflow to Horizontal Conversion
The unit is shipped ready for downflow duct connections. If horizontal ducts are required, the unit must be converted according to the directions in the conversion kit for both the supply and return ducts.

ELECTRICAL WIRING

⚠ WARNING!

To avoid the 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 power supply.

- 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. See Table 2 (page 18) or 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.
√ For 3 phase units always check the phase balance.

Line Voltage
It is recommended that the line voltage to the unit be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit.

IMPORTANT NOTE: An electrical disconnect must be installed readily accessible from and located within sight of the unit. (See unit data label for proper incoming field wiring). Any other wiring methods must be acceptable to authority having jurisdiction.

The power supply for the unit must be in accordance with the unit wiring diagram, and the unit rating plate. Connect the line-voltage leads to the corresponding terminals on the terminal block inside the Element access compartment. Refer to physical data drawings for compartment location. Use only copper wire for the line voltage power supply to this unit. If using conduit to bring in supply wiring to the unit, use only UL listed or recognized conduit and conduit connections.

All Q6SP model units are shipped factory ready for Single Circuit Electrical Supply connections. See Table 2 or unit rating label for proper high voltage wiring requirements. For Dual Electrical Supply connections see unit rating plate or heater kit installation instructions for proper high voltage wiring requirements. Use NORDYNE P/N-917468 Pole Dual Circuit Adaptor for converting to dual supply connections.

⚠ CAUTION:

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

Units are shipped from the factory wired for 230 or 460 volt operation. On 208 - 230V units being placed into 208 volt operation, remove the lead from the transformer terminal marked 240V and connect it to the terminal marked 208V.

Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to the National Electric Code and applicable local codes. **NOTE:** See the unit rating plate for maximum circuit ampacity and maximum overcurrent protection limits.

NOTE: 1-3/8" conduit openings are supplied for high voltage field wiring entrance. If smaller openings are required use suitable (field supplied) reducers to meet specific conduit size requirements.

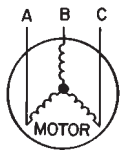
Unbalanced 3-Phase Supply Voltage

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

Perform the following steps to determine the percentage of voltage imbalance:

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

Example:



AB = 451V
BC = 460V
AC = 453V

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

3. Determine the maximum deviation:

Example:

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

460 - 454 = 6 ← Highest Value
454 - 451 = 3
454 - 453 = 1

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

Example:

$$100 \times \frac{6}{454} = 1.32\%$$

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

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

Grounding

⚠ WARNING:

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

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

Line Voltage Connections

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 corresponding terminals on the terminal block inside the control compartment. Use only copper wire for the line voltage power supply to this unit. If using conduit, use proper code agency listed conduit and a conduit connector for connecting the supply wires to the unit and for obtaining proper grounding. Grounding may also be accomplished by using the grounding lug provided in the control box.

Blower Speed

The blower speed is preset at the factory. For optimum system performance and comfort, it may be necessary to change the factory set speed. Refer to Blower Performance Data (Tables 3 - 6, pages 20 - 23) for the allowable operating range and adjustments. Units are shipped from the factory with the blower drive belt removed and located in the same compartment as the field electrical connections.

⚠ WARNING!

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

To change the blower speed:
1. Disconnect all electrical power to the unit and remove the blower access panel.
2. Loosen the motor tension bars to allow removal of the blower belt from the motor sheave.
3. Loosen top set screw on motor sheave and turn clockwise to close (increases blower speed), or counterclockwise to open (decreases blower speed).
4. Replace belt on pulleys and position motor mounting plate to correct position for proper belt tension.
5. Tighten tension bar bolts.

Check all factory wiring per the unit wiring diagram and inspect the factory wiring connections to ensure none loosened during shipping or installation.

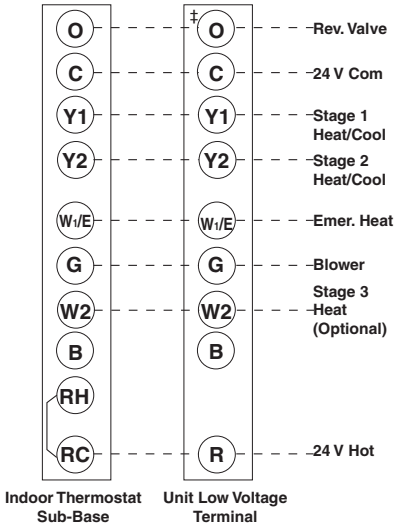
Low Voltage Connections

Thermostat

A two stage heating/two stage cooling 24 VAC heat pump thermostat is required for these units. **NOTE: If "optional" electric heat is added, a 3 Stage Heat / 2 Stage Cool 24 VAC heat pump thermostat must be used.** Several options are available for a room thermostat depending on the accessories installed with the unit. Select a thermostat which operates in conjunction with the installed accessories. The thermostat should be mounted about five feet above the floor on an inside wall. The thermostat should be kept away from drafts, slamming doors, lamps, direct sunlight and supply air flow.

To install the thermostat:
1. Position the subbase on an inside wall and mark the mounting holes and thermostat cable openings.
2. Cut out the cable opening and route the thermostat cable from the unit's low voltage compartment to the thermostat location. The thermostat cable is supplied by the installer. See Figure 8 for recommended wire size.
3. Connect the cable leads to the subbase or thermostat terminals and to the unit's low voltage terminal block as shown in Figure 8. System wiring diagrams are also provided on the inside of the control access panel and in Figure 11 (page 19).
4. Secure the subbase or thermostat to the wall using screws provided with the thermostat.
5. Install the correct thermostat housing to subbase.
6. Refer to thermostat instruction sheet for complete detailed mounting and operating information.

T-Stat Wire Gauge	Recommended T-Stat Wire Length - Ft. (Unit to T-Stat)
18 Ga.	0 - 60
16 Ga.	61 - 130
Field Supplied Wiring - Use Solid Class II Copper Wire.	



‡ "O" - Energized when thermostat system is in "Cool" Mode.

NOTE: If thermostat has one combined "O/B" Terminal and an Economizer is installed, see Economizer Installation Instructions for unit wiring change for proper operation.

Figure 8. Typical Connections - 2 Stage Cool/3 Stage Heat T-Stat

Defrost Cycle Timer

The defrost cycle timer controls the time interval of the hot gas defrost after the defrost sensor closes. It is located in the lower left corner of the defrost control board on the of the control panel. Three interval settings are available: 30, 60, and 90 minutes. Time setting selection is dependent on the climate where the unit is being installed. To set the cycle timer, place the timing pin on the defrost control board to the desired time interval post. **NOTE:** All units are shipped from the factory with the default time setting of 30 minutes. Longer settings are recommended for drier climate areas and shorter time intervals are recommended for moist climate areas.

Defrost Control Board Operation and Testing
1. Terminals **R** - **RC** must have 24±V present between them in order for the time delay and defrost sequences to be operational.
2. Jumper the **T2** - **DFT** test pins. This will indicate to the board that the defrost T-stat is closed (if the compressor is running). Defrost T-stat is closed at 32° F or below and is open at 68° F or above. But it's state is unknown if the temperature is between 32° F and 68° F. The

defrost thermostat tells the board whether a defrost cycle needs to be started or terminated. With the DFT closed the unit will run for 30/60/90 minutes in heat mode and then defrost the outdoor coil. The defrost will turn off the outdoor fan, turn on the compressor and raise the coil temperature to 68° F. This will open the DFT and terminate the defrost. If the DFT does not open the defrost will end after 10 minutes.

3. Defrost board speed-up. With compressor running in heat mode, next jump the **Test** pin to **C** on terminal strip. This will initiate a defrost test in 5, 10 or 15 seconds (This is determined by the 30, 60 or 90 minute defrost pin settings. The factory setting will be 30 minutes). **NOTE:** This will bypass the compressor off delay when the unit goes into defrost test and if left in defrost test, the delay will be bypassed when the test is terminated by the processor. If the jumper is removed before the test is over, the processor will perform the remainder of a normal defrost. See step 2 above.
4. Remove the jumpers.

NOTE: The delay/no-delay pin concerns compressor operation during defrosts. Reciprocating compressors should only use this setting in conjunction with an approved hard start kit. Scroll compressors that have noise issues while going into or coming out of defrost should use this 30 second delay to reduce the defrost noise. To switch from no-delay to delay, remove the pin from the **no - delay** pin location and shift it to the **delay** pin location. The default setting is delay.

Speed up changes:
Manually initiating a defrost will cause the compressor to run continually when entering defrost.

Normal defrost operation:
To test normal defrost operation when the temperature is above 35° F, jumper **R** to **DFT** on the 624656 board and allow the unit to run for 30 minutes. Defrost will continue until the **R** to **DFT** jumper is removed or for 10 minutes. Remove the jumper.

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

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

Defrost Test Procedure for 624656

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

STARTUP AND ADJUSTMENTS

Pre-Start Check List

- √ Verify that the unit is level to allow proper condensate drainage.
- √ Verify that the outdoor fan turns freely.
- √ Verify that there is free airflow to and from the outdoor coil and that all clearance requirements are met.
- √ Verify that the ductwork is sealed to prevent air leakage.
- √ Verify that the power supply branch circuit overcurrent protection is sized properly.
- √ Verify that the line voltage power leads are securely connected and the unit is properly grounded.
- √ Verify that low voltage wires are securely connected to correct leads in the low voltage area of the control box.
- √ Verify that the thermostat is wired correctly. The thermostat function switch should be set to **Off** and the thermostat fan switch should be set to **Auto**.
- √ Verify that all exterior panels are replaced and securely fastened.

Startup-Up Procedures

⚠ WARNING!

The unit is equipped with crankcase heaters. 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.

- Check unit for return air filters and condensate trap.
- Check all electrical wiring for loose connections and tighten as required.
- Close all electrical disconnects to energize the system.

Air Circulation

Leave the thermostat system switch set to **Off** and set the thermostat fan switch to **On**. The blower motor should run continuously. Check for air delivery at the register(s). Ensure that there are no obstructions at the registers or in the ductwork. Set thermostat fan switch to **Auto** the blower will shut down immediately. **NOTE:** If blower is turning opposite of arrow direction, shut off main power to the unit and switch any two field wires at the disconnect. **DO NOT** alter unit wiring.

Heat Pump Cooling Operation - 2 Stage
(2 individual refrigerant systems)

1. Set the thermostat system switch to **Cool** and the thermostat fan switch to **Auto**. Lower the thermostat temperature switch below room temperature and observe that the blower, both compressors and fan(s) energize. **NOTE:** This unit is equipped with a five minute anti-short cycle timer (ASCT) built in to the defrost control board for Stage 1 Heat/Cool **(Y1)**. If the thermostat temperature level is re-adjusted, or if the system switch is re-positioned, Stage 1 compressor will not start immediately. Stage 2 Heat/Cool **(Y2)** has no ASCT protection and can operate immediately upon a call from the thermostat. Some thermostats may also have anti-short cycle protection built in causing a delay in one or both stages. A protective timer circuit could hold the compressor(s) off for up to five minutes following a previous operation or an interruption of the main power. Consult the operation manual for the type thermostat being installed.
2. Check that air cooler than room temperature is being discharged at the register. Ensure unit refrigerant pressures are in order. Blower should be turning in direction indicated by arrow. **NOTE:** If refrigerant pressures are abnormal and blower is rotating in the opposite direction of the arrow, shut off main power to the unit and switch any two field wires at the disconnect. Ensure proper rotation of both compressors. **DO NOT** alter unit wiring. Listen for any unusual noises. Locate the source and correct as needed.
3. After allowing the unit to run for several minutes, set the temperature selector above room temperature, verify that the fan, blower, and compressors cycle off with the thermostat.

Short Cycle Protection
Following the shut down sequence in the Heat Pump Cooling Operation Start-Up procedures, immediately lower the set point temperature of the thermostat slightly below room temperature and verify that the indoor blower is energized and after approximately 5 minutes the compressor and outdoor fans energize.

Heat Pump Heating Operation — 2 or 3 Stage
2 individual refrigerant systems + Electric Heat (Optional)

1. Set the thermostat system switch to **Heat** and the thermostat fan switch to **Auto**. Raise the thermostat temperature switch above room temperature and observe that the outdoor fans, compressor(s), and indoor blower energize. **NOTE:** This unit is equipped with a five minute anti-short cycle timer (ASCT) built in to the defrost control board for Stage 1 Heat/Cool (**Y1**). If the thermostat temperature level is re-adjusted, or if the system switch is re-positioned, Stage 1 compressor will not start immediately. Stage 2 Heat/Cool **(Y2)** has no ASCT protection and can operate immediately upon a call from the thermostat. Some thermostats may also have anti-short cycle protection built in causing a delay in one or both stages. A protective timer circuit could hold the compressor(s) off for up to five minutes following a previous operation or an interruption of the main power. Consult the operation manual for the type thermostat being installed.
2. Verify the air being discharged at the registers is warmer than room temperature.
3. After allowing the unit to operate for several minutes, set the thermostat temperature switch below room temperature, verify that fans, blower, and compressors cycle off with the thermostat.

NOTE: If electric heat has been added, Stage 2 compressor will cycle off while Stage 3 heater elements are energized.

Field Installed Electric Heat (Optional)
This package heat pump system is designed to allow optional electric heat to be field installed as required by the building's particular heating load, as make up heat during defrost mode, and as Emergency Heat. **NOTE:** If "Optional" electric heat is added a 3 Stage Heat / 2 Stage Cool 24VAC heat pump thermostat must be used.

9, 18, 30, and 35 KW models are available for all unit models. Use only NORDYNE manufactured H5HK series heater kits with these units.

Install the heater kits as directed by the instruction sheet that comes as part of the heater kit. Follow all cautions and warnings as directed.

1. Set the thermostat to above room temperature.
2. Verify that Stage 1 compressor outdoor fan motors and blower are energized and the electric heat is energized.
3. After the unit has run for approximately five minutes, set the thermostat below room temperature and verify that the electric heat, Stage 1 compressor, fans, and blower have de-energized.

Emergency Heat
Most Heat Pump thermostats will include a system switch position termed EM.HT. or AUX.HT, etc. This is a back-up heating mode to be used only if a problem is suspected. With the system switch set to Emer. Ht., etc., the compressor(s) and outdoor fans will be locked off and supplemental heat (electric resistance heating) will be used as a source of heat. Sustained use of electric resistance heat in place of the heat pump will result in an increase in electric utility costs.

Defrost Mode
During cold weather heating operation, the outdoor unit will develop a coating of snow and ice on the outdoor section heat transfer coils. This is normal and the unit will defrost itself automatically. During the defrost cycle, the outdoor fans will stop while the compressor(s) continue to operate and heat the outdoor coil, causing the snow

and ice to melt. During defrost, some steam may rise from the outdoor unit as the warm coil causes the melted frost to evaporate.

Verify Operation of Over-Temperature Limit Control

⚠ WARNING!

Uninsulated live components are exposed when element access panel is removed.

Make sure all access panels are in place and that there is power to the unit. Block the return airflow to the unit by installing a close-off plate in place of or upstream of the filter. Set the thermostat above room temperature and verify the unit operates with the correct operating sequence (see page 13). The over-temperature limit control should turn off the electric strip heat within approximately four minutes. **Note:** The exact time depends on the efficiency of the close-off in the return air to the unit.

The circulating air blower should continue to run when the over-temperature limit control switch opens. Remove the close-off immediately after the over-temperature limit control opens. If the unit operates for more than four minutes with no return air, set the thermostat below room temperature, shut off the power to the unit, and replace the over-temperature limit control.

UNIT MAINTENANCE

⚠ 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.

⚠ CAUTION:

Use care when removing parts from this unit. Personal injury can result from sharp metal edges in equipment of sheet metal construction.

Routine Maintenance

Proper maintenance is important to achieve optimum performance from the unit 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. At a minimum, routine maintenance should include the following:

Air Filters

⚠ WARNING!

Never operate the unit without a filter in place. Dust and lint in the return air can build up on internal components, resulting in loss of efficiency, equipment damage, and possible fire risk.

It is recommended that you inspect and clean or replace the air filters every three to four weeks. Units are equipped with 2" pleated disposable filters. Filter rack is adjustable for 1" permanent type filters. Do not use 1" *disposable* filters. Replace with filters of like size and kind rated for at least 500 feet per minute.

Condensate Drain and Outdoor Coil

Inspect the condensate drain and outdoor coil at the beginning of each cooling season. Remove any debris. Clean the outdoor coil and hail guard louvers (optional) as necessary using a mild detergent and water. Rinse thoroughly with water.

Electrical

Inspect the electrical connections for tightness at the beginning of each heating and cooling season. Service as necessary.

Motor Lubrication

⚠ WARNING!

Lubrication of the motors in this unit is not required. Do not lubricate any motor in this product.

The motors for the circulating air blower and outdoor fans, are pre-lubricated at the factory. No further oiling is required for the life of this product.

Blower Compartment

⚠ CAUTION:

Verify proper operation after servicing.

The blower compartment should be cleaned monthly during the heating and cooling seasons to remove any dirt and lint that may have accumulated in the compartment or on the blower and motor. Buildup of dirt and lint on the blower and motor can create excessive loads on the motor resulting in higher than normal operating temperatures and possible shortened service life.

Refrigerant Charging

⚠ WARNING!

The units are shipped fully charged and ready for installation. When a system is installed according to these instructions, no refrigerant charging is required. If repairs make it necessary for evacuation and charging, it should only be done by qualified, trained personnel thoroughly familiar with this equipment. Some local codes require licensed installation/service personnel to service this type of 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.

The system refrigerant charge can be checked and adjusted through the service ports provided on compressor suction and liquid lines. Use only gauge lines which have a “Schrader” depression device present to actuate the valve. Draw a vacuum on the gauge lines to remove air or moisture before attaching them to the service ports on the unit. Refrigerant charging must be done by qualified personnel familiar with safe and environmentally responsible refrigerant handling procedures. Refer to charging instructions on page 24 and Figures 12 - 13 (pages 22 - 26) or the Unit Rating Plate for proper amount of charge.

Operating Sequence

The operating sequences for the heating, cooling, and fan modes are described below. Refer to the wiring diagram (Figure 11, page 19) for the unit.

Heat Pump Cooling Mode:

1. Set the thermostat system switch to **Cool** and the thermostat fan switch to **Auto**.
   NOTE: Heat pump thermostats typically energize reversing valves through the **O** terminal with the system switch set to **Cool**. Reversing valves will remain energized until the system switch is moved to **Off**, **Heat**, or **Emer.Heat**. Consult the instructions for the specific type of thermostat being used for proper unit operation.
2. On a call for cooling the thermostat closes, applying 24 VAC directly to **Y1**, **G**, and **Y2** if Stage 2 cooling is required.
   NOTE: Stage 1 Compressor (**Y1**) has a built in 5 minute anti-short cycle timer (ASCT) function built into the defrost board. Any loss of power or 24V interruption to the defrost board will cause the ASCT to reset and start the timing cycle over.
3. **G** applies 24VAC to the main circulating blower circuit.
4. **Y1** and **Y2** apply 24VAC through all safety switches before energizing their respective compressor contactors.
5. Outdoor fan contactor is energized through auxiliary contacts on either of the compressor contactors once energized.
6. As the thermostat is satisfied the contactors are de-energized in sequence.
7. The circulating blower motor is de-energized immediately.

Blower Mode:

1. On a call for fan operation, the thermostat applies 24 VAC directly to the **G** terminal and the blower contactor.
2. The circulating blower is energized immediately.

Heat Pump Heating Mode:

1. Set the thermostat system switch to **Heat** and the thermostat fan switch to **Auto**. On a call for heating, the thermostat closes, applying 24 VAC to **Y1**, **G**, and **Y2** if Stage 2 heating is required.
2. **G** applies 24VAC to the main circulating blower circuit.
3. **Y1** and **Y2** apply 24VAC through all safety switches before energizing their respective contactors.
4. Outdoor fan contactor is energized through auxiliary contacts on either of the compressor contactors once energized.
5. As the thermostat is satisfied the contactors are de-energized in sequence.
6. The circulating blower motor is de-energized immediately.

Heat Pump Heating Mode + "Optional" Electric Heat: (Stage 3 Heat or Emergency Heat)

- If "optional" electric heat is added a 3 Stage Heat / 2 Stage Cool 24VAC heat pump thermostat must be used.
- This heating system energizes the fan on a call for heat. Select the "GAS" setting for fan mode of operation during thermostat configuration.
- Several options are available for a room thermostat depending on the accessories installed with the unit. Consult the instructions for the specific type of thermostat being used for proper unit operation.

On a call for heating the thermostat closes, applying 24 VAC to **Y1**, **G**, and **Y2** if Stage 2 heating is required. If the desired room temperature is not maintained, Stage 3 heat will call applying 24 VAC to **W2**, energizing the electric heat kits. **NOTE:** If Stage 3 Electric Heat is energized, Stage 2 compressor will cycle off.

As the thermostat is satisfied the contactors are de-energized in sequence.

Emergency Heat Mode:

Set the thermostat system switch to **Emer.Heat** and the thermostat fan switch to **Auto**. On a call for heating the thermostat closes, applying 24 VAC to **W2** only. Compressors and outdoor fans will not operate when Emergency Heat mode is selected. Sustained use of electric resistance heat in place of the heat pump will result in an increase in electric utility costs.

Unit Fails to Operate

If the unit does not operate properly in either the heating or cooling mode, be certain to check the following:

1. The thermostat is operating properly.
2. Electrical power to the unit is turned on.
3. All safety switches are closed.
4. The service doors are in place.
5. Transformer circuit breaker is reset.

REPLACEMENT PARTS

Replacement parts are available through all NORDYNE distributors. When ordering, remember to have the complete Model and Serial number of the unit.

ELECTRICAL		
Transformers	Contactors	Temperature Limit Switches
Thermostats	Capacitors	Pressure Switches
Relays	Defrost Boards	
MOTORS		
Fan Motor	Blower Motor	Compressors
COMPONENTS		
Expansion Valves	Cabinet Panels	Filter Driers
Blower Assembly	Fan Grille	Filters
Gaskets	Reversing Valves	

COMPONENT FUNCTIONS

High Pressure switch (HPS)

Prevents compressors from operating at elevated pressures. High pressure switches are located on both compressor hot gas lines and are fitted with Schrader cores. The switch is non-adjustable set to open at 650 PSIG and must be manually reset.

Low Pressure switch (LPS)

Prevents compressors from operating at sufficiently low pressures due loss of charge. Low pressure switches are located on both compressor return gas lines and are fitted with Schrader cores. The switch is non-adjustable set to open at 5 PSIG and close at 20 PSIG.

Freezestat

Prevents evaporator coils from freeze-ups due to lack of airflow or below normal return air temperatures. The switch is a non-adjustable, sealed, bi-metal sensor set to open at 28° F and closes at 57° F.

Over-Temperature Limit Control

The over-temperature limit control acts to prevent the air temperature leaving the unit from exceeding the maximum outlet air temperature. If the limit opens, electric heat will shut off. Provide w/ electric heat kits.

Defrost Control Board

This control includes - 5 minute anti-short cycle timer protection for Stage 1 Heat/Cool, defrost time interval selection, and reversing valve, outdoor fan, and auxiliary heat operation during defrost control. See Operating Sequence (page 13).

Defrost Temperature Sensor

Switches are located on the hairpin end of both outdoor coils. The switch is a non-adjustable, sealed, bi-metal sensor set to open at 68° F and closes at 30° F. When closed, compressor run time is accumulated and initiates coil defrost dependent on time interval selected.

Heat Pump Relay (HPR)

The heat pump relay is located to the left side of the unit's main control panel. It is required for proper operation of an economizer (optional) in the heat pump Heating mode, if installed. If installing an economizer in this unit, refer to the setup procedures in the Economizer Installation Instructions.

Blower Isolation Relay

The isolation relay is located on the right of the main control panel, near the transformer. It is required when using an electric heat kit to prevent a return signal to the thermostat when a **W1** or **W2** call for heat is made.

FIGURES AND TABLES

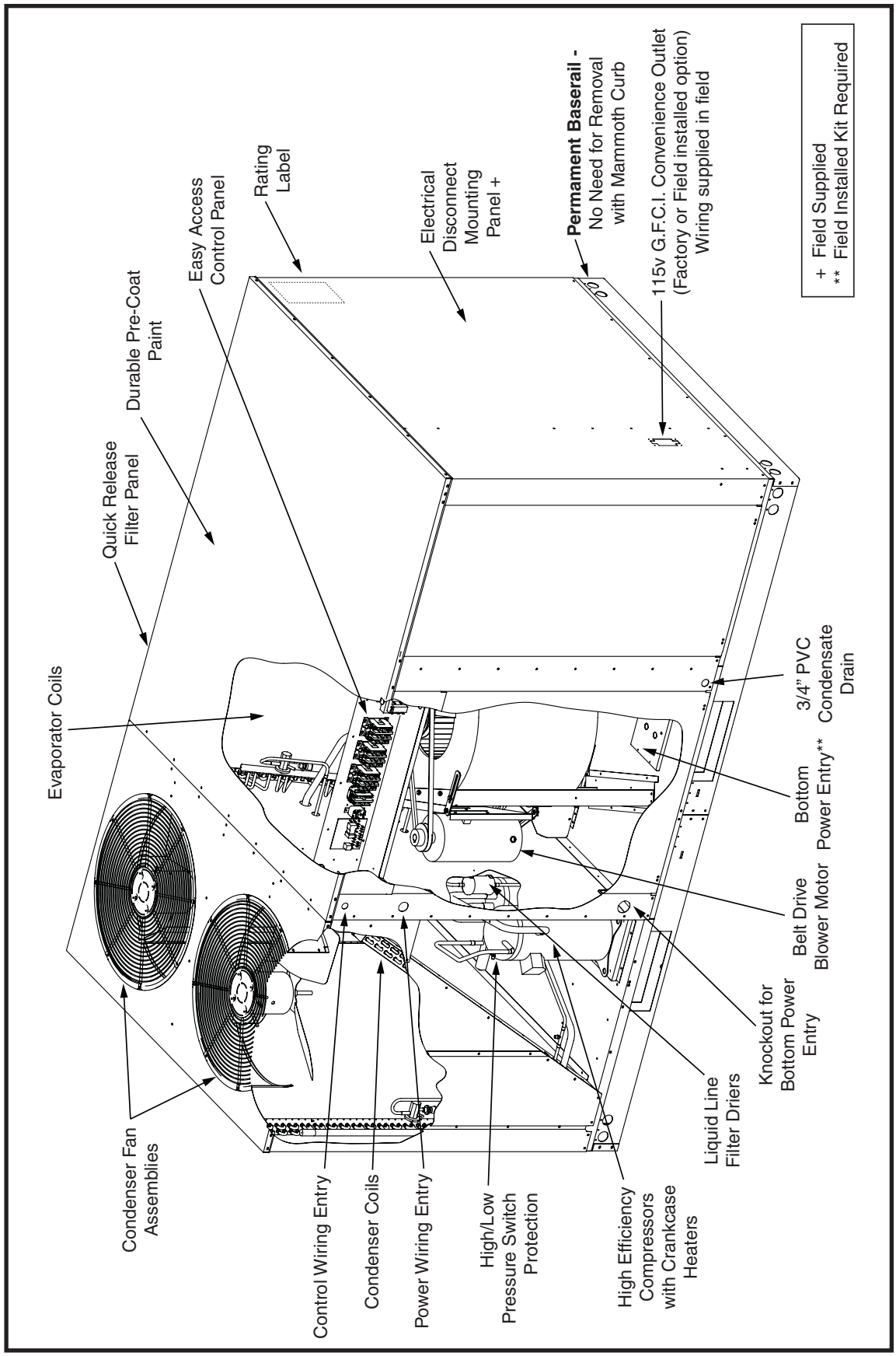
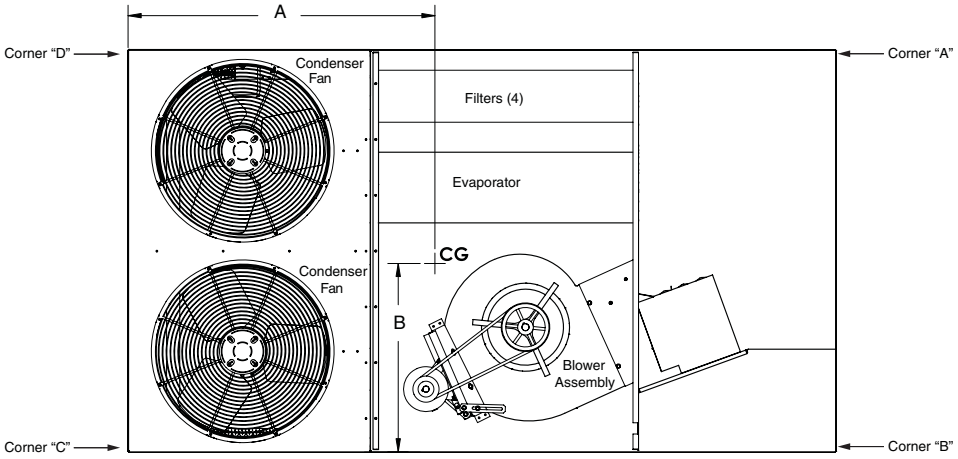


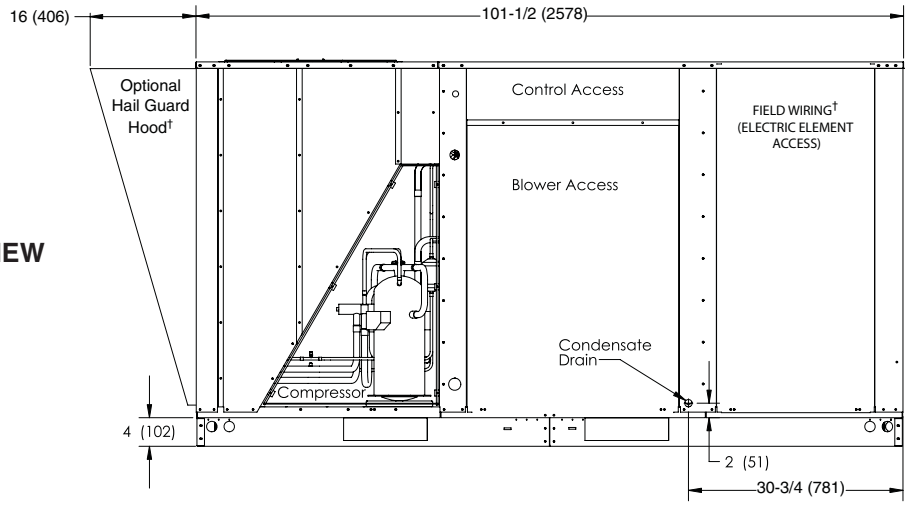
Figure 9. Q6SP Components

PHYSICAL DATA

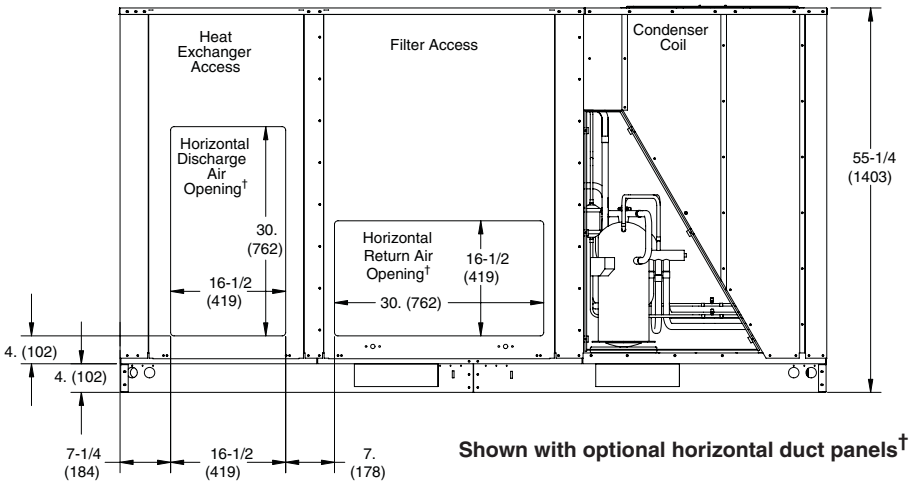
Dimensions shown in inches (mm)



TOP VIEW



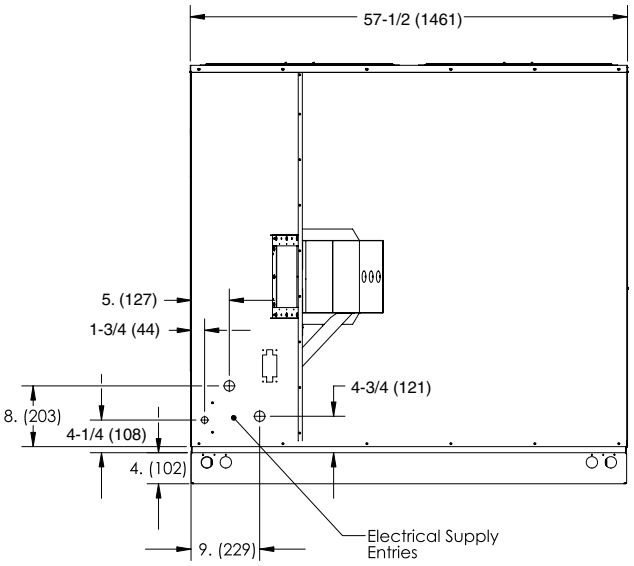
FRONT VIEW



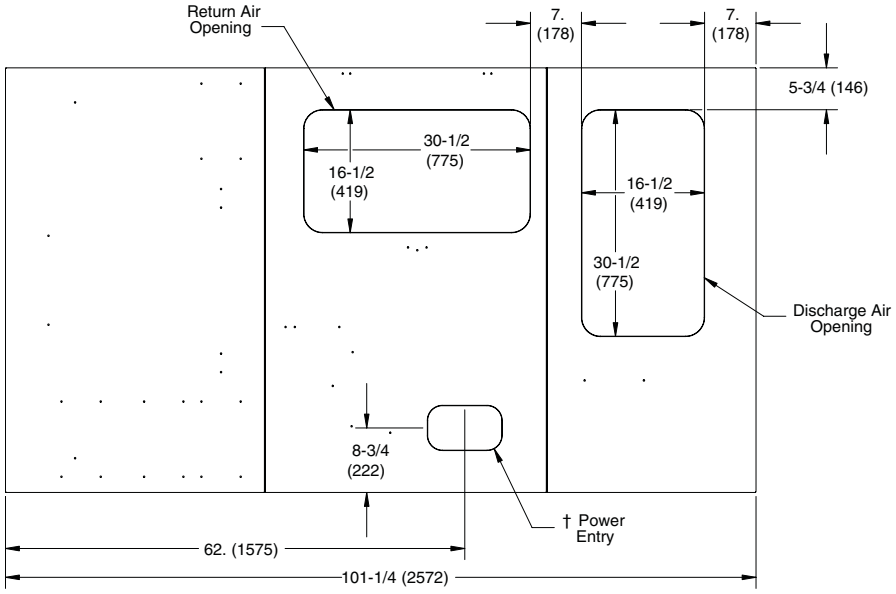
REAR VIEW

Shown with optional horizontal duct panels†

Figure 10. Physical Data - Q6SP - 090 & 120 Series



HEAT EXCHANGER END



BOTTOM PAN TOP VIEW

Figure 10. Physical Data - Continued

Model No.	Unit Weight ‡		Shipping Weight		Center of Gravity Inches (mm)		Corner Weights								Unit Height*	
							A		B		C		D			
	Lbs.	Kg.	Lbs.	Kg	A	B	Lbs.	Kg.	Lbs.	Kg	Lbs.	Kg.	Lbs.	Kg	Vertical Duct Applications	Horizontal Duct Applications
Q6SP-090(C,D)	1065	484	1205	548	45 (1143)	27 (686)	218	99	255	116	320	145	273	124	51 (1295)	55-1/4 (1409)
Q6SP-120(C,D)	1130	514	1270	577	44 (1118)	27 (686)	226	103	264	120	345	157	295	134		

* Baserails are not intended to be removed. Information provided is total unit height for Horizontal duct applications or height dimension added to selected roof curb height for Vertical duct applications.

‡ Unit weight without packaging or field installed accessories.

† Field Installed Kit

Table 1. Center of Gravity and Unit Shipping Weights

Model Number (Q6SP-)	Allowable Voltage Range		Compressors			Outdoor Motors (2) each.	Indoor Motor	Multiple. Circuit "A" †		Single Circuit - Q6SP & H5HK kit							
								MCA	MOP	MCA				MOP			
	Min	Max	Qty	RLA		FLA	FLA	No Heater Kit		9 kW	18 kW	30 kW	35 kW	9 kW	18 kW	30 kW	35 kW
Factory Drive Data:																	
090 C	187	253	2 ea.	13.1	83.1	2.3	4.2 - 4.0	39 - 39	50 - 50	49 - 52	71 - 78	101 - 112	116 - 130	55 - 55	80 - 80	110 - 125	125 - 150
090 D	414	506	2 ea.	6.1	41	1.2	2.0	19	20	27	40	56	65	30	45	60	70
120 C	187	253	2 ea.	15.6	110	2.3	6.2 - 5.8	46 - 46	60 - 60	54 - 57	76 - 83	106 - 117	121 - 135	60 - 60	80 - 90	110 - 125	125 - 150
120 D	414	506	2 ea.	7.8	52	1.2	2.9	23	30	30	43	59	68	35	45	60	70
High Static Drive Data:																	
090 C	187	253	2 ea.	13.1	83.1	2.3	9.1 - 8.9	44 - 44	55 - 55	54 - 57	76 - 83	106 - 117	121 - 135	60 - 60	80 - 90	110 - 125	125 - 150
090 D	414	506	2 ea.	6.1	41	1.2	4.4	21	25	30	42	58	67	35	45	60	70
120 C	187	253	2 ea.	16.0	110	2.3	9.1 - 8.9	49 - 49	60 - 60	57 - 61	79 - 86	109 - 120	124 - 138	60 - 70	80 - 90	110 - 125	125 - 150
120 D	414	506	2 ea.	7.8	52	1.2	4.4	25	30	32	44	60	69	35	45	70	70

FLA = Full Load Amps
RLA = Rated Load Amps
Notes: LRA = Locked Rotor Amps

MCA = Minimum Circuit Ampacity
MOP = Maximum Over-Current Protection

C Series, Electrical unit data shown for 208V - 230V
D Series, Electrical unit data shown for 460V

† When used with 917468 Dual Circuit Adapter Kit - See Table 2 for Multiple Circuit "B" data

Table 2. Electrical Data - Q6 Units - 3 Phase, 60 Hertz

WIRING DIAGRAM

Q6SP-(090/120)(C/D) Series — 208-230/460 Volt — Three Phase / 60 Hz.

NOTES:

1. For supply wire ampacities and overcurrent protection, see unit rating label.
2. For "C" Series Models only. For208 VAC operation remove wire at 230V tap and place on 208V tap.
3. Wires attached to normally open contacts of auxillary switch.
4. Wires attached to normally closed contacts of auxillary switch.
5. Disconnect all power before servicing.
6. For supply connections, use copper conductors only.
7. If any of the original wire as supplied with the unit must be replaced, it must be replaced with wiring material having a temperature rating of at least 105C.

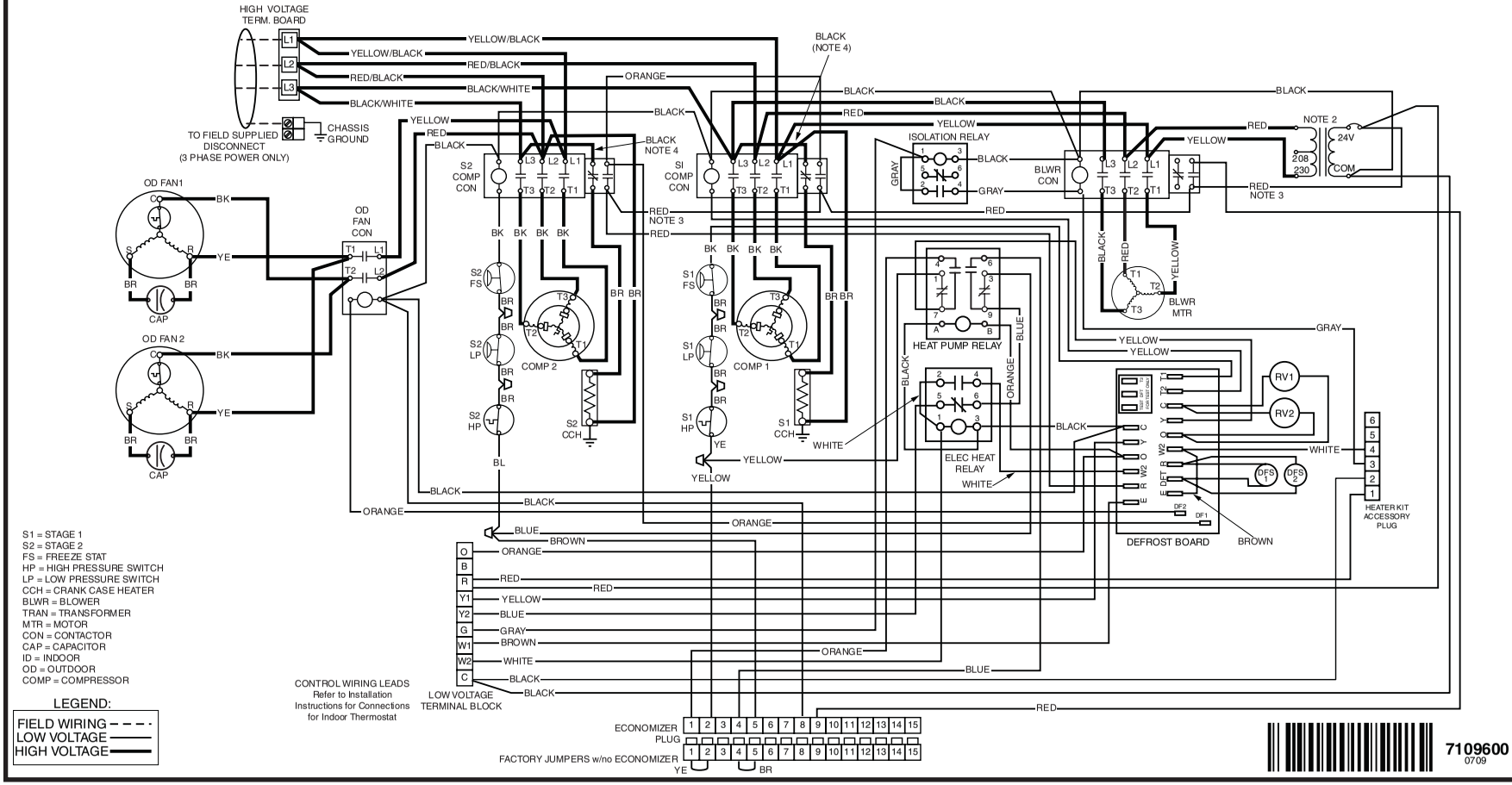


Figure 11. Wiring Diagram for Q6SP-090 & 120 Series

Blower Performance - Downflow Configuration

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		0.1			0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1.00			1.10		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(1.5 HP) Low Static Drive Kit	Fully Closed																						*3420*	*837*	*1.41*	**3250**	**839**	**1.33**	**3080**	**840**	**1.26**			
	1 Turn Open																*3640*	*806*	*1.41*	**3410**	**808**	**1.32**	**3180**	**810**	**1.23**	**3070**	**811**	**1.18**	**2960**	**812**	**1.13**			
	2 Turns Open										*3770*	*770*	*1.36*	**3570**	**773**	**1.28**	**3370**	**775**	**1.21**	**3120**	**778**	**1.12**	**2870**	**780**	**1.02**									
	3 Turns Open							*3740*	*735*	*1.26*	**3530**	**738**	**1.18**	**3300**	**740**	**1.10**	**3070**	**741**	**1.02**	**2800**	**741**	**0.93**												
	4 Turns Open				*3690*	*700*	*1.14*	**3480**	**702**	**1.07**	**3270**	**703**	**1.00**	**3020**	**706**	**0.92**	*2770*	*708*	*0.84*															
	5 Turns Open				**3450**	**665**	**1.00**	**3230**	**665**	**0.93**	**2980**	**669**	**0.86**	**2700**	**670**	**0.78**																		

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		1.0			1.1			1.2			1.3			1.4			1.5			1.6			1.7			1.8			1.9			2		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(3 HP) High Static Drive Kit	Fully Closed																									*3900*	*1105*	*2.95*	**3700**	**1109**	**2.74**	**3100**	**1117**	**2.33**
	1 Turn Open																						*3750*	*1074*	*2.48*	**3525**	**1079**	**2.43**	**3050**	**1084**	**2.20**			
	2 Turns Open																*3775*	*1032*	*2.36*	**3525**	**1035**	**2.23**	**3050**	**1040**	**2.05**	*2575*	*1044*	*1.88*						
	3 Turns Open										*3720*	*986*	*2.42*	**3480**	**988**	**2.24**	**3010**	**992**	**2.05**	*2540*	*996*	*1.89*												
	4 Turns Open				*3725*	*937*	*2.03*	**3490**	**938**	**2.18**	**3020**	**943**	**2.01**	*2540*	*947*	*1.84*																		
	5 Turns Open				**2820**	**875**	**1.56**																											

NOTES:
Boldface type indicates factory recommended blower operating range.
Values include losses for air filters, unit casing, and dry evaporator coil.
See Accessory Performance Data table for additional static pressure information.
Values can be approximated for 1/2 turn increments by interpolating between lines
Deduct 250 CFM from value shown for equipment installed with H5HK electric heat kits

Low Static Drive Consists of: 1.5 Hp Motor; 1VP44 Motor Sheave; BK 95 Blower Pulley & B-52 belt
High Static Drive Consists of: 3 Hp Motor; 1VP44 Motor Sheave; BK 72 Blower Pulley & B-51 belt

Table 3. Q6SP-090C Series

Blower Performance - Horizontal Configuration

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		0.1			0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1.00			1.10		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(1.5 HP) Low Static Drive Kit	Fully Closed																									*3625*	*833*	*1.54*	**3390**	**835**	**1.47**			
	1 Turn Open																						*3610*	*804*	*1.51*	**3315**	**807**	**1.47**	**3015**	**810**	**1.42**			
	2 Turns Open																*3810*	*772*	*1.47*	**3560**	**775**	**1.37**	**3310**	**777**	**1.27**	*2925*	*781*	*1.14*						
	3 Turns Open													**3705**	**736**	**1.30**	**3470**	**738**	**1.27**	**3170**	**741**	**1.17**	*2870*	*744*	*1.06*									
	4 Turns Open							*3891*	*701*	*1.30*	**3670**	**703**	**1.21**	**3418**	**705**	**1.16**	**3165**	**707**	**1.11**															
	5 Turns Open				*3830*	*665*	*1.19*	**3620**	**666**	**1.12**	**3360**	**668**	**1.04**																					

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		1.0			1.1			1.2			1.3			1.4			1.5			1.6			1.7			1.8			1.9			2		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(3 HP) High Static Drive Kit	Fully Closed																																	
	1 Turn Open																												**3975**	**1073**	**2.73**	**3059**	**1083**	**2.22**
	2 Turns Open																						**3960**	**1031**	**2.52**	**3690**	**1035**	**2.35**	**2800**	**1044**	**1.92**			
	3 Turns Open													*4150*	*983*	*2.45*	**3940**	**985**	**2.33**	**3630**	**988**	**2.15**	**2750**	**996**	**1.74**									
	4 Turns Open							*4140*	*937*	*2.28*	**3910**	**939**	**2.15**	**3640**	**942**	**2.00**	**3250**	**945**	**1.82**															
	5 Turns Open				**3890**	**891**	**1.93**	**3625**	**893**	**1.82**	**3260**	**897**	**1.66**																					

NOTES:
Boldface type indicates factory recommended blower operating range.
Values include losses for air filters, unit casing, and dry evaporator coil.
See Accessory Performance Data table for additional static pressure information.
Values can be approximated for 1/2 turn increments by interpolating between lines
Deduct 250 CFM from value shown for equipment installed with H5HK electric heat kits

Low Static Drive Consists of: 1.5 Hp Motor; 1VP44 Motor Sheave; BK 95 Blower Pulley & B-52 belt
High Static Drive Consists of: 3 Hp Motor; 1VP44 Motor Sheave; BK 72 Blower Pulley & B-51 belt

Table 4. Q6SP-090C Series

Blower Performance - Downflow Configuration

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		0.1			0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1.00			1.10		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(2 HP) Low Static Drive Kit	Fully Closed																																
	1/2 Turn Open																							**4128**	**927**	**2.15**	**3945**	**931**	**2.03**			
	1 Turn Open																						**4208**	**911**	**2.13**	**4021**	**915**	**2.05**	**3833**	**919**	**1.96**			
	2 Turns Open													**4436**	**869**	**2.09**	**4274**	**873**	**2.03**	**4083**	**876**	**1.93**	**3891**	**879**	**1.82**	**3668**	**883**	**1.74**	*3444*	*886*	*1.66*			
	3 Turns Open				**4667**	**823**	**2.04**	**4490**	**826**	**1.98**	**4317**	**830**	**1.88**	**4127**	**833**	**1.79**	**3936**	**835**	**1.70**	**3722**	**837**	**1.58**	*3507*	*838*	*1.47*									
	4 Turns Open				**4368**	**783**	**1.76**	**4183**	**785**	**1.68**	**3975**	**788**	**1.61**	**3785**	**790**	**1.52**	**3594**	**792**	**1.44**															
	5 Turns Open				**4034**	**741**	**1.46**	**3847**	**743**	**1.39**	**3645**	**745**	**1.32**	*3415*	*747*	*1.23*																		

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		1.0			1.1			1.2			1.3			1.4			1.5			1.6			1.7			1.8			1.9			2		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(3 HP) High Static Drive Kit	Fully Closed																																
	1 Turn Open																															**3862**	**1159**	**3.03**
	1.5 Turns Open																									**4102**	**1136**	**3.00**	**3886**	**1140**	**2.89**	**3762**	**1142**	**2.82**
	2 Turns Open																						**4119**	**1117**	**2.96**	**3891**	**1121**	**2.80**	**3766**	**1123**	**2.74**	**3534**	**1126**	**2.58**
	3 Turns Open										*4571*	*1068*	*3.01*	**4387**	**1071**	**2.87**	**4164**	**1075**	**2.74**	**3941**	**1078**	**2.61**	**3749**	**1081**	**2.49**	**3556**	**1084**	**2.37**						
	4 Turns Open	*4724*	*1023*	*2.90*	**4583**	**1026**	**2.80**	**4368**	**1029**	**2.69**	**4161**	**1032**	**2.56**	**3954**	**1035**	**2.42**	**3757**	**1037**	**2.30**	**3559**	**1039**	**2.18**												
	5 Turns Open	**4397**	**986**	**2.54**	**4186**	**988**	**2.40**	**3969**	**990**	**2.29**	**3723**	**993**	**2.14**	*3476*	*995*	*1.99*																		

NOTES:

Boldface type indicates factory recommended blower operating range.
Values include losses for air filters, unit casing, and dry evaporator coil.
See Accessory Performance Data table for additional static pressure information.
Values can be approximated for 1/2 turn increments by interpolating between lines
Deduct 250 CFM from value shown for equipment installed with H5HK electric heat kits

Low Static Drive Consists of: 2 Hp Motor; 1VP40 Motor Sheave; BK 75 Blower Pulley & B-49 belt
High Static Drive Consists of: 3 Hp Motor; 1VP50 Motor Sheave; BK 75 Blower Pulley & B-51 belt

Table 5. Q6SP-120C Series

Blower Performance - Horizontal Flow Configuration

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		0.1			0.2			0.3			0.4			0.5			0.6			0.7			0.8			0.9			1.00			1.10		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(2 HP) Low Static Drive Kit	Fully Closed																																
	1 Turn Open																												*4095*	*908*	*2.15*			
	1.5 Turns Open																									**4120**	**890**	**2.07**	**3921**	**894**	**1.96**			
	2 Turns Open																*4521*	*870*	*2.17*	**4331**	**869**	**2.08**	**4142**	**873**	**1.96**	**3945**	**876**	**1.86**	**3747**	**879**	**1.76**			
	3 Turns Open										**4537**	**822**	**2.06**	**4355**	**825**	**1.95**	**4172**	**827**	**1.84**	**3958**	**825**	**1.76**	**3750**	**834**	**1.65**	**3536**	**837**	**1.53**	*3322*	*840*	*1.41*			
	4 Turns Open				**4584**	**776**	**1.93**	**4406**	**779**	**1.86**	**4228**	**781**	**1.78**	**4026**	**783**	**1.70**	**3824**	**785**	**1.61**	**3580**	**788**	**1.52**	*3336*	*790*	*1.42*									
	5 Turns Open				**4305**	**734**	**1.61**	**4081**	**735**	**1.51**	**3868**	**737**	**1.45**	**3669**	**740**	**1.35**	*3413*	*743*	*1.26*															

Model	Motor Sheave Position	External Static Pressures (Inches Water Column)																														
		1.0			1.1			1.2			1.3			1.4			1.5			1.6			1.7			1.8			1.9			2		
		CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw	CFM	RPM	Kw
(3 HP) High Static Drive Kit	Fully Closed																																
	1 Turn Open																																
	2 Turns Open																															**4083**	**1118**	**2.93**
	2.5 Turns Open																												**4068**	**1096**	**2.87**	**3797**	**1099**	**2.68**
	3 Turns Open																						*4327*	*1072*	*2.96*	**4137**	**1074**	**2.78**	**3824**	**1077**	**2.60**	**3511**	**1080**	**2.42**
	4 Turns Open													**4558**	**1027**	**2.90**	**4358**	**1030**	**2.74**	**4135**	**1033**	**2.60**	**3912**	**1036**	**2.46**	**3640**	**1040**	**2.29**						
	4.5 Turns Open							**4784**	**1003**	**2.94**	**4568**	**1006**	**2.79**	**4352**	**1009**	**2.65**	**4137**	**1012**	**2.50**	**3749**	**1016**	**2.35**	**3361**	**1020**	**2.20**									
	5 Turns Open	*4914*	*980*	*2.94*	**4738**	**982**	**2.80**	**4561**	**984**	**2.66**	**4378**	**987**	**2.53**	**4147**	**990**	**2.40**	**3915**	**993**	**2.26**	*3363*	*999*	*2.10*												

NOTES:

Boldface type indicates factory recommended blower operating range.
Values include losses for air filters, unit casing, and dry evaporator coil.
See Accessory Performance Data table for additional static pressure information.
Values can be approximated for 1/2 turn increments by interpolating between lines
Deduct 250 CFM from value shown for equipment installed with H5HK electric heat kits

Low Static Drive Consists of: 2 Hp Motor; 1VP40 Motor Sheave; BK 75 Blower Pulley & B-49 belt
High Static Drive Consists of: 3 Hp Motor; 1VP50 Motor Sheave; BK 75 Blower Pulley & B-51 belt

Table 6. Q6SP-120C Series

Q6SP Charging Charts - Cooling Only

Application Notes on the Use of Charging Charts

This equipment's cooling systems contain refrigerant under high pressure, always use safe practices when servicing the unit. Always review the factory literature and safety warnings prior to servicing.

All Q6SP-090/120 units are shipped from the factory with the proper amount and type of refrigerant. Always inspect the unit rating label to determine the units information prior to working on the system. Do not mix different refrigerants or charge the unit with a refrigerant not listed on the unit rating label.

The charging charts below are valid for a variety of indoor, return air conditions and are most highly influenced by the outdoor ambient temperature, outdoor fan operation and the unit operating voltage. Before referencing the charts below, always ensure that all compressor circuits are energized and have stable operation. As can be seen in the charging charts, the ideal system sub-cooling can vary over the range of operation. Always reference the charts to determine the ideal amount of sub-cooling for a given liquid pressure. Units charged to other values will not perform at the rated unit efficiency (EER) or rated Coefficient of Performance (COP) in heating mode.

To inspect a systems operation, using quality instruments, match the measured liquid temperature to the units chart. The measured liquid pressure reading should be within 3% of the value shown for most installations. For two stage systems, the charts are valid for both compressor stages.

For systems that are operating with more then 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 then the amount stated above.

Always use safe and environmentally sound methods for refrigerant handling. When repairing system leakages, always utilize 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 weight in the refrigerant to the amount specified on the unit rating label.

DO NOT utilize the charts for two stage systems operating only under a single stage call for cooling.

DO NOT utilize the charts in systems that do not have all the outdoor fans energized, or have the fans cycling under a low-ambient control. Refer to the low-ambient kit instructions for more information, if applicable.

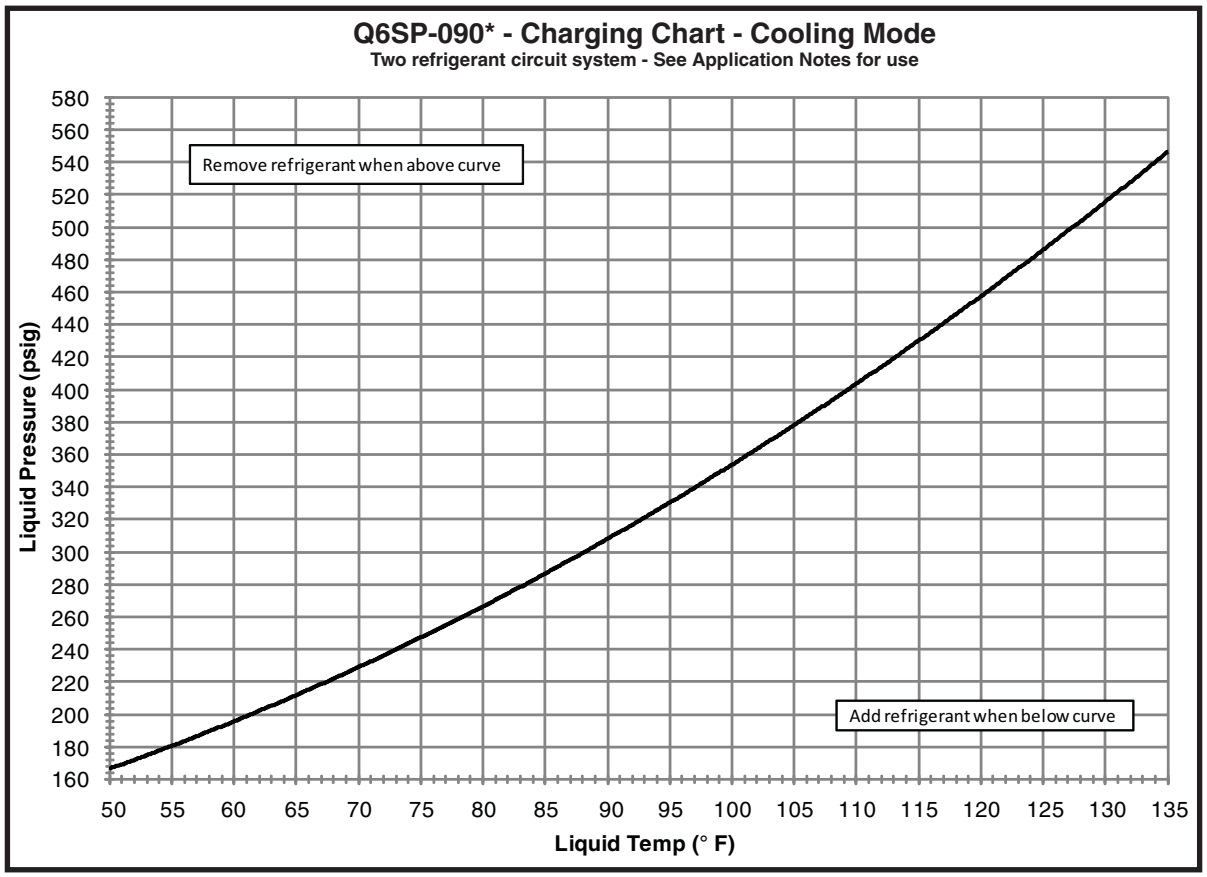


Figure 12. Charging Chart for 7 1/2 Ton Units

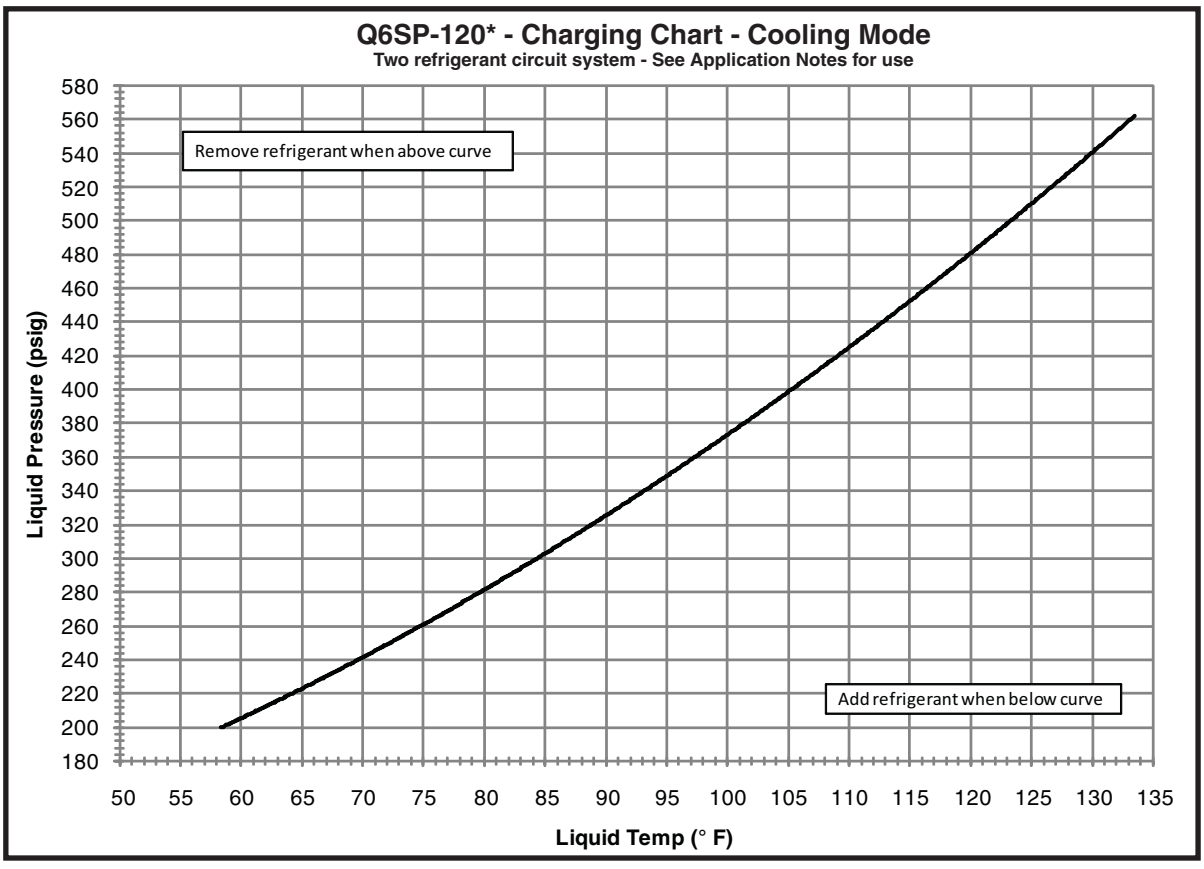


Figure 13. Charging Chart for 10 Ton Units

Heat Mode Verification Charts - Heating Only

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

Read all notes and warnings for the Cooling-mode charging charts prior to utilizing these Heating-mode charge verification charts.

All Q6SP-090/120 units are shipped from the factory with accumulators installed in the refrigeration systems and the correct factory charge. The charge verification charts below are provided for quick reference when the unit is in heating-mode and allow the inspection of the liquid line pressures and temperature for both stage one and stage two. In heating mode, stage one and two will operate at similar but slightly different operating points.

Before using these charts, determine the Outdoor ambient temperature and the Return air temperature to the unit. (If the unit is equipped with an economizer, determine the mixed air temperature entering the filters.)

Locate the appropriate location on the units verification chart based on those measurements to determine the ideal liquid line pressure and temperature. Ensure that all outdoor fans are operating, that both compressors are running and that the outdoor coils are free from any frost accumulation. Additionally, ensure that 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 liquid line temperature should be within 2 degrees of the ideal value and the pressure should be within 2%. For a more accurate comparison to the chart, record both the stage one and stage two readings and compare them to each other. If the system pressures are with in 8 psig of each other and the temperatures are with 1.5˚ F then average the values together and compare them to the chart values.

The most reliable way of ensuring that 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 40˚ 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 ΔT 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 then previously stated.
3. Inspect the input voltage for a phase imbalance. Units with greater then 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. Verify the drive belt is in good condition and properly tightened.
6. Inspect the system for leaks. If a leak cannot be located and stage one and two are operating with similar characteristics and both stages are sub-cooled, the system charge is probably correct. Re-inspect the return air and ambient temperatures and verify that the correct system point on the verification chart was selected.

Always use safe and environmentally sound methods for refrigerant handling. When repairing system leakages, always utilize 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.

DO NOT utilize the charts for two stage systems operating only under a single stage call for heating. (Or for units with an electric heat kit installed, that they are not operating on a 3rd stage call for heat.)

DO NOT utilize the charts in systems that do not have all the outdoor fans energized, or have the fans 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 fans should always operate in conjunction with the compressors.

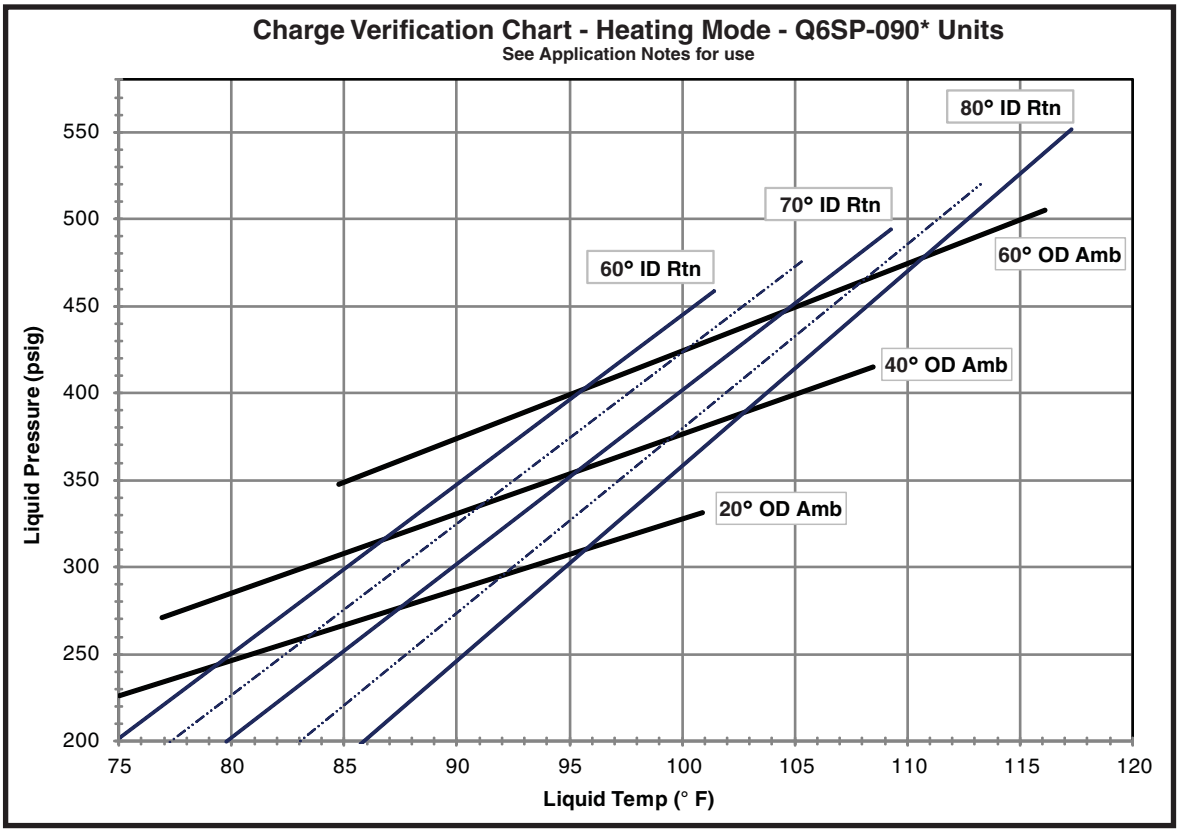


Figure 14. Verification Chart for 7 1/2 ton units

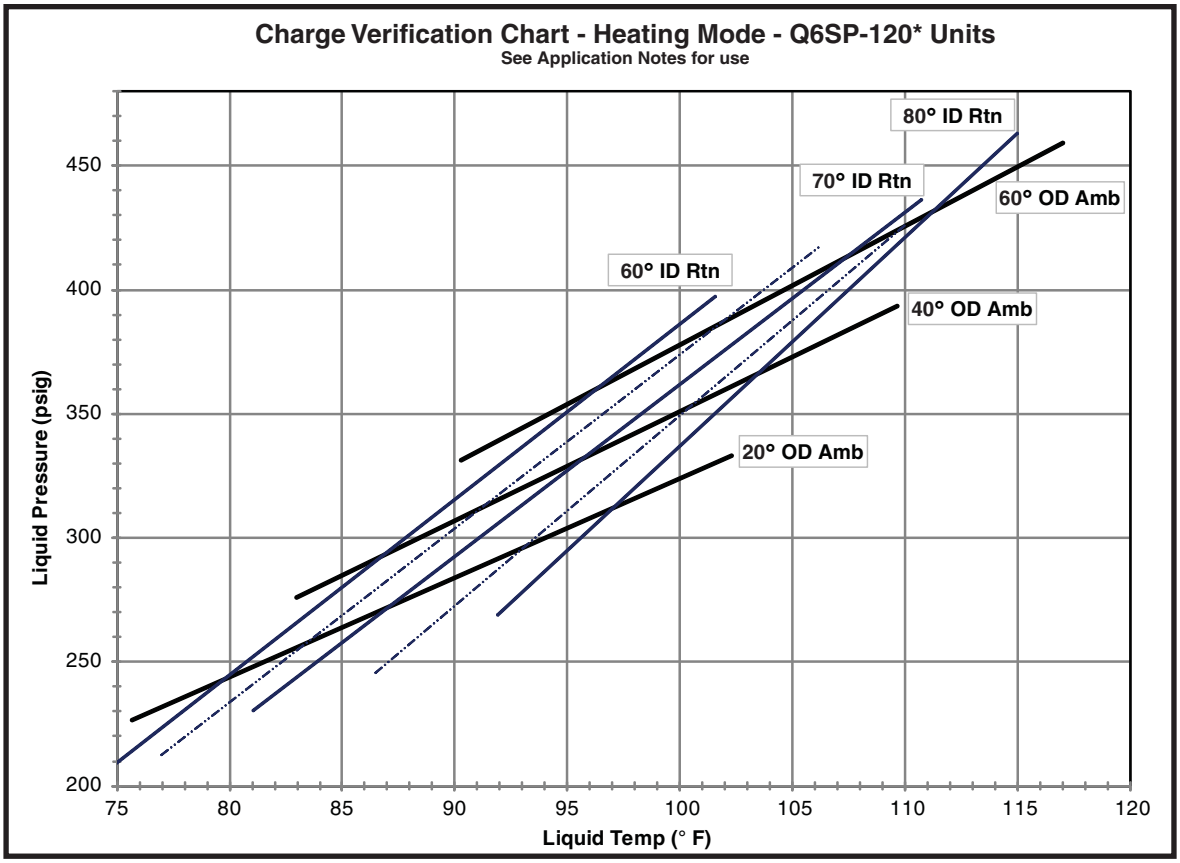


Figure 15. Verification Chart for 10 ton units

INSTALLATION/PERFORMANCE CHECK LIST

INSTALLATION ADDRESS:	
CITY _____	STATE _____
UNIT MODEL # _____	
UNIT SERIAL # _____	

INSTALLER NAME:	
CITY _____	STATE _____

Unit Installed Minimum clearances per Figure 1 (page 4)?	YES	NO

ELECTRICAL SYSTEM:		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage: _____ VOLTS		
L1-L2 Volts: _____ VOLTS		
L1-L3 Volts: _____ VOLTS		
L2-L3 Volts: _____ VOLTS		
Avg. Volts: _____ VOLTS		
Max. deviation of voltage from avg. volts: _____ VOLTS		
% Volt imbalance: _____ VOLTS		

GENERAL:		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct?	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
Date Installed: _____		
Installation Type: Horizontal / Downflow		

REFRIGERATION SYSTEM:		
Was unit given 24 hr warm up period for crankcase heaters?	YES	NO
Ambient Temperature _____ °F		
Return Air Temperature _____ °F		
Stage-1 Liquid Pressure (high side) _____		
Stage-1 Liquid Temperature _____ °F		
Stage-1 Suction Pressure (low side) _____		
Stage-2 Liquid Pressure (high side) _____		
Stage-2 Liquid Temperature _____ °F		
Stage-2 Suction Pressure (low side) _____		

BLOWER SYSTEM:
Blower Motor HP: _____
Sheave Setting: _____ turns open
System Static: _____ E.S.P. (in -Wg)

ELECTRIC HEAT:		
Heater Kit Installed?	YES	NO
Heater Kit Model #: _____		
Return Air Temp: _____ °F		
Supply Air Temp: _____ °F		
Temperature Rise: _____ °F		

ARI PERFORMANCE CERTIFIED ™ ARI Standard 340/360 Unitary Large HP Certification applies only when the complete system is listed with ARI. www.aridirectory.org

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INSTALLER: PLEASE LEAVE THESE INSTALLATION INSTRUCTIONS WITH THE OWNER.

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