

USER'S MANUAL / INSTALLATION INSTRUCTIONS

SINGLE PACKAGE HEAT PUMP - SINGLE PHASE - R410A



IMPORTANT

ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

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

USER INFORMATION

IMPORTANT SAFETY INFORMATION	3	Operating the Heat Pump for Automatic Cooling and Heating.....	4
ABOUT THE HEAT PUMP	3	Operating the Indoor Blower Continuously.....	4
OPERATING INSTRUCTIONS	3	Shutting the Heat Pump Off	4
Cooling Operation	3	HEAT PUMP MAINTENANCE	4
Heating Operation	3	Regular Cleaning.....	4
Emergency Heat.....	3	TROUBLESHOOTING	4
Defrost Operation	3	WARRANTY INFORMATION	4

INSTALLER INFORMATION

IMPORTANT SAFETY INFORMATION	5	System Cooling.....	11
GENERAL INFORMATION	6	System Heating - Heat Pump Mode	11
Before you install this unit	6	System Heating - Electric Heat Mode	11
Locating the Heat Pump.....	6	REFRIGERANT CHARGING	11
Field Connections for Electrical Power Supply.....	6	Charging an R-410A Unit in AC Mode	12
Air Ducts.....	6	Charging an R-410A Unit in Heating Mode	12
Unconditioned Spaces	6	Verification of charge in Heat Mode	12
Acoustical Duct Work	6	HEAT PUMP MAINTENANCE	12
Air Filter Requirements.....	7	FIGURES & TABLES	13
HEAT PUMP INSTALLATION	7	Figure 7. Q104SD Heat pump Dimensions.....	13
Packaging Removal.....	7	Table 2. Center of Gravity & Unit Shipping Weights.....	13
Rigging & Hoisting.....	7	Electrical Information.....	14
Minimum Clearances.....	7	Figure 8. Typical Heat Pump Thermostat Connections 208V/230V	14
Ground Level.....	7	Figure 9. Wiring Diagram for 208/230V Units.....	15
Rooftop.....	8	Charging Charts - Cooling.....	16
Horizontal to Downflow Conversion.....	8	Figure 10. Charging Chart for 2 Ton Units.....	16
Condensate Drain	8	Figure 11. Charging Chart for 2.5 Ton Units.....	16
ELECTRICAL WIRING	8	Figure 12. Charging Chart for 3 Ton Units.....	17
Pre-Electrical Checklist:.....	8	Figure 13. Charging Chart for 3.5 Ton Units.....	17
Line Voltage.....	8	Figure 14. Charging Chart for 4 Ton Units.....	18
Grounding.....	9	Figure 15. Charging Chart for 5 Ton Units.....	18
Blower Speed.....	9	Airflow Data	19
Safety Protection	9	Table 3. Q104SD Airflow Data.....	19
Thermostat Connections	9	Table 4. Control Board Status Indicators.....	19
Ambient Sensor Mounting	10	INSTALLATION CHECKLIST	20
Defrost Board Operation	10	REPLACEMENT PARTS	20
Forced Defrost When the Following Conditions are Met	10		
Optional Outdoor Thermostat.....	10		
Optional Electric Heater Kits	10		
START UP & ADJUSTMENTS	11		
Pre-Start Check List.....	11		
Start-Up Procedure	11		
Air Circulation.....	11		
Short Cycle Protection	11		

USER INFORMATION

IMPORTANT SAFETY INFORMATION

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.

ABOUT THE HEAT PUMP

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

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

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

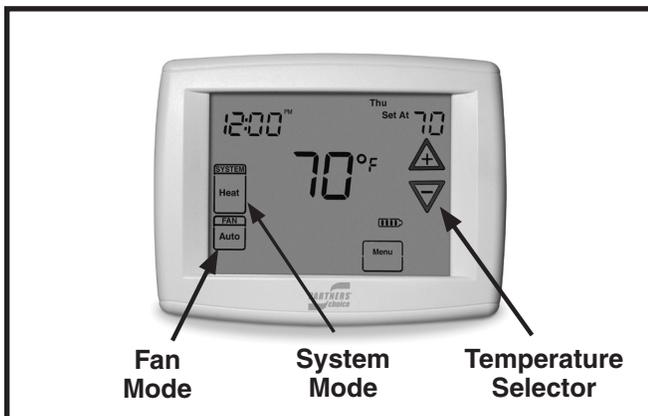


Figure 1. Digital Thermostat

OPERATING INSTRUCTIONS

Please refer to the thermostat manufacturer's User manual for detailed programming instructions.

Cooling Operation

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

NOTE: If the temperature level is re-adjusted, or the system mode is reset, the fan and compressor in the outdoor unit may not start immediately. A protective timer circuit holds the compressor and the outdoor fan off for approximately three minutes following a previous operation or the interruption of the main electrical power.

Heating Operation

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

NOTE: If the temperature level is re-adjusted, or the system mode is reset, the fan and compressor in the outdoor unit may not start immediately. A protective timer circuit holds the compressor and the outdoor fan off for approximately three minutes following a previous operation or the interruption of the main electrical power.

Emergency Heat

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

Defrost Operation

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

At the beginning of the defrost cycle, both the outdoor condenser fan and compressor will turn off. After approximately 30 seconds, the compressor will turn on and begin to heat the outdoor coil causing the ice and snow to melt.

NOTE: While the ice and snow is melting, some steam may rise from the outdoor unit as the warm coil causes the

USER INFORMATION

melting frost to evaporate. When defrost is completed, the outdoor fan motor will start, and the compressor will turn off again. In approximately 30 seconds the compressor will start up again and continue normal operation.

Operating the Heat Pump for Automatic Cooling and Heating

1. Set the thermostat system mode to AUTO and the thermostat fan mode to AUTO. See [Figure 1](#).

NOTE: Thermostat styles vary. Some models will not include the AUTO mode and others will have the AUTO in place of the HEAT and COOL. Others may include all three. Refer to the instructions supplied with your thermostat for specific instructions.

2. Set the thermostat's temperature selector to the desired heating and cooling temperature level(s). The outdoor unit and the indoor blower will then cycle on and off in either the heating or cooling mode of operation as required to automatically maintain the indoor temperature within the desired limits.

Operating the Indoor Blower Continuously

The continuous indoor blower operation is typically used to circulate the indoor air to equalize a temperature imbalance due to a sun load, cooking, or fireplace operation.

Set the thermostat fan mode to ON ([Figure 1](#)). The indoor blower starts immediately, and will run continually until the fan mode is reset to AUTO.

The continuous indoor blower operation can be obtained with the thermostat system mode set in any position, including OFF.

Shutting the Heat Pump Off

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

HEAT PUMP MAINTENANCE

CAUTION:

Shut off all electrical power to the unit before performing any maintenance or service on the system. Failure to comply may result in personal injury or death.

Proper maintenance is most important to achieve the best performance from the appliance and should be performed by a qualified service technician at least once a year. Follow the maintenance schedule and the instructions below for years of safe, trouble free operation.

Regular Cleaning

- Clean or replace the indoor air filter at the start of each heating and cooling season, and when an accumulation of dust and dirt is visible on the air filter.
- Remove any leaves and grass clippings from the coil in the outdoor unit, being careful not to damage the aluminum fins.
- Check for obstructions, such as twigs, sticks, etc.

TROUBLESHOOTING

If the unit fails to operate, check the following:

- The thermostat is properly set. See Cooling Operation for air conditioning or Heating Operation for furnace or air handler.
- The unit disconnect fuses are in good condition and the electrical power to the unit is turned on.

WARRANTY INFORMATION

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

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

INSTALLER INFORMATION

IMPORTANT SAFETY INFORMATION

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

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.

CAUTION:

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

WARNING:

Shut off all electrical power to the unit before performing any maintenance or service on the system. Failure to comply may result in personal injury or death.

WARNING:

These units are fully charged with R-410A refrigerant 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 attempted 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 homeowner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.

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.

WARNING:

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

- The installer must comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI CI) for special installation requirements.
- This equipment contains liquid and gaseous refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment.
- All electrical wiring must be completed in accordance with local, state and national codes and regulations and with the National Electric Code (ANSI/NFPA 70) or in Canada the Canadian Electric Code Part 1 CSA C.22.1.
- 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.
- Install this unit only in a location and position as specified on [page 6](#). This unit is designed only for outdoor installations and should be located with consideration of minimizing the length of the supply and return ducts. Consideration should also be given to the accessibility of fuel, electric power, service access, noise, and shade.
- Follow all precautions in the literature, on tags, and on labels provided with the equipment. Read and thoroughly understand the instructions provided with the equipment prior to performing the installation and operational checkout of the equipment.

GENERAL INFORMATION

The Q104SD series heat pump is 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.

Before you install this unit

- ✓ The cooling load of the area to be conditioned must be calculated and a system of the proper capacity selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.
- ✓ Check the electrical supply and verify the power supply is adequate for unit operation. If there is any question concerning the power supply, contact the local power company.
- ✓ All units are securely packed at the time of shipment and upon arrival should be carefully inspected for damage prior to installing the equipment at the job site. Verify coil fins are straight. If necessary, comb fins to remove flattened or bent fins. Claims for damage (apparent or concealed) should be filed immediately with the carrier.
- ✓ Please consult your dealer for maintenance information and availability of maintenance contracts. Please read all instructions before installing the unit.

Locating the Heat Pump

- Survey the job site to determine the best location for mounting the outdoor unit.
- Choose an appropriate location that minimizes the length of the supply and return air ducts.
- Overhead obstructions, poorly ventilated areas, and areas subject to accumulation of debris should be avoided.
- Sufficient clearance for unobstructed airflow through the outdoor coil must be maintained in order to achieve rated performance. See [Figure 2](#) for minimum clearances to obstructions.

Field Connections for Electrical Power Supply

- All wiring must comply with current provisions of the National Electrical Code (ANSI/NFPA 70) and with applicable local codes having jurisdiction.
- The minimum size of electrical conductors and circuit protection must be in compliance with information listed on the outdoor unit data label.
- Electrical power supplied to the unit must be adequate for proper operation of the equipment. The system must be wired and provided with circuit protection in accordance with local building codes.

Air Ducts

This unit is designed only for use with a supply and return duct. Air ducts must be installed in accordance with the standards of the National Fire Protection Association Standard for Installation of Air Conditioning Systems (NFPA 90A), Standard for Installation of Residence Type

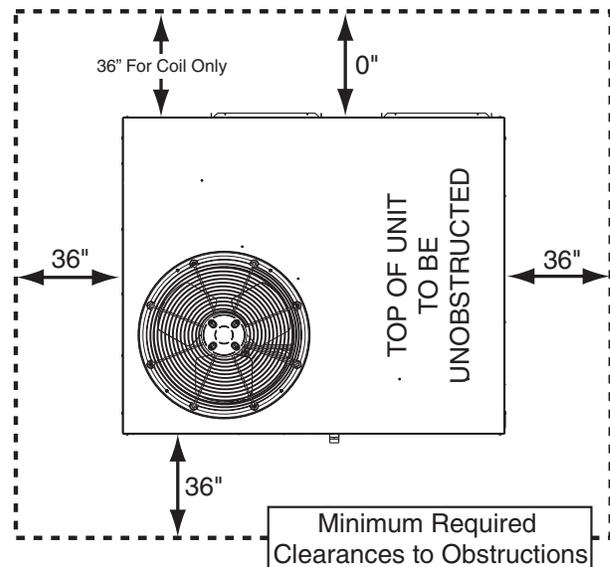


Figure 2. Clearance Requirements

Warm Air Heating and Air Conditioning Systems (NFPA 90B), and all applicable local codes. NFPA publications are available by writing to: National Fire Protection Association, Batterymarch Park, Quincy, ME 02269 or visit www.NFPA.org on the web.

- Design the duct work according to methods described by the Air Conditioning Contractors of America (ACCA).
- The ducts must be properly sized not to exceed .2" W.C. pressure drop at 400 scfm per nominal ton of cooling capacity.
- Duct work should be attached directly to the unit flanges for horizontal applications.
- If roof curb is installed, the ducts must be attached to the curb hangers, not the unit.

Unconditioned Spaces

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

Acoustical Duct Work

Certain installations may require the use of acoustical lining inside the supply duct work.

- 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 duct work may be used in place of internal duct liners if the fiber duct work is in accordance with the current revision of the SMACNA construction standard on fibrous glass ducts. Fibrous duct work and internal acoustical lining must be NFPA Class 1 air ducts when tested per UL Standard 181 for Class 1 ducts.

Air Filter Requirements

WARNING:

Never operate the unit without a filter in place. Dust and lint could accumulate on internal parts, resulting in loss of efficiency, equipment damage, and possible fire.

NOTE TO INSTALLER: After installing or replacing the filtration system for this unit, add the following statement on or adjacent to the filter service panel: "Replace filter(s) installed in your system only with the same dimensional size filters that are being replaced."

- An air filter is not supplied with this package unit as shipped from the factory. The installer must provide a high velocity filter that is appropriately sized to the return air duct opening or internal filter rack. The filters must comply with ANSI/UL 900 or CAN/ULC-S111.
- Horizontal installations require the air filter system be installed in the return air ductwork.
- For recommended external filter sizes, refer to Table 2 (page 12) under **Heat Pump Maintenance**
- All return air must pass through the filters before entering the evaporator coil. It is important that all filters be kept clean and replaced frequently to ensure proper operation of unit. Dirty or clogged filters will reduce the efficiency of the unit and result in unit shutdowns.
- Air filter pressure drop is recommended not to exceed 0.08 inches WC.
- Single phase downflow applications require either a Nortek internal filter kit be used, or an air filter system be installed in the return air ductwork. See Table 2 for specific unit model and filter sizes.
- Horizontal installations require the air filter system be installed in the return air ductwork.

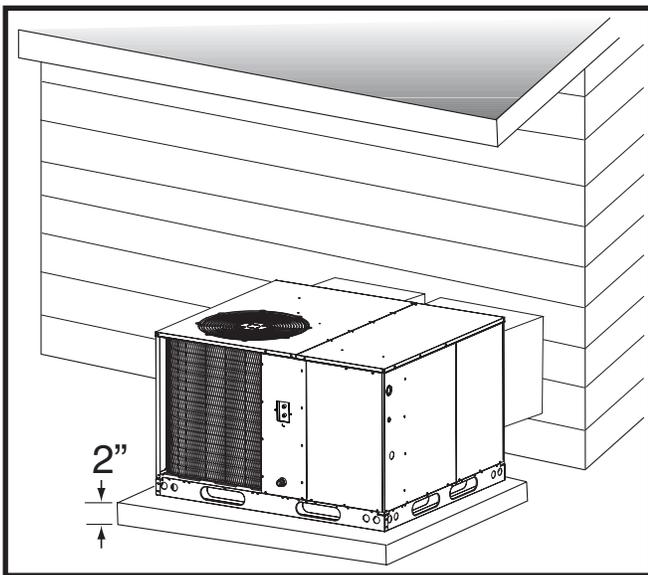


Figure 3. Ground Level Installation

HEAT PUMP INSTALLATION

Packaging Removal

Remove the shipping carton and User's Manual from the equipment. Take care not to damage the tubing connections when removing the carton. For rooftop installations, remove and discard the two supports attached beneath the unit.

Rigging & 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. Refer to Table 3 (page 13) for unit weights.**
- **The unit must be lifted from the holes in the base rails using cables or chains.**
- **Spreader bars 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 Figure 7 (page 13) for locating the center of gravity.**
- **All panels must be securely in place during rigging and hoisting.**

Minimum Clearances

Q104SD units are certified as combination heating and cooling equipment for outdoor installation only. Figure 2 (page 6) displays the minimum clearances to obstructions for both downflow and horizontal discharge.

Units may be installed on wood flooring or on Class A, B, or C roof covering material when used with bottom supply and return air ducts as long as the following requirements are met:

- If using horizontal supply and return air ducts, the horizontal roof curb kit and return air kit must be installed prior to unit installation. Horizontal roof curb is required.
- If using bottom discharge with return air ducts a roof curb must be installed prior to unit installation. See Rigging and Hoisting section for setting of the unit.

Ground Level

Ground level installations must be located according to local building codes or ordinances and these requirements:

- Clearances must be in accordance with those shown in Figure 2. Also consider clearances for access to the internal filter.
- A suitable mounting pad must be provided and separate from the building foundation. The pad must be level to ensure proper condensate disposal and strong enough to support the unit's weight. The slab height must be a minimum of 2" (5cm) above grade and with adequate drainage. See Figure 3.

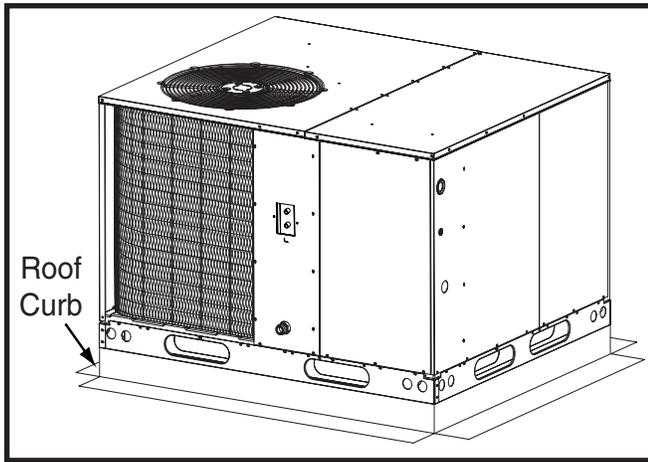


Figure 4. Roof Top Installation

- Units require horizontal roof curb and return air kit for horizontal installations.
- Ductwork should be attached directly to flanges on panels supplied in horizontal duct conversion kits.

Rooftop

Rooftop installations must be located according to local building codes or ordinances and these requirements:

- The roof must be capable of handling the weight of the unit. For unit weights, see [Table 3 \(page 13\)](#). Reinforce the roof if necessary.
- The appropriate accessory roof curb ([Figure 4](#)) must be installed prior to unit installation. The roof curb must be square and level to ensure proper condensate drainage. **Please follow all instructions provided with the kit.**
- Secure roof curb or frame to roof using acceptable mechanical methods per local codes. **NOTE:** Make sure the two supports beneath the unit have been removed.

Horizontal to Downflow Conversion

If down flow ducts are required, the unit must be converted following the steps below for the supply and return ducts.

1. Locate the duct cap inside the duct openings and remove the screw holding it in place.
2. Lift the cap out of the unit. (**Hint:** The cap can be pushed up from the bottom by reaching through the fork slot).
3. Cover the horizontal duct opening with the horizontal duct cap. The insulation will be on the indoor side.
4. Fasten the cover with screws to seal.

Condensate Drain

Condensate is removed from the unit through the 3/4" female pipe fitting located on the front side of the unit. Install a 2 inch condensate trap in the drain line of the same size and prime with water. See [Figure 5](#).

When connecting rigid drain line, hold the female fitting with a wrench to prevent twisting. **Do not over tighten!** Refer to local codes and restrictions for proper condensate disposal requirements.

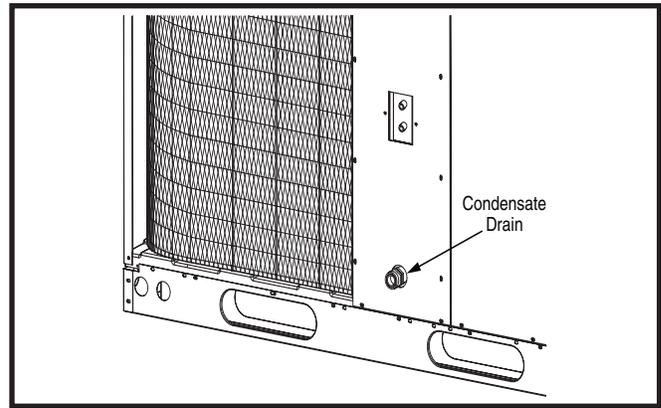


Figure 5. Condensate Drain Location

ELECTRICAL WIRING

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

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

Pre-Electrical Checklist:

- ✓ Verify that the voltage, frequency, and phase of the supply source match the specifications on the unit rating plate.
- ✓ Verify that the service provided by the utility is sufficient to handle the additional load imposed by this equipment. refer to the unit wiring label for proper high and low voltage wiring.
- ✓ Verify factory wiring is in accordance with the unit wiring diagram. See [Figure 9 \(page 15\)](#). Inspect for loose connections.

Line Voltage

- A wiring diagram is located on the inside cover of the units electrical box. 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 unit.
- Line voltage to the unit should be supplied from a dedicated branch circuit containing the correct fuse or circuit breaker for the unit. Incoming field wiring and minimum size of electrical conductors and circuit

protection must be in compliance with information listed on the outdoor unit data label. Any other wiring methods must be acceptable to authority having jurisdiction.

- The outdoor unit requires both power and control circuit electrical connections. Refer to [Figure 8 \(page 14\)](#) for identification and location of outdoor unit field wiring interfaces. Make all electrical connections in accordance with all applicable codes and ordinances.
- Overcurrent protection must be provided at the branch circuit distribution panel and sized as shown on the unit rating label and according to applicable local codes. See the unit rating plate for minimum circuit ampacity and maximum overcurrent protection limits.
- Provide power supply for the unit in accordance with the unit wiring diagram, and the unit rating plate. Connect the line-voltage leads to the terminals on the contactor inside the control compartment.
- Use only copper wire for the line voltage power supply to this unit. 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.
- Units are shipped from the factory wired for 240 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.

Blower Speed

The blower speed is preset (for operation) at the factory for heating and cooling. These factory settings are listed in [Table 8 \(page 19\)](#). For optimum system performance and comfort, it may be necessary to change the factory set speed.

Safety Protection

- A high-pressure switch is factory-installed and located in the compressor discharge line of the unit. The switch is designed to de-energize the system when very high pressures occur during abnormal conditions. Under normal conditions, the switch is closed. If the discharge pressure rises above 650 psig, 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 and located on the suction line of the 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 unit. The switch will close again when the suction pressure increases above 35 psig. When the switch opens and then closes, there is a 5 minute short cycling delay before the outdoor unit will energize. Under normal conditions the switch is closed.

CAUTION:

To avoid personal injury or property damage, make sure the motor leads do not come into contact with any uninsulated metal components of the unit.

1. Shut off all electrical power to the unit and remove the blower panel. Locate the orange and red wires terminated to the blower motor. **NOTE:** The orange wire controls cooling operation while the red wire controls heating operation.
2. Verify the required speed from the airflow data found in [Table 8 \(page 19\)](#). Place appropriate wire on the correct motor speed tap for the required airflow point.

Thermostat Connections

- This heat pump may require a 2-stage cooling / heating thermostat if used in conjunction with certain installed accessories. Refer to your manual for additional instructions.
- The low voltage wires must be properly connected to the units low voltage terminal block as shown in [Figure 8 \(page 14\)](#).
- The **L** terminal on the defrost control board is used for fault monitoring. This is a 24V output and may be used with compatible thermostats. Refer to the thermostat manufacturer's manual to ensure compatibility. **FAILURE TO ENSURE COMPATIBILITY CAN LEAD TO THERMOSTAT FAILURE.**
- The thermostat should be mounted about 5 feet above the floor on an inside wall. **DO NOT** install the thermostat on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, and convective heat from warm air registers or electrical appliances. Refer to the thermostat's instruction sheet for detailed mounting and installation information.

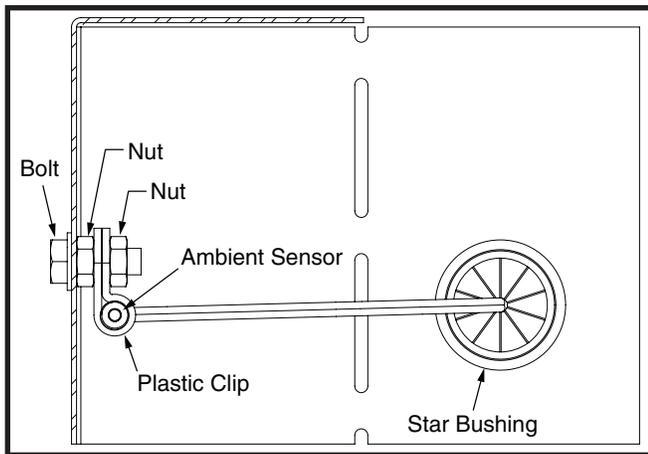


Figure 6. Ambient Sensor Mounting

Ambient Sensor Mounting

For optimum performance of the heat pump system, the ambient sensor must be mounted on the outside of the unit. See [Figure 6 \(page 10\)](#).

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

Defrost Board Operation

1. Heat Pump operates in heating mode until the combination of outdoor ambient and outdoor coil temperatures initiate a defrost cycle. The outdoor coil temperature must be at or below 25.5°F before the defrost cycle begins.
2. There must be a minimum of 35 minutes between defrost cycles. After this time, coil temperature & outdoor ambient will drive a call for defrost after conditions are met continuously for 30 seconds before a defrost cycle is initiated.
3. Outdoor fan is off during defrost operation.
4. The defrost cycle ends when the outdoor temperature reaches 50°F-80°F, dependent on TERM TEMP jumper position (default 70°F-no jumper) or if the defrost terminate time of 11 minutes is reached.

See "Control Board Status Indicators" for operation and fault codes, [Table 4 \(page 19\)](#).

Forced Defrost When the Following Conditions are Met:

- LPS and HPS are closed
- Y1 input is active
- O input is either active or inactive
- TEST terminals shorted for more than three seconds
Compressor will start and unit will operate in DEFROST mode.

Unit will run in DEFROST mode after pins have been shorted at least 3 seconds regardless of whether short is removed or not.

Qualifying conditions of minimum ambient or coil temperature do not need to be met when the unit is forced into defrost. If the short across the TEST pins exist, the unit will stay in DEFROST as long as the short remains or until the TERMINATE TIME is reached (11 minutes). This will happen regardless of coil temperature.

W2 OUT is active during this time if the O input is inactive.

If after 11 minutes the short remains, the unit shall not run in any mode and the display shall flash 'DF' until the short is removed.

W2 OUT shall remain on during the whole time that the short exists, if the O input is inactive.

Crankcase Heater (CCH) Operation

The outdoor temperature is measured by the ambient temperature sensor. The CCH is enabled during first 2 minutes after board power up regardless of any other condition.

- The CCH is disabled during compressor operation.
- The CCH is disabled when OD temperature > 70F.
- The CCH is enabled when OD temperature < 71F.

Optional Outdoor Thermostat (Field Supplied)

An outdoor thermostat can be installed in the field with 2-stage electric heat by removing the orange wire from the **W2** terminal on the unit terminal block and re-connecting it to the outdoor thermostat. Connect the other side of the outdoor thermostat to **W2** on the unit terminal block..

Optional Electric Heater Kits

Optional electric heater kits are available in 5 kw through 20 kw heating capacities. Single package heat pumps are designed to allow optional electric heat to be field installed as required by the building's particular heating load. The options available for each unit are shown in the heater kit installation instructions. A heating/cooling 24V thermostat should be used when an electric heater kit is installed. **NOTE:** A 2-stage heating thermostat is required if installing a 2-stage heater kit. As previously noted, a field installed circuit breaker kit is available as a means of electrical disconnect for the unit. Install the heater kits as directed by the instructions supplied with the heater kit. Follow all cautions and warnings as directed.

START UP & ADJUSTMENTS

Pre-Start Check List

- √ Verify the unit is level and allows condensate to drain.
- √ Verify the outdoor coil and top of the unit are free from obstructions and debris, and all equipment access/control panels are in place.
- √ Verify that the duct work is sealed to prevent air leakage.
- √ Verify that the line voltage power leads are securely connected and the unit is properly grounded.
- √ Verify that the low voltage wires are securely connected to the correct leads on the low voltage terminal strip.
- √ Verify that the outdoor fan turns freely.
- √ Verify that the power supply branch circuit overcurrent protection is sized properly.
- √ Verify that the thermostat is wired correctly. The thermostat system mode should be set to OFF and the thermostat fan mode should be set to AUTO.

Start-Up Procedure

Close all electrical disconnects to energize the system.

CAUTION:

If the 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.

Air Circulation

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

Short Cycle Protection

1. With the system operating in cooling mode, note 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.
3. After approximately 5 minutes, verify the compressor and fan energize and the temperature of the discharge air is cooler than the room temperature.

System Cooling

1. Set the thermostat's system mode to COOL and the fan mode to AUTO. Gradually lower the thermostat temperature setpoint below room temperature and verify the outdoor unit and indoor blower energize.
2. 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. Allow the cooling 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 mode is set to ON.

System Heating - Heat Pump Mode

1. Set the thermostat's system mode to HEAT and the fan mode to AUTO. Gradually raise the thermostat temperature setpoint above room temperature and verify the compressor, outdoor fan, and indoor blower energize.
2. Feel the air being circulated by the indoor blower and verify 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.

System Heating - Electric Heat Mode (If Equipped-Optional)

1. Set the thermostat's system mode to EMER. HEAT and the fan mode to AUTO. Gradually raise the thermostat temperature setpoint above room temperature and verify the compressor and outdoor fan remain off, but that the blower and heaters are energized.
2. 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.

REFRIGERANT CHARGING

WARNING:

Single Packaged Heat Pumps are shipped fully charged with R-410A refrigerant 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 at the front panel. Use only gauge lines which have a Schrader depression device present to actuate the valve. Draw a vacuum on gauge lines to remove air before attaching them to the service ports on the unit.

IMPORTANT NOTES:

- To achieve rated capacity and efficiency the compressor must be exposed to refrigerant for at least 24 hours prior to running and then must be run for a minimum of 12 hours.
- The refrigerant cooling charging charts are applicable to units at rated factory airflows for the indoor coil. See [Figure 10](#), [Figure 11 \(page 16\)](#), [Figure 12](#), [Figure 13 \(page 17\)](#), [Figure 14](#), [Figure 15 \(page 18\)](#).

Charging an R-410A Unit in AC Mode (With Outdoor Temperatures Above 60° F)

1. With the system operating at steady-state, measure the liquid refrigerant pressure in psig at the service valve. Measure the liquid refrigerant temperature in Fahrenheit on the liquid line before TXV at indoor coil.
2. For the temperature measured, determine the required liquid refrigerant pressure from the appropriate charging charts in [Figure 10](#), [Figure 11 \(page 16\)](#), [Figure 12](#), [Figure 13 \(page 17\)](#), [Figure 14](#), [Figure 15 \(page 18\)](#).
3. If the pressure measured in step 1 is greater than the required liquid refrigerant pressure determined in step 4, then there is too much charge in the system. Remove refrigerant and repeat steps 1 through 3 until the system is correctly charged.
4. If the pressure measured in step 1 is less than the required liquid refrigerant pressure determined in step 4, then there is too little charge in the system. Add refrigerant and repeat steps 1 through 3 until the system is correctly charged.

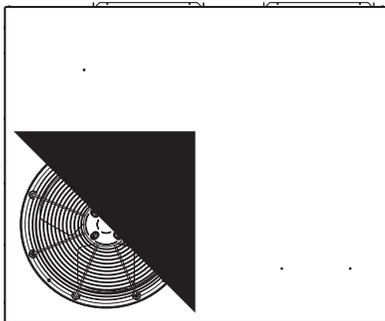
Charging an R-410A Unit in Heating Mode

Use the steps below for proper charging of unit in heat mode:

1. Evacuate the refrigerant system.
2. Weigh in the proper charge as shown on the unit rating plate (during heating mode operation).
3. Verify the unit is operating properly according to the System Heating-Heat Pump Mode section on page 11.

Verification of Charge in Refrigerant Heating Mode

- Block off half of the outdoor fan discharge grille area as shown.



- With the unit in COOLING MODE, use the appropriate charging chart curves shown in Tables 10-15 as a guide to ensure proper operation of your system.
- For units with a TXV, the refrigerant system should be evacuated and the proper charge weighed in as shown on the unit rating plate.

- Return to the system when the outdoor temperature is 60 degrees F or higher and follow the steps defined in Charging an R410A Unit in AC Mode.

NOTE: Unit charge MUST be verified in cooling season.

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. Unit may have more than one electrical supply.

⚠ CAUTION:

Use care when servicing the heat pump or removing components. Personal injury can result from sharp edges present in equipment constructed with sheet metal

Proper maintenance is important to achieve optimum performance from the heat pump. The ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess these skills, contact your dealer for maintenance. Consult your local dealer about the availability of maintenance contracts. Routine maintenance should include the following:

- Inspect and clean or replace air filters at the beginning of each heating and cooling season, or more frequently if required.
- Inspect the condensate drain and outdoor coil at the beginning of each cooling season. Remove any debris. Clean the outdoor coil and louvers as necessary using a mild detergent and water. Rinse thoroughly with water.
- Inspect the electrical connections for tightness at the beginning of each heating and cooling season. Service as necessary.

⚠ CAUTION:

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

RECOMMENDED EXTERNAL FILTER SIZES

Nominal Cooling (Tonnage)	Filter Size (in. x in.)	Approximate Air Flow Range (CFM)	Approximate Filter Area (sq. in.)*
2.0	20 x 25	600-900	480
2.5	25 x 25	750-1125	600
3.0	25 x 25	900-1350	600
3.5	20 x 25 (2 required)	1050-1575	960
4.0	20 x 25 (2 required)	1200-1700	960
5.0	20 x 25 (2 required)	1500-2000	960

*Based on velocity of 300ft/min for disposable filters.

Table 1. Recommended External Filter Sizes

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

FIGURES & TABLES

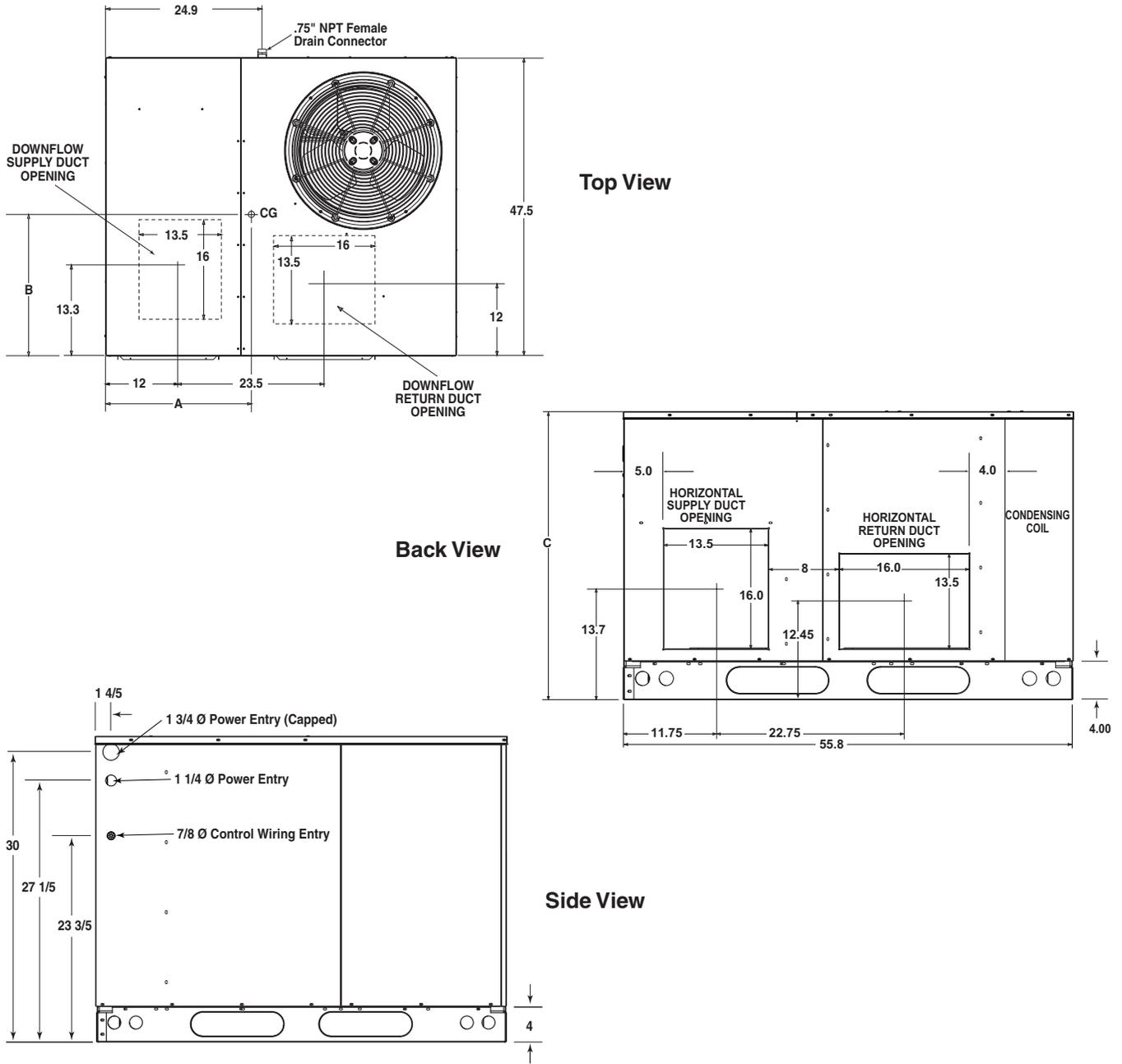
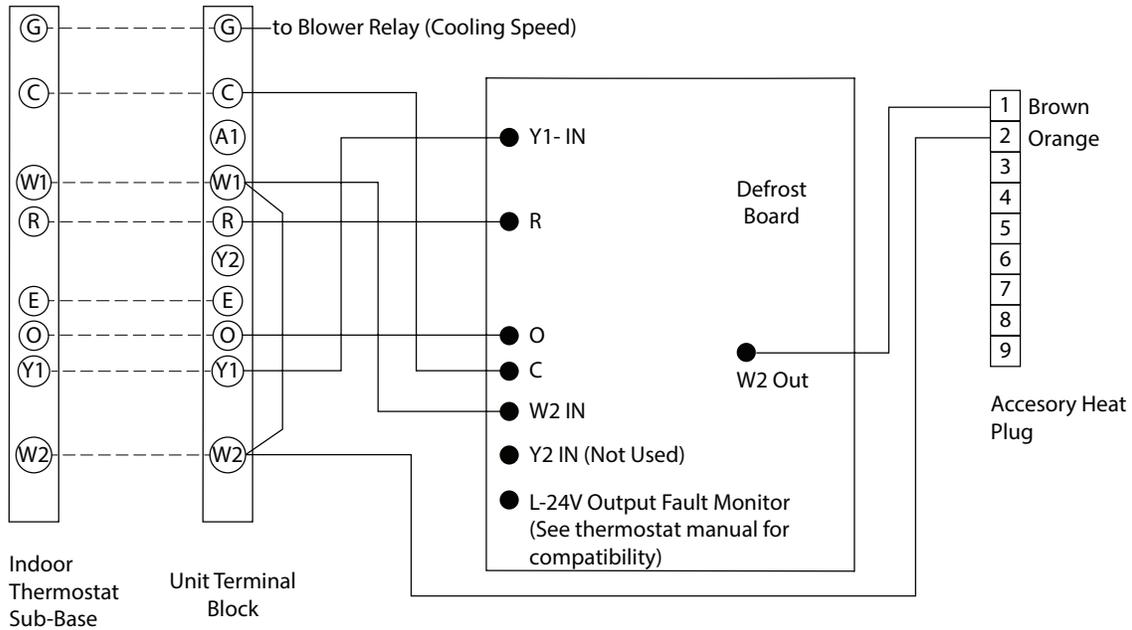


Figure 7. Q104SD Heat pump Dimensions

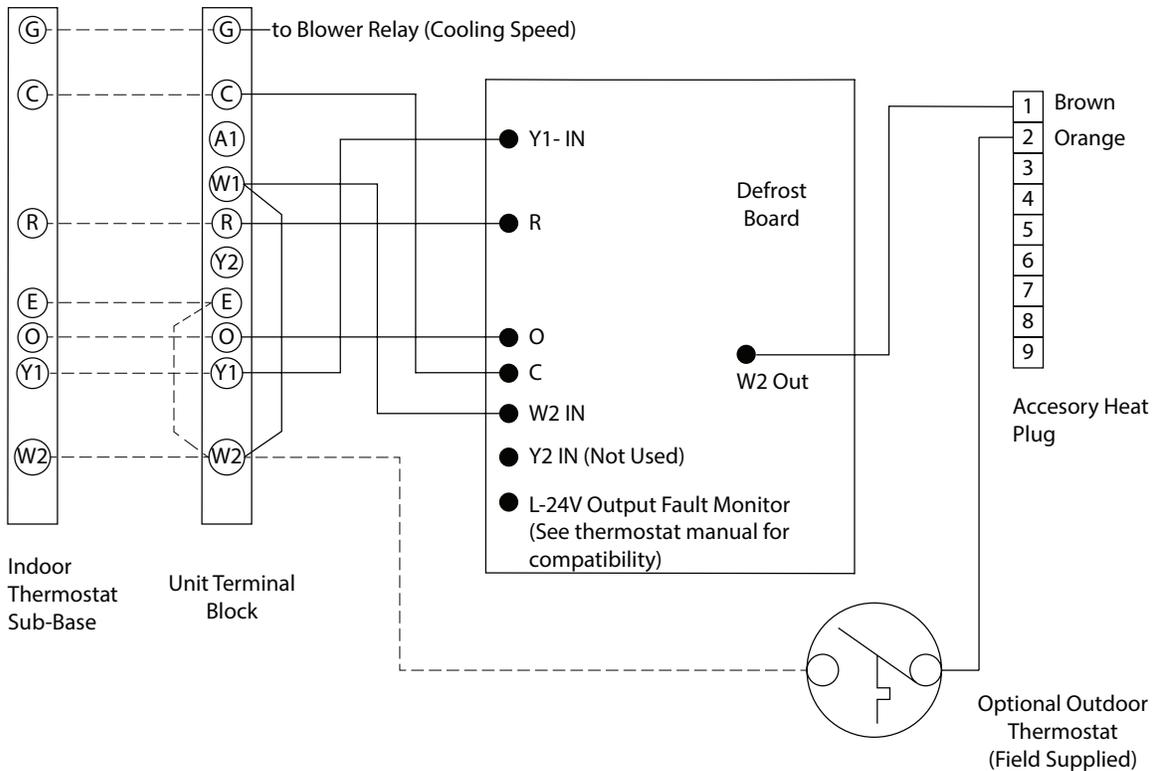
MODEL NUMBER Q104SD-	UNIT WEIGHT (WITH PACKAGING)	CENTER OF GRAVITY		HEIGHT -C- (IN INCHES)	
		-A-	-B-	WITH BASE RAILS	WITHOUT BASE RAILS
X24K	410	28.0	25.5	39.0	35.3
X30K	410	28.0	26.0	39.0	35.3
X36K	442	28.0	25.5	39.0	35.3
X42K	507	29.5	26.0	43.0	39.3
X48K	522	29.5	26.0	43.0	39.3
X60K	530	29.5	26.0	43.0	39.3

Table 2. Center of Gravity & Unit Shipping Weights

Electrical Information



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



Typical Wiring (Field Supplied) for 1-Stage Cool, 2-Stage Electric Heat with an Optional Outdoor Thermostat

Figure 8. Typical Heat Pump Thermostat Connections 208V / 230V

WIRING DIAGRAM

Convertible Packaged Heat Pump

- NOTES:**
1. Disconnect all power before servicing.
 2. For supply connections use copper conductors only.
 3. Not suitable on systems that exceed 150V to ground.
 4. If any of the original wire as supplied with the furnace must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C.
 5. For supply wire ampacities overcurrent protection, see unit rating plate.
 6. For HUD installations only. See installation instructions in the branding kit.

208/230 Volt Single Phase 60Hz

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

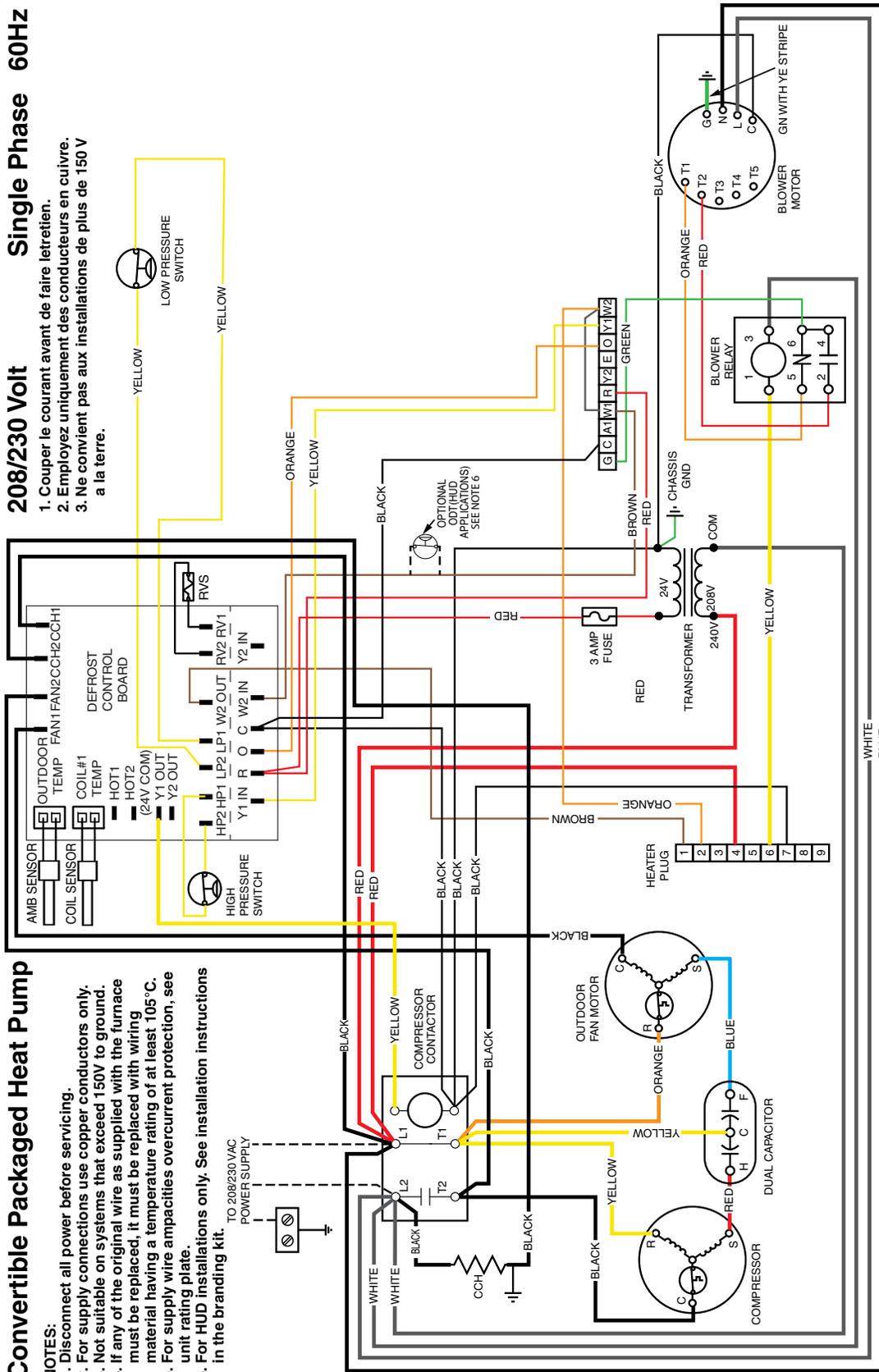


Figure 9. Wiring Diagram for 208/230V Units

Charging Charts - Cooling

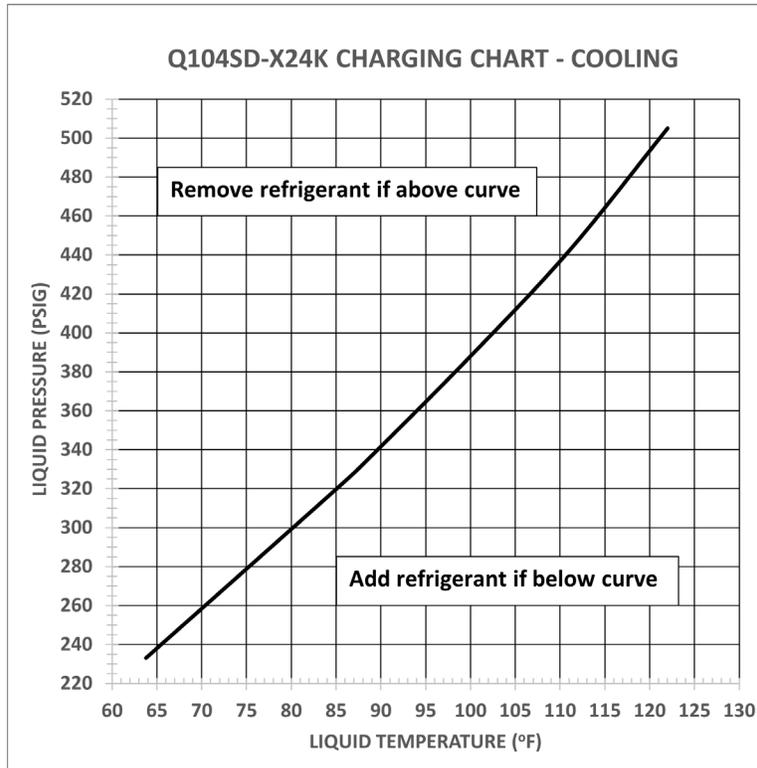


Figure 10. Charging Chart for 2 Ton Units

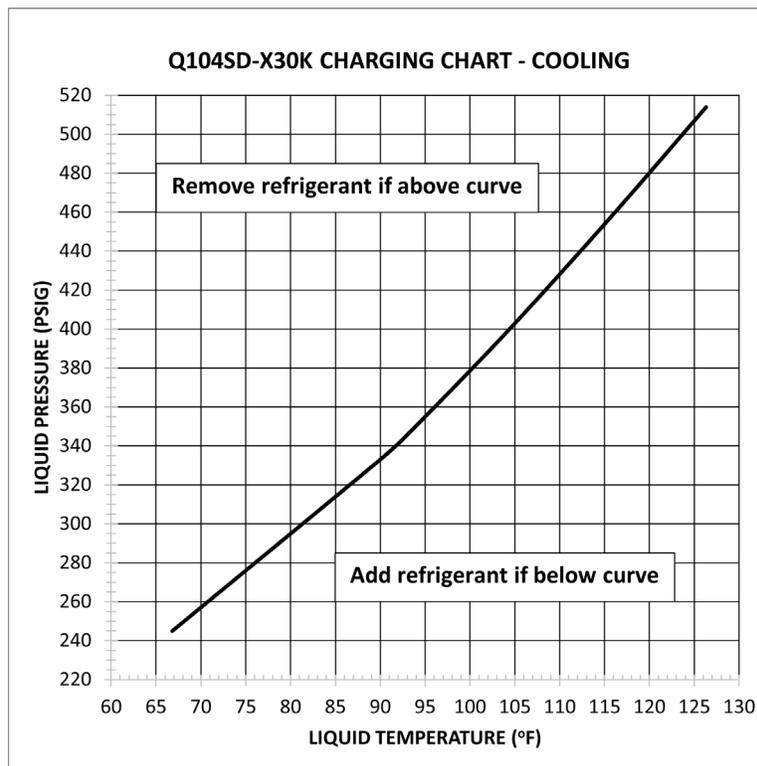


Figure 11. Charging Chart for 2.5 Ton Units

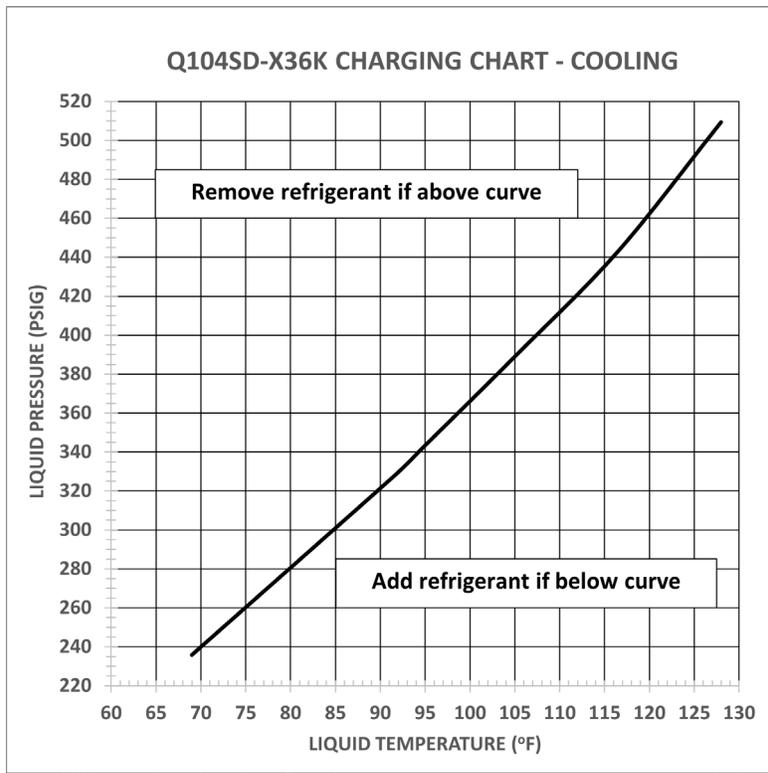


Figure 12. Charging Chart for 3 Ton Units

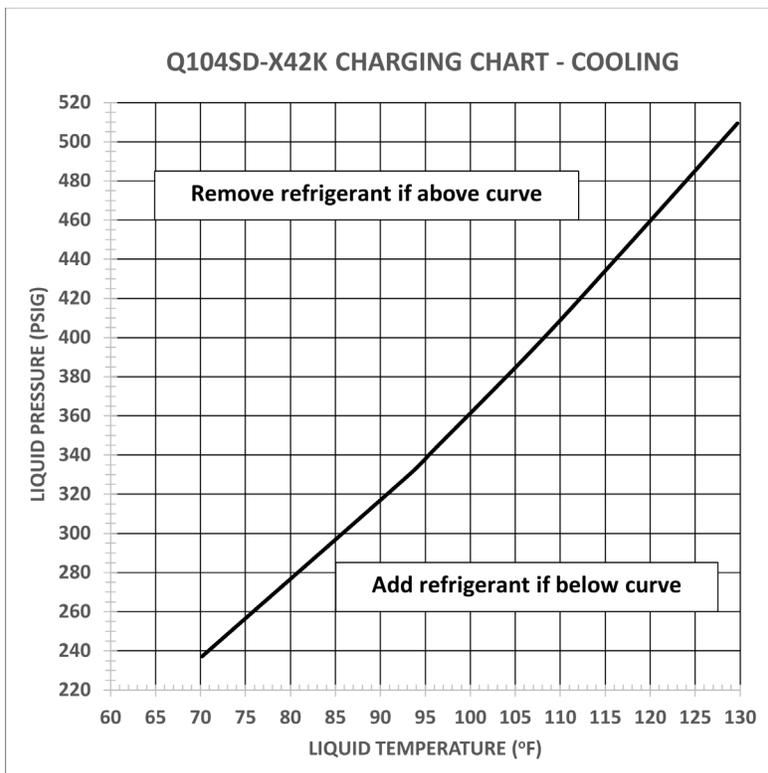


Figure 13. Charging Chart for 3.5 Ton Units

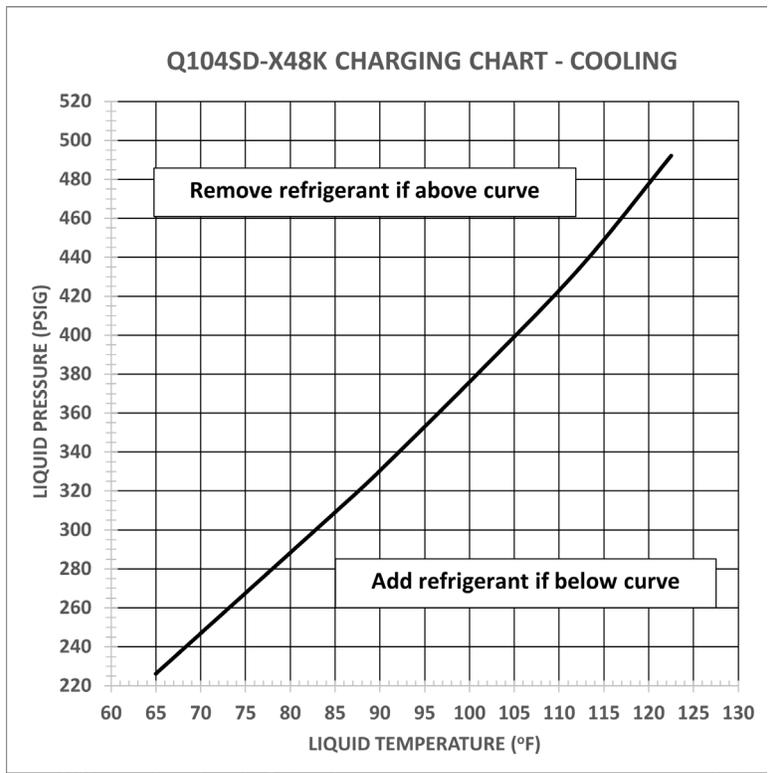


Figure 14. Charging Chart for 4 Ton Units

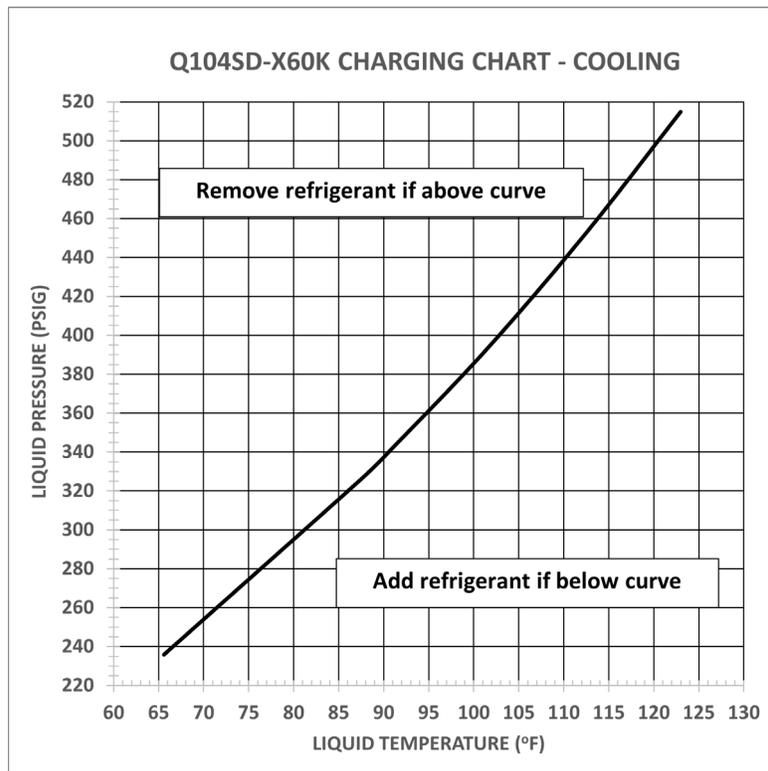


Figure 15. Charging Chart for 5 Ton Units

Airflow Data

MODEL NUMBER Q104SD-	TAP	EXTERNAL STATIC PRESSURE DROP - INCHES WATER COLUMN															
		0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
X24K	Tap T1	825	38.4	785	40.3	710	44.4	645	48.9	580	54.5	510	62.0	435	72.5	-	-
	Tap T2	970	32.6	925	34.2	865	36.5	800	39.5	715	44.1	650	48.5	590	53.5	520	60.5
	Tap T3*	1070	29.6	1010	31.3	945	33.4	905	34.9	815	38.8	745	42.5	675	46.9	615	51.2
	Tap T4**	1190	26.6	1140	27.7	1070	29.6	1020	30.9	955	33.1	860	36.7	805	39.3	765	41.4
	Tap T5	1330	23.8	1275	24.8	1220	25.9	1165	27.1	1105	28.6	1045	30.3	955	33.0	880	35.9
X30K	Tap T1	890	35.5	830	38.0	765	41.3	685	46.0	625	50.6	575	54.9	500	62.9	420	75.4
	Tap T2*	970	32.6	925	34.2	865	36.5	800	39.5	715	44.1	650	48.5	590	53.5	520	60.5
	Tap T3**	1190	26.6	1140	27.7	1070	29.6	1020	30.9	955	33.1	860	36.7	805	39.3	765	41.4
	Tap T4	1380	22.9	1335	23.7	1275	24.8	1220	25.9	1165	27.1	1095	28.8	1020	31.0	945	33.4
	Tap T5	1640	19.3	1605	19.7	1545	20.4	1490	21.2	1435	22.0	1380	22.9	1325	23.9	1250	25.3
X36K	Tap T1	1135	27.8	1075	29.4	1010	31.2	950	33.3	865	36.6	770	41.0	695	45.5	620	51.0
	Tap T2**	1240	25.4	1185	26.6	1130	28.0	1055	29.9	995	31.8	920	34.3	825	38.2	755	41.9
	Tap T3*	1420	22.3	1370	23.1	1310	24.2	1250	25.3	1205	26.2	1125	28.1	1065	29.7	975	32.4
	Tap T4	1630	19.4	1590	19.9	1530	20.7	1465	21.6	1410	22.4	1345	23.5	1270	24.9	1195	26.4
	Tap T5	1700	18.6	1660	19.1	1595	19.8	1535	20.6	1480	21.3	1420	22.2	1360	23.3	1280	24.7
X42K	Tap T1**	1260	25.1	1200	26.4	1135	27.9	1070	29.5	980	32.2	905	34.9	830	38.1	760	41.5
	Tap T2	1375	23.0	1330	23.7	1270	24.9	1220	25.9	1155	27.4	1075	29.3	970	32.5	900	35.1
	Tap T3*	1575	20.1	1520	20.8	1470	21.5	1420	22.3	1355	23.3	1295	24.4	1215	26.0	1095	28.9
	Tap T4	1655	19.1	1600	19.8	1555	20.3	1500	21.1	1445	21.9	1380	22.9	1315	24.0	1215	26.0
	Tap T5	1850	17.1	1795	17.6	1740	18.2	1710	18.5	1640	19.3	1595	19.8	1540	20.5	1475	21.4
X48K	Tap T1	950	33.2	900	35.1	865	36.6	730	43.4	670	47.0	585	54.2	510	62.2	-	-
	Tap T2**	1645	19.2	1595	19.8	1520	20.8	1475	21.4	1415	22.3	1350	23.4	1265	25.0	1200	26.4
	Tap T3*	1765	17.9	1705	18.5	1625	19.4	1570	20.1	1525	20.7	1450	21.8	1405	22.5	1305	24.2
	Tap T4	1995	15.8	1945	16.2	1875	16.8	1790	17.6	1725	18.3	1660	19.0	1610	19.6	1550	20.4
	Tap T5	2390	13.2	2335	13.5	2300	13.7	2240	14.1	2180	14.5	2130	14.8	2075	15.2	2015	15.7
X60K	Tap T1	1090	29.0	1030	30.6	960	33.0	880	36.0	790	40.0	715	44.2	640	49.3	570	55.4
	Tap T2**	1765	17.9	1705	18.5	1625	19.4	1570	20.1	1525	20.7	1450	21.8	1405	22.5	1305	24.2
	Tap T3*	2000	15.8	1945	16.2	1890	16.7	1835	17.2	1785	17.7	1735	18.2	1690	18.7	1635	19.3
	Tap T4	2235	14.1	2180	14.5	2125	14.9	2075	15.2	2035	15.5	1985	15.9	1940	16.3	1895	16.7
	Tap T5	2390	13.2	2335	13.5	2300	13.7	2240	14.1	2180	14.5	2130	14.8	2075	15.2	2015	15.7

Notes:

1. * Denotes factory set cooling speed
2. ** Denotes factory set electric heating speed
3. Heat rise calculated based on 10KW of electric heat using formula (KW x 3413)/1.08/CFM
4. Temperature rises in tables are approximate. Actual temperature rises may vary.
5. Shaded areas are not approved for proper electric heat operation above 40F rise.
6. Deduct approximately 3% from airflow shown for 208V applications.

Table 3. Q104SD Airflow Data

STATUS INDICATOR	STATUS TYPE	DIAGNOSTIC DESCRIPTION
Ⓒ	Operating Status	Cooling, 1st Stage
Ⓗ	Operating Status	Heating, 1st Stage
Ⓔ	Operating Status	Anti Short Cycle Timer
Ⓓ	Operating Status	Defrost
..	Operating Status	Power on, no call for operation
Ⓖ	Fault	Pressure Switch, low
Ⓖ	Fault	Pressure Switch, high
Ⓖ	Fault	Temperature Sensor, Ambient
Ⓖ	Fault	Temperature Sensor, Coil
Ⓖ	Fault	Board
Ⓓ (flashing)	Input Error	Forced defrost - test short applied longer than 11 minutes

Table 4. Control Board Status Indicators

INSTALLATION CHECKLIST

INSTALLATION ADDRESS:		
CITY:	STATE:	
UNIT MODEL #:		
UNIT SERIAL #:		
Unit Installed Minimum clearances per Figure 2 (page 6)	YES	NO
INSTALLER NAME:		
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

FILTER SYSTEM		
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO

PROPOSITION 65 WARNING:

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

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

REFRIGERATION SYSTEM		
Was unit given 24 hr warm up period for crankcase heaters (if applicable)?	YES	NO
Stage-1 Liquid Pressure:	HIGH SIDE:	
Stage-1 Suction Pressure:	LOW SIDE:	

ELECTRICAL SYSTEM		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Rated Voltage:	VOLTS:	
L1-L2 Volts:	VOLTS:	
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
Is the heat anticipator setting correct?	YES	NO

INSTALLER: PLEASE LEAVE THESE INSTRUCTIONS WITH THE OWNER.

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:

- Ambient Sensor
- Capacitors
- Coil Sensor
- Compressors
- Contactors
- Pressure Switches
- Relays
- Transformers

MOTORS:

- Blower Motor
- Fan Motor

COMPONENTS:

- Blower Assembly
- Cabinet Panels
- Expansion Valves
- Fan Grille
- Filter/Driers

