

# INSTALLATION INSTRUCTIONS

## ⚠️ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier

## ⚠️ CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

### Table Of Contents

|  |         |
|--|---------|
| Dimensions .....                       | Page 2  |
| Parts Arrangements .....               | Page 3  |
| Shipping and Packing List .....        | Page 4  |
| General .....                          | Page 4  |
| Safety .....                           | Page 4  |
| Unit Support .....                     | Page 5  |
| Duct Connection .....                  | Page 6  |
| Rigging Unit For Lifting .....         | Page 6  |
| Condensate Drains .....                | Page 6  |
| Connect Gas Piping .....               | Page 8  |
| Pressure Test Gas Piping .....         | Page 9  |
| High Altitude Derate .....             | Page 9  |
| Electrical Connections .....           | Page 9  |
| Unit Power-Up .....                    | Page 11 |
| Blower Operation and Adjustments ..... | Page 11 |

|                   |              |
|-------------------|--------------|
| <b>KGC/KCC092</b> | (7.5 Ton)    |
| <b>KGC/KCC102</b> | (8.5 Ton)    |
| <b>KGC/KCC120</b> | (10 Ton)     |
| <b>KGC/KCC150</b> | (12-1/2 Ton) |

**GAS AND COOLING PACKAGED UNITS**  
 507118-13  
 8/2022  
 Supersedes 507118-12

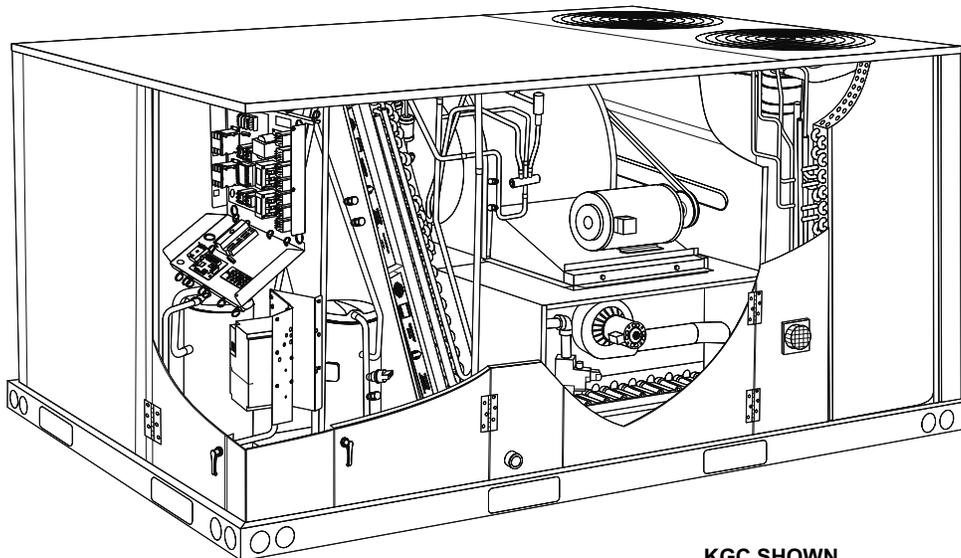
|   |         |
|---|---------|
| Cooling Start-Up .....                      | Page 18 |
| Gas Heat Start-Up .....                     | Page 26 |
| Heating Operation and Adjustments .....     | Page 27 |
| Electric Heat Start-Up .....                | Page 27 |
| Supply Air Inverter Start-Up .....          | Page 28 |
| Hot Gas Reheat Operation and Start-Up ..... | Page 31 |
| Service .....                               | Page 32 |

## ⚠️ WARNING

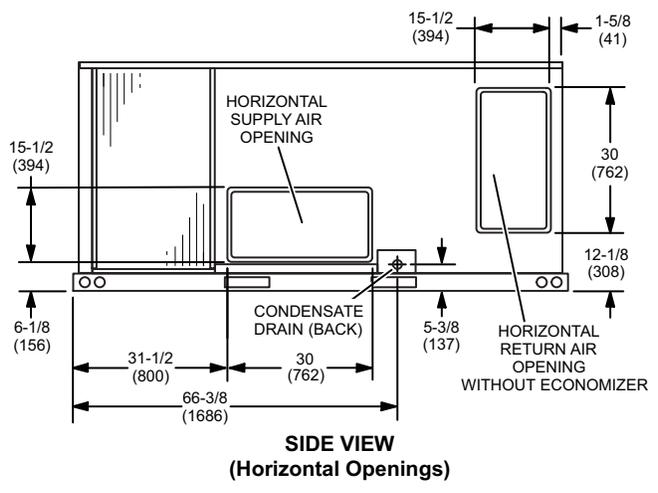
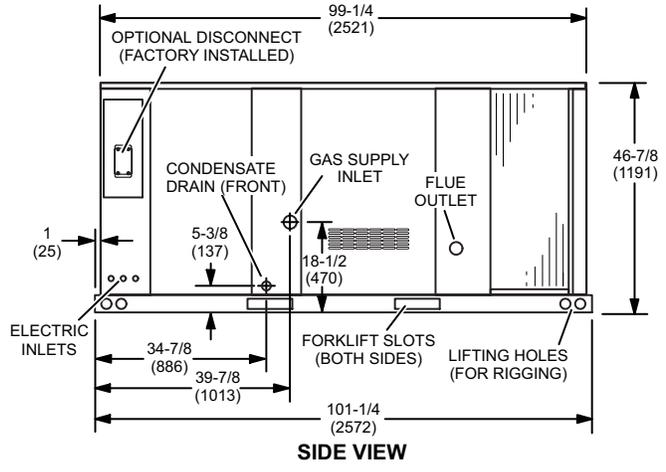
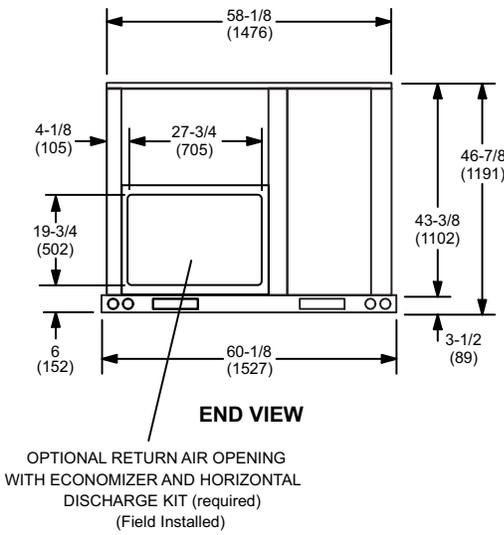
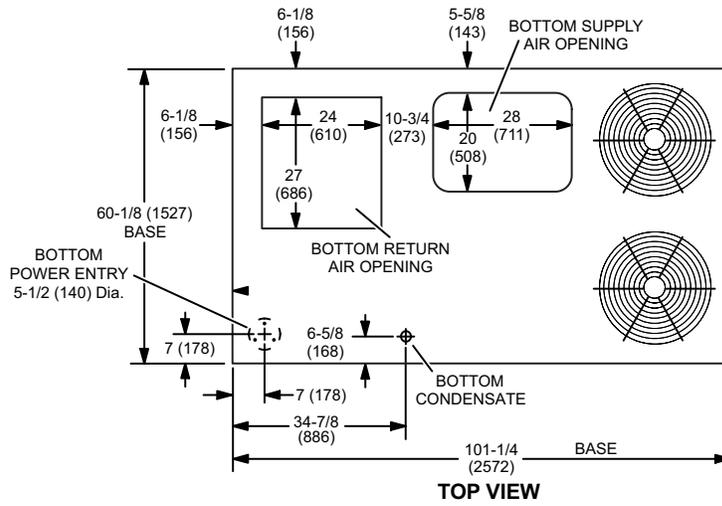
To prevent serious injury or death:

- 1- Lock-out/tag-out before performing maintenance.
- 2- If system power is required (e.g., smoke detector maintenance), disable power to blower, remove fan belt where applicable, and ensure all controllers and thermostats are set to the "OFF" position before performing maintenance.
- 3- Always keep hands, hair, clothing, jewelry, tools, etc., away from moving parts.

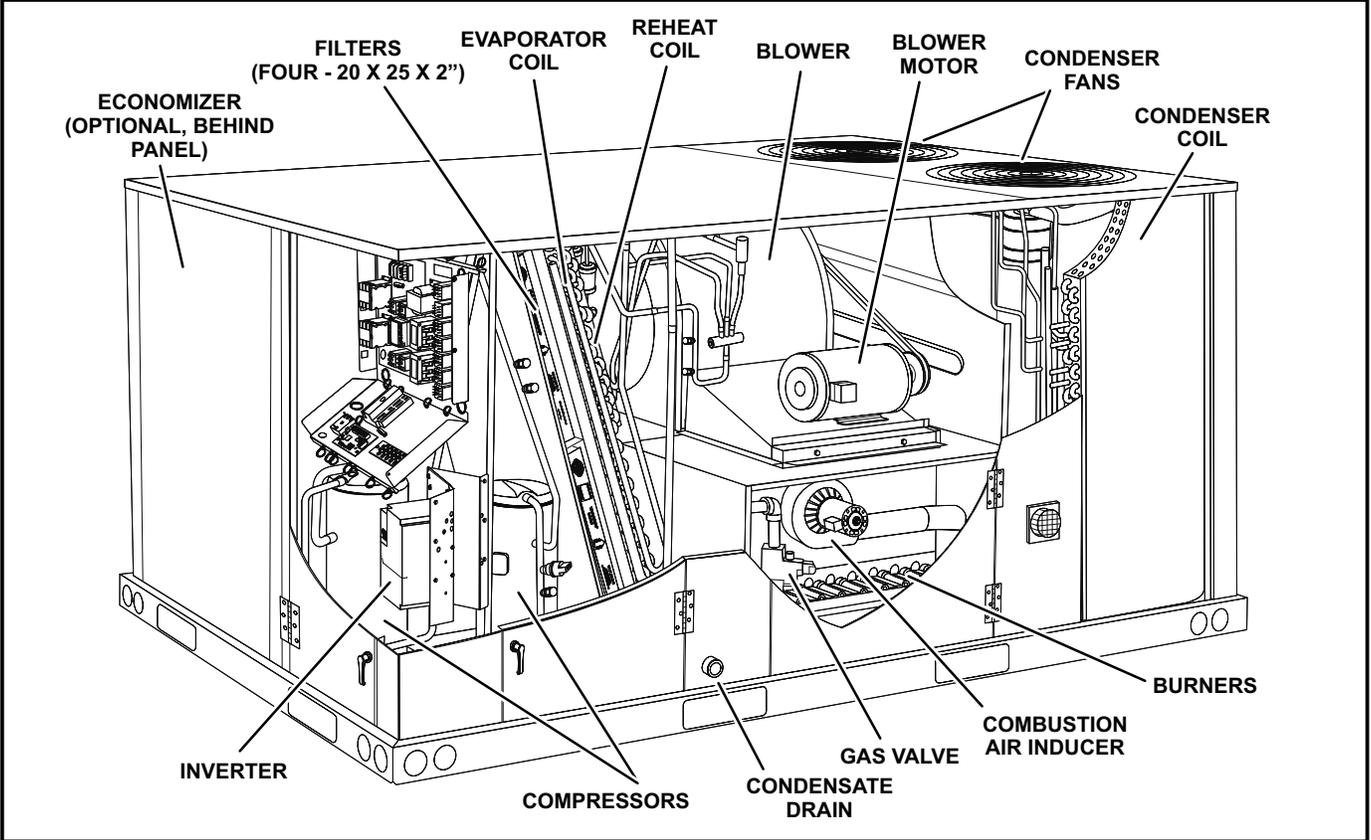
**RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE**



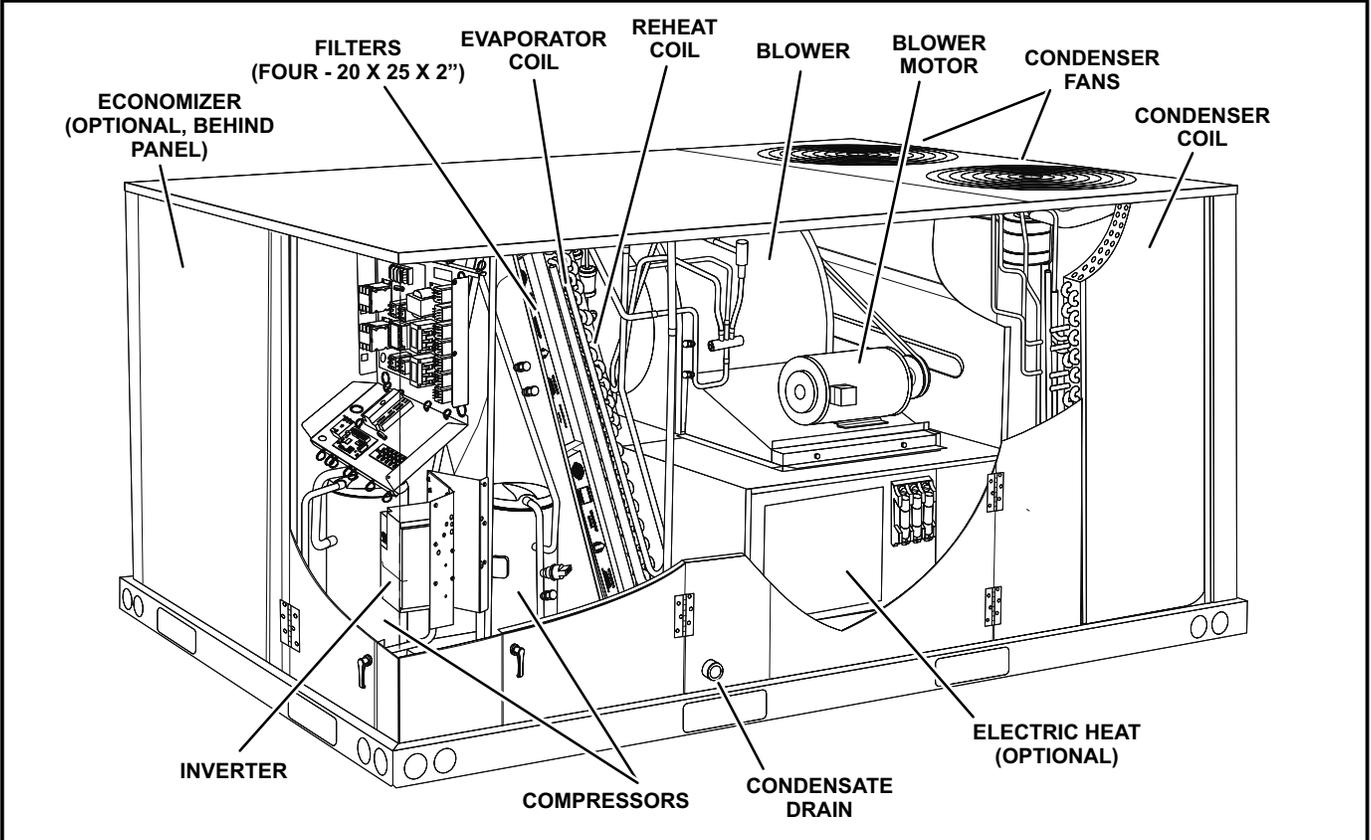
**KG/KC 092, 102, 120, & 150 DIMENSIONS - Gas heat section shown**



**KG 092, 102, 120, & 150 PARTS ARRANGEMENT**



**KC 092, 102, 120, & 150 PARTS ARRANGEMENT**



## Shipping and Packing List

### Package 1 of 1 contains:

1- Assembled unit

Check unit for shipping damage. Receiving party should contact last carrier immediately if shipping damage is found.

## General

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation.

The KG units are available in three heating inputs. The KC cooling packaged rooftop unit is the same basic design as the KG unit except for the heating section. Optional electric heat is available for KC units. KG and KC units have identical refrigerant circuits with respective 7-1/2, 8-1/2, 10, and 12-1/2 ton cooling capacities.

Units are equipped with a two-speed compressor on stage 1 and a fixed-speed compressor on stage 2, allowing for 3 stages of cooling.

Units are equipped with a supply air inverter (variable frequency drive or VFD). The blower will operate at lower speeds when demand is low and increase to higher speeds when demand is high. Refer to Inverter Start-Up section.

Units come default with a lightweight, all-aluminum condenser coil. Units are available with an optional, factory-installed fin/tube condenser coil.

Units equipped with optional fin/tube outdoor coils are available with an optional hot gas reheat coil which provides a dehumidifying mode of operation. Refer to Reheat Operation section.

Availability of units and options varies by brand.

## Safety

See figure 1 for unit clearances.

Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

## ⚠️ IMPORTANT

**The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.**

## ⚠️ WARNING



**Electric shock hazard and danger of explosion. Can cause injury, death or product or property damage. Turn off gas and electrical power to unit before performing any maintenance or servicing operations on the unit. Follow lighting instructions attached to unit when putting unit back into operation and after service or maintenance.**

## ⚠️ NOTICE

### Roof Damage!

**This system contains both refrigerant and oil. Some rubber roofing material may absorb oil, causing the rubber to swell. Bubbles in the rubber roofing material can cause leaks. Protect the roof surface to avoid exposure to refrigerant and oil during service and installation. Failure to follow this notice could result in damage to roof surface.**

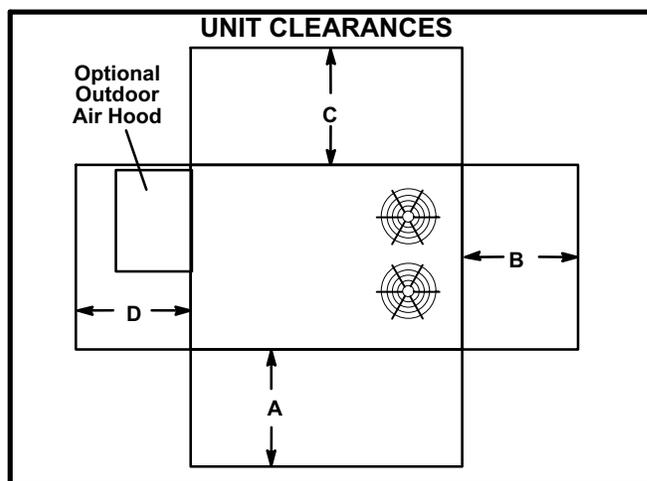


FIGURE 1

| <sup>1</sup> Unit Clearance      | A<br>in.(mm) | B<br>in.(mm) | C<br>in.(mm) | D<br>in.(mm) | Top<br>Clearance  |
|----------------------------------|--------------|--------------|--------------|--------------|-------------------|
| Service Clearance                | 60<br>(1524) | 36<br>(914)  | 36<br>(914)  | 60<br>(914)  | Unob-<br>structed |
| Clearance to<br>Combustibles     | 36<br>(914)  | 1<br>(25)    | 1<br>(25)    | 1<br>(25)    | Unob-<br>structed |
| Minimum Opera-<br>tion Clearance | 36<br>(914)  | 36<br>(914)  | 36<br>(914)  | 36<br>(914)  | Unob-<br>structed |

Note - Entire perimeter of unit base requires support when elevated above mounting surface.

<sup>1</sup> **Service Clearance** - Required for removal of serviceable parts.

**Clearance to Combustibles** - Required clearance to combustible material (gas units). On KCC units, see clearance to combustible materials as outlined on heater rating plate.

**Minimum Operation Clearance** - Required clearance for proper unit operation.

If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

This appliance is not to be used by persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.

This appliance should not be used by children. Children should be supervised to ensure they do not play with the appliance.

### **Unit Support**

In downflow discharge installations, install the unit on a non-combustible surface only. Unit may be installed on combustible surfaces when used in horizontal discharge applications or in downflow discharge applications when installed on an C1CURB roof mounting frame.

*NOTE - Securely fasten roof frame to roof per local codes.*

|   |
|---|
| <b>⚠ CAUTION</b>  |
| <b>To reduce the likelihood of supply / return air bypass and promote a proper seal with the RTU, duct work / duct drops / diffuser assemblies must be supported independently to the building structure.</b> |

## **A-Downflow Discharge Application**

### **Roof Mounting with C1CURB**

Make sure the cap over the unit bottom drain hole is secure.

- 1- The C1CURB roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The C1CURB roof mounting frame should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.
- 3- Duct must be attached to the roof mounting frame and not to the unit; supply and return plenums must be installed before setting the unit.

### **Installer's Roof Mounting Frame**

Many types of roof frames can be used to install the unit depending upon different roof structures. Items to keep in mind when using the building frame or supports are:

- 1- The base is fully enclosed and insulated, so an enclosed frame is not required.
- 2- The frames or supports must be constructed with non-combustible materials and should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.
- 3- Frame or supports must be high enough to prevent any form of moisture from entering unit. Recommended minimum frame height is 14" (356mm).
- 4- Duct must be attached to the roof mounting frame and not to the unit. Supply and return plenums must be installed before setting the unit.
- 5- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

*NOTE-When installing a unit on a combustible surface for downflow discharge applications, an C1CURB roof mounting frame is required.*

## **B-Horizontal Discharge Applications**

- 1- Units installed in horizontal airflow applications must use a horizontal conversion kit (K1HECK00).
- 2- Specified installation clearances must be maintained when installing units. Refer to figure 1.
- 3- Top of support slab should be approximately 4" (102mm) above the finished grade and located so no run-off water from higher ground can collect around the unit.
- 4- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

## Duct Connection

All exterior ducts, joints and openings in roof or building walls must be insulated and weather-proofed with flashing and sealing compounds in accordance with applicable codes. Any duct passing through an unconditioned space must be insulated.

## ⚠ CAUTION

**In downflow applications, do not drill or punch holes in base of unit. Leaking in roof may occur if unit base is punctured.**

## Rigging Unit For Lifting

Rig unit for lifting by attaching four cables to holes in unit base rail. See figure 2.

- 1- Detach wooden base protection before rigging.
- 2- Connect rigging to the unit base using both holes in each corner.
- 3- All panels must be in place for rigging.
- 4- Place field-provided H-style pick in place just above top edge of unit. Frame must be of adequate strength and length. (H-style pick prevents damage to unit.)

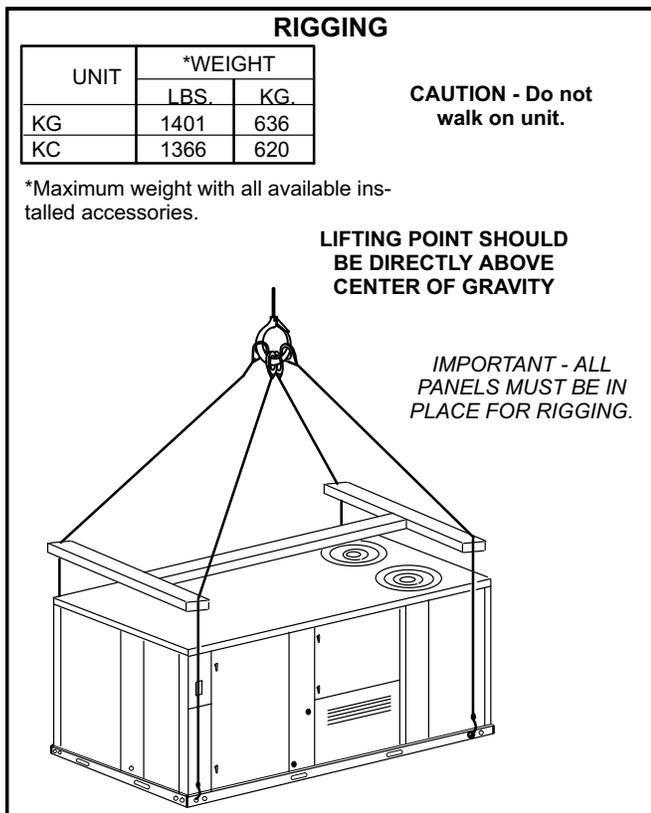


FIGURE 2

## Condensate Drains

Make drain connection to the 1" N.P.T. drain coupling provided on unit.

*Note - The drain pan is made with a glass reinforced engineered plastic capable of withstanding typical joint torque but can be damaged with excessive force. Tighten pipe nipple hand tight and turn an additional quarter turn.*

A trap must be installed between drain connection and an open vent for proper condensate removal. See figure 3 or 4. It is sometimes acceptable to drain condensate onto the roof or grade; however, a tee should be fitted to the trap to direct condensate downward. The condensate line must be vented. Check local codes concerning condensate disposal. Refer to pages 2 and 3 for condensate drain location.

Units are shipped with the drain coupling facing the front of the unit. Condensate can be drained from the back or bottom of the unit with the following modifications. The unit can be installed in either downflow or horizontal air discharge regardless of condensate drain location.

### Rear Drain Connection

- 1- Remove heat access door. See figure 5.
- 2- Remove filter access door.
- 3- Remove eight screws holding condensate drain mullion and remove mullion.
- 4- Lift front edge of the drain pan (to clear bottom drain plug) and slide drain pan out of unit. See figure 6.
- 5- Make sure the cap over the unit bottom drain hole is secure.
- 6- Rotate the drain pan until the downward slope is toward the back of the unit. Slide the drain pan back into the unit. Be careful not to dislodge the cap over the bottom drain hole.

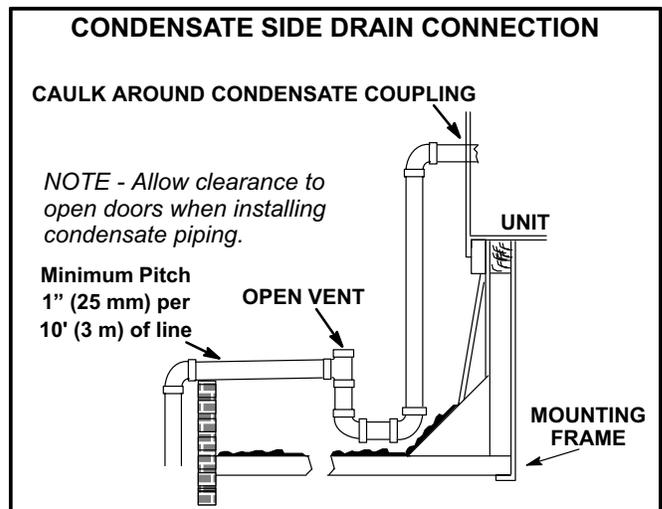
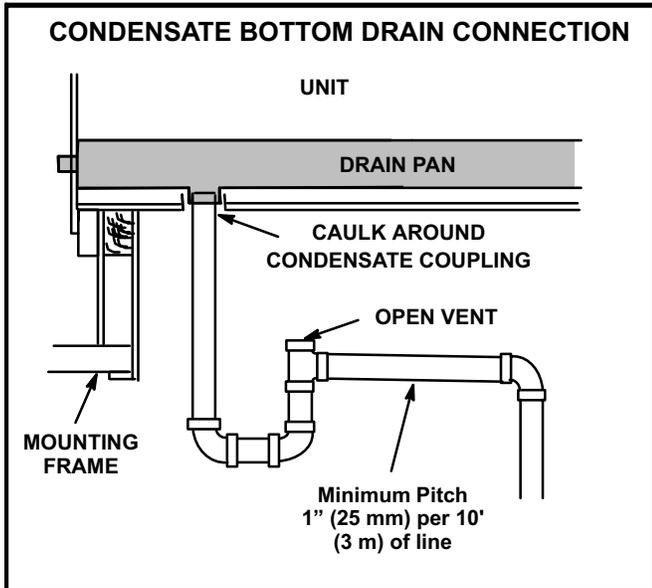
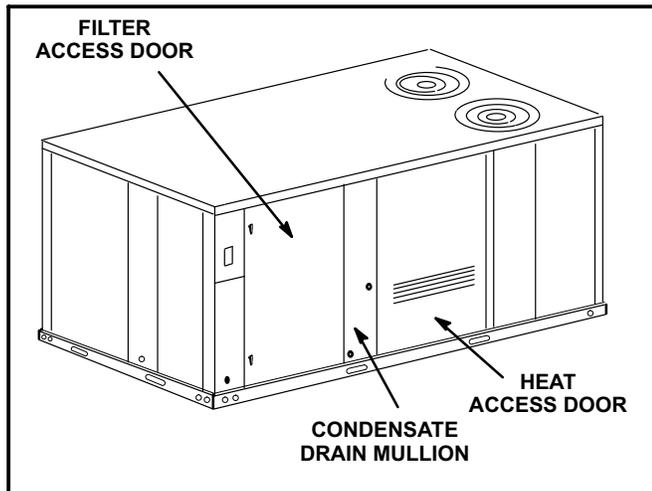


FIGURE 3

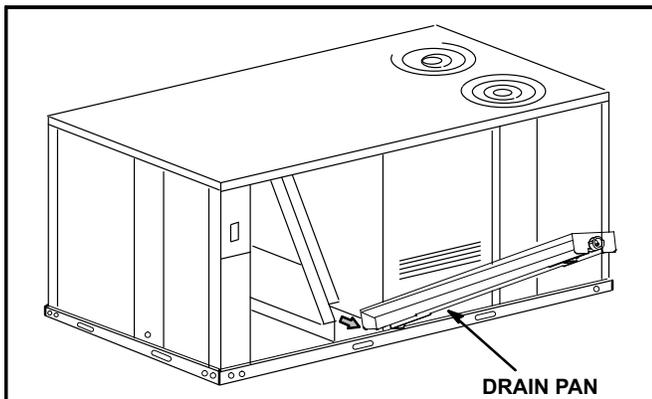
- 7- From the back side of the unit, pull the drain pan coupling through the rear condensate opening.
- 8- Replace the condensate drain mullion and reinstall eight screws.
- 9- Reinstall access doors.



**FIGURE 4**



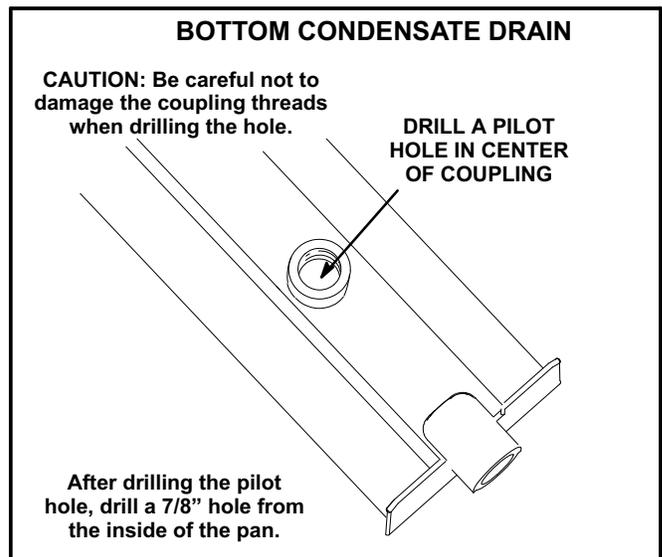
**FIGURE 5**



**FIGURE 6**

**Bottom Drain Connection**

- 1- Remove heat access door. See figure 5.
- 2- Remove filter access door.
- 3- Remove eight screws holding condensate drain mullion and remove mullion.
- 4- Lift front edge of the drain pan (to clear bottom drain plug) and slide drain pan out of unit. See figure 6.
- 5- Turn the drain pan upside down and drill a pilot hole through the bottom of the drain pan in the center of the coupling. See figure 7.
- 6- From the inside of the pan, use a Vari-Bit® bit to enlarge the hole to 7/8". Do not damage coupling threads.
- 7- Remove the cap over the unit bottom drain hole.
- 8- Slide the drain pan back into the unit.
- 9- From the back side of the unit, pull the drain pan coupling through the rear condensate opening.
- 10- From the front side of the unit, move the drain pan until the bottom coupling settles into the unit bottom drain opening. Once in place, check to make sure the coupling is still positioned through the rear condensate drain hole.
- 11- Use a field-provided 1" plug to seal side drain connection.
- 12- Replace the condensate drain mullion and reinstall eight screws.
- 13- Reinstall access doors.



**FIGURE 7**

## Connect Gas Piping (Gas Units)

Before connecting field-provided piping, check with gas company or authorities having jurisdiction for local code requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5" w.c. (.12kPa) maximum pressure drop. Do not use supply pipe smaller than unit gas connection. For natural gas units, operating pressure at the unit gas connection must be a minimum of 4.7" w.c. (1.19kPa) and a maximum of 10.5" (2.60kPa) w.c. For LP/propane gas units, operating pressure at the unit gas connection must be a minimum of 11" w.c. (2.74kPa) and a maximum of 13.0" w.c. (3.23kPa).

When making piping connections a drip leg should be installed on vertical pipe runs to serve as a trap for sediment or condensate. A 1/8" N.P.T. plugged tap is located on gas valve for test gauge connection. Refer to Heating Start-Up section for tap location. Install a ground joint union between the gas control manifold and the main manual shut-off valve. See figure 8 for gas supply piping entering outside the unit. Figure 9 shows bottom gas entry piping through the curb. Figure 10 shows bottom gas entry piping through the unit.

Compounds used on threaded joints of gas piping shall be resistant to the action of liquified petroleum gases.

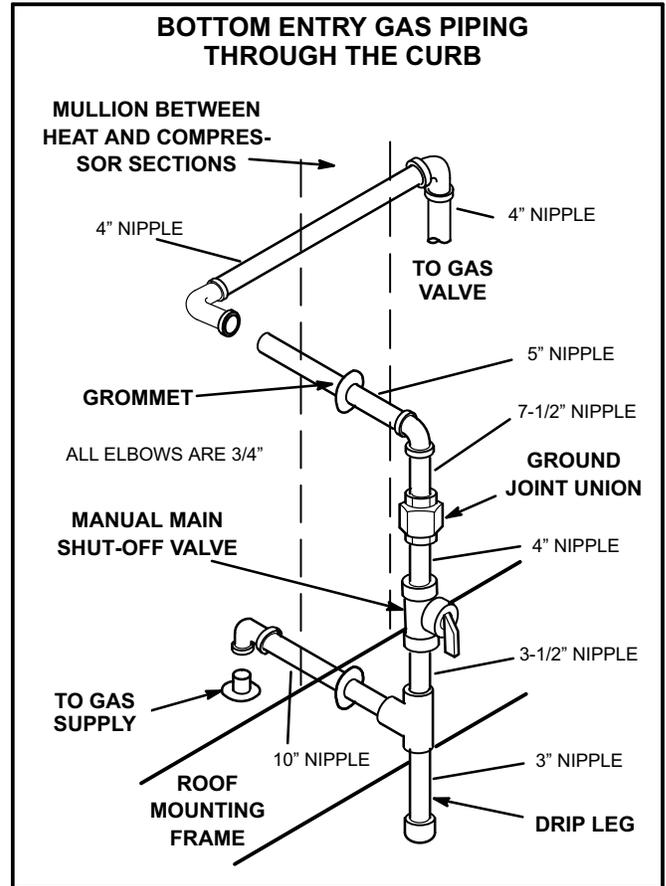


FIGURE 9

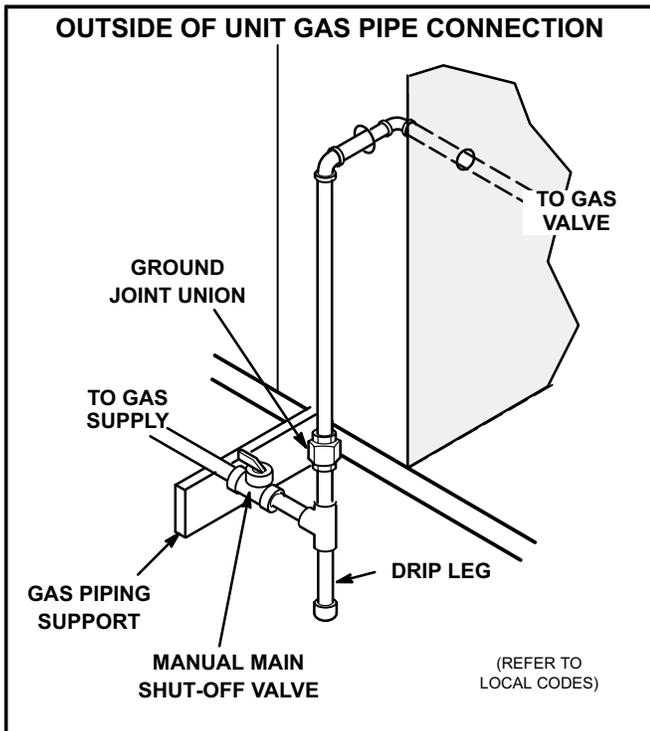


FIGURE 8

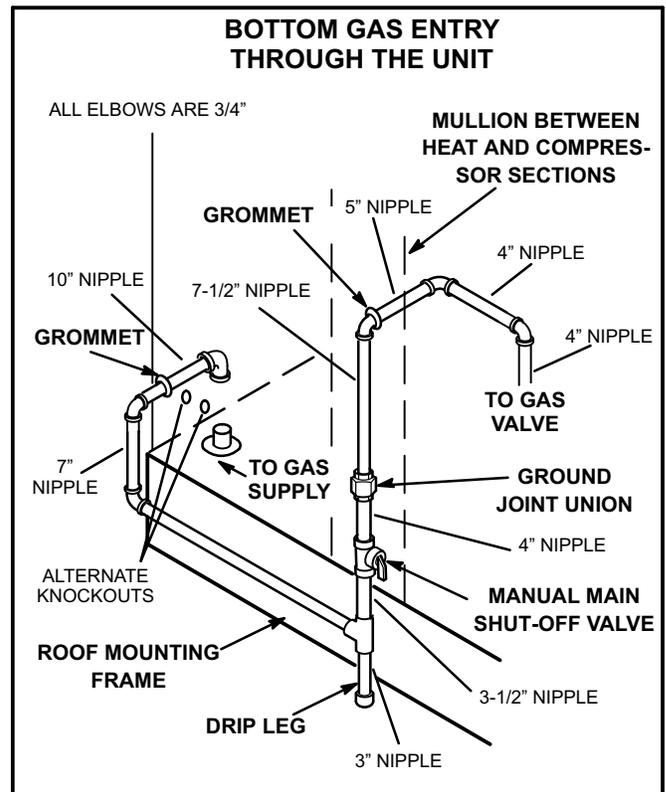


FIGURE 10

## Pressure Test Gas Piping (Gas Units)

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 11.

*NOTE-Codes may require that manual main shut-off valve and union (furnished by installer) be installed in gas line external to unit. Union must be of the ground joint type.*

After all connections have been made, check all piping connections for gas leaks. Also check existing unit gas connections up to the gas valve; loosening may occur during installation. Use a leak detection solution or other preferred means. Do not use matches candles or other sources of ignition to check for gas leaks.

### ⚠ CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or othe sources of ignition to check for gas leaks.

### ⚠ WARNING



Danger of explosion. Can cause injury or product or property damage. Do not use matches, candles, flame or other sources of ignition to check for leaks.

*NOTE-In case emergency shut down is required, turn off the main manual shut-off valve and disconnect main power to unit. These devices should be properly labeled by the installer.*

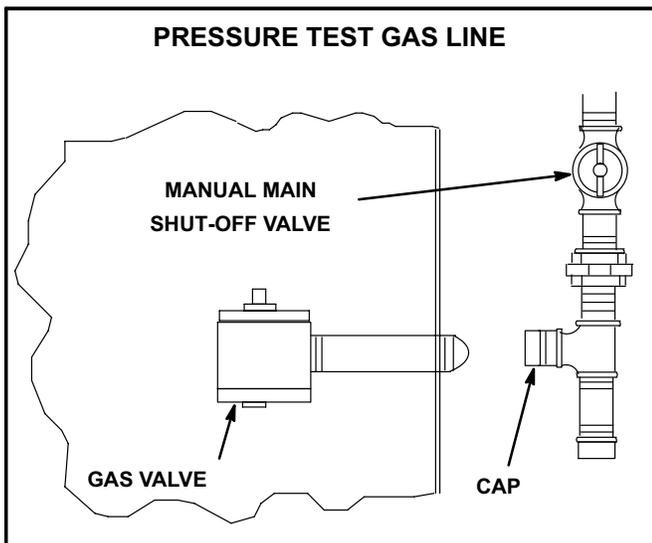


FIGURE 11

## High Altitude Derate

Locate the high altitude conversion sticker in the unit literature bag. Fill out the conversion sticker and affix next to the unit nameplate. High altitude kits are available for field-installation.

Refer to table 1 for high altitude adjustments.

**TABLE 1  
HIGH ALTITUDE DERATE**

| Altitude Ft.*                   | Gas Manifold Pressure                |
|---------------------------------|--------------------------------------|
| 2000-4500                       | See Unit Nameplate                   |
| 4500 And Above<br>65K-180KBtuh  | Derate 2% / 1000 Ft. Above Sea Level |
| 4500 And Above<br>240K-480KBtuh | Derate 4% / 1000 Ft. Above Sea Level |

\*Units installed at 0-2000 feet do not need to be modified.

*NOTE - This is the only permissible derate for these units.*

## Electrical Connections

### POWER SUPPLY

#### A-Wiring

Do not apply power or close disconnect switch until installation is complete. Refer to start-up directions. Refer closely to unit wiring diagram.

Refer to unit nameplate for minimum circuit ampacity and maximum fuse size.

- 1- 230/460/575 volt units are factory wired. **For 208V supply**, disconnect the pink wire (230V) at all control power transformer(s). Reconnect the pink wire (208V). Tape the exposed end of the 230V pink wire.
- 2- Route power through the bottom power entry area and connect to L1, L2, and L3 on the bottom of TB2 in control box for gas units or units equipped with electric heat. Route power to F4 on cooling only units (no electric heat). Route power to S48 disconnect switch when the option is factory-installed. See unit wiring diagram.
- 3- Route field wiring in field-provided conduit as shown in figure 12.
- 4- Connect separate 120v wiring to optional GFCI outlet pigtailed.

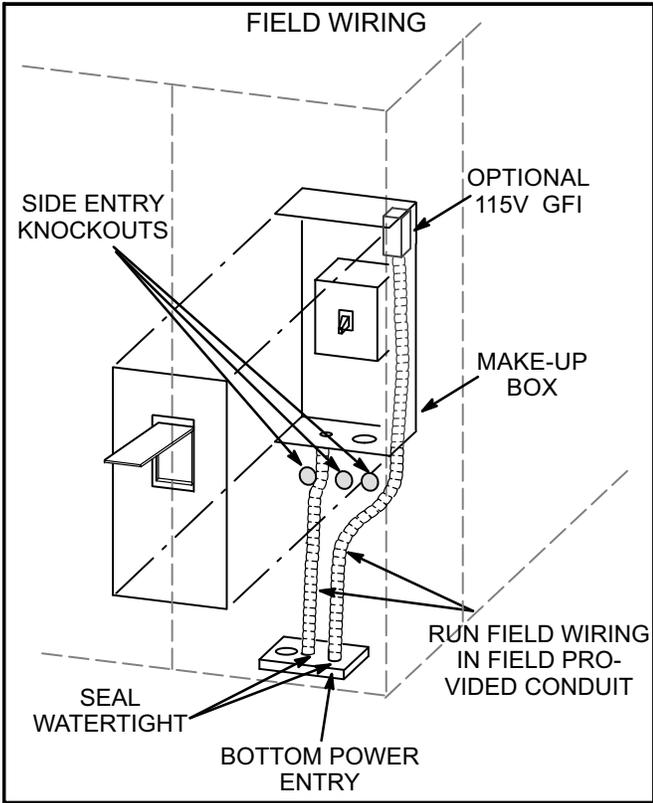
#### B-Unbalanced Three-Phase Voltage - VFD

Units are designed to operate on balanced, three-phase power. Operating units on unbalanced three-phase power will reduce the reliability of all electrical components in the unit. Unbalanced power is a result of the power delivery system supplied by the local utility company.

Factory-installed inverters are sized to drive blower motors with an equivalent current rating using balanced three-phase power. When unbalanced three-phase power is supplied; the installer must replace the existing factory-installed inverter with an inverter that has a higher current rating to allow for the imbalance. Use table 2 to determine the appropriate replacement inverter.

**TABLE 2  
INVERTER UP-SIZING**

| Factory-Installed Inverter HP | Replacement Inverter HP |
|-------------------------------|-------------------------|
| 2                             | 5                       |
| 3                             | 7-1/2                   |
| 5                             | 10                      |



**FIGURE 12**

**CONTROL WIRING**

**A-Thermostat Location**

Room thermostat mounts vertically on a standard 2" X 4" handy box or on any non-conductive flat surface.

Locate thermostat approximately 5 feet (1524mm) above the floor in an area with good air circulation at average temperature. Avoid locating the room thermostat where it might be affected by:

- drafts or dead spots behind doors and in corners
- hot or cold air from ducts
- radiant heat from sun or appliances
- concealed pipes and chimneys

**B-Control Wiring**

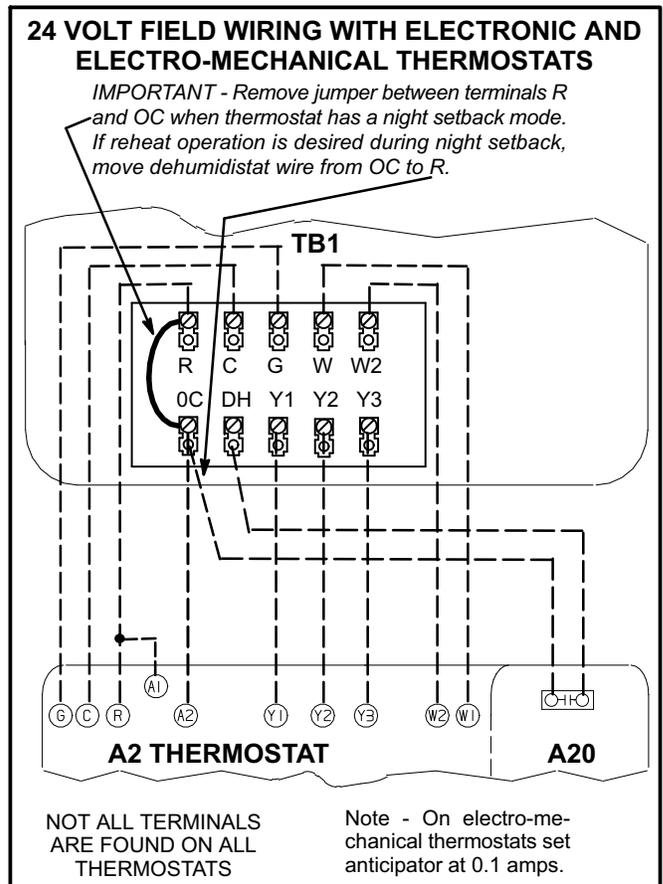
*NOTE - Units operate with 3 stages of cooling and require a 3-stage thermostat. If a 3-stage thermostat is not available, a 2-stage thermostat can be paired with a field-installed Stage-Up Timer Kit to achieve desired results. See Stage-Up Timer Kit installation instructions for wiring.*

- 1- Route thermostat cable or wires from subbase to control box (refer to unit dimensions to locate bottom and side power entry).

*IMPORTANT - Unless field thermostat wires are rated for maximum unit voltage, they must be routed away from line voltage wiring. Use wire ties located near the lower left corner of the controls hat section to secure thermostat cable.*

Use 18 AWG wire for all applications using remotely installed electro-mechanical and electronic thermostats.

- 2- Install thermostat assembly in accordance with instructions provided with thermostat.
- 3- Connect thermostat wiring to TB1 terminal board on the lower side of the controls hat section. Wire as shown in figure 13 for electro-mechanical and electronic thermostats. If using other temperature control devices or energy management systems see instructions and wiring diagram provided by manufacturer.



**FIGURE 13**

*IMPORTANT - Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may allow unit to operate but not with proper response to room demand.*

## C-Hot Gas Reheat Units Only

Units require a dehumidify demand to initiate operation. A 24V input at DH is required to energize reheat. A standalone dehumidistat (A20) and/or a room thermostat / energy management system with humidity sensing may be used. Refer to device manual for setup details.

- 1- When a dehumidistat is used, route wires from the A20 dehumidistat switch to the control box. Install dehumidistat assembly in accordance with instructions provided with the dehumidistat.
- 2- Connect dehumidistat and/or thermostat wiring to TB1 as shown in figure 13.

**IMPORTANT** - Remove jumper between terminals R (24V) and OC when thermostat has a night setback mode. If reheat operation is desired during night setback, move dehumidistat wire from OC to R.

*Note* - When initially setting up some thermostats, a dehumidification mode must be enabled. When prompted by thermostat menus, select RTU/AUX DEHUMIDIFIER mode.

## Unit Power-Up

### A-General

- 1- Make sure that unit is installed in accordance with the installation instructions and applicable codes.
- 2- Inspect all electrical wiring, both field- and factory-installed, for loose connections. Tighten as required.
- 3- Check to ensure that refrigerant lines do not rub against the cabinet or against other refrigerant lines.
- 4- Check voltage at main unit power connection. Voltage must be within range listed on nameplate. If not, consult power company and have voltage condition corrected before starting unit.
- 5- Make sure filters are in place before start-up.
- 6- Make sure there is no heating, cooling, or blower demand from thermostat. Apply power to unit.

## Blower Operation and Adjustments

### A-Three Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower rotation and operation. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

- 1- Observe suction and discharge pressures and blower rotation on unit start-up.

If pressure differential is not observed or blower rotation is not correct:

- 2- Suction pressure must drop, discharge pressure must rise, and blower rotation must match rotation marking.
- 3- Disconnect all remote electrical power supplies.
- 4- Reverse any two field-installed wires connected to the line side of TB2 or F4. Do not reverse wires at VFD or compressors.
- 5- Make sure the connections are tight.

Discharge and suction pressures should operate at their normal start-up ranges.

**Supply Air Inverter Units** - Units are equipped with a phase monitor located in the control compartment. The phase monitor will detect the phasing of incoming power. If the incoming power is out of phase or if any of the three phases are lost, the indicating LED on the phase monitor will turn red and the unit will not start. In normal operation with correct incoming power phasing, the LED will be green.

### B-Blower Operation

Initiate blower demand at thermostat according to instructions provided with thermostat. Unit will cycle on thermostat demand. The following steps apply to applications using a typical electro-mechanical thermostat.

- 1- Blower operation is manually set at the thermostat subbase fan switch. With fan switch in **ON** position, blowers will operate continuously.
- 2- With fan switch in **AUTO** position, the blowers will cycle with demand. Blowers and entire unit will be off when system switch is in **OFF** position.

### C-Blower Access

The blower assembly is secured to a sliding frame which allows the blower motor to be pulled out of the unit. See figure 14.

- 1- Loosen the reusable wire tie which secures the blower wiring to the blower motor mounting plate.
- 2- Remove and retain screws on either side of sliding frame. Pull frame toward outside of unit.
- 3- Slide frame back into original position when finished servicing. Reattach the blower wiring in the previous location on the blower motor base using the wire tie.
- 4- Replace retained screws on either side of the sliding frame.

## D-Determining Unit CFM

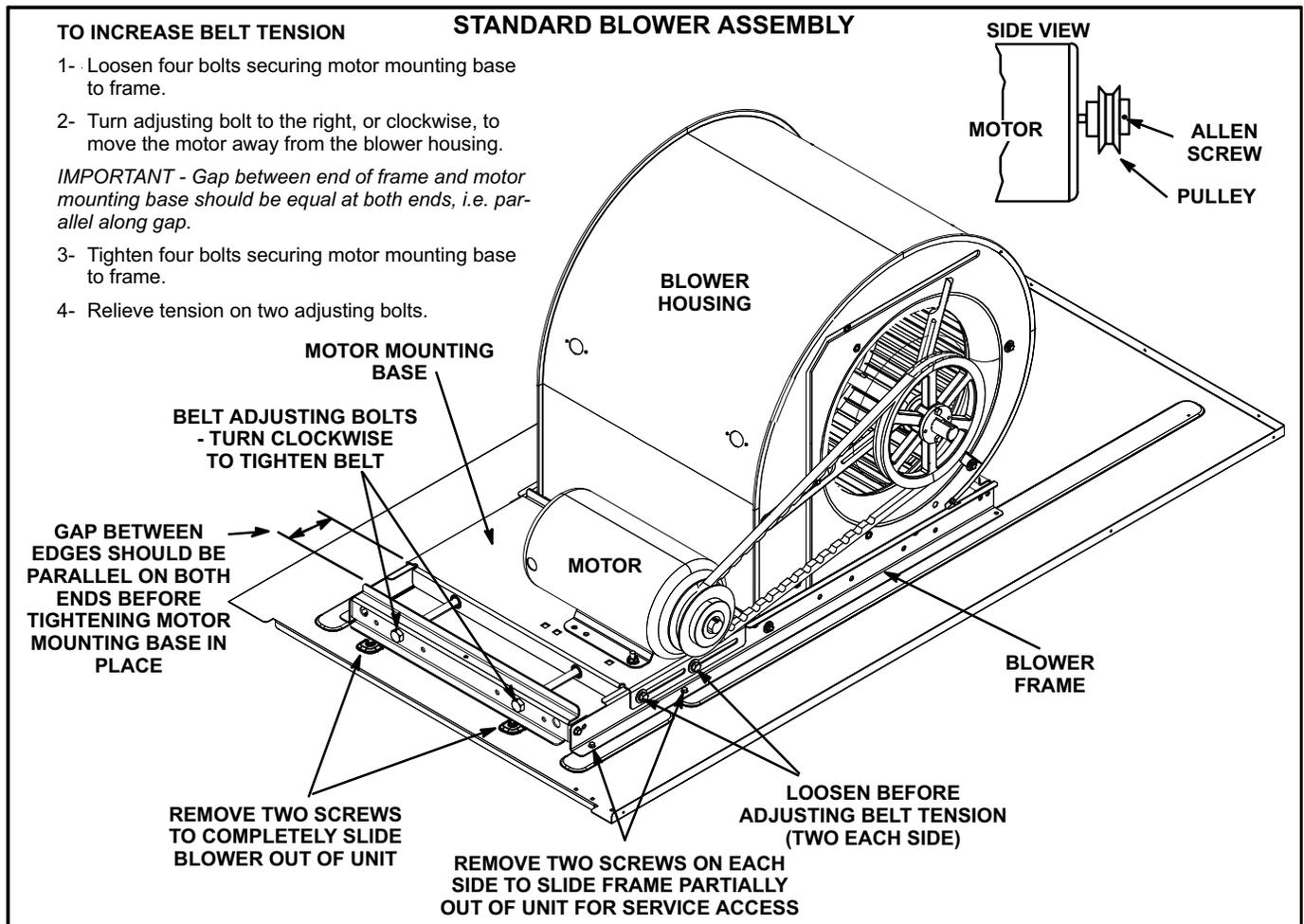
*IMPORTANT - Units equipped with an inverter are factory-set to run the blower at full speed when there is a blower (G) demand without a heating or cooling demand. Use the following procedure to adjust motor pulley to deliver the full load cooling or heating CFM. See Inverter Start-Up section to set blower CFM for all modes once the motor pulley is set.*

- 1- The following measurements must be made with a dry indoor coil. Run blower without a cooling demand. Measure the indoor blower shaft RPM. Air filters must be in place when measurements are taken.

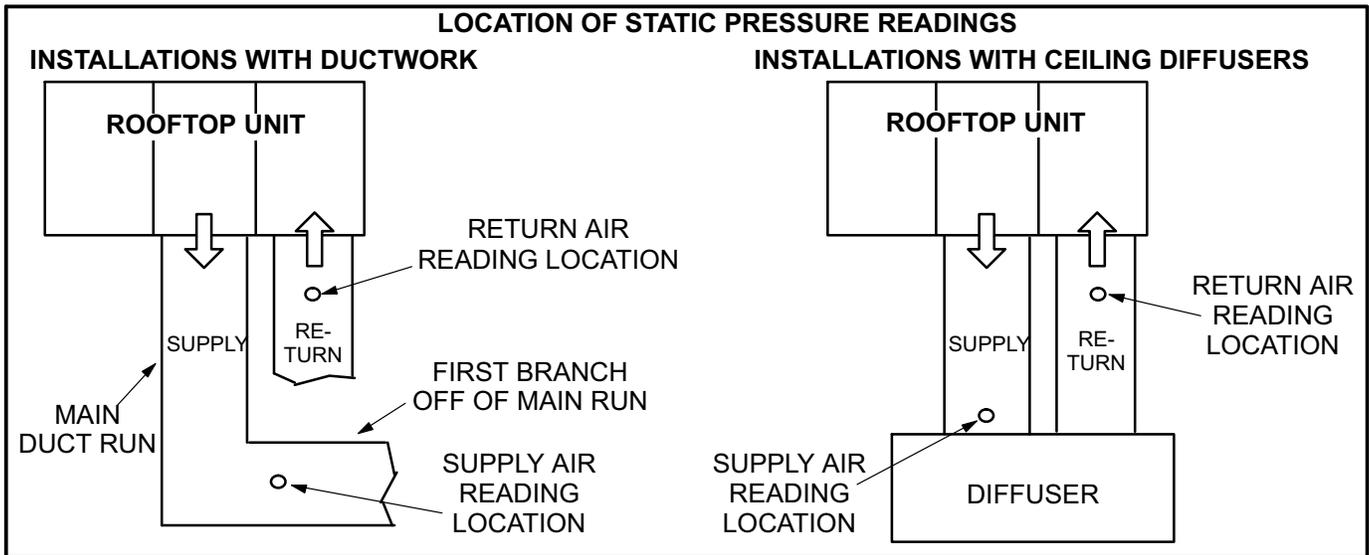
- 2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 15.

*Note - Static pressure readings can vary if not taken where shown.*

- 3- Referring to page 15-18 use static pressure and RPM readings to determine unit CFM. Use page 19 when installing units with any of the optional accessories listed.



**FIGURE 14**



**FIGURE 15**

4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 14. Do not exceed minimum and maximum number of pulley turns as shown in table 3.

**TABLE 3  
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT**

| Belt      | Minimum Turns Open | Maximum Turns Open |
|-----------|--------------------|--------------------|
| A Section | 0                  | 5                  |
| B Section | 1*                 | 6                  |

\*No minimum number of turns open when B belt is used on pulleys 6" O.D. or larger.

**E-Blower Belt Adjustment**

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat in the pulley grooves. Make sure blower and motor pulleys are aligned as shown in figure 16.

- 1- Loosen four bolts securing motor base to mounting frame. See figure 14.
- 2- *To increase belt tension -*  
Turn both adjusting bolts to the right, or clockwise, to

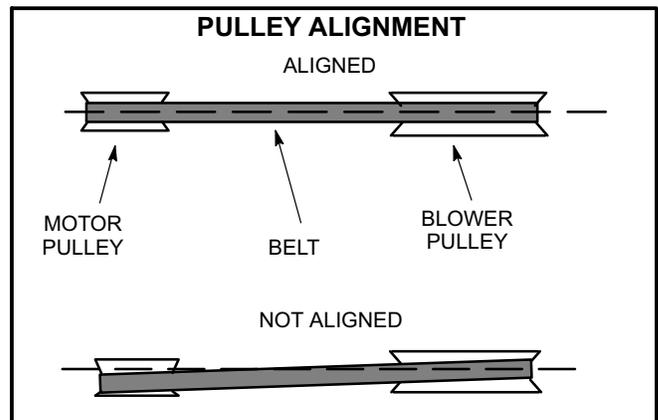
move the motor outward and tighten the belt. This increases the distance between the blower motor and the blower housing.

*To loosen belt tension -*

Turn the adjusting bolts to the left, or counterclockwise to loosen belt tension.

**IMPORTANT -** Align top edges of blower motor base and mounting frame base parallel before tightening two bolts on the other side of base. Motor shaft and blower shaft must be parallel.

- 3- Tighten two bolts on each side of the motor mounting base. This secures the mounting base to the frame.



**FIGURE 16**

## F-Check Belt Tension

Overtensioning belts shortens belt and bearing life. Check belt tension as follows:

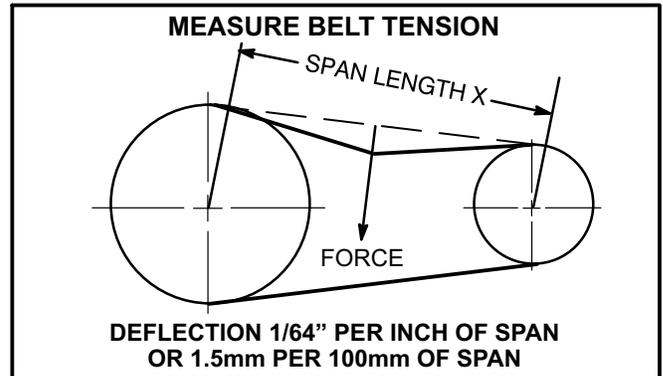
- 1- Measure span length X. See figure 17.
- 2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 1.5mm per 100mm of span length.

Example: Deflection distance of a 40" span would be 40/64" or 5/8".

Example: Deflection distance of a 400mm span would be 6mm.

- 3- Measure belt deflection force. For a new 2 and 3hp belt, the deflection force should be 5.0-7.0 lbs. (35-48kPa). For a new 5hp belt, the deflection force should be 7-10lbs. (48-69kPa).

A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.



**FIGURE 17**

## G-Field-Furnished Blower Drives

For field-furnished blower drives, use pages 15 through 17 to determine BHP and RPM required. Reference table 4 for drive component manufacturer's numbers.

## BLOWER DATA

### 092S & 102S STANDARD EFFICIENCY BELT DRIVE BLOWER – BASE UNIT

**BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE. FOR ALL UNITS ADD:**

- 1 – Wet indoor coil air resistance of selected unit.
- 2 – Any factory installed options air resistance (heat section, economizer, etc.)
- 3 – Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output required.

See page 17 for blower motors and drives.

See page 17 for wet coil and option/accessory air resistance data.

**MAXIMUM STATIC PRESSURE WITH GAS HEAT - 2.0 in. w.g.**

**MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT (Maximum Static Pressure - 2.0 in. w.g.)**

**15 kW, 22.5 kW, 30 kW and 45 kW - 2800 cfm**

**60 kW - 4000 cfm**

| Total Air Volume cfm | Total Static Pressure – in. w.g. |      |     |      |     |      |     |      |     |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |
|----------------------|----------------------------------|------|-----|------|-----|------|-----|------|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|
|                      | 0.2                              |      | 0.4 |      | 0.6 |      | 0.8 |      | 1.0 |      | 1.2 |      | 1.4  |      | 1.6  |      | 1.8  |      | 2    |      | 2.2  |      | 2.4  |      | 2.6  |      |     |
|                      | RPM                              | BHP  | RPM | BHP  | RPM | BHP  | RPM | BHP  | RPM | BHP  | RPM | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM |
| 2000                 | 593                              | 0.11 | 636 | 0.07 | 682 | 0.10 | 731 | 0.22 | 784 | 0.60 | 840 | 0.96 | 898  | 1.26 | 948  | 1.38 | 996  | 1.47 | 1045 | 1.57 | 1092 | 1.71 | 1140 | 1.92 | 1188 | 2.32 |     |
| 2250                 | 604                              | 0.15 | 645 | 0.11 | 690 | 0.15 | 739 | 0.39 | 790 | 0.74 | 846 | 1.08 | 901  | 1.34 | 953  | 1.48 | 1002 | 1.57 | 1052 | 1.70 | 1100 | 1.86 | 1149 | 2.09 | 1197 | 2.42 |     |
| 2500                 | 615                              | 0.19 | 655 | 0.15 | 699 | 0.20 | 747 | 0.55 | 797 | 0.89 | 851 | 1.20 | 906  | 1.44 | 959  | 1.58 | 1009 | 1.68 | 1059 | 1.83 | 1108 | 2.01 | 1158 | 2.26 | 1206 | 2.52 |     |
| 2750                 | 626                              | 0.23 | 666 | 0.19 | 709 | 0.37 | 755 | 0.71 | 805 | 1.03 | 858 | 1.32 | 912  | 1.55 | 966  | 1.70 | 1017 | 1.81 | 1067 | 1.97 | 1117 | 2.17 | 1166 | 2.44 | 1215 | 2.71 |     |
| 3000                 | 637                              | 0.27 | 677 | 0.24 | 719 | 0.55 | 764 | 0.87 | 813 | 1.18 | 866 | 1.45 | 920  | 1.67 | 975  | 1.82 | 1026 | 1.96 | 1076 | 2.13 | 1126 | 2.35 | 1176 | 2.63 | 1225 | 2.92 |     |
| 3250                 | 650                              | 0.31 | 688 | 0.43 | 730 | 0.73 | 775 | 1.04 | 823 | 1.34 | 875 | 1.60 | 930  | 1.81 | 985  | 1.97 | 1036 | 2.12 | 1086 | 2.31 | 1136 | 2.54 | 1186 | 2.83 | 1235 | 3.13 |     |
| 3500                 | 663                              | 0.35 | 700 | 0.63 | 741 | 0.92 | 786 | 1.22 | 834 | 1.50 | 886 | 1.76 | 942  | 1.96 | 997  | 2.14 | 1048 | 2.31 | 1097 | 2.51 | 1147 | 2.75 | 1196 | 3.04 | 1245 | 3.35 |     |
| 3750                 | 676                              | 0.57 | 714 | 0.84 | 754 | 1.12 | 798 | 1.41 | 846 | 1.68 | 899 | 1.93 | 956  | 2.14 | 1010 | 2.32 | 1060 | 2.51 | 1109 | 2.72 | 1158 | 2.98 | 1207 | 3.27 | 1255 | 3.58 |     |
| 4000                 | 691                              | 0.79 | 728 | 1.05 | 768 | 1.33 | 812 | 1.61 | 860 | 1.88 | 914 | 2.12 | 971  | 2.34 | 1023 | 2.53 | 1072 | 2.73 | 1121 | 2.95 | 1169 | 3.22 | 1218 | 3.51 | 1266 | 3.83 |     |
| 4250                 | 706                              | 1.03 | 743 | 1.28 | 783 | 1.55 | 827 | 1.82 | 876 | 2.09 | 931 | 2.33 | 987  | 2.55 | 1037 | 2.76 | 1085 | 2.97 | 1133 | 3.20 | 1181 | 3.47 | 1229 | 3.76 | 1277 | 4.08 |     |
| 4500                 | 722                              | 1.27 | 759 | 1.52 | 799 | 1.78 | 844 | 2.05 | 894 | 2.31 | 949 | 2.56 | 1003 | 2.79 | 1052 | 3.00 | 1098 | 3.22 | 1145 | 3.46 | 1193 | 3.73 | 1241 | 4.03 | 1289 | 4.34 |     |
| 4750                 | 739                              | 1.53 | 776 | 1.77 | 817 | 2.03 | 862 | 2.30 | 913 | 2.56 | 968 | 2.81 | 1020 | 3.04 | 1066 | 3.27 | 1112 | 3.49 | 1158 | 3.74 | 1205 | 4.01 | 1253 | 4.30 | 1301 | 4.61 |     |
| 5000                 | 757                              | 1.79 | 794 | 2.04 | 835 | 2.30 | 882 | 2.56 | 934 | 2.83 | 988 | 3.08 | 1036 | 3.32 | 1081 | 3.55 | 1125 | 3.78 | 1171 | 4.02 | 1218 | 4.29 | 1265 | 4.59 | 1312 | 4.89 |     |

## BLOWER DATA

### 120S & 150S STANDARD EFFICIENCY – BASE UNIT

**BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE. FOR ALL UNITS ADD:**

- 1 – Wet indoor coil air resistance of selected unit.
- 2 – Any factory installed options air resistance (heat section, economizer, etc.)
- 3 – Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output required.

See page 17 for blower motors and drives.

See page 17 for wet coil and option/accessory air resistance data.

**MAXIMUM STATIC PRESSURE WITH GAS HEAT - 2.0 in. w.g.**

**MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT (Maximum Static Pressure - 2.0 in. w.g.)**

**15 kW, 22.5 kW, 30 kW and 45 kW - 2800 cfm**

**60 kW - 4000 cfm**

| Total Air Volume cfm | Total Static Pressure – in. w.g. |      |     |      |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |
|----------------------|----------------------------------|------|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|
|                      | 0.2                              |      | 0.4 |      | 0.6 |      | 0.8  |      | 1.0  |      | 1.2  |      | 1.4  |      | 1.6  |      | 1.8  |      | 2.0  |      | 2.2  |      | 2.4  |      | 2.6  |      |     |     |
|                      | RPM                              | BHP  | RPM | BHP  | RPM | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM  | BHP  | RPM | BHP |
| 2000                 | 497                              | 0.25 | 558 | 0.44 | 624 | 0.6  | 694  | 0.74 | 764  | 0.85 | 830  | 0.99 | 889  | 1.16 | 943  | 1.34 | 994  | 1.52 | 1045 | 1.71 | 1096 | 1.89 | 1146 | 2.08 | 1197 | 2.27 |     |     |
| 2250                 | 511                              | 0.34 | 573 | 0.52 | 638 | 0.68 | 708  | 0.82 | 776  | 0.94 | 839  | 1.09 | 896  | 1.26 | 948  | 1.45 | 998  | 1.64 | 1048 | 1.83 | 1098 | 2.01 | 1149 | 2.2  | 1200 | 2.4  |     |     |
| 2500                 | 527                              | 0.44 | 589 | 0.62 | 654 | 0.78 | 723  | 0.91 | 789  | 1.05 | 850  | 1.21 | 904  | 1.39 | 955  | 1.58 | 1003 | 1.77 | 1052 | 1.96 | 1101 | 2.14 | 1152 | 2.33 | 1203 | 2.53 |     |     |
| 2750                 | 545                              | 0.55 | 606 | 0.72 | 672 | 0.88 | 740  | 1.03 | 804  | 1.17 | 861  | 1.34 | 914  | 1.53 | 962  | 1.72 | 1010 | 1.92 | 1057 | 2.10 | 1105 | 2.29 | 1154 | 2.47 | 1206 | 2.68 |     |     |
| 3000                 | 564                              | 0.66 | 626 | 0.84 | 692 | 1.01 | 759  | 1.16 | 819  | 1.32 | 874  | 1.49 | 924  | 1.68 | 971  | 1.88 | 1017 | 2.08 | 1063 | 2.26 | 1110 | 2.44 | 1158 | 2.63 | 1208 | 2.83 |     |     |
| 3250                 | 585                              | 0.79 | 648 | 0.98 | 714 | 1.14 | 778  | 1.31 | 836  | 1.48 | 887  | 1.66 | 935  | 1.86 | 981  | 2.06 | 1026 | 2.26 | 1071 | 2.45 | 1117 | 2.63 | 1163 | 2.80 | 1213 | 3.00 |     |     |
| 3500                 | 607                              | 0.93 | 672 | 1.13 | 737 | 1.31 | 798  | 1.48 | 852  | 1.66 | 901  | 1.85 | 948  | 2.05 | 993  | 2.26 | 1037 | 2.46 | 1081 | 2.65 | 1125 | 2.83 | 1171 | 3.01 | 1221 | 3.21 |     |     |
| 3750                 | 632                              | 1.10 | 698 | 1.31 | 762 | 1.50 | 819  | 1.67 | 869  | 1.86 | 915  | 2.05 | 961  | 2.25 | 1005 | 2.47 | 1049 | 2.68 | 1092 | 2.88 | 1136 | 3.05 | 1181 | 3.24 | 1231 | 3.45 |     |     |
| 4000                 | 660                              | 1.30 | 726 | 1.52 | 787 | 1.70 | 838  | 1.87 | 885  | 2.06 | 930  | 2.26 | 974  | 2.48 | 1018 | 2.71 | 1062 | 2.93 | 1105 | 3.12 | 1149 | 3.30 | 1194 | 3.49 | 1245 | 3.72 |     |     |
| 4250                 | 691                              | 1.53 | 755 | 1.75 | 810 | 1.91 | 857  | 2.07 | 901  | 2.27 | 945  | 2.50 | 990  | 2.74 | 1034 | 2.98 | 1077 | 3.20 | 1120 | 3.39 | 1163 | 3.58 | 1210 | 3.79 | 1262 | 4.03 |     |     |
| 4500                 | 724                              | 1.78 | 783 | 1.98 | 831 | 2.12 | 874  | 2.28 | 917  | 2.50 | 962  | 2.75 | 1006 | 3.02 | 1051 | 3.27 | 1094 | 3.49 | 1137 | 3.70 | 1181 | 3.89 | 1228 | 4.11 | 1281 | 4.38 |     |     |
| 4750                 | 757                              | 2.05 | 809 | 2.20 | 851 | 2.33 | 891  | 2.51 | 935  | 2.76 | 980  | 3.05 | 1025 | 3.33 | 1070 | 3.59 | 1113 | 3.82 | 1156 | 4.03 | 1201 | 4.24 | 1249 | 4.47 | 1303 | 4.75 |     |     |
| 5000                 | 787                              | 2.31 | 831 | 2.43 | 870 | 2.57 | 910  | 2.78 | 954  | 3.06 | 1000 | 3.38 | 1046 | 3.68 | 1091 | 3.95 | 1135 | 4.19 | 1178 | 4.40 | 1224 | 4.62 | 1272 | 4.86 | 1325 | 5.13 |     |     |
| 5250                 | 814                              | 2.55 | 852 | 2.66 | 889 | 2.83 | 930  | 3.09 | 975  | 3.41 | 1023 | 3.76 | 1070 | 4.08 | 1115 | 4.35 | 1159 | 4.59 | 1203 | 4.81 | 1248 | 5.03 | 1297 | 5.27 | 1350 | 5.53 |     |     |
| 5500                 | 835                              | 2.78 | 871 | 2.91 | 909 | 3.13 | 952  | 3.44 | 999  | 3.81 | 1049 | 4.18 | 1096 | 4.51 | 1142 | 4.79 | 1186 | 5.03 | 1229 | 5.24 | 1275 | 5.46 | 1324 | 5.69 | ---  | ---  |     |     |
| 5750                 | 854                              | 3.01 | 890 | 3.19 | 930 | 3.48 | 977  | 3.86 | 1027 | 4.27 | 1078 | 4.66 | 1126 | 4.99 | 1171 | 5.26 | 1214 | 5.49 | 1258 | 5.70 | ---  | ---  | ---  | ---  | ---  | ---  |     |     |
| 6000                 | 871                              | 3.26 | 910 | 3.53 | 955 | 3.90 | 1006 | 4.34 | 1060 | 4.80 | 1111 | 5.19 | 1158 | 5.51 | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  |     |     |
| 6250                 | 890                              | 3.57 | 934 | 3.94 | 985 | 4.41 | 1041 | 4.91 | 1096 | 5.38 | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  | ---  |     |     |

## BLOWER DATA

### FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

| Nominal hp | Maximum hp | Drive Kit Number | RPM Range   |
|------------|------------|------------------|-------------|
| 2          | 2.3        | 1                | 590 - 890   |
| 2          | 2.3        | 2                | 800 - 1105  |
| 2          | 2.3        | 3                | 795 - 1195  |
| 3          | 3.45       | 4                | 730 - 970   |
| 3          | 3.45       | 5                | 940 - 1200  |
| 3          | 3.45       | 6                | 1015 - 1300 |
| 5          | 5.75       | 10               | 900 - 1135  |
| 5          | 5.75       | 11               | 1040 - 1315 |
| 5          | 5.75       | 12               | 1125 - 1425 |

NOTE - Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

NOTE - Units equipped with option are limited to a motor service factor of 1.0.

### POWER EXHAUST FAN PERFORMANCE

| Return Air System Static Pressure | Air Volume Exhausted |
|-----------------------------------|----------------------|
| in. w.g.                          | cfm                  |
| 0                                 | 3175                 |
| 0.05                              | 2955                 |
| 0.10                              | 2685                 |
| 0.15                              | 2410                 |
| 0.20                              | 2165                 |
| 0.25                              | 1920                 |
| 0.30                              | 1420                 |
| 0.35                              | 1200                 |

### FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE - in. w.g.

| Air Volume cfm | Wet Indoor Coil |          | Condenser Reheat Coil | Gas Heat Exchanger |             |           | Economizer | Filters |         | Return Air Adaptor Plate |
|----------------|-----------------|----------|-----------------------|--------------------|-------------|-----------|------------|---------|---------|--------------------------|
|                | 092, 102        | 120, 150 |                       | Standard Heat      | Medium Heat | High Heat |            | MERV 8  | MERV 13 |                          |
| 1750           | .04             | .04      | .02                   | .06                | .02         | .02       | .05        | .01     | .03     | .00                      |
| 2000           | .05             | .05      | .02                   | .07                | .05         | .06       | .06        | .01     | .03     | .00                      |
| 2250           | .06             | .06      | .02                   | .07                | .07         | .08       | .08        | .01     | .04     | .00                      |
| 2500           | .07             | .07      | .03                   | .09                | .10         | .11       | .11        | .01     | .05     | .00                      |
| 2750           | .08             | .08      | .03                   | .09                | .11         | .12       | .12        | .02     | .05     | .00                      |
| 3000           | .10             | .09      | .03                   | .11                | .12         | .13       | .13        | .02     | .06     | .02                      |
| 3250           | .11             | .10      | .04                   | .12                | .15         | .16       | .15        | .02     | .06     | .02                      |
| 3500           | .12             | .11      | .04                   | .12                | .16         | .17       | .15        | .03     | .07     | .04                      |
| 3750           | .14             | .13      | .05                   | .14                | .19         | .20       | .15        | .03     | .08     | .07                      |
| 4000           | .15             | .14      | .05                   | .14                | .21         | .22       | .19        | .04     | .08     | .09                      |
| 4250           | .17             | .15      | .06                   | .14                | .24         | .28       | .19        | .04     | .09     | .11                      |
| 4500           | .19             | .17      | .07                   | .15                | .26         | .32       | .22        | .04     | .09     | .12                      |
| 4750           | .20             | .18      | .07                   | .16                | .29         | .37       | .25        | .05     | .10     | .16                      |
| 5000           | .22             | .20      | .08                   | .16                | .34         | .43       | .29        | .06     | .10     | .18                      |
| 5250           | .24             | .22      | .08                   | .16                | .37         | .47       | .32        | .06     | .11     | .19                      |
| 5500           | .25             | .23      | .09                   | .18                | .44         | .54       | .34        | .07     | .12     | .22                      |
| 5750           | .27             | .25      | .10                   | .19                | .49         | .59       | .45        | .07     | .12     | .25                      |
| 6000           | .29             | .27      | .10                   | .20                | .54         | .64       | .52        | .08     | .13     | .27                      |

**TABLE 4  
MANUFACTURER'S NUMBERS**

| DRIVE NO. | DRIVE COMPONENTS  |              |              |              |              |              |
|-----------|-------------------|--------------|--------------|--------------|--------------|--------------|
|           | ADJUSTABLE SHEAVE |              | FIXED SHEAVE |              | BELT         |              |
|           | BROWNING NO.      | OEM PART NO. | BROWNING NO. | OEM PART NO. | BROWNING NO. | OEM PART NO. |
| 1         | 1VP34x7/8         | 31K6901      | AK61x1       | 100244-20    | AX54         | 100245-25    |
| 2         | 1VP40x7/8         | 79J0301      | AK59x1       | 31K6801      | AX55         | 100245-26    |
| 3         | 1VP34x7/8         | 31K6901      | AK46x1       | 100244-17    | AX52         | 100245-33    |
| 4         | 1VP44x7/8         | 53J9601      | AK74x1       | 100244-21    | AX58         | 100245-34    |
| 5         | 1VP50x7/8         | 98J0001      | AK69x1       | 37L4701      | AX58         | 100245-34    |
| 6         | 1VP50x7/8         | 98J0001      | AK64x1       | 12L2501      | AX57         | 100245-28    |
| 10        | 1VP50x1-1/8       | P-8-1977     | BK77x1       | 49K4001      | BX59         | 59A5001      |
| 11        | 1VP50x1-1/8       | P-8-1977     | BK67x1       | 100244-24    | BX57         | 78L5301      |
| 12        | 1VP50x1-1/8       | P-8-1977     | BK62x1       | 100244-23    | BX56         | 100245-11    |

**Cooling Start-Up**

**▲ IMPORTANT**

**If unit is equipped with a crankcase heater. Make sure heater is energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.**

**A-Operation**

*Supply Air Inverter Units - Refer to the Inverter Start-Up section for further instruction on blower control. See table 18 for full details on unit operation.*

Compressor 1 is a two-stage compressor. Compressor 2 is a single-stage compressor.

1- Initiate first, second, and third stage cooling demands according to instructions provided with thermostat.

2- *No Economizer Installed in Unit -*  
See table 5 for cooling operation.

*Units Equipped With Economizer -*

When outdoor air is suitable, any combination of thermostat demands will energize the economizer. See table 6 for cooling operation.

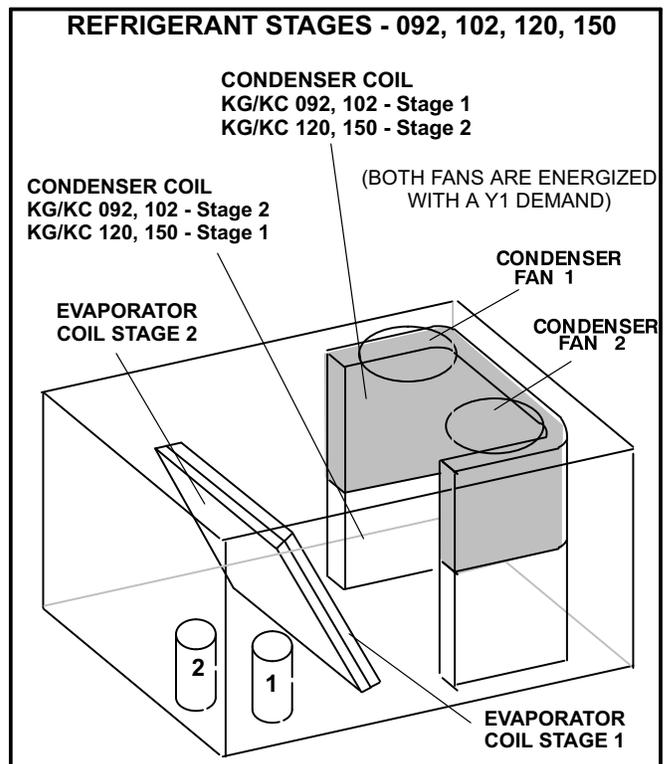
**TABLE 5  
COOLING OPERATION - NO ECONOMIZER**

| T'Stat       | Compressors                | OD Fans |
|--------------|----------------------------|---------|
| Y1           | Compr. 1 Low               | Both On |
| Y1 + Y2      | Compr. 1 Low; Compr. 2 On  | Both On |
| Y1 + Y2 + Y3 | Compr. 1 High; Compr. 2 On | Both On |

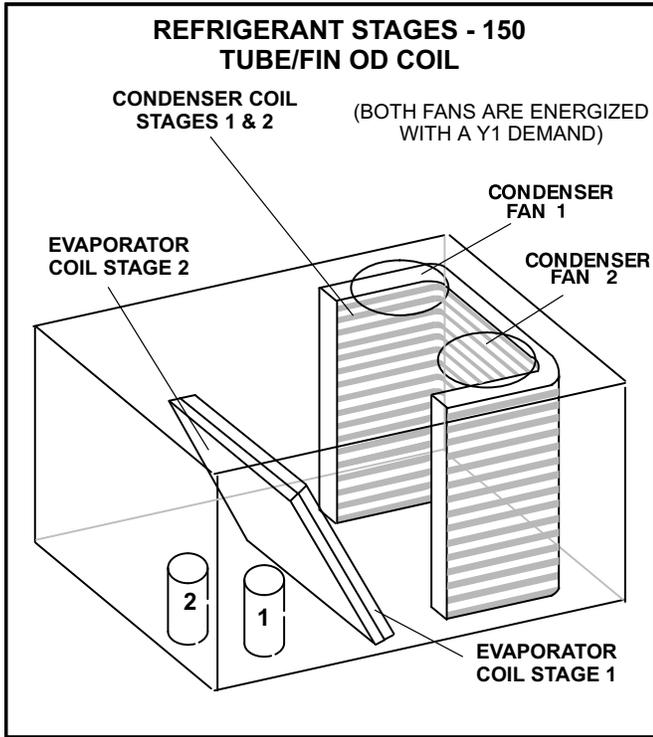
**TABLE 6  
COOLING OPERATION - WITH ECONOMIZER**

| T'Stat       | Compressors   | OD Fans |
|--------------|---------------|---------|
| Y1           | Off           | Off     |
| Y1 + Y2      | Compr. 1 Low  | Both On |
| Y1 + Y2 + Y3 | Compr. 1 High | Both On |

- 3- Units contain two refrigerant circuits or stages. See figure 18 or 19.
- 4- Each refrigerant circuit is separately charged with R-410A refrigerant. See unit rating plate for correct amount of charge.
- 5- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.



**FIGURE 18**



**FIGURE 19**

### B-R410A Refrigerant

Units charged with R410A refrigerant operate at much higher pressures than R22. The expansion valve and liquid line drier provided with the unit are approved for use with R410A. Do not replace them with components designed for use with R22.

R410A refrigerant is stored in a pink cylinder.

## ⚠ IMPORTANT

**Mineral oils are not compatible with R410A. If oil must be added, it must be a polyol ester oil.**

Manifold gauge sets used with systems charged with R410A refrigerant must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0-800 on the high side and a low side of 30" vacuum to 250 psi with dampened speed to 500 psi. Gauge hoses must be rated for use at up to 800 psi of pressure with a 4000 psi burst rating.

### C-Refrigerant Charge and Check - All-Aluminum Coil

**KG/KC 092, 102, 120, 150**

**WARNING-Do not exceed nameplate charge under any condition.**

This unit is factory charged and should require no further adjustment. If the system requires additional refrigerant, reclaim the charge, evacuate the system, and add required nameplate charge.

*NOTE - System charging is not recommended below 60°F (15°C). In temperatures below 60°F (15°C), the charge **must** be weighed into the system.*

If weighing facilities are not available, or to check the charge, use the following procedure:

### IMPORTANT - Charge unit in standard cooling mode.

- 1- Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.
- 2- Check each system separately with all stages operating. Compare the normal operating pressures (see tables 7 - 10) to the pressures obtained from the gauges. Check unit components if there are significant differences.
- 3- Measure the outdoor ambient temperature and the suction pressure. Refer to the appropriate circuit charging curve to determine a target liquid temperature.

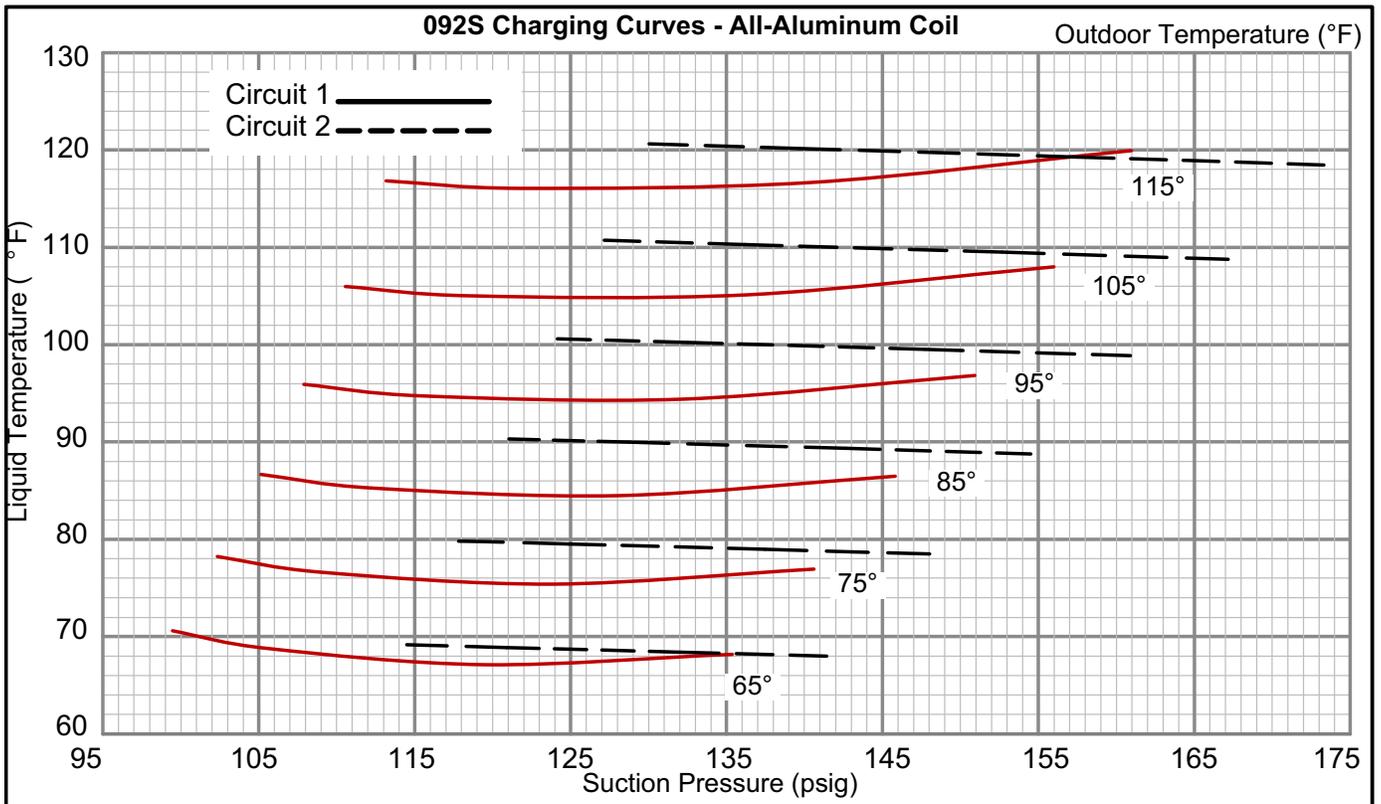
*Note - Pressures are listed for sea level applications.*

- 4- Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).
  - If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
  - If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.
- 5- Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.
- 6- Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.
- 7- Example KG/KC 092S Circuit 1: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 94.4°F. For a measured liquid temperature of 112°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

**TABLE 7 581125-01**

**KG/KC 092S Normal Operating Pressures - All-Aluminum Coil**

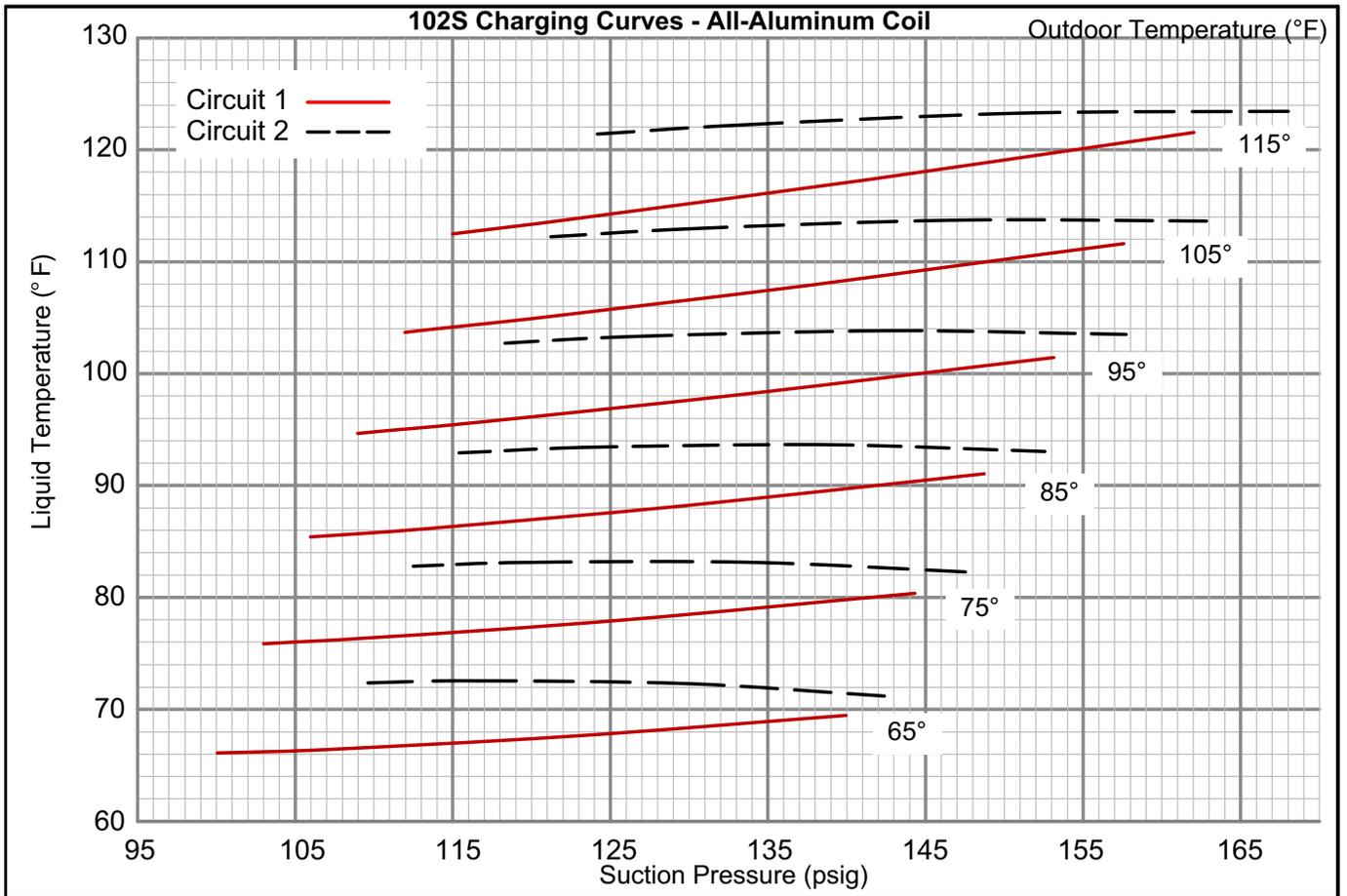
|           | Outdoor Coil Entering Air Temperature |             |             |             |             |             |             |             |             |             |             |             |
|-----------|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|           | 65 °F                                 |             | 75 °F       |             | 85 °F       |             | 95 °F       |             | 105 °F      |             | 115 °F      |             |
|           | Suct (psig)                           | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) |
| Circuit 1 | 99                                    | 247         | 102         | 293         | 105         | 341         | 108         | 393         | 111         | 448         | 113         | 506         |
|           | 106                                   | 249         | 109         | 293         | 112         | 341         | 116         | 392         | 119         | 446         | 122         | 503         |
|           | 120                                   | 256         | 124         | 298         | 128         | 344         | 132         | 392         | 136         | 444         | 140         | 499         |
|           | 135                                   | 267         | 141         | 308         | 146         | 351         | 151         | 397         | 156         | 447         | 161         | 500         |
| Circuit 2 | 115                                   | 246         | 118         | 282         | 121         | 322         | 124         | 366         | 127         | 413         | 130         | 464         |
|           | 121                                   | 250         | 125         | 287         | 129         | 327         | 133         | 371         | 136         | 419         | 140         | 470         |
|           | 132                                   | 257         | 137         | 295         | 143         | 336         | 148         | 382         | 153         | 430         | 158         | 483         |
|           | 141                                   | 265         | 148         | 304         | 155         | 346         | 161         | 393         | 167         | 443         | 173         | 496         |



**TABLE 8 581126-01**

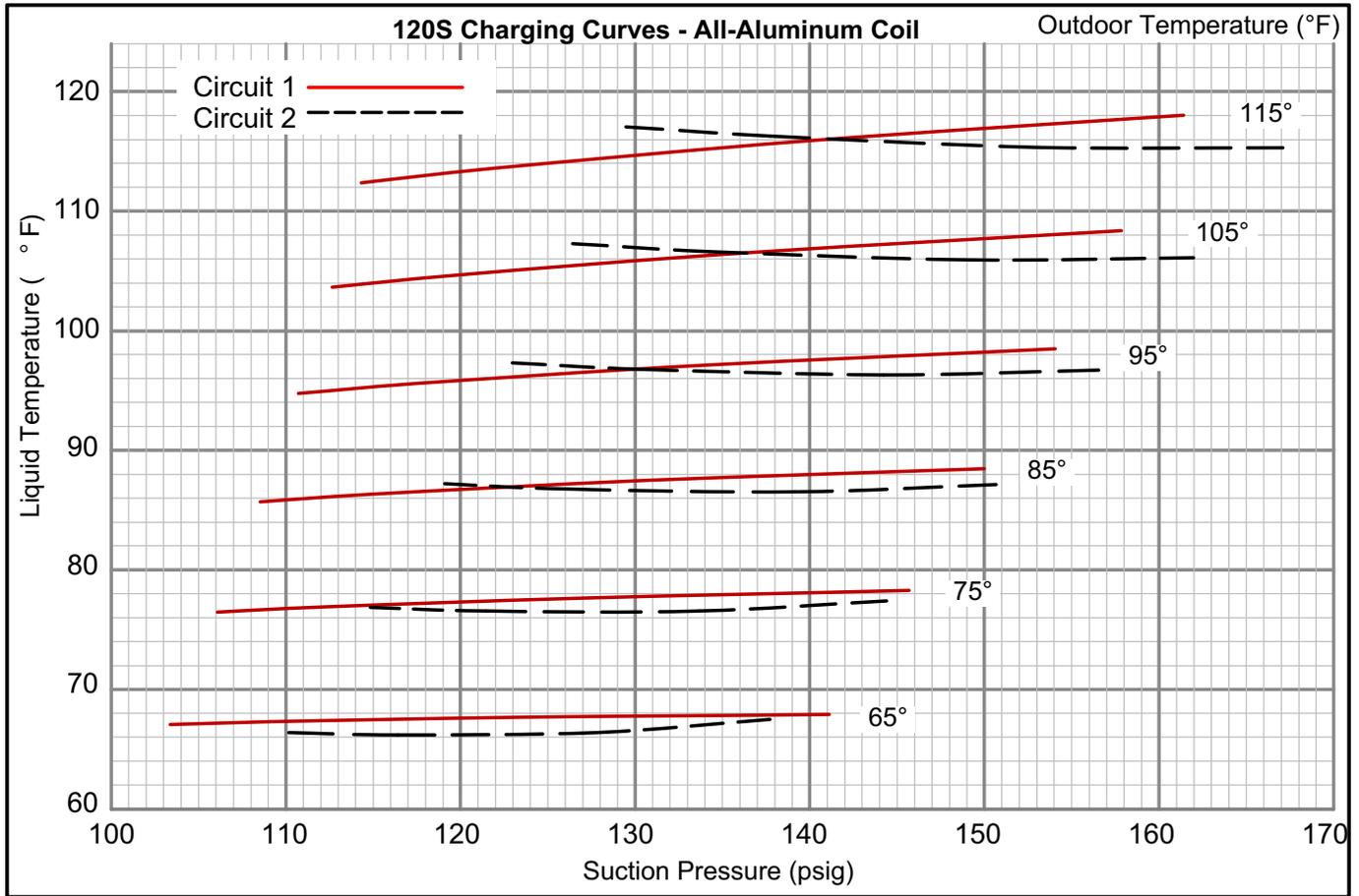
**KG/KC 102S Normal Operating Pressures - All-Aluminum Coil**

|              | Outdoor Coil Entering Air Temperature |             |             |             |             |             |             |             |             |             |             |             |
|--------------|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|              | 65 °F                                 |             | 75 °F       |             | 85 °F       |             | 95 °F       |             | 105 °F      |             | 115 °F      |             |
|              | Suct (psig)                           | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) |
| <b>STG 1</b> | 100                                   | 245         | 103         | 288         | 106         | 337         | 109         | 390         | 112         | 449         | 115         | 513         |
|              | 107                                   | 251         | 110         | 293         | 113         | 340         | 117         | 392         | 120         | 450         | 123         | 513         |
|              | 122                                   | 262         | 126         | 301         | 130         | 345         | 134         | 395         | 138         | 450         | 141         | 510         |
|              | 140                                   | 271         | 144         | 307         | 149         | 349         | 153         | 396         | 158         | 448         | 162         | 506         |
| <b>STG 2</b> | 110                                   | 262         | 113         | 300         | 115         | 342         | 118         | 388         | 121         | 439         | 124         | 493         |
|              | 117                                   | 267         | 120         | 306         | 123         | 348         | 127         | 394         | 130         | 445         | 133         | 499         |
|              | 130                                   | 278         | 134         | 317         | 138         | 359         | 143         | 406         | 147         | 457         | 151         | 511         |
|              | 142                                   | 288         | 148         | 327         | 153         | 371         | 158         | 418         | 163         | 468         | 168         | 523         |



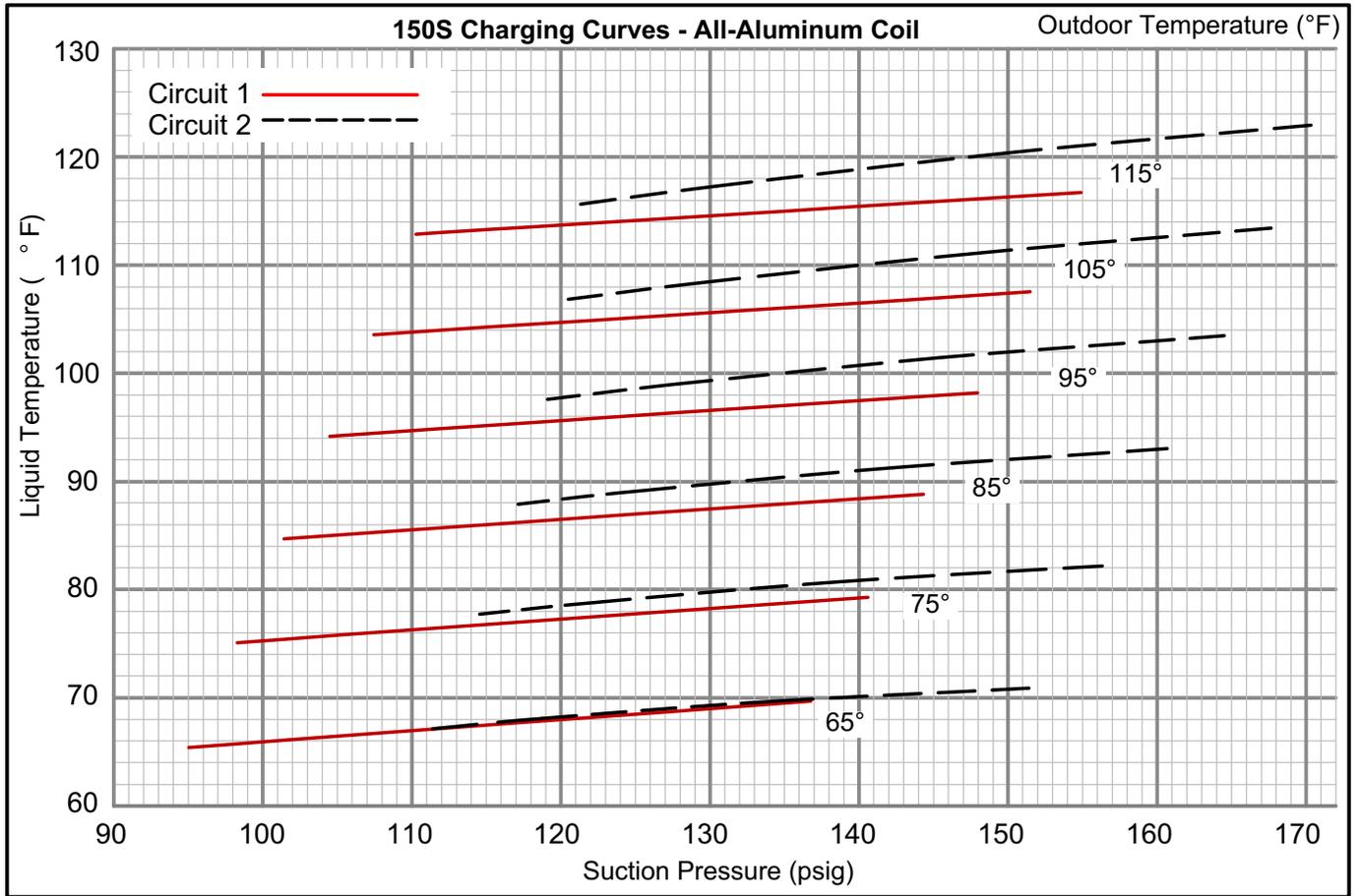
**TABLE 9 581127-01**

| <b>KG/KC 120S Normal Operating Pressures - All-Aluminum Coil</b> |                                       |             |             |             |             |             |             |             |             |             |             |             |
|--|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|  | Outdoor Coil Entering Air Temperature |             |             |             |             |             |             |             |             |             |             |             |
|  | 65 °F                                 |             | 75 °F       |             | 85 °F       |             | 95 °F       |             | 105 °F      |             | 115 °F      |             |
|  | Suct (psig)                           | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) |
| <b>STG 1</b>   | 103                                   | 255         | 106         | 306         | 109         | 366         | 111         | 434         | 113         | 511         | 114         | 598         |
|  | 109                                   | 253         | 112         | 299         | 115         | 354         | 118         | 417         | 120         | 490         | 122         | 571         |
|  | 123                                   | 265         | 127         | 301         | 131         | 346         | 134         | 400         | 137         | 463         | 140         | 534         |
|  | 141                                   | 298         | 146         | 324         | 150         | 360         | 154         | 404         | 158         | 457         | 161         | 519         |
| <b>STG 2</b>   | 110                                   | 248         | 115         | 284         | 119         | 324         | 123         | 370         | 126         | 422         | 129         | 479         |
|  | 116                                   | 267         | 121         | 303         | 126         | 344         | 130         | 390         | 134         | 442         | 138         | 499         |
|  | 128                                   | 292         | 134         | 328         | 139         | 370         | 144         | 417         | 149         | 469         | 153         | 527         |
|  | 138                                   | 300         | 144         | 337         | 151         | 379         | 157         | 426         | 162         | 479         | 167         | 537         |



**TABLE 10 581128-01**

| <b>KG/KC 150S Normal Operating Pressures - All-Aluminum Coil</b> |                                       |             |             |             |             |             |             |             |             |             |             |             |
|--|---------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|  | Outdoor Coil Entering Air Temperature |             |             |             |             |             |             |             |             |             |             |             |
|  | 65 °F                                 |             | 75 °F       |             | 85 °F       |             | 95 °F       |             | 105 °F      |             | 115 °F      |             |
|  | Suct (psig)                           | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) | Suct (psig) | Disc (psig) |
| <b>Circuit 1</b>   | 95                                    | 250         | 98          | 293         | 101         | 342         | 104         | 397         | 107         | 459         | 110         | 527         |
|  | 102                                   | 253         | 105         | 295         | 109         | 343         | 112         | 397         | 115         | 458         | 118         | 525         |
|  | 118                                   | 263         | 122         | 303         | 125         | 349         | 128         | 401         | 132         | 459         | 135         | 524         |
|  | 137                                   | 279         | 141         | 316         | 144         | 360         | 148         | 410         | 151         | 466         | 155         | 529         |
| <b>Circuit 2</b>   | 111                                   | 259         | 115         | 303         | 117         | 355         | 119         | 413         | 121         | 479         | 121         | 553         |
|  | 119                                   | 260         | 122         | 302         | 125         | 351         | 128         | 407         | 129         | 471         | 130         | 542         |
|  | 134                                   | 272         | 139         | 309         | 142         | 353         | 145         | 405         | 148         | 464         | 150         | 530         |
|  | 151                                   | 296         | 156         | 329         | 161         | 368         | 165         | 415         | 168         | 469         | 170         | 531         |



**D-Refrigerant Charge and Check - Fin/Tube Coil**

**WARNING-Do not exceed nameplate charge under any condition.**

This unit is factory charged and should require no further adjustment. If the system requires additional refrigerant, reclaim the charge, evacuate the system, and add required nameplate charge.

*NOTE - System charging is not recommended below 60°F (15°C). In temperatures below 60°F (15°C) , the charge **must** be weighed into the system.*

If weighing facilities are not available, or to check the charge, use the following procedure:

**IMPORTANT - Charge unit in standard cooling mode.**

- 1- Attach gauge manifolds and operate unit in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure outdoor air dampers are closed.
- 2- Check each system separately with all stages operating.
- 3- Use a thermometer to accurately measure the outdoor ambient temperature.
- 4- Apply the outdoor temperature to table 11-14 to determine normal operating pressures. Pressures are listed for sea level applications at 80°F dry bulb and 67°F wet bulb return air.
- 5- Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. **Correct any system problems before proceeding.**
- 6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.
  - Add or remove charge in increments.
  - Allow the system to stabilize each time refrigerant is added or removed.
- 7- Use the following approach method along with the normal operating pressures to confirm readings.

**TABLE 11 581129-01  
KGC/KCC092S Fin/Tube - W & W/O Reheat**

| Outdoor Coil Entering Air Temp | CIRCUIT 1           |                 | CIRCUIT 2           |                 |
|--------------------------------|---------------------|-----------------|---------------------|-----------------|
|                                | Dis-charge ±10 psig | Suction ±5 psig | Dis-charge ±10 psig | Suction ±5 psig |
| 65°F                           | 270                 | 128             | 255                 | 140             |
| 75°F                           | 310                 | 131             | 295                 | 146             |
| 85°F                           | 352                 | 133             | 338                 | 151             |
| 95°F                           | 401                 | 136             | 388                 | 155             |
| 105°F                          | 453                 | 140             | 433                 | 160             |
| 115°F                          | 511                 | 145             | 488                 | 162             |

**TABLE 12 581130-01  
KGC/KCC102S Fin/Tube - W & W/O Reheat**

| Outdoor Coil Entering Air Temp | CIRCUIT 1           |                 | CIRCUIT 2           |                 |
|--------------------------------|---------------------|-----------------|---------------------|-----------------|
|                                | Dis-charge ±10 psig | Suction ±5 psig | Dis-charge ±10 psig | Suction ±5 psig |
| 65°F                           | 269                 | 128             | 276                 | 138             |
| 75°F                           | 308                 | 132             | 314                 | 142             |
| 85°F                           | 350                 | 135             | 359                 | 146             |
| 95°F                           | 396                 | 139             | 407                 | 149             |
| 105°F                          | 447                 | 141             | 458                 | 152             |
| 115°F                          | 502                 | 146             | 513                 | 156             |

**TABLE 13 581131-01  
KGC/KCC120S Fin/Tube - W & W/O Reheat**

| Outdoor Coil Entering Air Temp | CIRCUIT 1           |                 | CIRCUIT 2           |                 |
|--------------------------------|---------------------|-----------------|---------------------|-----------------|
|                                | Dis-charge ±10 psig | Suction ±5 psig | Dis-charge ±10 psig | Suction ±5 psig |
| 65°F                           | 263                 | 125             | 262                 | 132             |
| 75°F                           | 301                 | 125             | 304                 | 140             |
| 85°F                           | 341                 | 123             | 348                 | 146             |
| 95°F                           | 386                 | 125             | 394                 | 152             |
| 105°F                          | 440                 | 130             | 447                 | 156             |
| 115°F                          | 492                 | 139             | 499                 | 158             |

**TABLE 14 581132-01  
KGC/KCC150S Fin/Tube - W & W/O Reheat**

| Outdoor Coil Entering Air Temp | CIRCUIT 1           |                 | CIRCUIT 2           |                 |
|--------------------------------|---------------------|-----------------|---------------------|-----------------|
|                                | Dis-charge ±10 psig | Suction ±5 psig | Dis-charge ±10 psig | Suction ±5 psig |
| 65°F                           | 281                 | 121             | 283                 | 137             |
| 75°F                           | 320                 | 125             | 325                 | 141             |
| 85°F                           | 364                 | 129             | 370                 | 143             |
| 95°F                           | 407                 | 132             | 415                 | 145             |
| 105°F                          | 456                 | 135             | 464                 | 148             |
| 115 °F                         | 508                 | 139             | 517                 | 151             |

**Charge Verification - Approach Method - AHRI Testing (Fin/Tube Coil Continued)**

1. Using the same thermometer, compare liquid temperature to outdoor ambient temperature.  
 Approach Temperature = Liquid temperature (at condenser outlet) minus ambient temperature.
2. Approach temperature should match values in table 15. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.
3. The approach method is not valid for grossly over or undercharged systems. Use table 14 as a guide for typical operating pressures.

**TABLE 15  
 APPROACH TEMPERATURE - Fin/Tube - TXV**

| Unit        | Liquid Temp. Minus Ambient Temp. |                         |
|-------------|----------------------------------|-------------------------|
|             | 1st Stage                        | 2nd Stage               |
| <b>092S</b> | 7°F ± 1 (3.9°C ± 0.5)            | 9°F ± 1 (5.0°C ± 0.5)   |
| <b>102S</b> | 5°F ± 1 (2.8°C ± 0.5)            | 15°F ± 1 (8.3°C ± 0.5)  |
| <b>120S</b> | 3°F ± 1 (1.6°C ± 0.5)            | 2.0°F ± 1 (1.1°C ± 0.5) |
| <b>150S</b> | 1°F ± 1 (0.6°C ± 0.5)            | 3°F ± 1 (1.6°C ± 0.5)   |

**E-Compressor Controls**

See unit wiring diagram to determine which controls are used on each unit. Optional controls are identified on wiring diagrams by arrows at junction points.

- 1- High Pressure Switches (S4, S7)  
 Compressor circuits are protected by a high pressure switch which cuts out at 640 psig ± 10 psig (4413 kPa ± 70 kPa).
- 2- Freezestats (S49, S50)  
 Switches de-energize compressors when evaporator coil temperature falls below 29°F (-2°C) to prevent evaporator freeze-up. Switches reset when evaporator coil temperature reaches 58°F (15°C).
- 3- Crankcase Heater (HR1, HR2)  
 Compressors have belly band compressor oil heaters which must be on 24 hours before running compressors. Energize by setting thermostat so that there is no cooling demand, to prevent compressor from cycling, and apply power to unit.

## Gas Heat Start-Up (Gas Units)

FOR YOUR SAFETY READ BEFORE LIGHTING

### ⚠ WARNING



Electric shock hazard. Can cause injury or death. Do not use this unit if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system and any gas control which has been under water.

### ⚠ WARNING



Danger of explosion. Can cause injury or product or property damage. If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

### ⚠ WARNING



Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

### ⚠ WARNING

#### SMOKE POTENTIAL

The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

### ⚠ WARNING



Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

This unit is equipped with an automatic spark ignition system. There is no pilot. In case of a safety shutdown, move thermostat switch to **OFF** and return the thermostat switch to **HEAT** to reset ignition control.

#### A-Placing Unit In Operation

### ⚠ WARNING



Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

Gas Valve Operation for Honeywell VR8205Q/VR8305Q and White Rodgers 36H54 (figure 20 and 21)

- 1- Set thermostat to lowest setting.
- 2- Turn off all electrical power to appliance.
- 3- This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- 4- Open or remove the heat section access panel.

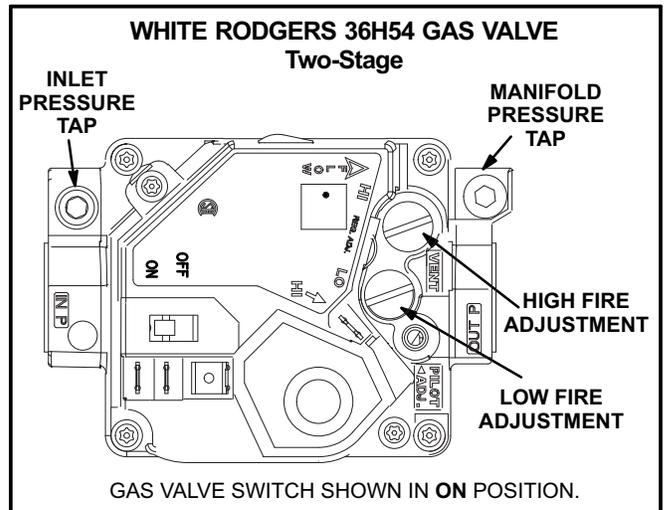


FIGURE 20

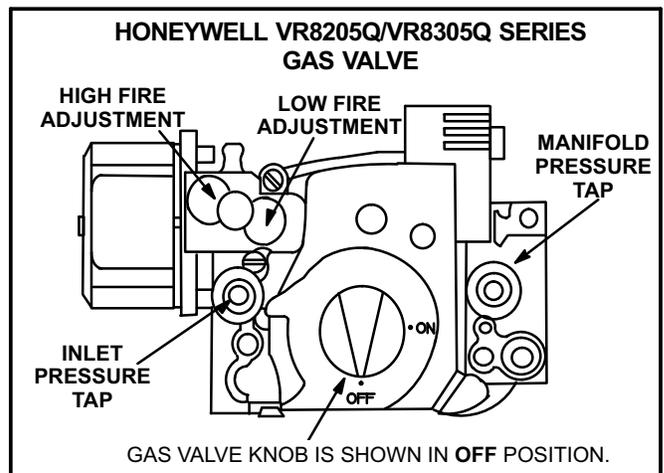


FIGURE 21

- 5- Turn gas valve switch to **OFF**. See figure 20. On Honeywell VR8305Q gas valves, turn the knob on the gas valve clockwise  to “**OFF**”. Do not force. See figure 21.
- 6- Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.
- 7- Turn gas valve switch to **ON**. See figure 20. On Honeywell VR8305Q gas valves, turn the knob on the gas valve counterclockwise  to “**ON**”. Do not force. See figure 21.
- 8- Close or replace the heat section access panel.
- 9- Turn on all electrical power to appliance.
- 10- Set thermostat to desired setting.
- 11- The ignition sequence will start.
- 12- If the appliance does not light the first time (gas line not fully purged), it will attempt up to two more ignitions before locking out.
- 13- If lockout occurs, repeat steps 1 through 10.
- 14- If the appliance will not operate, follow the instructions “Turning Off Gas to Appliance” and call your service technician or gas supplier.

#### Turning Off Gas to Unit

- 1- If using an electromechanical thermostat, set to the lowest setting.
- 2- Before performing any service, turn off all electrical power to the appliance.
- 3- Open or remove the heat section access panel.
- 4- Turn gas valve switch to **OFF**. On Honeywell VR8305Q gas valves, turn the knob on the gas valve clockwise  to “**OFF**”. Do not force.
- 5- Close or replace the heat section access panel.

|   |   |
|---|---|
| <b>⚠ WARNING</b>  |   |
|  | <b>Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.</b> |

### Heating Operation and Adjustments

#### (Gas Units)

#### A-Heating Sequence of Operation

- 1- On a heating demand the combustion air inducer starts immediately.
- 2- Combustion air pressure switch proves inducer operation. After a 30-second pre-purge, power is allowed to ignition control. Switch is factory set and requires no adjustment.

- 3- Spark ignitor energizes and gas valve solenoid opens.
- 4- Spark ignites gas, ignition sensor proves the flame and combustion continues.
- 5- If flame is not detected after first ignition trial, ignition control will repeat steps 3 and 4 two more times before locking out the gas valve.
- 6- For troubleshooting purposes, an ignition attempt after lock out may be re-established manually. Move thermostat to “OFF” and return thermostat switch to “HEAT” position.

#### B-Ignition Control Diagnostic LED's

**TABLE 16  
IGNITION CONTROL HEARTBEAT LED STATUS**

| LED Flashes | Indicates   |
|-------------|---|
| Slow        | Normal operation. No call for heat.                                     |
| Fast        | Normal operation. Call for heat.  |
| Steady Off  | Internal control fault OR no power to control OR Gas Valve Relay Fault. |
| Steady On   | Control internal failure.   |
| 2           | Lockout. Failed to detect or sustain flame.                             |
| 3           | Prove switch open or closed or rollout switch open.                     |
| 4           | Limit switch is open and/or limit has opened three times.               |
| 5           | Flame sensed but gas valve solenoid not energized.                      |

#### C-Limit Controls

Limit controls are factory-set and are not adjustable. The primary limit is located on the blower deck to the right of blower assembly.

#### D-Heating Adjustment

Main burners are factory-set and do not require adjustment.

The following manifold pressures are listed on the gas valve.

- Natural Gas Units - Low Fire - 1.6” w.c. (not adjustable)
- Natural Gas Units - High Fire - 3.7” w.c.
- LP Gas Units - Low Fire - 5.5” w.c. (not adjustable)
- LP Gas Units - High Fire - 10.5” w.c.

### Electric Heat Start-Up (KC Units)

Optional electric heat will stage on and cycle with thermostat demand. Number of stages of electric heat will vary depending on electric heat assembly. See electric heat wiring diagram on unit for sequence of operation.

## Inverter Start-Up

### A-General

Units provide three blower speeds. The blower will operate at lower speeds when cooling demand is low and higher speeds when cooling demand is high. This results in lower energy consumption. See table 18 for detailed unit operation.

Inverter-driven blowers will operate at high speed during ventilation (blower “G” only signal) but can be adjusted to operate at low speed.

Low speed is approximately 66% of the full speed RPM and medium speed is 75% of the full speed RPM.

### B-Set Maximum Blower CFM

- 1- Initiate a blower (G) only signal from the room thermostat or control system.
- 2- Adjust the blower pulley to deliver the full (high speed) CFM in the typical manner. See *Determining Unit CFM* in the Blower Operation and Adjustment section.

Note - The following sections detail how to set ventilation speeds and minimum damper positions on units with standard economizers. On units with high performance economizers, ventilation speeds and three separate damper positions must be programmed via the economizer controller display. See economizer installation instructions and high performance economizer application guide provided with the unit for further instructions.

### C-Set Blower Speed During Ventilation (Units With Standard Economizers Only)

To save energy during ventilation, the blower speed can be set to low. This is accomplished by changing the ventilation speed switch on the VFD control board to “LO”. See figure 22.

*Note - On units equipped with a standard economizer, set damper minimum position as shown in the next section. After adjusting the low speed minimum position, the ventilation speed switch will be in the “LO” position.*

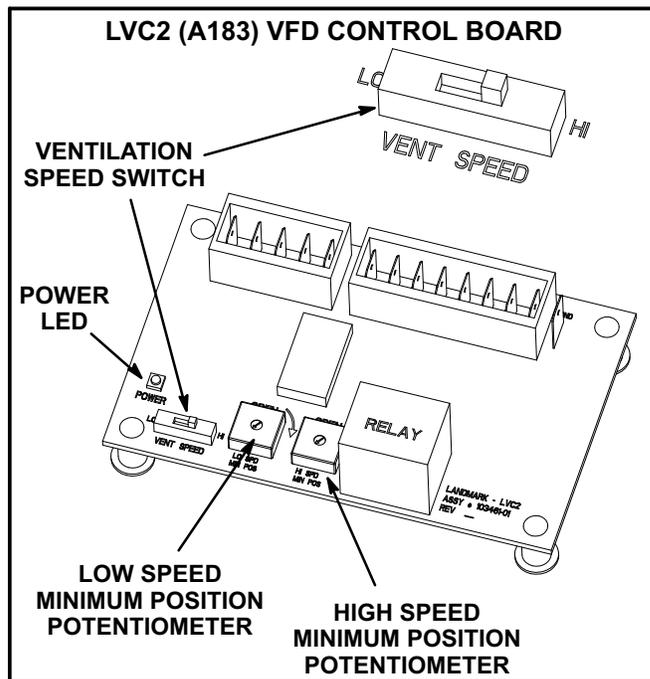


FIGURE 22

### D-Set Damper Minimum Position (Units With Standard Economizers Only)

To maintain required minimum ventilation air volumes when the unit is in the occupied mode, two minimum damper positions must be set. A high and a low speed potentiometer are provided on the VFD control board to adjust minimum damper position. See figure 22. The low speed minimum damper position is used for both low and medium blower speeds as standard economizers only offer 2 damper positions.

#### Set High Speed Minimum Position

- 1- Initiate a blower (G) only AND occupied demand from the room thermostat or control system.
- 2- Set the ventilation speed switch on the VFD control board to “HI”.
- 3- Rotate the high speed potentiometer on the VFD control board to set the high speed minimum damper position.
- 4- Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the potentiometer to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

*Note - Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.*

### Set Low Speed Minimum Position

- 1- Initiate a blower (G) only AND occupied demand from the room thermostat or control system.
- 2- Set the ventilation speed switch on the VFD control board to "LO".
- 3- Rotate the low speed potentiometer on the VFD control board to set the low speed minimum damper position.
- 4- Measure the intake air CFM. If the CFM is lower than the design specified CFM for ventilation air, use the potentiometer to increase the damper percent open. If the CFM is higher than specified, decrease the damper percent open.

*Note - Intake air CFM can also be determined using the outdoor air temperature, return air temperature and mixed air temperature. Refer to the economizer or outdoor air damper installation instructions.*

### Troubleshoot LVC2 Board (A183)

Refer to wiring diagram sections B (unit), C (control) and D (economizer) located on inside of unit panels.

- 1- Inspect the LVC2 for damaged components. Replace the LVC2 if damaged components are found.
- 2- Check all wire connections to LVC2; secure if loose.
- 3- Check for 24VAC signal at the thermostat blower input (G to GND terminal). See figure 23.

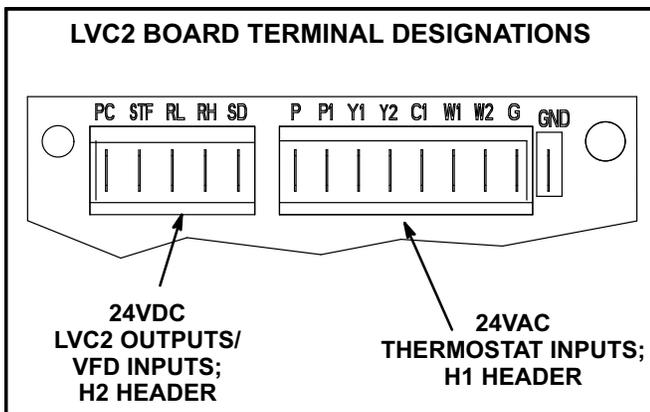


FIGURE 23

- 4- If there is no thermostat signal, troubleshoot back toward the thermostat.
- 5- Check the power LED on the board. See figure 22.
- 6- If the power LED is not on, check voltage between LVC2 terminals PC (H2-1) and SD (H2-5). Voltage should read 24VDC.
- 7- If voltage does not read 24VDC, disconnect the H2 header from the LVC2 VFD terminal block (to make sure the LVC2 is not shorting 24VDC supply from the inverter). Measure the voltage between the end terminals on the H2 header. If 24VDC is present, replace the LVC2 board. If no voltage is read, troubleshoot the VFD.
- 8- When LVC2 24VAC thermostat blower (G) input and 24VDC power are present, check the LVC2 low and high speed outputs. The LVC2 uses inverse logic to enable the blower; 1VDC will be read at the enabled blower speed terminal. See table 17.
- 9- If all inputs are correct and the unit still does not operate as intended, replace LVC2 board.

**TABLE 17  
LVC2 BOARD BLOWER OUTPUTS**

| Output Terminals | Voltage | Blower Operation                 |
|------------------|---------|----------------------------------|
| RL-SD            | 1VDC    | Low Speed                        |
| RH-SD            | 24VDC   |                                  |
| RL-SD            | 24VDC   | High Speed                       |
| RH-SD            | 1VDC    |                                  |
| RL-SD            | 1VDC    | Illegal State<br>(replace board) |
| RH-SD            | 1VDC    |                                  |
| RL-SD            | 24VDC   | Blower Off<br>(replace board)    |
| RH-SD            | 24VDC   |                                  |

**TABLE 18  
UNIT OPERATION**

| TStat<br>DDC | Humid.<br>Sensor | OAS | Compressor |      |     | Blower Speeds |            |            |            |      | OD<br>Fans | Gas<br>Heat | Econo      |        | Reheat<br>Valve |
|--------------|------------------|-----|------------|------|-----|---------------|------------|------------|------------|------|------------|-------------|------------|--------|-----------------|
|              |                  |     | 1-Low      | 1-Hi | 2   | Vent          | Cool<br>C1 | Cool<br>C2 | Cool<br>C3 | Heat | 1 & 2      | 1 & 2       | Occupied   | Unocc. |                 |
| G            |                  |     | Off        | Off  | Off | X             |            |            |            |      | Off        | Off         | Min (Vent) | Closed | Off             |
| W1           |                  |     | Off        | Off  | Off |               |            |            |            | X    | Off        | Low         | Min Hi     | Closed | Off             |
| W2           |                  |     | Off        | Off  | Off |               |            |            |            | X    | Off        | Hi          | Min Hi     | Closed | Off             |
| Y1           |                  | No  | On         | Off  | Off |               | X          |            |            |      | On         | Off         | Min Lo     | Closed | Off             |
| Y1 + Y2      |                  | No  | On         | Off  | On  |               |            | X          |            |      | On         | Off         | Min Lo     | Closed | Off             |
| Y1 + Y2 + Y3 |                  | No  | On         | On   | On  |               |            |            | X          |      | On         | Off         | Min Hi     | Closed | Off             |
| Y1           |                  | Yes | Off        | Off  | Off |               |            |            | X          |      | Off        | Off         | Mod        | Mod    | Off             |
| Y1 + Y2      |                  | Yes | On         | Off  | Off |               | X          |            |            |      | On         | Off         | Mod        | Mod    | Off             |
| Y1 + Y2 + Y3 |                  | Yes | On         | On   | Off |               |            |            | X          |      | On         | Off         | Mod        | Mod    | Off             |
|              | Yes              | No  | On         | On   | Off |               | X          |            |            |      | On         | Off         | Min Lo     | Closed | On              |
| Y1           | Yes              | No  | On         | On   | On  |               |            | X          |            |      | On         | Off         | Min Lo     | Closed | On              |
| Y1 + Y2      | Yes              | No  | On         | Off  | On  |               |            | X          |            |      | On         | Off         | Min Lo     | Closed | Off             |
| Y1 + Y2 + Y3 | Yes              | No  | On         | On   | On  |               |            |            | X          |      | On         | Off         | Min Hi     | Closed | Off             |
|              | Yes              | Yes | On         | On   | Off |               | X          |            |            |      | On         | Off         | Min Lo     | Closed | On              |
| Y1           | Yes              | Yes | On         | On   | On  |               |            | X          |            |      | On         | Off         | Min Lo     | Closed | On              |
| Y1 + Y2      | Yes              | Yes | On         | Off  | On  |               |            | X          |            |      | On         | Off         | Min Lo     | Closed | Off             |
| Y1 + Y2 + Y3 | Yes              | Yes | On         | On   | On  |               |            |            | X          |      | On         | Off         | Min Hi     | Closed | Off             |

## Hot Gas Reheat Start-Up And Operation

### General

Hot gas reheat units provide a dehumidifying mode of operation. These units contain a reheat coil adjacent to and downstream of the evaporator coil. Reheat coil solenoid valve, L14, routes hot discharge gas from the compressor to the reheat coil. Return air pulled across the evaporator coil is cooled and dehumidified; the reheat coil adds heat to supply air. See figure 24 for reheat refrigerant routing.

### L14 Reheat Coil Solenoid Valve

When room conditions close the dehumidistat switch, L14 reheat valve is energized and refrigerant is routed to the reheat coil.

### Reheat Setpoint

Reheat is factory-set to energize when indoor relative humidity rises above setpoint. Reheat will terminate when the indoor relative humidity falls below or the digital output de-energizes. Turn the knob on the dehumidistat to adjust the setpoint.

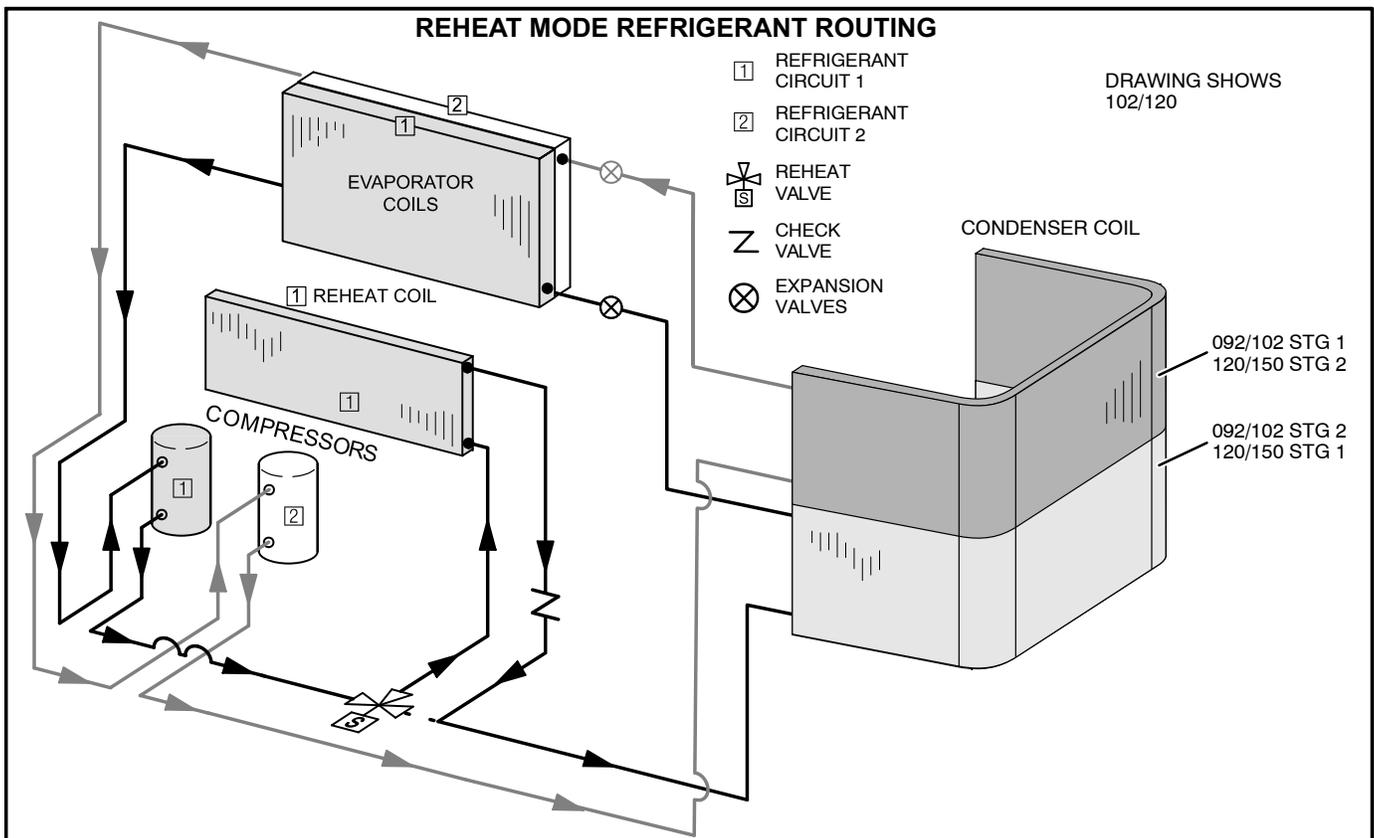
### Check-Out

Test hot gas reheat operation using the following procedure.

- 1- Make sure reheat is wired as shown in wiring section.
- 2- Initiate a dehumidification demand by adjusting dehumidistat setpoint knob **BELOW** indoor relative humidity. The blower, compressor 1 and compressor 2 should be operating.
- 3- End a dehumidification demand by adjusting setpoint knob **ABOVE** indoor relative humidity. The blower, compressor 1, and compressor 2 should de-energize.

### Default Reheat Operation

See table 18 for detailed unit operation.



## Service

The unit should be inspected once a year by a qualified service technician.

## ⚠ CAUTION

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

### A-Filters

Units are equipped with four 20 X 25 X 2" filters. Filters should be checked monthly and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 25.

*NOTE-Filters must be U.L.C. certified or equivalent for use in Canada.*

### B-Lubrication

All motors are lubricated at the factory. No further lubrication is required.

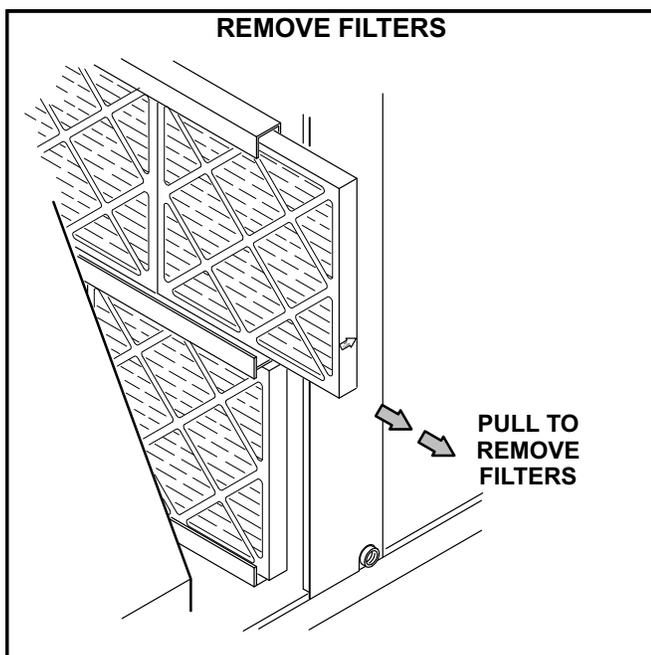


FIGURE 25

### C-Burners (Gas Units)

Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

Clean burners as follows:

- 1- Turn off both electrical power and gas supply to unit.
- 2- Remove burner compartment access panel.
- 3- Remove screws securing burners to burner support and lift the individual burners or the entire burner assembly from the orifices. See figure 26. Clean as necessary.
- 4- Locate the ignitor under the left burners. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See figure 27.

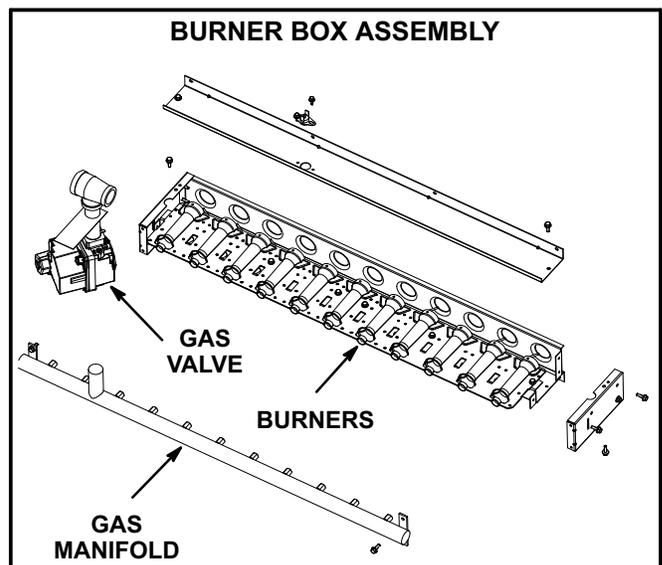


FIGURE 26

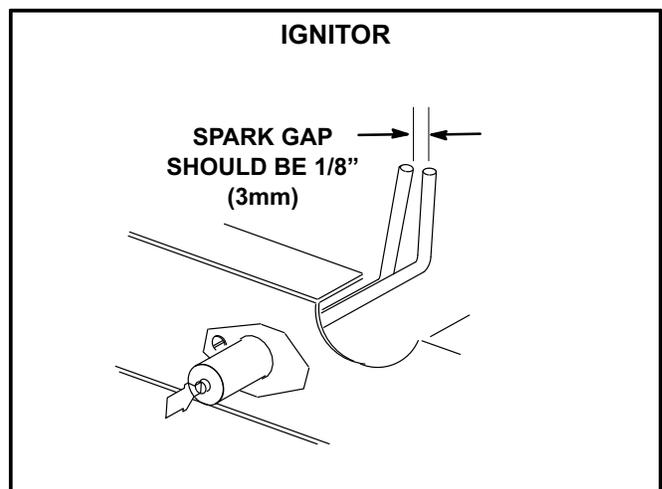


FIGURE 27

- 5- Check the alignment of the ignitor and the sensor as shown in figure 28 and table 19.
- 6- Replace burners and screws securing burner.

- 7- Replace access panel.
- 8- Restore electrical power and gas supply. Follow lighting instructions attached to unit and use inspection port in access panel to check flame.

**⚠ WARNING**

**Danger of explosion. Can cause injury or death. Do not overtighten main burner mounting screws. Snug tighten only.**

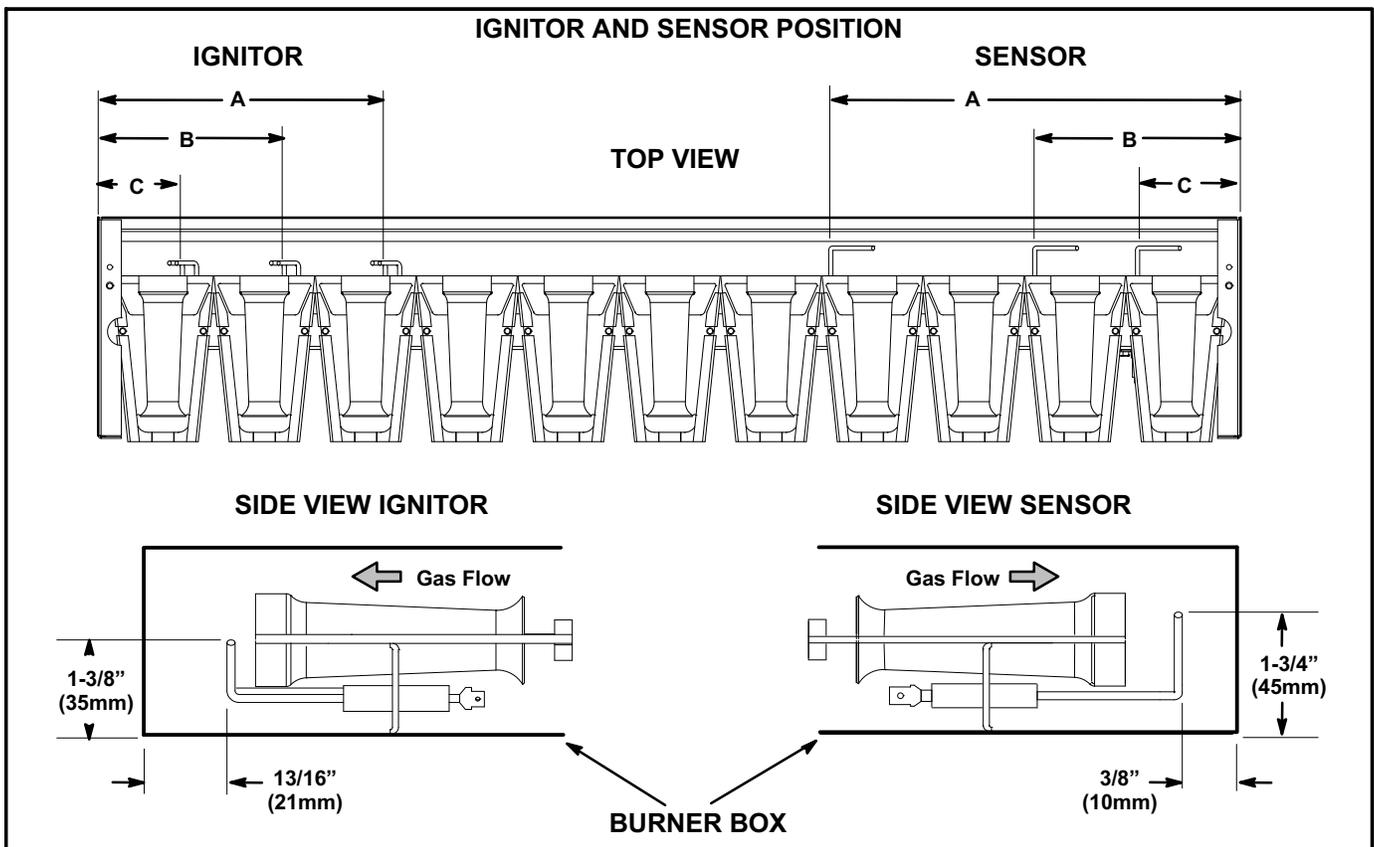
**TABLE 19**

| Dimension | Unit Btuh Input | Length - in. (mm) |             |
|-----------|-----------------|-------------------|-------------|
|           |                 | Ignitor           | Sensor      |
| A         | 130K            | 7-3/4 (197)       | 11 (279)    |
| B         | 180K            | 5 (127)           | 5-1/2 (140) |
| C         | 240K            | 2-1/4 (57)        | 2-3/4 (70)  |

**D-Combustion Air Inducer (Gas Units)**

A combustion air proving switch checks combustion air inducer operation before allowing power to the gas controller. Gas controller will not operate if inducer is obstructed.

Under normal operating conditions, the combustion air inducer wheel should be checked and cleaned prior to the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule. With power supply disconnected, the condition of the inducer wheel can be determined by looking through the vent opening.



**FIGURE 28**

Clean combustion air inducer as follows:

- 1- Shut off power supply and gas to unit.
- 2- Disconnect pressure switch air tubing from combustion air inducer port.
- 3- Remove and retain screws securing combustion air inducer to flue box. Remove vent connector. See figure 29.

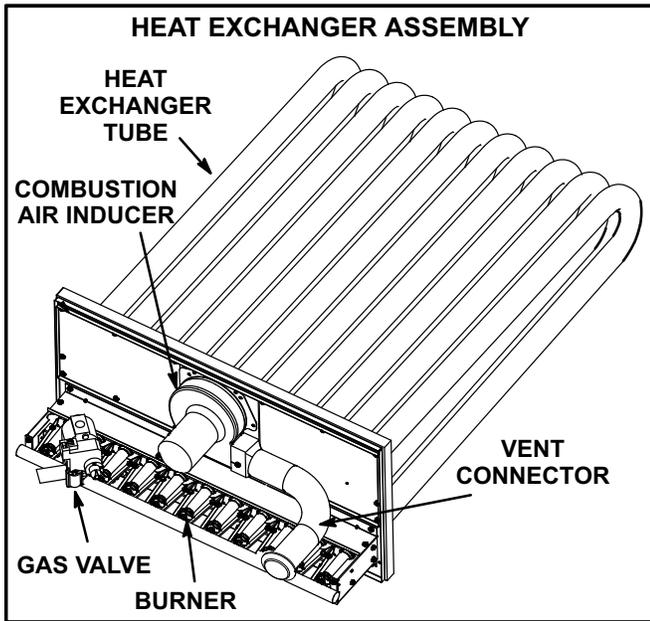


FIGURE 29

- 4- Clean inducer wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.
- 5- Return combustion air inducer motor and vent connector to original location and secure with retained screws. It is recommended that the

combustion air inducer gasket be replaced during reassembly.

- 6- Clean combustion air inlet louvers on heat access panel using a small brush.

#### E-Flue Passageway and Flue Box (Gas Units)

- 1- Remove combustion air inducer assembly as described in section D.
- 2- Remove flue box cover. Clean with a wire brush as required.
- 3- Clean tubes with a wire brush.
- 4- Reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

#### F-Evaporator Coil

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleaner. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

#### G-Condenser Coil

Clean condenser coil annually with water and inspect monthly during the cooling season.

Clean the coil by spraying the coil steadily and uniformly from top to bottom. Do not exceed 900 psi or a 45° angle; nozzle must be at least 12 inches from the coil face. Take care not to fracture the braze between the fins and refrigerant tubes. Reduce pressure and work cautiously to prevent damage.

#### H-Supply Air Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel.

## START-UP REPORT

Job Name: \_\_\_\_\_  
 Store No. \_\_\_\_\_ Start-Up Date: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_  
 Start-Up Contractor: \_\_\_\_\_  
 Technician: \_\_\_\_\_  
 Model No.: \_\_\_\_\_  
 Serial No.: \_\_\_\_\_  
 RTU No.: \_\_\_\_\_ Catalog No.: \_\_\_\_\_

| Inspections and Checks                                 |     |    |   |
|--|-----|----|---|
| Damage?  | Yes | No | R22 <input type="checkbox"/> R410A <input type="checkbox"/> |
| If yes, reported to: _____                             |     |    |   |
| Verify factory and field-installed accessories.        |     |    |   |
| Check electrical connections. Tighten if necessary.    |     |    |   |
| Supply voltage: L1-L2 _____ L1-L3 _____ L2-L3 _____    |     |    |   |
| If unit contains a 208-230/240 volt transformer:       |     |    |   |
| Check primary transformer tap <input type="checkbox"/> |     |    |   |
| Transformer secondary voltage: _____                   |     |    |   |

| Cooling Checks   |                 |    |    |                  |       |       |           |       |                    |    |    |                |
|--|-----------------|----|----|------------------|-------|-------|-----------|-------|--------------------|----|----|----------------|
| Compressor Rotation <input type="checkbox"/> Ambient Temp. _____ Return Air Temp. _____ Supply Air Temp. _____ |                 |    |    |                  |       |       |           |       |                    |    |    |                |
|  | Compressor Amps |    |    | Compressor Volts |       |       | Pressures |       | Condenser Fan Amps |    |    | CC Heater Amps |
|  | L1              | L2 | L3 | L1-L2            | L1-L3 | L2-L3 | Disch.    | Suct. | L1                 | L2 | L3 | L1             |
| 1  |                 |    |    |                  |       |       |           |       |                    |    |    |                |
| 2  |                 |    |    |                  |       |       |           |       |                    |    |    |                |
| 3  |                 |    |    |                  |       |       |           |       |                    |    |    |                |
| 4  |                 |    |    |                  |       |       |           |       |                    |    |    |                |
|  |                 |    |    |                  |       |       |           |       |                    |    |    |                |
|  |                 |    |    |                  |       |       |           |       |                    |    |    |                |

| Blower Checks                                  |  |             |  |
|--|--|-------------|--|
| Pulley/Belt Alignment <input type="checkbox"/> | Blower Rotation <input type="checkbox"/> |             |  |
| Set Screws Tight <input type="checkbox"/>      | Belt Tension <input type="checkbox"/>    |             |  |
| Nameplate Amps: _____ Volts: _____             |  |             |  |
| Motor  | Amps                                     | Volts       |  |
|  | L1 _____                                 | L1-L2 _____ |  |
|  | L2 _____                                 | L1-L3 _____ |  |
|  | L3 _____                                 | L2-L3 _____ |  |

| Heating Checks - Gas  |                   |           |
|---|-------------------|-----------|
| Fuel type: Nat. <input type="checkbox"/> LP <input type="checkbox"/> Inlet Pressure: _____ in. w.c. |                   |           |
| Return Air Temp.: _____ Supply Air Temp.: _____   |                   |           |
| Altitude: _____ Primary Limits Operate: <input type="checkbox"/>                                    |                   |           |
| CO <sub>2</sub> %: _____  |                   |           |
| Gas Valve   | Manifold Pressure |           |
|   | Low Fire          | High Fire |
| GV1   |                   |           |
| GV2   |                   |           |

| Control Type |
|--------------|
|              |

| Heating Checks - Electric                       |      |    |    |    |    |    |    |
|---|------|----|----|----|----|----|----|
| Return Air Temp.: _____ Supply Air Temp.: _____ |      |    |    |    |    |    |    |
| Limits Operate: <input type="checkbox"/>        |      |    |    |    |    |    |    |
|   | Amps |    |    |    |    |    |    |
|   | L1   | L2 | L3 |    | L1 | L2 | L3 |
| 1   |      |    |    | 10 |    |    |    |
| 2   |      |    |    | 11 |    |    |    |
| 3   |      |    |    | 12 |    |    |    |
| 4   |      |    |    | 13 |    |    |    |
| 5   |      |    |    | 14 |    |    |    |
| 6   |      |    |    | 15 |    |    |    |
| 7   |      |    |    | 16 |    |    |    |
| 8   |      |    |    | 17 |    |    |    |
| 9   |      |    |    | 18 |    |    |    |

| Accessory Checks                   |   |
|------------------------------------|---|
| Power Exhaust Amps                 |   |
| 1 _____                            | 2 _____ None <input type="checkbox"/>                 |
| Economizer Operation               |   |
| Min. Pos. <input type="checkbox"/> | Motor travel full open/close <input type="checkbox"/> |