

**RETAIN THESE INSTRUCTIONS  
FOR FUTURE REFERENCE**

# INSTALLATION INSTRUCTIONS

**LGH/LCH242H (20 TON)**

**LGH/LCH300H (25 TON)**

**LGH/LCH360H (30 TON)**

**GAS AND COOLING PACKAGED UNITS**

506765-05

4/2022

Supersedes 3/2020

## **⚠ WARNING**

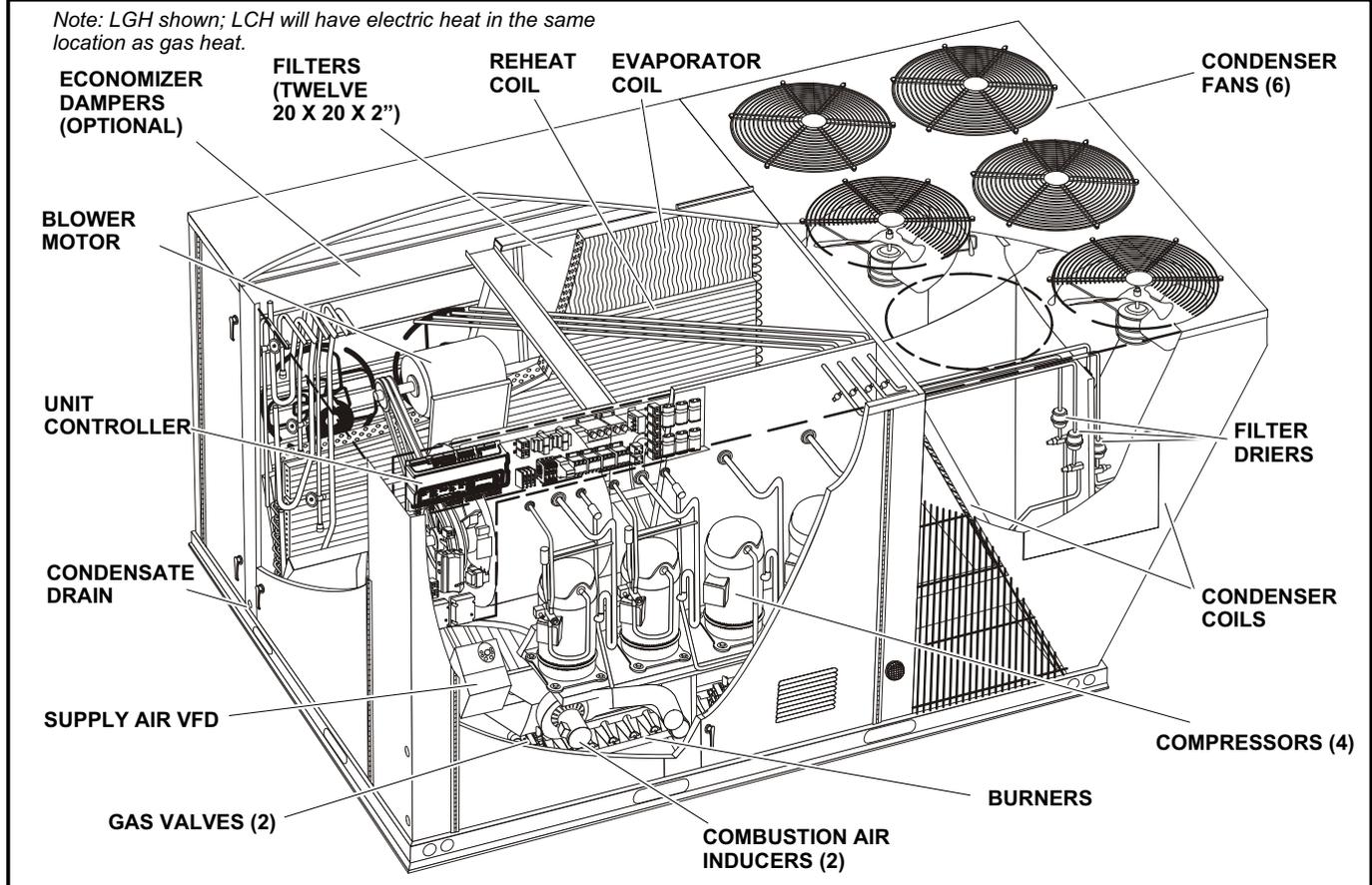
**Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional HVAC installer or equivalent, service agency, or the gas supplier**

### Table Of Contents

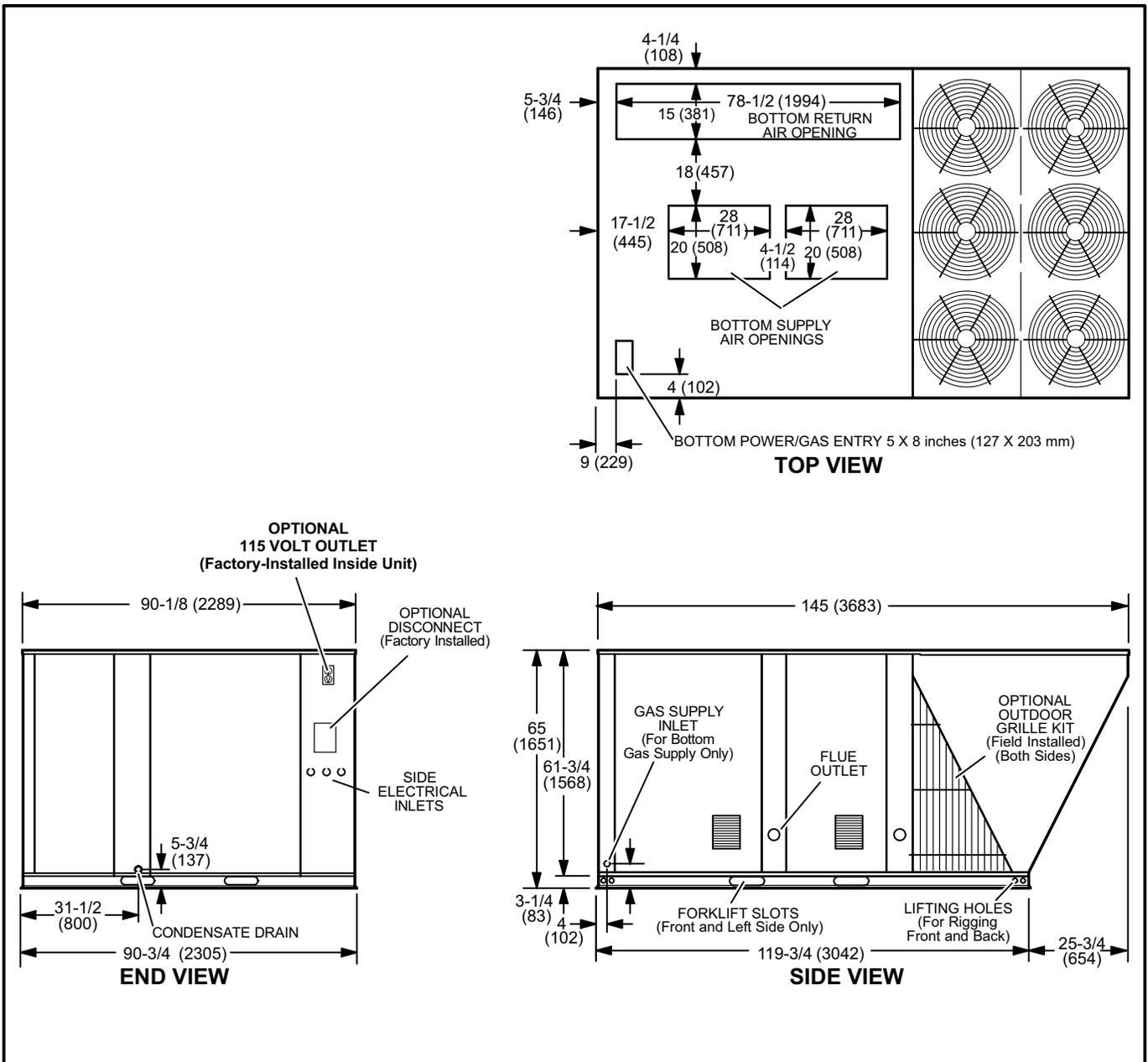
Dimensions . . . . .	Page 2	Electrical Connections . . . . .	Page 8
Shipping and Packing List . . . . .	Page 2	Blower Operation and Adjustments . . . . .	Page 12
General . . . . .	Page 2	Cooling Start-Up . . . . .	Page 17
Requirements . . . . .	Page 3	Gas Heat Start-Up . . . . .	Page 33
Unit Support . . . . .	Page 4	Heating Operation and Adjustments . . . . .	Page 35
Duct Connection . . . . .	Page 5	Electric Heat Start-Up . . . . .	Page 35
Rigging Unit For Lifting . . . . .	Page 5	Variable Air Volume Start-Up . . . . .	Page 35
Condensate Drains . . . . .	Page 5	Multi-Stage Air Volume Start-Up . . . . .	Page 37
Gas Piping . . . . .	Page 5	Optional Economizer Settings . . . . .	Page 42
Pressure Test Gas Piping . . . . .	Page 6	Optional Outdoor Air CFM Control . . . . .	Page 47
High Altitude Derate . . . . .	Page 7	Service . . . . .	Page 48
Factory-Installed Options . . . . .	Page 7		

### LGH/LCH242, 300 & 360 Parts Arrangement

*Note: LGH shown; LCH will have electric heat in the same location as gas heat.*



## LGH/LCH242, 300 & 360 Dimensions - LGH Heat Section Shown



### 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.

Units are available in 20, 25, and 30 ton cooling capacities. The gas/electric units are available in 260,000, 360,000, or 480,000 Btuh heating inputs. Optional electric heat is factory- or field-installed in electric/electric units. All units contain four compressors.

LGH/LCH242 units are available with variable air volume only. LGH/LCH300 and 360 are available in constant air volume, variable air volume, or multi-staged air volume. Refer to the 9<sup>th</sup> character of the model number to determine type of blower:

- B - Constant Air Volume
- V - Variable Air Volume
- M - Multi-Stage Air Volume

Units are available using R410A, an ozone-friendly HFC refrigerant. Refer to the Cooling Start-Up section for precautions when installing unit.

**⚠ IMPORTANT**

**Supply air VFD motor rotation is controlled independently from scroll compressor rotation. See Blower Operation and Adjustments section for correct compressor rotation. Compressor damage due to improper rotation is the responsibility of the installer.**

**Requirements**

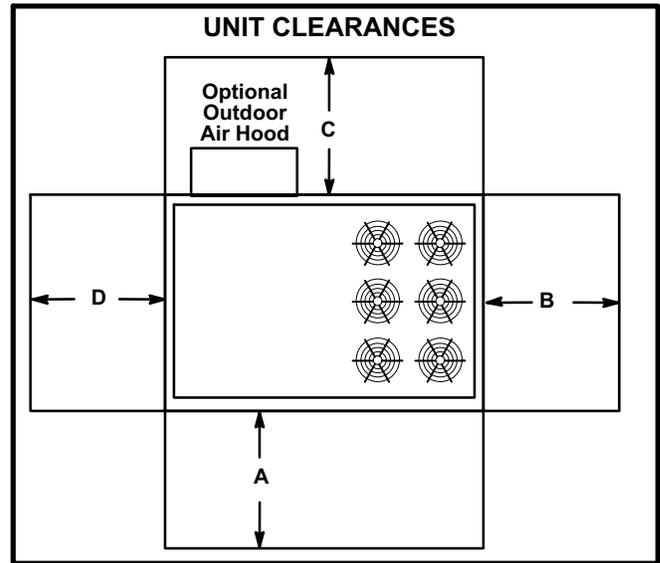
Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

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:

- The vent hood must be installed per these installation instructions.
- 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.

See figure 1 and table 1 for unit clearances.



**FIGURE 1**

**TABLE 1  
UNIT CLEARANCES**

<sup>1</sup> Unit Clearance	A in.(mm)	B in.(mm)	C in.(mm)	D* in.(mm)	Top Clearance
Service Clearance	60 (1524)	36 (914)	36 (914)	66 (1676)	Unobstructed
Service Clearance - Units With High Static Exhaust Fans	60 (1524)	36 (914)	80 (2032)	66 (1676)	Unobstructed
Clearance to Combustibles - LGH Units	36 (914)	1 (25)	1 (25)	1 (25)	Unobstructed
Minimum Operation Clearance	45 (1143)	36 (914)	36 (914)	41 (1041)	Unobstructed
Minimum Operation Clearance - Units With High Static Exhaust Fans	45 (1143)	36 (914)	80 (2032)	41 (1041)	Unobstructed

Note - Entire perimeter of unit base requires support when elevated above mounting surface. \*Not applicable on units equipped with horizontal barometric relief dampers.  
<sup>1</sup>**Service Clearance** - Required for removal of serviceable parts. **Clearance to Combustibles** - Required clearance to combustible material (gas units). **Minimum Operation Clearance** - Required clearance for proper unit operation.

## ⚠ 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.

## ⚠ 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.

## ⚠ 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.

## ⚠ 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.

### 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 S6CURB roof mounting frame.

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

## ⚠ CAUTION

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.

### A-Downflow Discharge Application

#### Roof Mounting with S6CURB

- 1- The roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The 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 S6CURB roof mounting frame is required.*

### B-Horizontal Discharge Applications

- 1- Units installed in horizontal airflow applications must use an LARMFH30/36 horizontal roof mounting frame. The supply air duct connects to the horizontal supply air opening on the LARMFH30/36. The return air duct connects to the unit horizontal return air opening. Refer to unit dimensions.
- 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.)

### RIGGING

Unit	*Weight	
	Lbs.	Kg.
LGH	3585	1626
LCH	3509	1592

\*Maximum weight with all available factory-installed accessories.

**LIFTING POINT SHOULD BE DIRECTLY ABOVE CENTER OF GRAVITY**

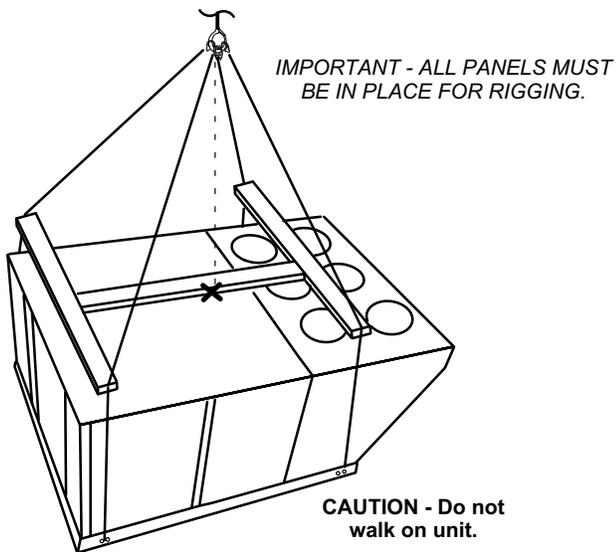


FIGURE 2

## Condensate Drains

Remove cap and make drain connection to the 1" N.P.T. drain coupling provided on unit. A trap must be installed between drain connection and an open vent for proper condensate removal. See figure 3. 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 1 and 2 for condensate drain location.

*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.*

### CONDENSATE DRAIN CONNECTION

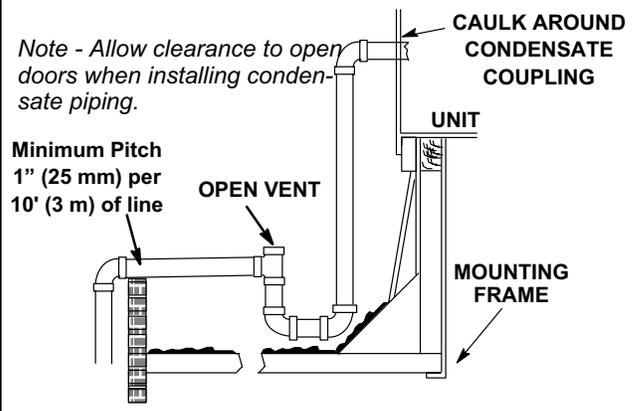


FIGURE 3

## Connect Gas Piping (Gas Units)

Before connecting 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. (1.17kPa) 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 13.5" w.c. (3.36kPa).

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 4 for gas supply piping entering outside the unit. Figure 5 shows complete bottom gas entry piping.

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

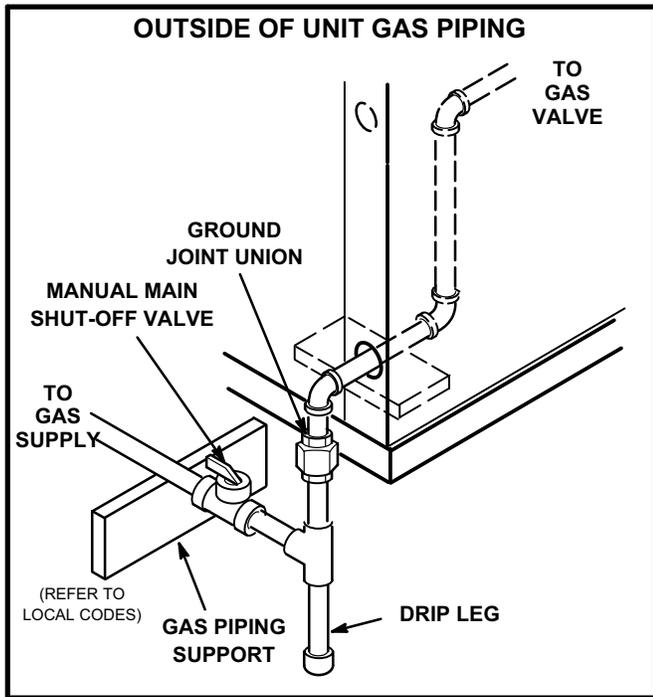


FIGURE 4

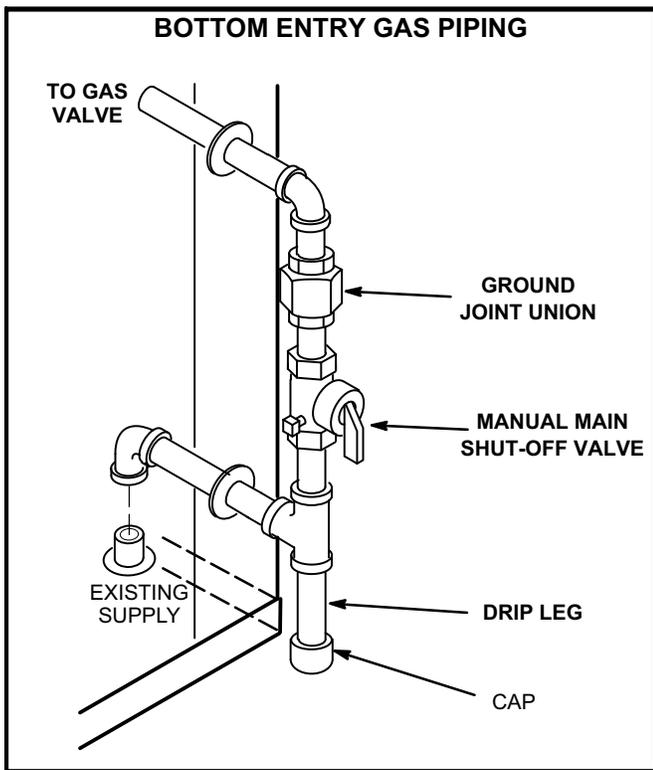


FIGURE 5

### 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 (3.5kPa). See figure 6.

*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.

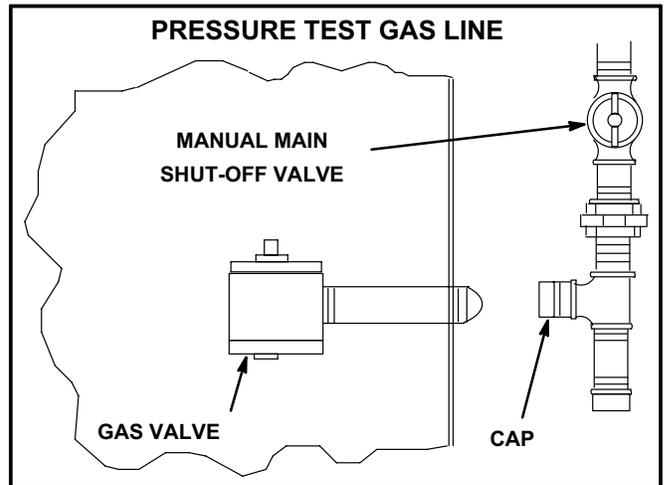


FIGURE 6

### 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.*

## 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.

Refer to table 2 for high altitude adjustments.

**TABLE 2  
HIGH ALTITUDE DERATE**

Altitude Ft.*	Gas Manifold Pressure
2000-4500	See Unit Nameplate
4500 And Above	Derate 2% / 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.

## Factory-Installed Options

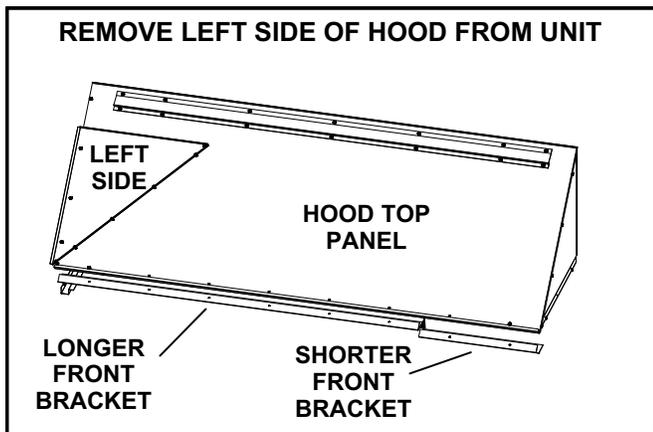
### A-Economizer

The Unit Controller A55 controls economizer operation and provides potentiometers to control minimum damper position and enthalpy control adjustments. See the economizer control settings section.

### B-Intake Hood

Outdoor air hood is shipped folded down over the horizontal supply air opening. The intake hood filters and support brackets are shipped unassembled in the blower compartment. Install as follows:

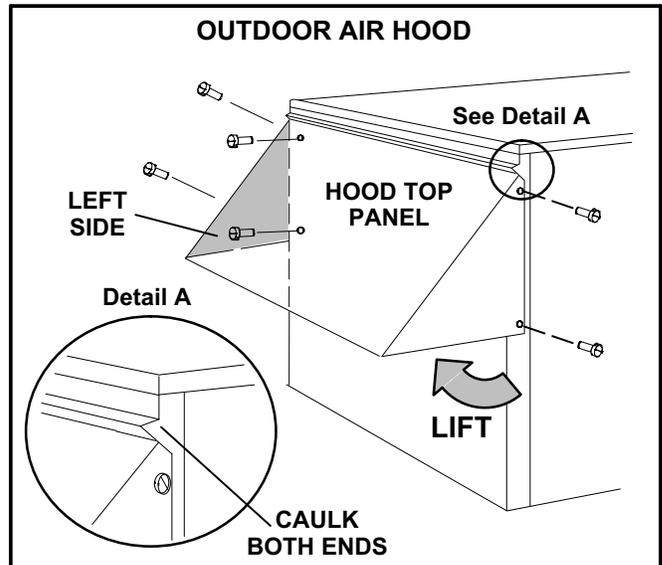
- 1- Remove left side from hood top panel. See figure 7.



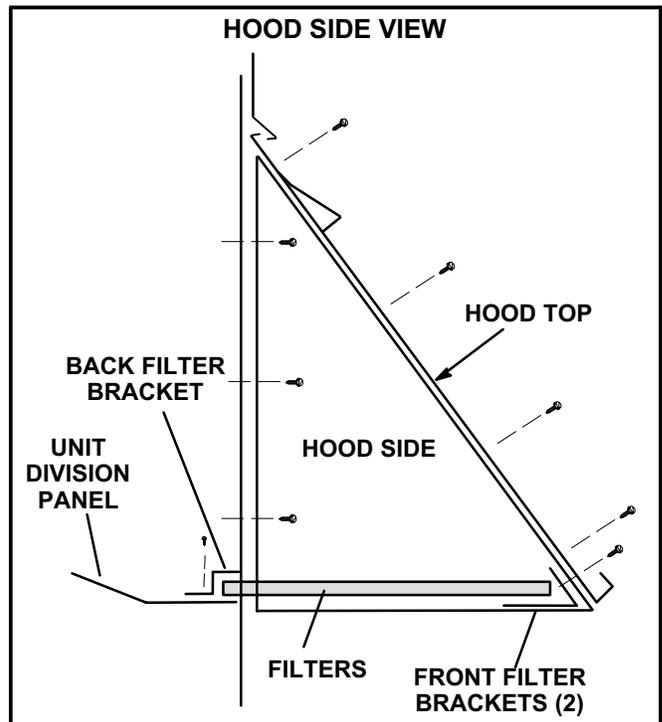
**FIGURE 7**

- 2- Remove and retain screws securing hood to unit.
- 3- Lift (rotate) the bottom of the hood top panel and attach left side to hood top panel. See figure 8.
- 4- Secure sides of hood to unit mullions with retained screws.
- 5- Caulk hinge opening on each end of air hood.

- 6- Install back filter bracket on unit division panel as shown in figure 9.



**FIGURE 8**



**FIGURE 9**

- 7- Secure side seals to the hood sides as shown in figure 10.
- 8- Install longer front filter bracket on hood top as shown in figures 7 and 9. Insert four filters.
- 9- Slide fifth filter into back filter bracket and hold in place at the top of the opening with the shorter front bracket. Align holes on hood with bracket holes and secure filter bracket with sheet metal screws.

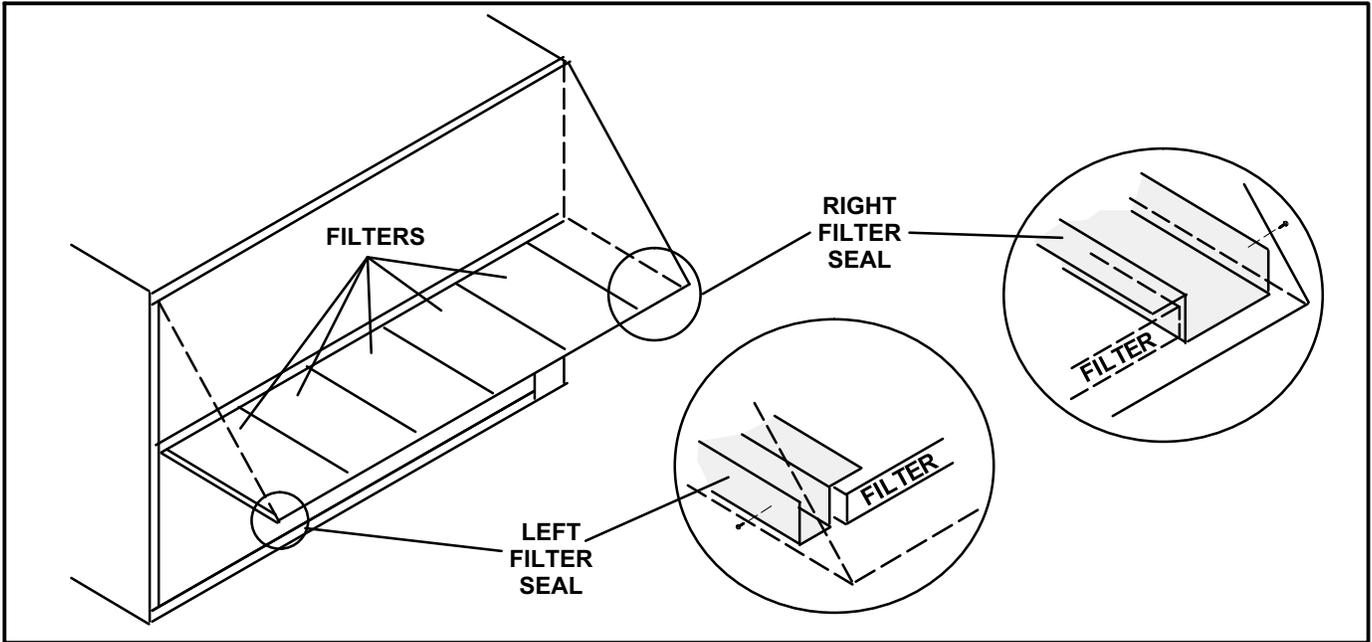


FIGURE 10

## Electrical Connections

### POWER SUPPLY

#### A-Wiring

Route field wiring in conduit between bottom power entry disconnect. See figure 11. This does not supersede local codes or authorities having jurisdiction.

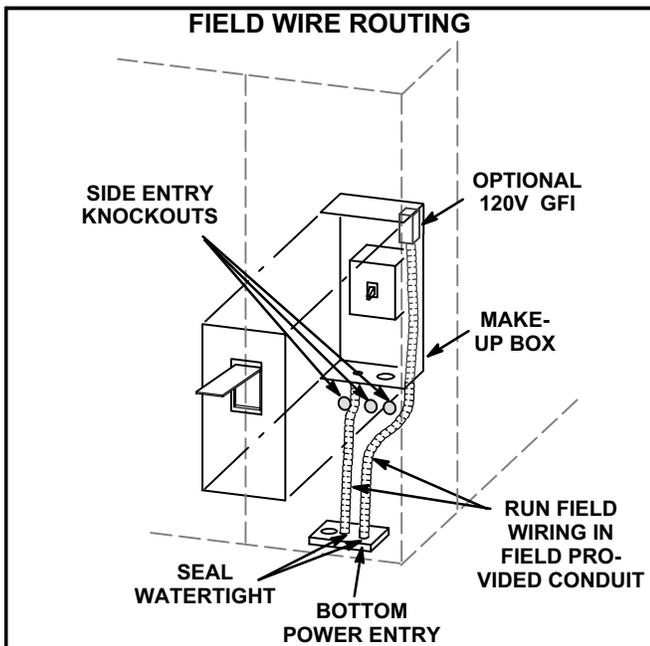


FIGURE 11

## ⚠ WARNING

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- Units are factory-wired for 230/460/575 volt supply. For 208V supply, remove the insulated terminal cover from the 208V terminal on the control transformer. Move the wire from the transformer 230V terminal to the 208V terminal. Place the insulated terminal cover on the unused 230V terminal.
- 2- Route power through the bottom power entry area and connect to line side of unit disconnect, circuit breaker or terminal block. See unit wiring diagram.
- 3- *Units With Optional 120v GFCI Outlet -* Route and connect separate 120v wiring to GFCI outlets which do not have factory-installed wiring. Route field wiring in conduit between bottom power entry and GFCI. See figure 11.

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

Units equipped with an optional inverter (VFD) 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 3 to determine the appropriate replacement inverter.

**TABLE 3  
INVERTER UP-SIZING**

Factory-Installed Inverter HP	Replacement Inverter HP
2	5
3	7-1/2
5	10
7-1/2	15*
10	20*

\*Replace the existing mounting plate.

**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-Wire Routing**

Route thermostat cable or wires from subbase through knockout provided in unit. For thermostat wire runs up to 60 feet, use 18 gauge wire. For 60 to 90 feet runs, use 16 gauge wire.

*IMPORTANT - Unless field thermostat wires are rated for maximum unit voltage, they must be routed away from line voltage wiring.*

**C-Wiring Connections**

The Unit Controller will operate the unit from a thermostat or zone sensor based on the System Mode. The default System Mode is the thermostat mode. Refer to the Unit Controller Setup Guide to change the System Mode.

1- **Default Thermostat Mode -**

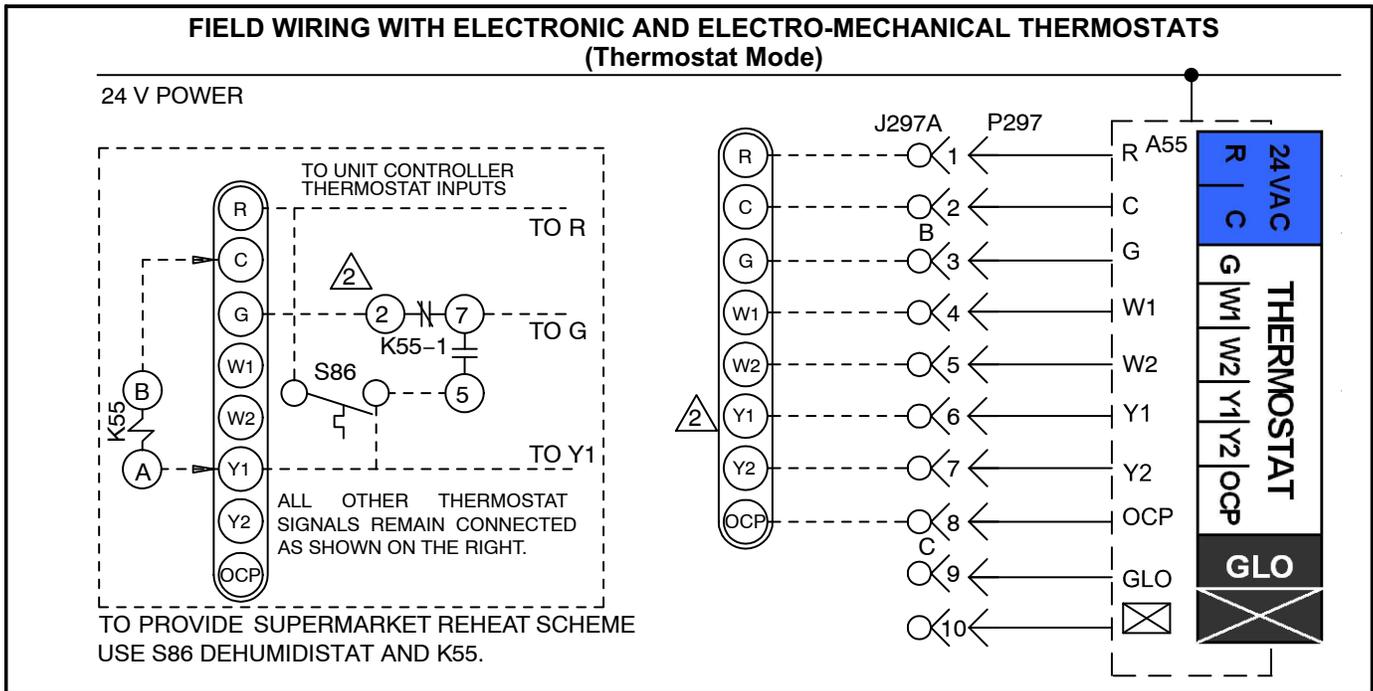
The Unit Controller will operate two stages of heating and cooling based on thermostat demands. Install thermostat assembly in accordance with instructions provided with thermostat. See figure 12 for field wiring and wiring diagrams on unit.

*IMPORTANT-Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may result in intermittent operation.*

2- **Zone Sensor Mode**

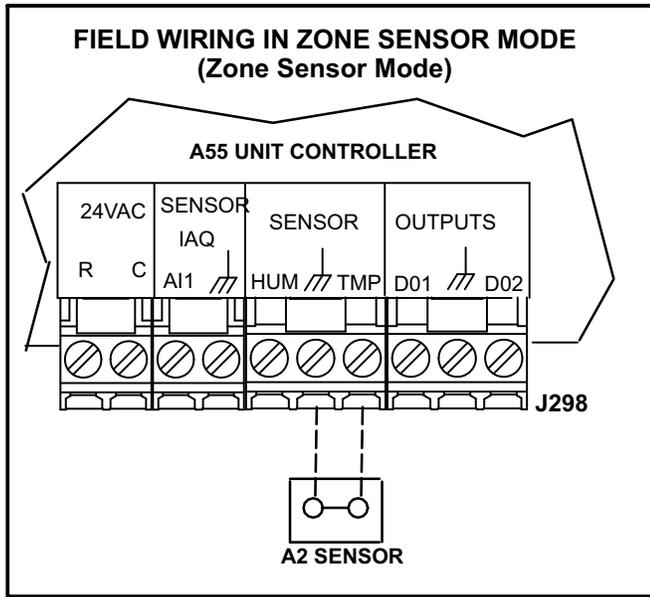
The Unit Controller will operate heating and cooling based on the Unit Controller internal setpoints and the temperature from the A2 zone sensor. An optional Network Control Panel (NCP) can also be used to provide setpoints. A thermostat or return air sensor can be used as a back-up mode. Make zone sensor wiring connections as shown in figure 13.

*Note - Install sensor and make communication wiring connections as shown in literature provided with sensor.*



**FIGURE 12**

**CONTROL WIRING (continued)**



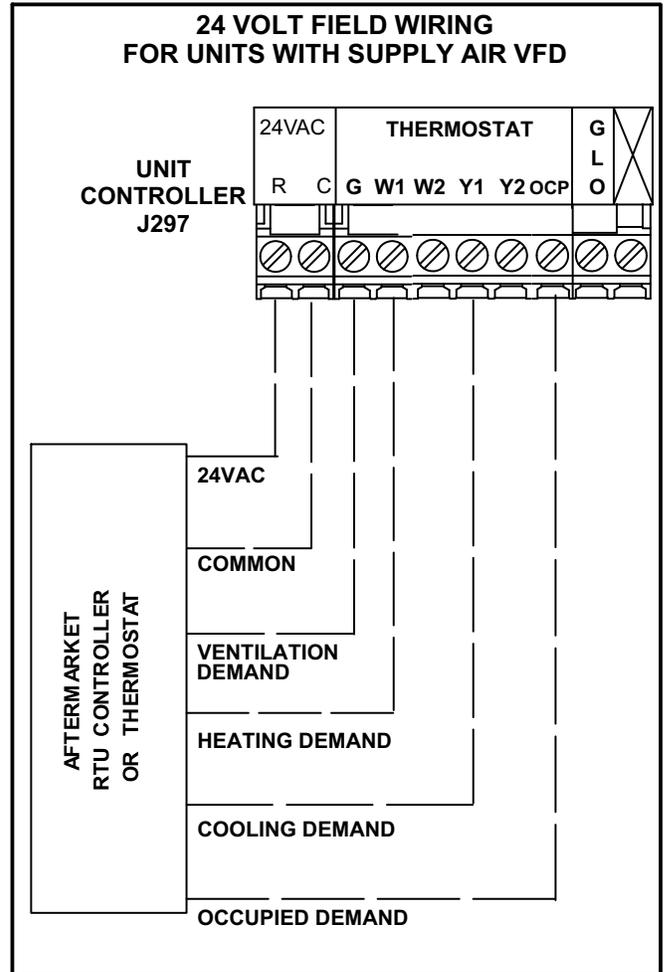
**FIGURE 13**

**3- Third-Party Zoning -**

The Unit Controller will operate up to four stages of heating and cooling based on a third-party zoning system. Only 4 inputs are required to control the rooftop unit: G (blower enable), OCP (occupied), Y1 (enables discharge cooling) and W1 (enables discharge heating). Make wiring connections as shown in figure 14.

**D-Hot Gas Reheat**

- 1- Install humidity sensor in accordance with instructions provided with sensor. A DDC input may be used to initiate dehumidification instead of a sensor.
- 2- Make wiring connections as shown in figure 12 for Thermostat Mode or figure 13 for Zone Sensor Mode. In addition, connect either a humidity sensor or a dehumidification input. See figure 15 or 16 for humidity sensor wiring or figure 17 for dehumidification input wiring.



**FIGURE 14**

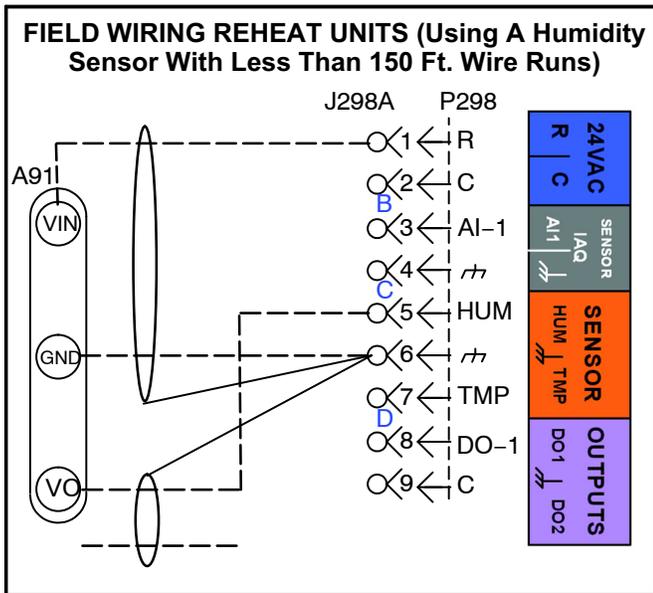
Humidity Sensor Cable Applications:

**Wire runs of 50 feet (mm) or less:**

Use two separate shielded cables containing 20AWG minimum, twisted pair conductors with overall shield. Belden type 8762 or 88760 (plenum) or equivalent. Connect both cable shield drain wires to the Unit Controller as shown in figure 15.

**Wire runs of 150 feet (mm) or less:**

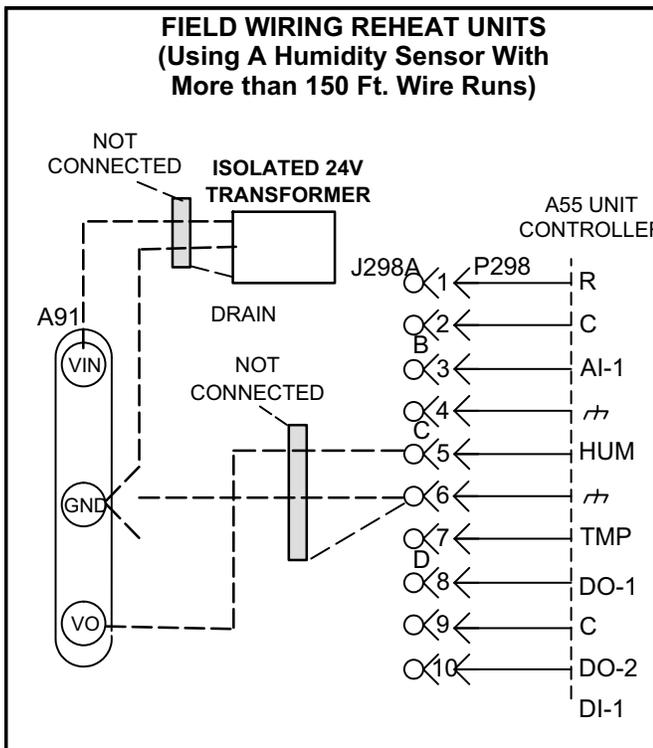
Use two separate shielded cables containing 18AWG minimum, twisted pair conductors with overall shield. Belden type 8760 or 88760 (plenum) or equivalent. Connect both cable shield drain wires to the Unit Controller as shown in figure 15.



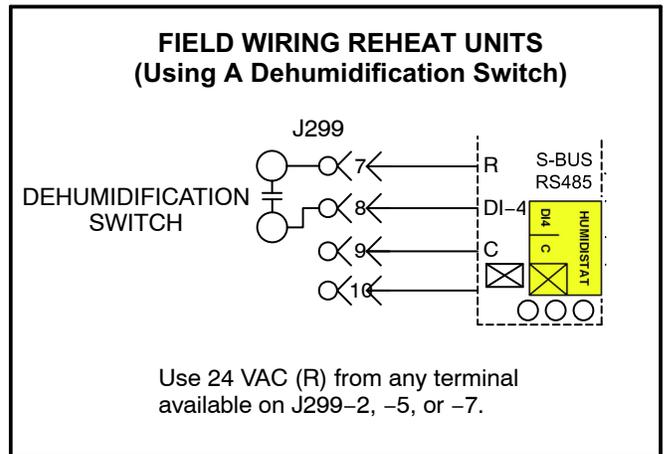
**FIGURE 15**

**Wire runs over 150 feet (mm):**

Use a local, isolated 24VAC transformer such as Lennox cat #18M13 (20VA minimum) to supply power to RH sensor as shown in figure 16. Use two shielded cables containing 20AWG minimum, twisted pair conductors with overall shield. Belden type 8762 or 88760 (plenum) or equivalent.



**FIGURE 16**



Use 24 VAC (R) from any terminal available on J299-2, -5, or -7.

**FIGURE 17**

## Blower Operation and Adjustments

**Units Equipped With A VFD** - The blower rotation will always be correct. Checking blower rotation is not a valid method of determining voltage phasing for incoming power.

### ⚠ IMPORTANT

#### 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.

2-Suction pressure must drop, discharge pressure must rise and blower\* rotation must match rotation marking.

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

3-Disconnect all remote electrical power supplies.

4-Reverse any two field-installed wires connected to the line side of S48 disconnect or TB13 terminal strip. Do not reverse wires at blower contactor.

5-Make sure the connections are tight.

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

\*Supply air VFD motors should rotate in the correct direction; verify scroll compressor rotation separately. Contact technical support if the VFD blower is rotating incorrectly.

**Units Equipped With Optional VFD or Voltage or Phase Detection** - The Unit Controller checks the incoming power during start-up. If the voltage or phase is incorrect, the Unit Controller will display an alarm and the unit will not start.

#### A-Blower Operation

Initiate blower only (G) 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.

#### B-Blower Access

- 1- Disconnect blower harness at K3 contactor or A96 inverter. Failure to do so could damage harness or components.
- 2- Remove screws on either side of blower assembly sliding base. See figure 18.
- 3- Pull base toward outside of unit.

#### C-Determining Unit CFM

**Variable Air Volume Units** - Refer to the *Variable Air Volume Start-Up* section.

**Multi-Stage Air Volume Units** - Refer to *Multi-Stage Air Volume Start-Up* section to set additional blower speeds.

- 1- The following measurements must be made with a dry indoor coil. Run blower at full speed 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 19.

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

- 3- Referring to Page 15, use static pressure and RPM readings to determine unit CFM. Use Page 16 when installing units with any of the optional accessories listed.
- 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 18. Do not exceed minimum and maximum number of pulley turns as shown in table 4.

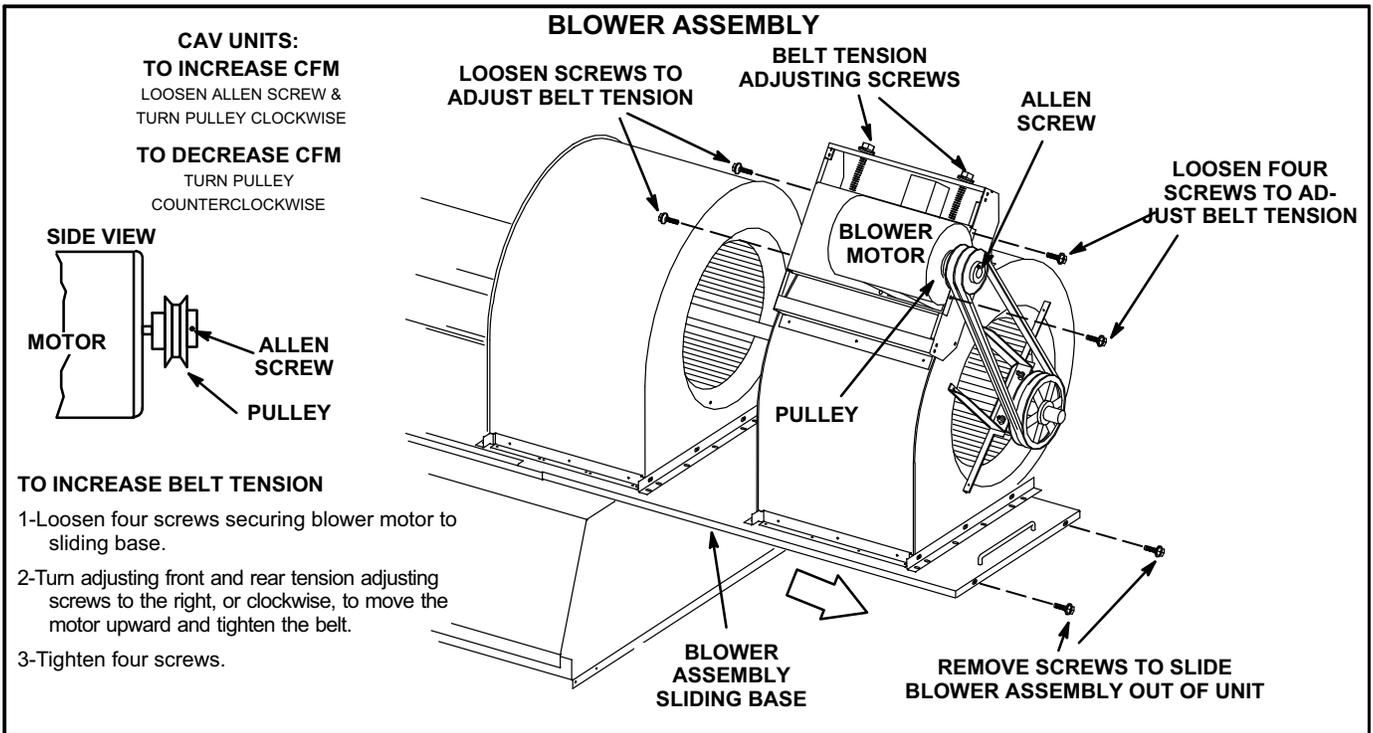
**TABLE 4  
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT**

Belt	Minimum Turns Open	Maximum Turns Open
A Section	No minimum	5
B Section	1*	6

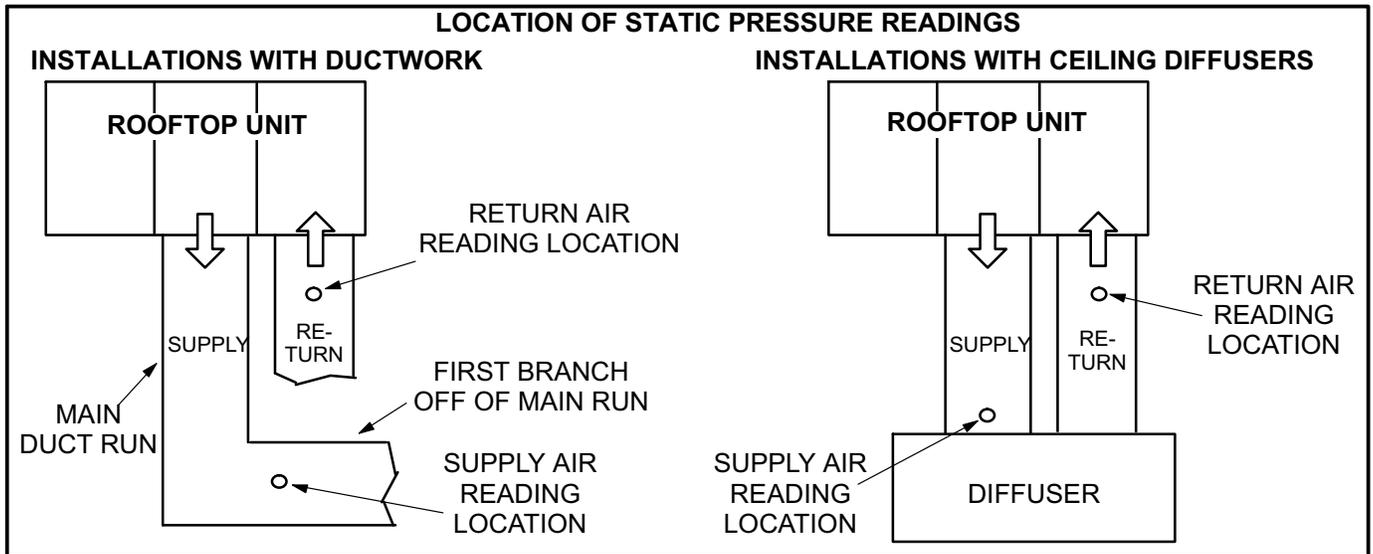
\*No minimum number of turns open when B belt is used on pulleys 6" O.D. or larger.

#### D-Blower Belt Adjustment

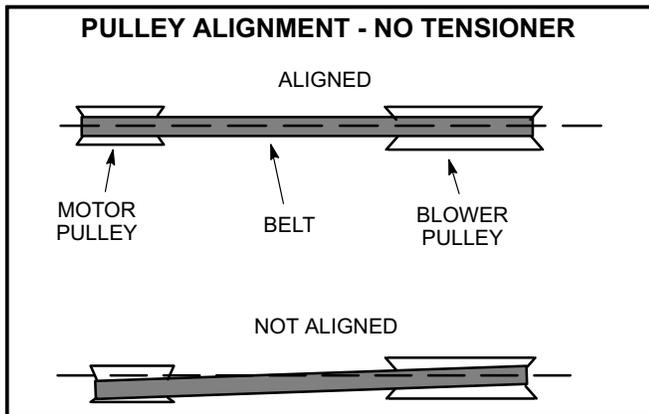
Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat grooves. Make sure blower and motor pulley are aligned. See figure 20 for blowers not equipped with a tensioner and figure 21 for blowers equipped with an optional tensioner.



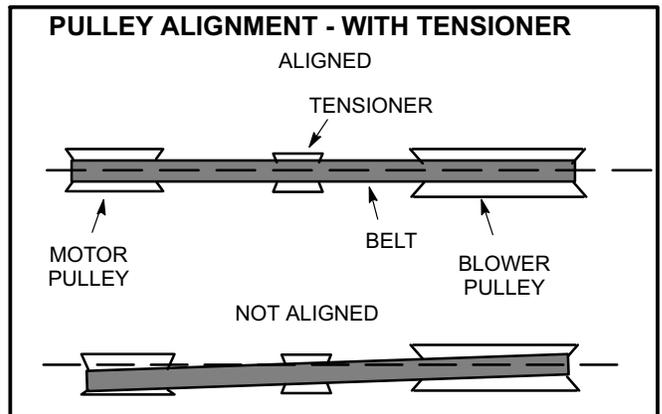
**FIGURE 18**



**FIGURE 19**



**FIGURE 20**



**FIGURE 21**

### Blowers Without Belt Tensioner

- 1- Loosen four screws securing blower motor to sliding base. See figure 18.
- 2- *To increase belt tension -*  
Turn belt tension adjusting screw to the right, or clockwise, to tighten the belt. This increases the distance between the blower motor and the blower housing.  
*To loosen belt tension -*  
Turn the adjusting screw to the left, or counterclockwise to loosen belt tension.
- 3- Tighten four screws securing blower motor to sliding base once adjustments have been made.

### Blowers Equipped With Belt Tensioner

- 1- Loosen the bolt in the center of the tensioner. See figure 22.
- 2- Place belt over all three pulleys. Tensioner pulley must be oriented toward blower, not motor.
- 3- Using a 15/16" wrench on the tensioner body nut, turn the tensioner nut until marks align (3rd mark).
- 4- Hold the tensioner with marks aligned and tighten the bolt to 22 ft.lbs. using the 9/16" wrench.
- 5- If tensioner pulley is past 7 o'clock when secured, The distance between the motor and blower pulleys need to be increased. Refer to the steps in figure 18 to increase belt tension.

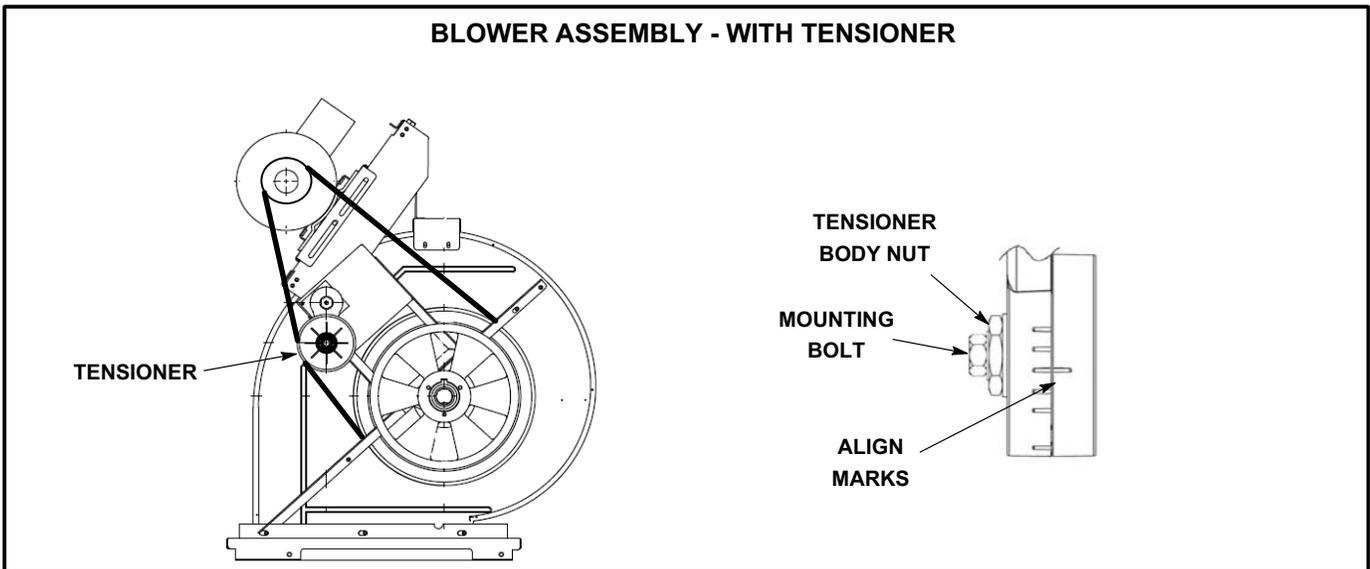


FIGURE 22

### E-Check Belt Tension (Models Without Tensioner)

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

- 1- Measure span length X. See figure 23.
- 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 used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa).

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

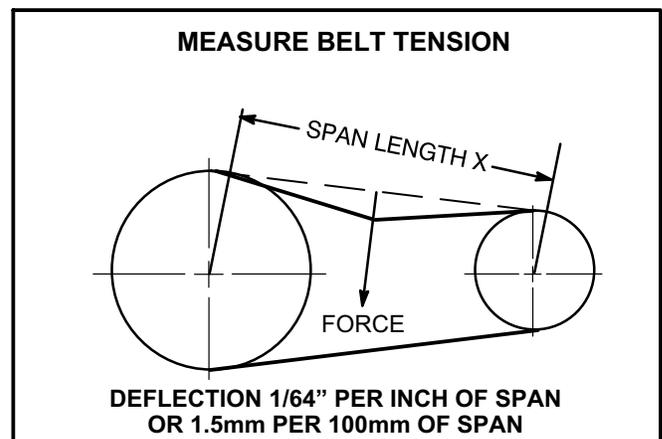


FIGURE 23

### F-Field-Furnished Blower Drives

For field-furnished blower drives, use the tables on Page 15 and Page 16 to determine BHP and RPM required. Use the Drive Kit Specification table on Page 16 to determine the drive number. Reference the manufacturer's model numbers in table 5.

## BLOWER DATA

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY WITH DRY INDOOR COIL & AIR FILTERS IN PLACE FOR ALL UNITS ADD:

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

Then determine from blower table blower motor output and drive required.

See page 15 for wet coil and option/accessory air resistance data.

See page 15 for factory installed drive kit specifications.

### MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

All units require 10,500 cfm minimum air with electric heat.

Air Volume cfm	TOTAL STATIC PRESSURE - In. w.g.																											
	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80		2.00		2.20		2.40		2.60			
	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		
4000	372	0.26	433	0.65	497	0.99	565	1.27	630	1.54	687	1.79	738	2.04	784	2.30	824	2.56	861	2.82	897	3.10	932	3.40	968	3.66	1001	3.91
4500	382	0.41	441	0.79	506	1.12	574	1.41	638	1.69	694	1.95	744	2.22	790	2.50	831	2.77	868	3.05	903	3.35	938	3.66	974	3.93	1008	4.22
5000	392	0.56	451	0.93	516	1.25	584	1.55	646	1.85	702	2.12	751	2.41	796	2.70	837	3.00	874	3.30	909	3.61	944	3.93	980	4.22	1014	4.52
5500	402	0.73	462	1.08	527	1.40	594	1.72	655	2.02	710	2.31	758	2.61	802	2.92	843	3.24	880	3.56	916	3.88	951	4.22	987	4.52	1021	4.82
6000	414	0.89	473	1.24	539	1.56	605	1.90	665	2.21	718	2.51	766	2.83	809	3.16	850	3.51	887	3.84	922	4.18	957	4.52	994	4.82	1028	5.12
6500	426	1.07	486	1.41	551	1.74	616	2.10	675	2.42	727	2.73	774	3.07	817	3.43	857	3.80	894	4.15	929	4.49	964	4.85	1001	5.15	1035	5.45
7000	439	1.26	499	1.60	565	1.93	628	2.31	685	2.64	737	2.97	782	3.34	825	3.72	864	4.11	901	4.48	937	4.83	971	5.19	1008	5.49	1044	5.79
7500	453	1.46	513	1.79	579	2.14	641	2.55	696	2.88	747	3.24	792	3.63	833	4.04	872	4.45	909	4.83	945	5.20	979	5.56	1016	5.86	1052	6.16
8000	467	1.66	528	2.00	593	2.38	653	2.81	708	3.15	757	3.53	801	3.95	843	4.39	881	4.82	918	5.22	953	5.59	988	5.96	1025	6.26	1061	6.56
8500	483	1.88	544	2.22	608	2.65	667	3.10	720	3.44	768	3.85	812	4.30	852	4.78	890	5.22	927	5.63	962	6.01	997	6.39	1034	6.69	1070	6.99
9000	499	2.11	561	2.47	624	2.95	681	3.41	733	3.76	780	4.20	823	4.69	862	5.19	900	5.65	936	6.07	972	6.46	1007	6.85	1044	7.15	1080	7.45
9500	516	2.36	578	2.75	640	3.26	696	3.73	746	4.10	792	4.58	834	5.11	873	5.64	910	6.12	946	6.54	982	6.93	1018	7.34	1055	7.64	1091	7.94
10,000	534	2.64	596	3.06	657	3.60	711	4.07	760	4.48	805	5.00	845	5.57	884	6.12	921	6.61	957	7.03	992	7.43	1028	7.86	1066	8.16	1102	8.46
10,500	553	2.93	615	3.39	674	3.95	727	4.44	775	4.90	817	5.46	857	6.06	895	6.62	932	7.12	967	7.55	1003	7.96	1039	8.40	1077	8.70	1113	9.00
11,000	572	3.24	634	3.74	692	4.31	744	4.83	789	5.35	830	5.95	869	6.58	907	7.16	943	7.65	978	8.09	1013	8.51	1050	8.98	1089	9.28	1125	9.58
11,500	592	3.58	653	4.12	711	4.70	760	5.27	803	5.85	843	6.49	881	7.13	918	7.71	954	8.21	989	8.65	1025	9.10	1062	9.59	1101	9.88	1137	10.18
12,000	613	3.95	674	4.53	729	5.14	776	5.75	818	6.39	857	7.06	894	7.71	930	8.30	965	8.80	1000	9.25	1036	9.71	1073	10.22	1112	10.51	1148	10.81
12,500	635	4.37	695	4.98	748	5.62	792	6.29	832	6.98	870	7.67	906	8.33	941	8.91	976	9.42	1011	9.87	1048	10.35	1085	10.86	1124	11.14	1160	11.44
13,000	657	4.83	715	5.50	766	6.18	808	6.89	847	7.61	883	8.32	918	8.98	953	9.56	988	10.06	1023	10.52	1059	11.00	1096	11.51	1135	11.80	1171	12.10
13,500	680	5.35	736	6.06	784	6.78	824	7.53	861	8.29	896	9.00	930	9.66	965	10.24	1000	10.74	1035	11.20	1071	11.71	1108	12.18	1147	12.47	1182	12.76
14,000	704	5.92	757	6.67	801	7.44	839	8.23	875	9.00	909	9.72	943	10.38	977	10.94	1012	11.43	1047	11.89	1083	12.41	1120	12.66	1159	12.94	1194	13.23
14,500	727	6.55	777	7.34	818	8.16	854	8.97	889	9.75	922	10.48	955	11.12	989	11.51	1024	11.91	1059	12.36	1095	13.00	1132	13.15	1170	13.42	1205	13.69
15,000	750	7.23	797	8.07	834	8.92	868	9.75	902	10.54	935	11.26	968	11.90	1002	12.19	1036	12.52	1071	13.01	1107	13.50	1144	13.79	1182	14.06	1217	14.35

## BLOWER DATA

### FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Motor Efficiency	Nominal hp	Maximum hp	Drive Kit Number	RPM Range
Standard	5	5.75	5	660 - 810
Standard	5	5.75	6	770 - 965
Standard	5	5.75	7	570 - 720
Standard	5	5.75	8	480 - 630
Standard	5	5.75	9	410 - 535
Standard	7.5	8.63	3	715 - 880
Standard	7.5	8.63	4	770 - 965
Standard	10	11.50	1	740 - 895
Standard	10	11.50	2	870 - 1045

#### NOTES

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.

For VFD applications, nominal motor output is also maximum usable motor output.

### FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume cfm	Wet Indoor Coil in. w.g.	Gas Heat Exchanger			Electric heat in. w.g.	Economizer in. w.g.	Filters		Horizontal Roof Curb in. w.g.
		Standard Heat in. w.g.	Medium Heat in. w.g.	High Heat in. w.g.			MERV 8 in. w.g.	MERV 13 in. w.g.	
4000	0.07	0.08	0.08	0.11	0.01	0.00	0.00	0.00	0.04
4500	0.09	0.09	0.10	0.13	0.01	0.00	0.00	0.00	0.05
5000	0.10	0.10	0.12	0.15	0.01	0.00	0.00	0.00	0.06
5500	0.13	0.11	0.14	0.17	0.02	0.01	0.00	0.01	0.07
6000	0.14	0.12	0.16	0.19	0.02	0.01	0.00	0.02	0.08
6500	0.16	0.13	0.18	0.21	0.02	0.01	0.01	0.02	0.09
7000	0.18	0.14	0.20	0.24	0.03	0.02	0.01	0.03	0.10
7500	0.20	0.15	0.21	0.25	0.03	0.02	0.01	0.04	0.11
8000	0.22	0.17	0.24	0.28	0.03	0.02	0.01	0.04	0.13
8500	0.24	0.20	0.27	0.31	0.04	0.03	0.01	0.04	0.15
9000	0.27	0.22	0.29	0.34	0.04	0.04	0.01	0.04	0.17
9500	0.29	0.24	0.32	0.38	0.05	0.04	0.02	0.06	0.19
10000	0.31	0.27	0.36	0.42	0.05	0.05	0.02	0.06	0.21
10500	0.33	0.30	0.40	0.46	0.06	0.06	0.02	0.06	0.24
11000	0.36	0.33	0.43	0.50	0.06	0.07	0.02	0.07	0.27
11500	0.39	0.37	0.48	0.55	0.07	0.08	0.02	0.08	0.30
12000	0.41	0.40	0.52	0.60	0.07	0.10	0.02	0.08	0.33
12500	0.44	0.44	0.57	0.65	0.08	0.11	0.03	0.10	0.37
13000	0.47	0.48	0.61	0.70	0.08	0.13	0.03	0.10	0.40
13500	0.49	0.53	0.67	0.76	0.09	0.14	0.03	0.11	0.44
14000	0.52	0.57	0.72	0.82	0.10	0.16	0.03	0.12	0.49
14500	0.55	0.62	0.78	0.89	0.10	0.18	0.04	0.13	0.53
15000	0.58	0.68	0.84	0.95	0.11	0.21	0.04	0.13	0.58

**TABLE 5  
MANUFACTURER'S NUMBERS (60 HZ)**

Drive No.	DRIVE COMPONENTS									
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		BELTS W/ TENSIONER		SPLIT BUSHING	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	1VP71x1-3/8	100239-06	BK140H	100788-13	BX78	100245-44	BX77	100245-43	H - 1-3/16	105616-02
2	1VP71x1-1/8	100239-06	BK120H	100788-07	BX75	31K9801	BX73	100245-41	H - 1-3/16	105616-02
3	1VP65x1-3/8	78M7101	BK130H	100788-08	BX75	31K9801	BX74	100245-42	H - 1-3/16	105616-02
4	1VP60x1-3/8	78L5501	BK110H	100788-06	BX71	31K9701	BX71	31K9701	H - 1-3/16	105616-02
5	1VP56x1-1/8	P-8-1492	BK120H	100788-07	BX71	31K9701	BX71	31K9701	H - 1-3/16	105616-02
6	1VP60x1-1/8	41C1301	BK110H	100788-06	BX70	31K9601	BX70	31K9601	H - 1-3/16	105616-02
7	1VP50x1-1/8	P-8-1977	BK120H	100788-07	BX70	31K9601	BX70	31K9601	H - 1-3/16	105616-02
8	1VP44x1-1/8	36C0701	BK120H	100788-07	BX70	31K9601	BX70	31K9601	H - 1-3/16	105616-02
9	1VP44x1-1/8	36C0701	BK140H	100788-13	BX73	100245-41	BX72	100245-14	H - 1-3/16	105616-02

**Cooling Start-Up**

*IMPORTANT-The crankcase heater must be energized for 24 hours before attempting to start compressor. Set thermostat so there is no demand to prevent compressors from cycling.*

**VFD Units** - The blower rotation will always be correct on VFD units. Checking blower rotation is not a valid method of determining voltage phasing for incoming power.

**⚠ IMPORTANT**

**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.

2-Suction pressure must drop, discharge pressure must rise and blower\* rotation must match rotation marking.

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

3-Disconnect all remote electrical power supplies.

4-Reverse any two field-installed wires connected to the line side of S48 disconnect or TB13 terminal strip. Do not reverse wires at blower contactor.

5-Make sure the connections are tight.

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

\*Supply air VFD motors should rotate in the correct direction; verify scroll compressor rotation separately. Contact technical support if the VFD blower is rotating incorrectly.

**VFD Units and Units Equipped With Optional Voltage or Phase Detection** - The Unit Controller checks the incoming power during start-up. If the voltage or phase is incorrect, the Unit Controller will display an alarm and the unit will not start.

**A-Preliminary Checks**

- 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 disconnect switch. 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.

**B-Start-Up**

*VFD Units - Refer to the Optional VFD Start-Up section.*

- 1- Initiate first and second stage cooling demands according to instructions provided with thermostat.
- 2- First-stage thermostat demand will energize compressors 1 and 2. Second-stage thermostat demand will energize compressors 3 and 4. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressors 1 and 2.
- 3- Units contain four refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuits 1 and 2 make up stage 1 cooling. Evaporator and condenser refrigerant circuits 3 and 4 make up stage 2 cooling. See figure 24 or 25.

4- Each refrigerant circuit is separately charged with R410A 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.

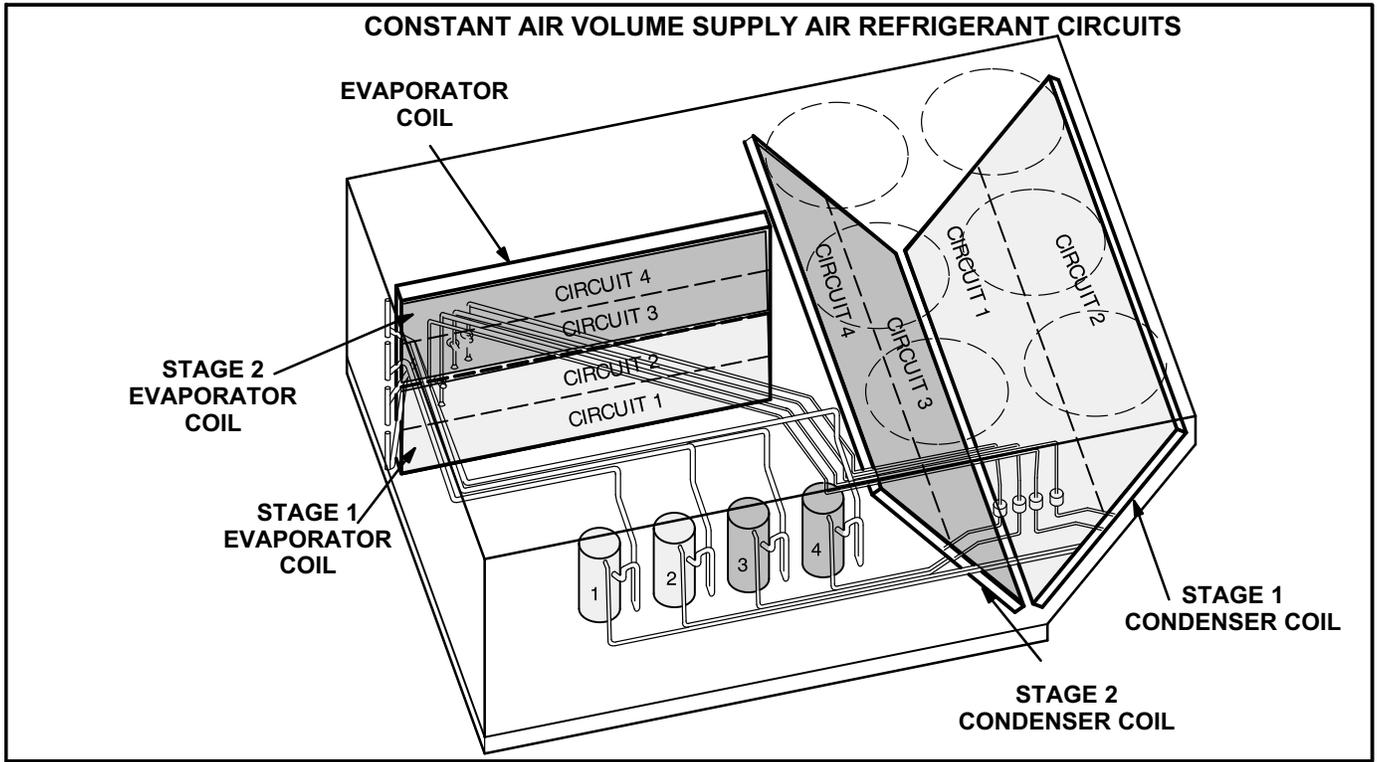


FIGURE 24

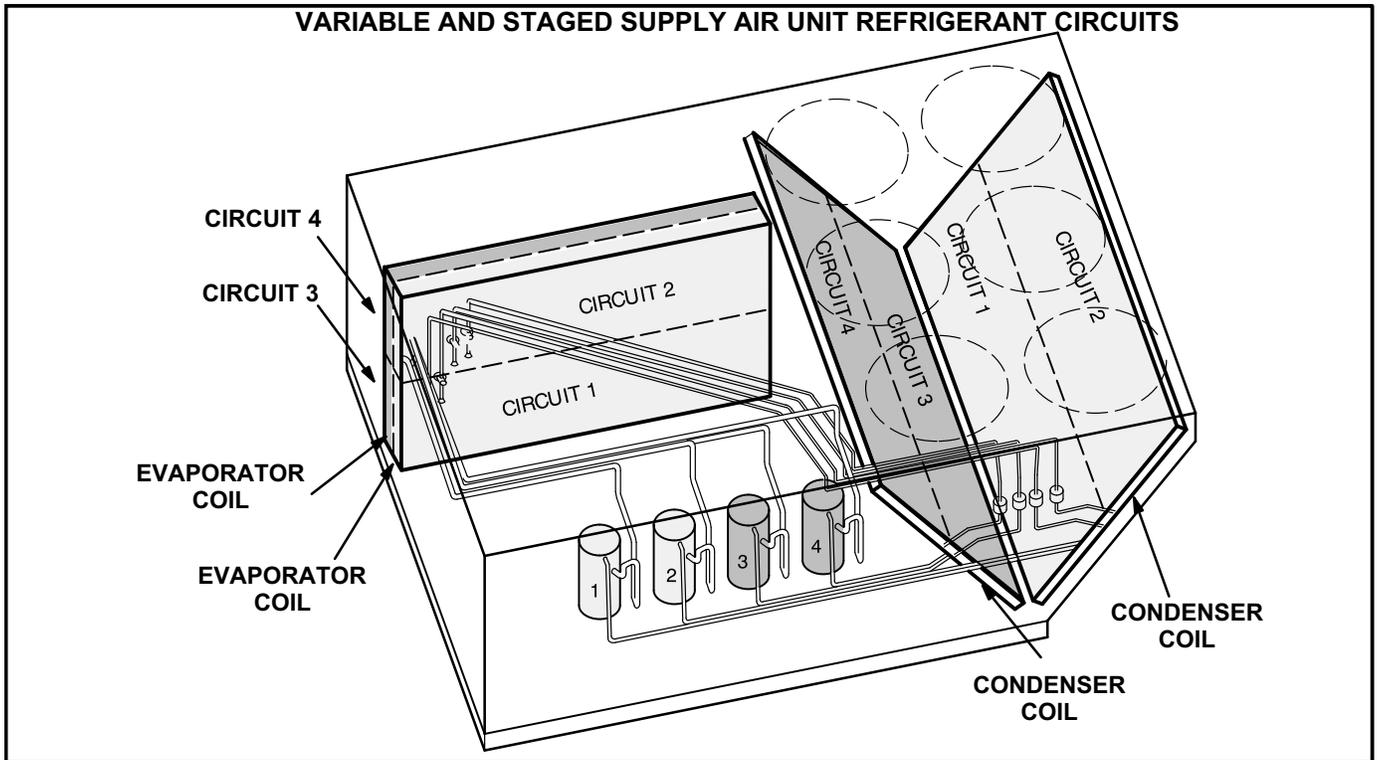


FIGURE 25

## C-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.

## D-Refrigerant Charge and Check

**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 6 - 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 (near the liquid service tap).

- 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 LGH/LCH242H Circuit 1: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 98°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

**TABLE 6**

<b>LGH/LCH242 VAV Normal Operating Pressures</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)
Circuit 1	97	232	99	268	102	309	104	358	104	407	109	465
	106	234	109	269	111	310	113	358	116	409	118	467
	129	241	126	275	129	318	132	363	134	416	139	469
	148	247	152	283	148	325	152	372	154	422	158	475
Circuit 2	103	225	104	263	107	303	108	353	108	407	113	471
	110	227	113	262	116	305	117	354	119	407	122	473
	133	236	130	267	133	313	135	358	138	414	141	475
	151	243	155	275	152	319	155	366	158	420	160	478
Circuit 3	117	237	118	273	120	321	122	370	123	422	125	478
	126	239	128	272	130	322	131	371	133	422	135	479
	149	245	148	280	149	328	151	376	153	430	157	483
	169	254	173	288	170	335	173	383	176	435	179	485
Circuit 3	118	234	120	271	122	313	124	361	124	409	129	471
	127	236	129	270	131	317	133	364	136	411	139	475
	150	244	149	277	150	325	153	370	156	421	159	476
	169	254	172	289	172	331	174	379	178	428	180	482

**TABLE 7**

<b>LGH/LCH300H CAV Normal Operating Pressures</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)
Circuit 1	103	243	105	282	108	327	110	377	112	429	114	489
	112	244	114	283	116	327	119	378	121	432	124	489
	131	251	133	289	136	334	138	383	140	434	143	496
	147	259	154	299	157	342	160	390	163	444	167	499
Circuit 2	105	251	108	291	109	337	112	391	113	456	115	552
	114	254	116	293	118	339	120	392	122	453	125	537
	135	258	137	297	138	343	140	394	142	449	144	520
	150	268	158	306	161	351	165	399	167	455	168	513
Circuit 3	107	237	109	277	111	323	112	379	114	434	117	494
	116	239	118	280	120	324	122	377	124	432	126	495
	136	245	138	285	140	330	142	381	144	431	146	499
	151	250	159	295	161	339	164	387	166	443	169	502
Circuit 4	102	252	105	293	108	328	110	393	112	449	114	523
	109	256	114	297	116	345	118	399	121	455	123	529
	130	261	133	303	135	348	137	402	139	456	141	525
	148	266	156	312	158	358	161	407	163	464	166	526

**TABLE 8**

<b>LGH/LCH300H Variable and Staged Supply Air Normal Operating Pressures</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)
Circuit 1	91	273	96	304	99	354	102	400	106	451	114	505
	102	278	107	315	110	356	112	404	114	455	119	509
	120	287	124	323	127	368	130	409	132	460	138	522
	140	297	142	332	146	372	151	422	154	467	158	525
Circuit 2	100	264	105	306	104	345	107	393	109	450	112	514
	107	269	111	306	113	348	116	395	118	452	121	515
	125	276	128	312	131	357	134	399	137	451	140	517
	146	284	148	318	151	359	155	410	158	456	161	520
Circuit 3	114	279	117	317	120	366	122	417	125	475	129	539
	124	282	128	323	130	370	132	420	134	478	137	539
	144	294	146	332	149	378	151	423	153	478	158	542
	151	298	167	339	170	383	174	436	177	484	181	546
Circuit 4	116	268	122	311	121	349	123	397	125	452	128	508
	125	270	128	309	130	353	132	400	135	454	136	512
	143	283	145	319	148	364	151	405	154	455	156	519
	151	288	165	327	169	369	173	419	176	466	179	525

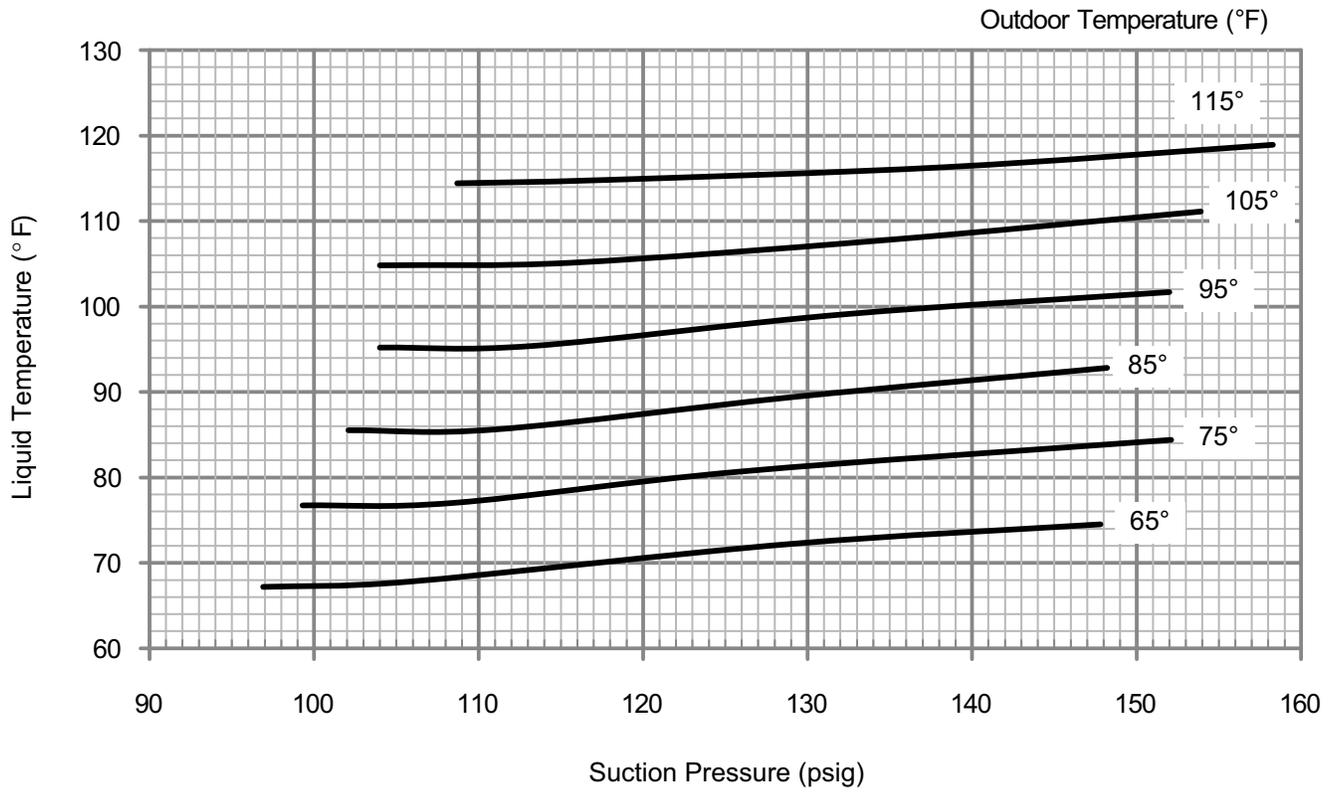
**TABLE 9**

<b>LGH/LCH360 CAV Normal Operating Pressures</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)
Circuit 1	96	254	102	295	105	338	107	393	107	446	111	511
	106	260	111	298	112	345	115	395	117	448	120	508
	126	267	131	307	133	356	135	399	137	456	140	511
	144	275	151	318	154	360	157	412	159	462	162	525
Circuit 2	98	255	104	301	106	349	108	405	109	477	113	563
	108	262	112	305	114	353	116	408	118	468	121	547
	129	272	133	313	135	363	136	407	138	468	141	532
	146	279	154	326	156	369	159	423	160	474	162	540
Circuit 3	99	253	108	299	110	345	112	400	113	452	116	525
	110	256	116	302	118	348	120	398	122	452	125	518
	132	266	137	314	139	362	140	405	142	460	145	522
	148	281	156	326	159	372	162	425	164	478	166	537
Circuit 4	102	258	104	313	106	359	110	414	110	471	114	544
	112	267	112	320	115	366	116	418	118	471	121	539
	130	287	133	330	136	378	137	422	138	479	142	541
	148	298	153	345	157	392	159	444	162	497	163	558

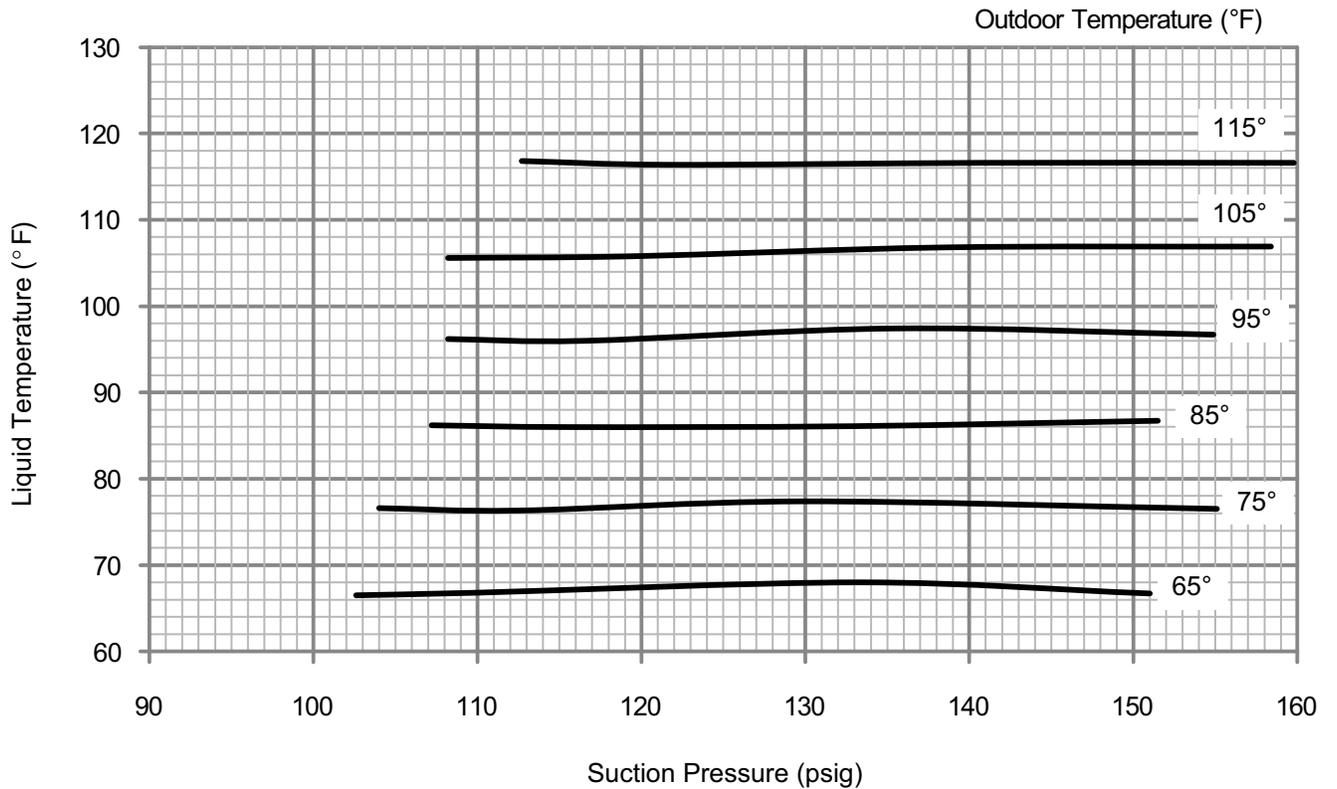
**TABLE 10**

<b>LGH/LCH360 Variable and Staged Supply Air Normal Operating Pressures</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)
Circuit 1	88	252	90	301	97	351	98	388	102	450	104	516
	100	255	102	305	105	355	107	403	111	456	113	523
	115	268	119	314	123	361	125	403	129	463	129	527
	133	282	137	327	140	371	144	425	147	473	152	544
Circuit 2	97	257	100	303	102	349	104	385	106	447	107	524
	104	256	107	305	110	353	112	399	115	451	117	523
	121	270	125	313	128	355	130	397	134	454	134	521
	135	280	140	322	145	364	148	416	151	464	154	535
Circuit 3	106	272	110	319	115	366	116	404	118	469	120	537
	118	266	120	320	123	375	124	422	127	472	130	545
	137	285	139	332	142	379	144	418	147	477	148	544
	155	294	158	344	161	393	164	443	167	492	172	563
Circuit 4	113	258	115	304	117	349	119	384	121	445	123	511
	119	253	122	305	125	356	128	399	130	450	132	520
	138	280	142	320	145	359	147	400	149	456	151	521
	156	293	159	333	163	374	166	424	169	471	173	539

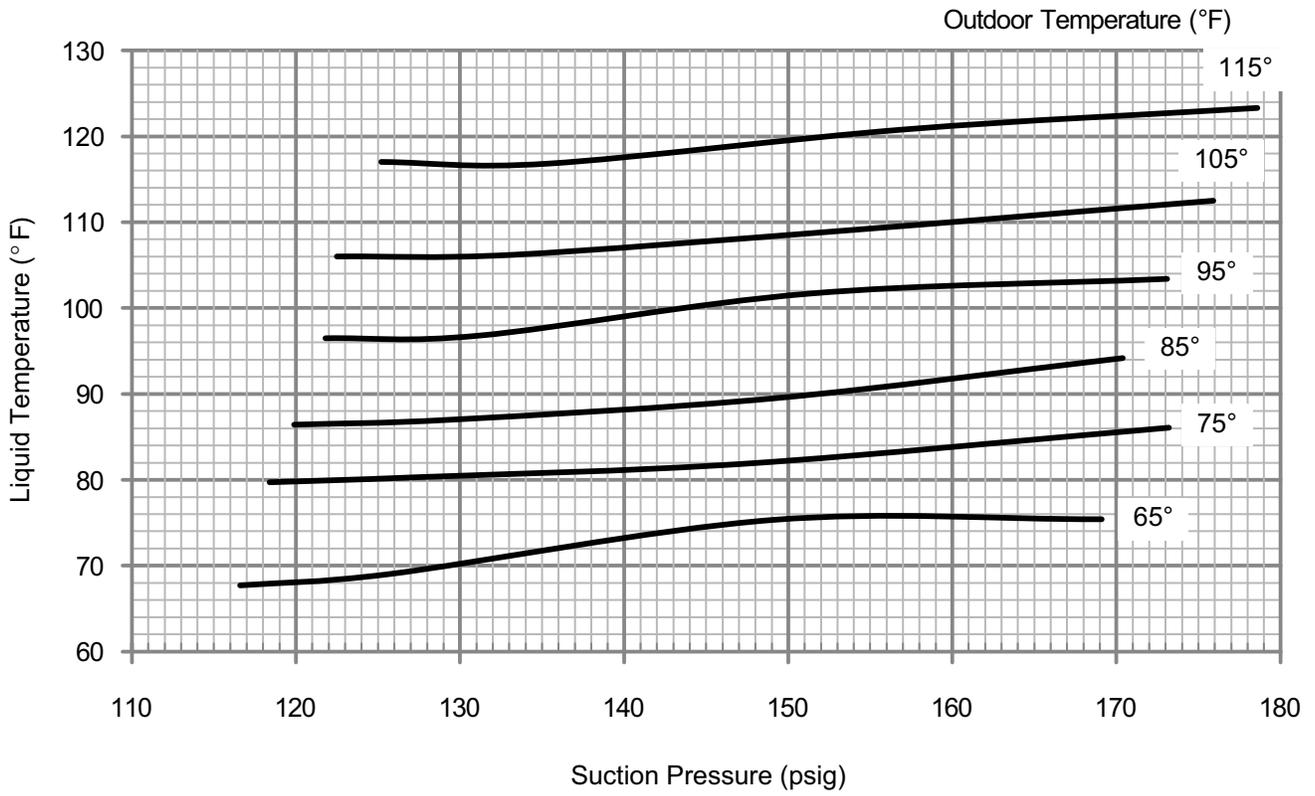
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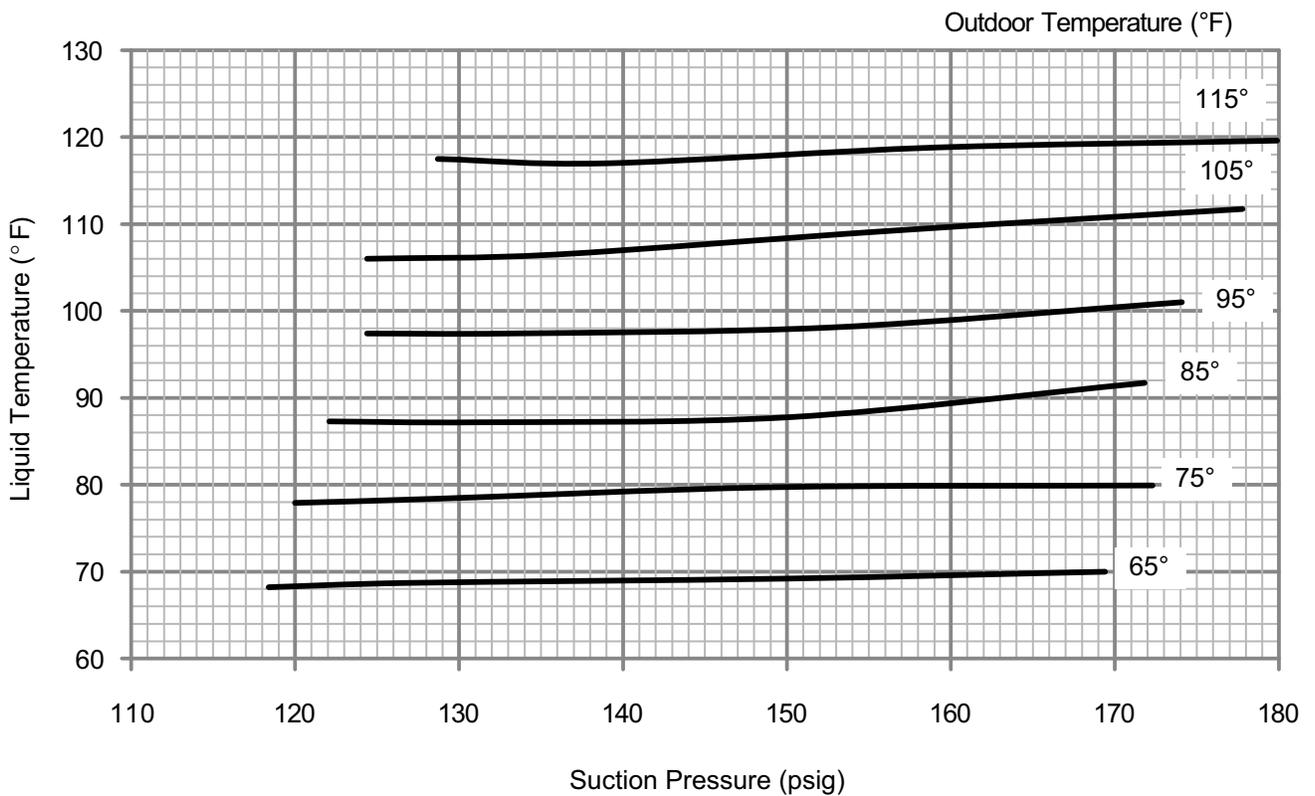
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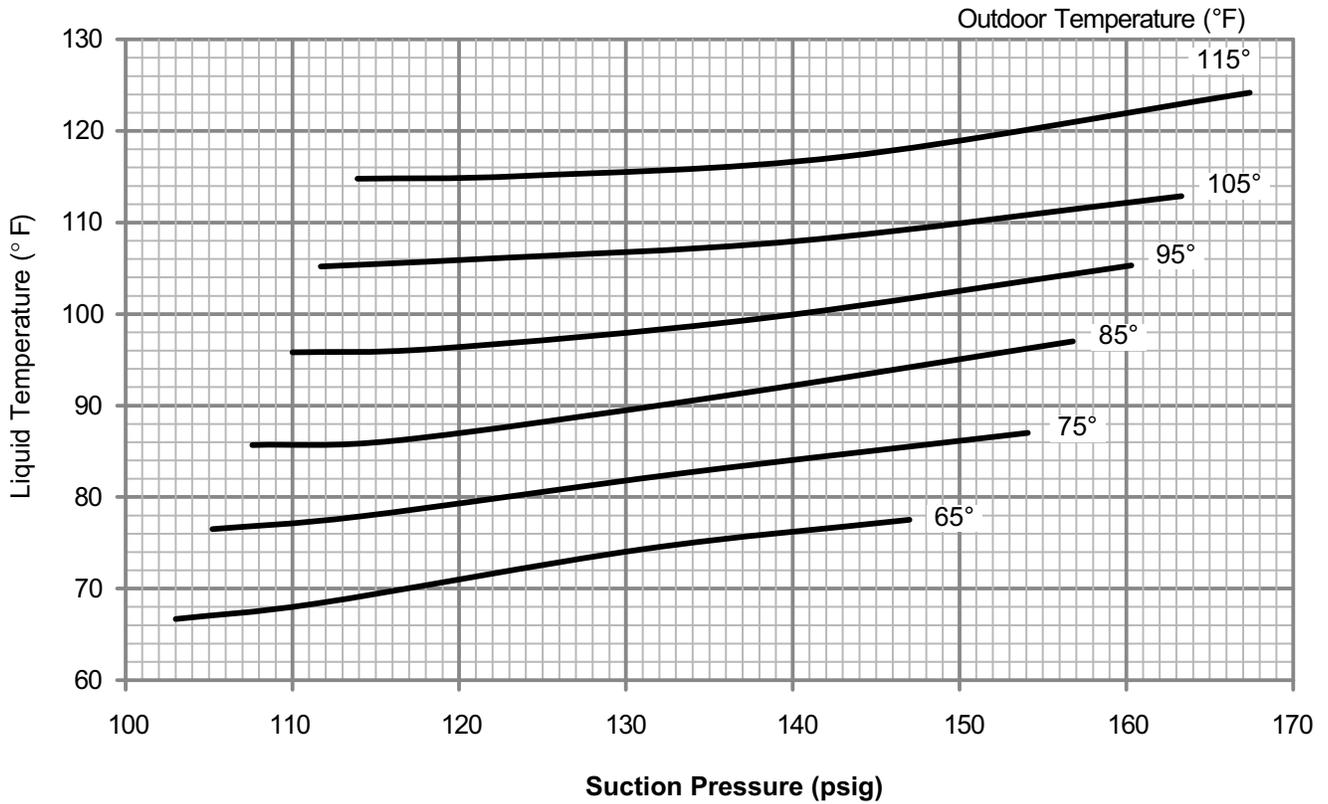
### LGH/LCH242 Variable Supply Air Circuit 3 Charging Curve



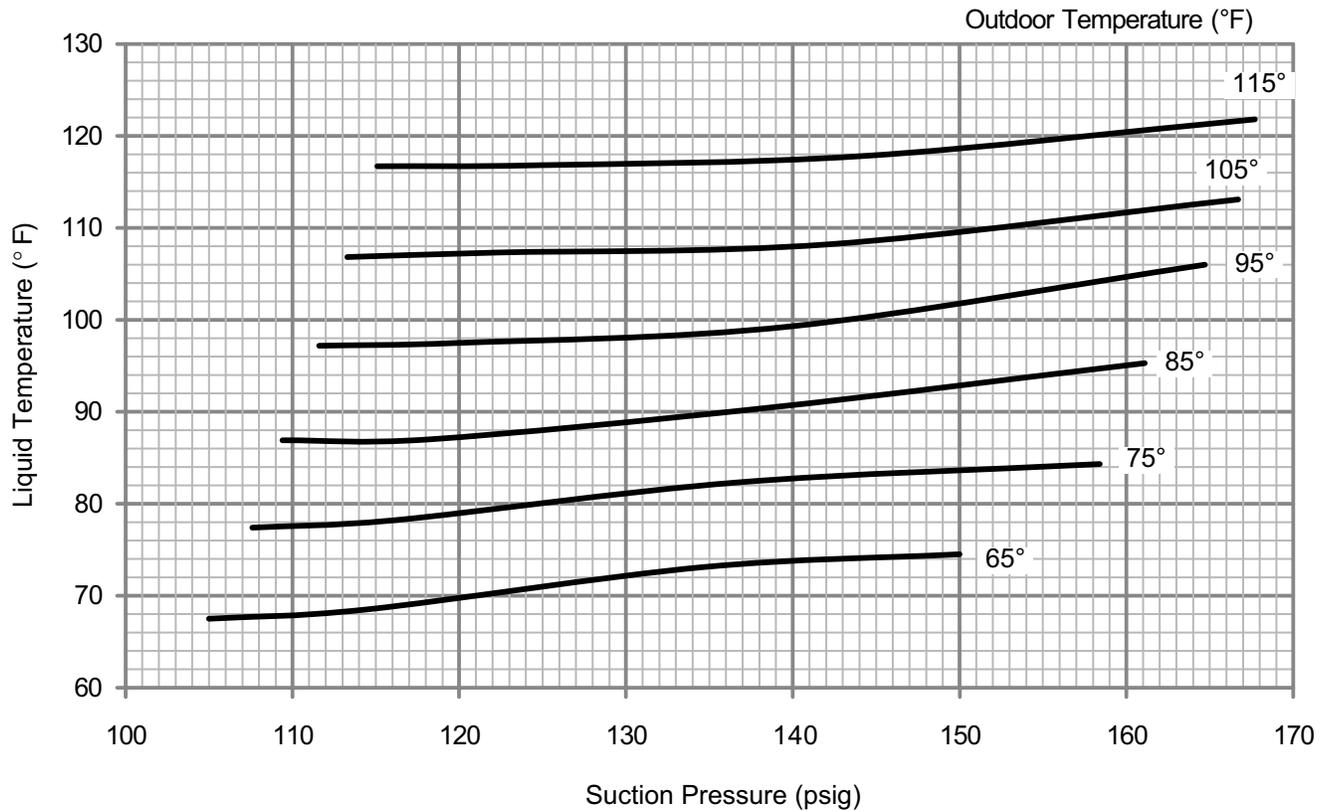
### LGH/LCH242 Variable Supply Air Circuit 4 Charging Curve



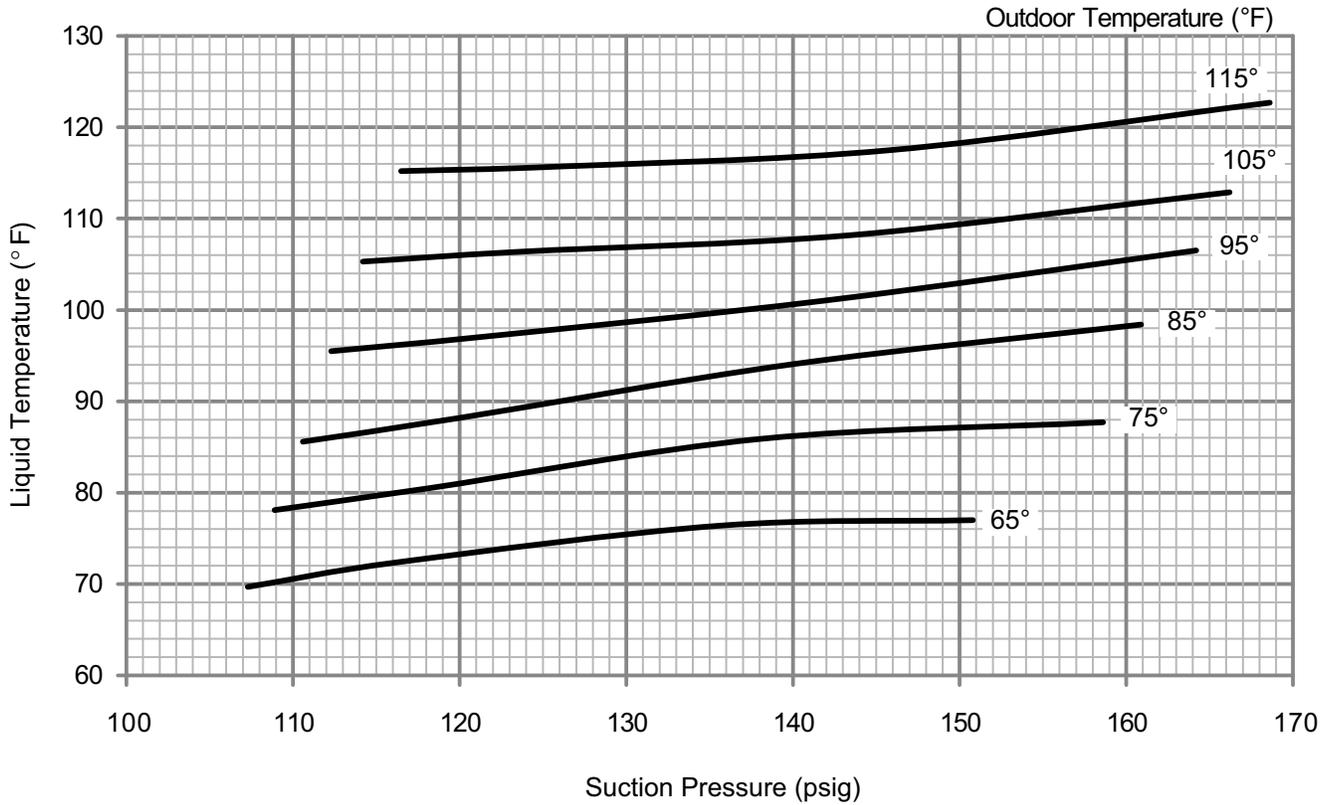
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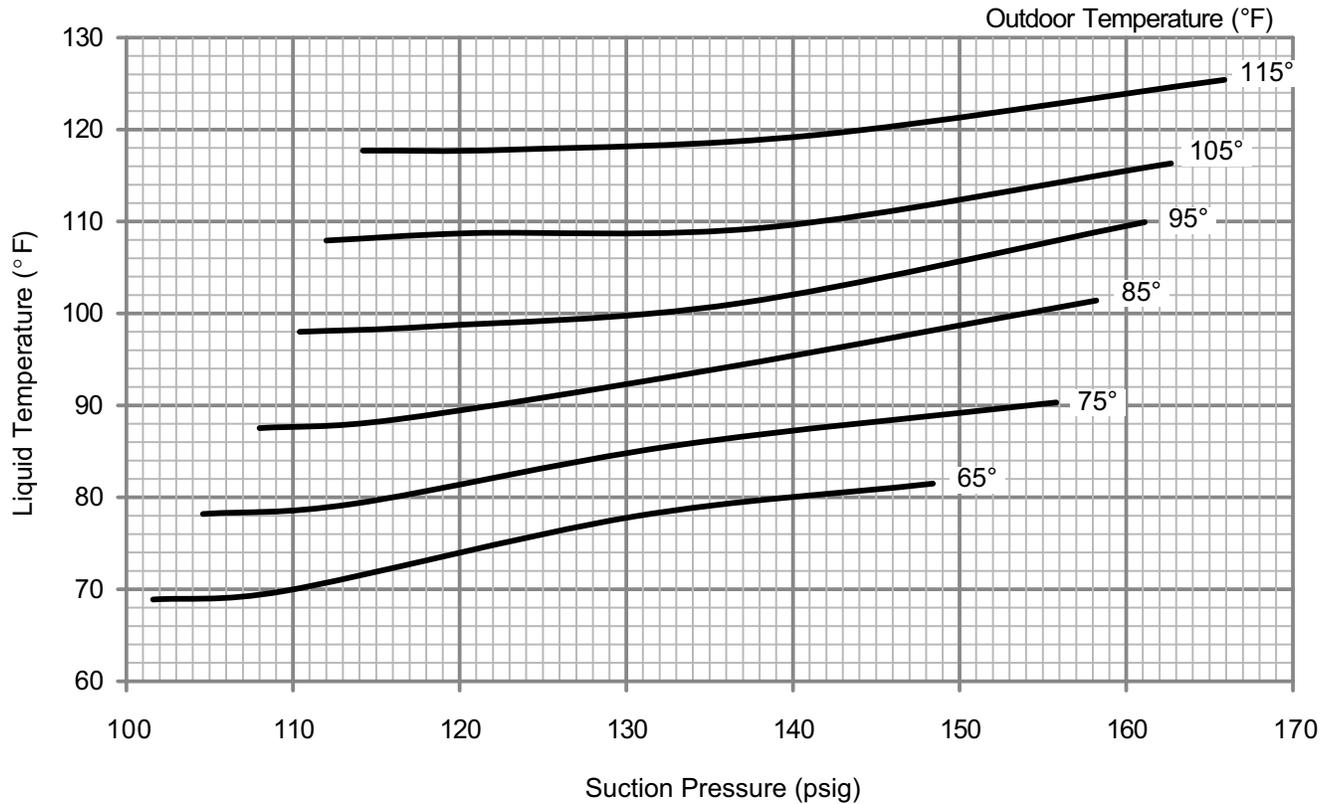
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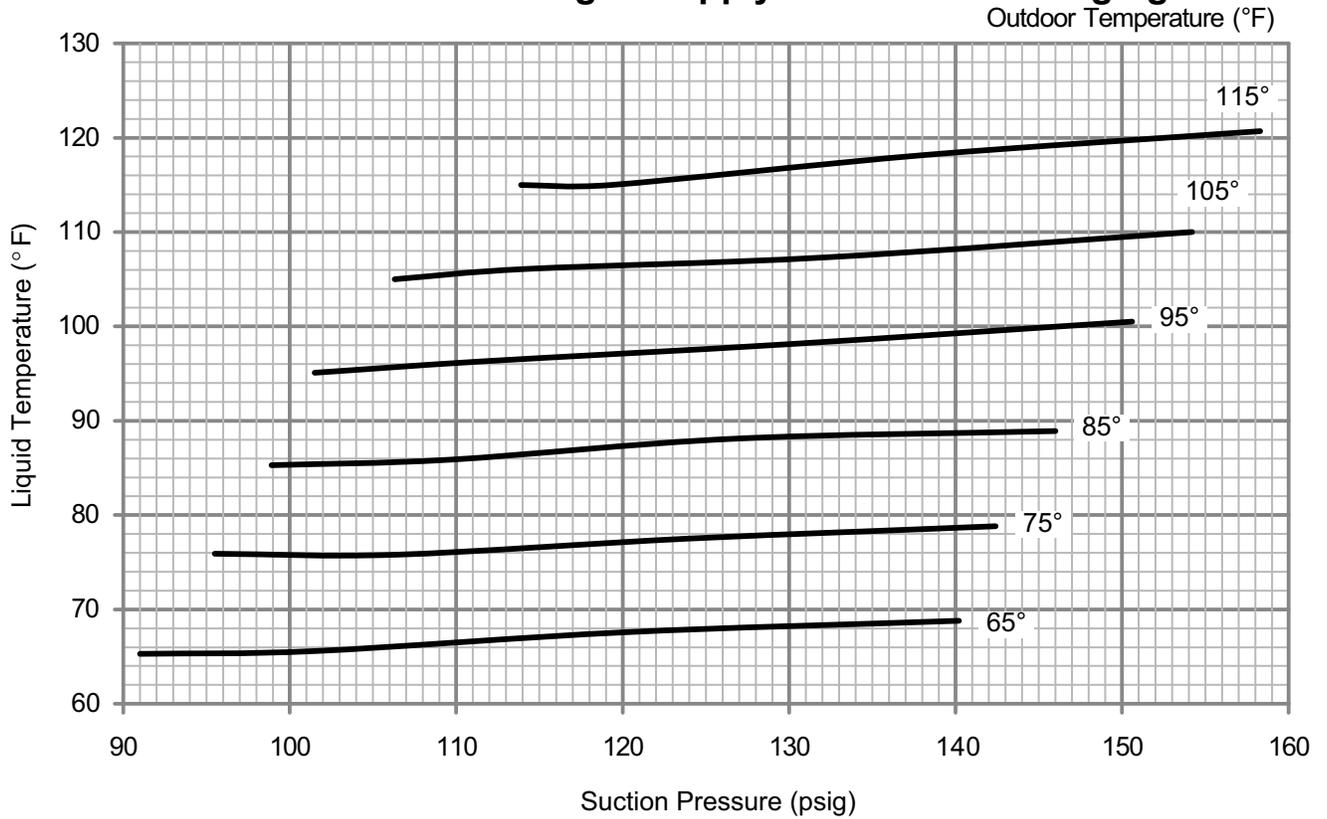
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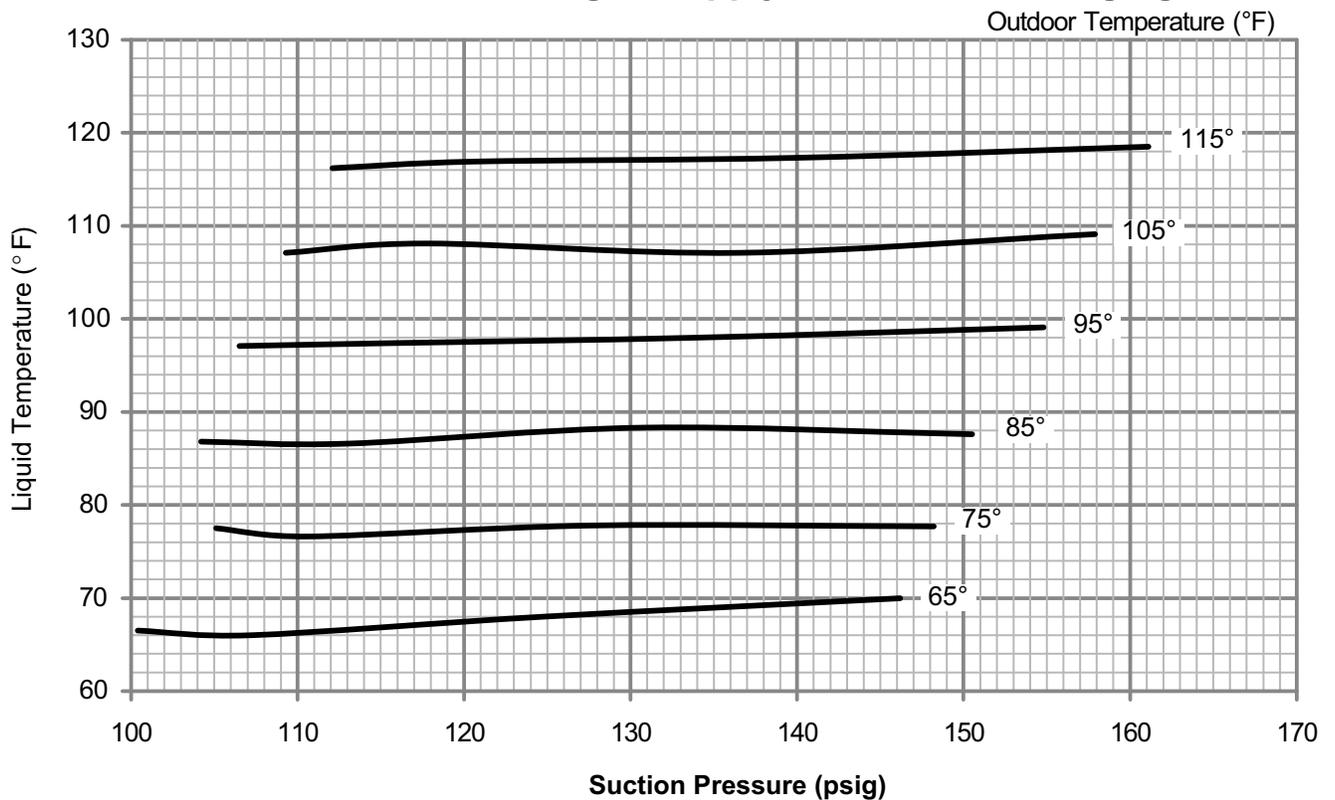
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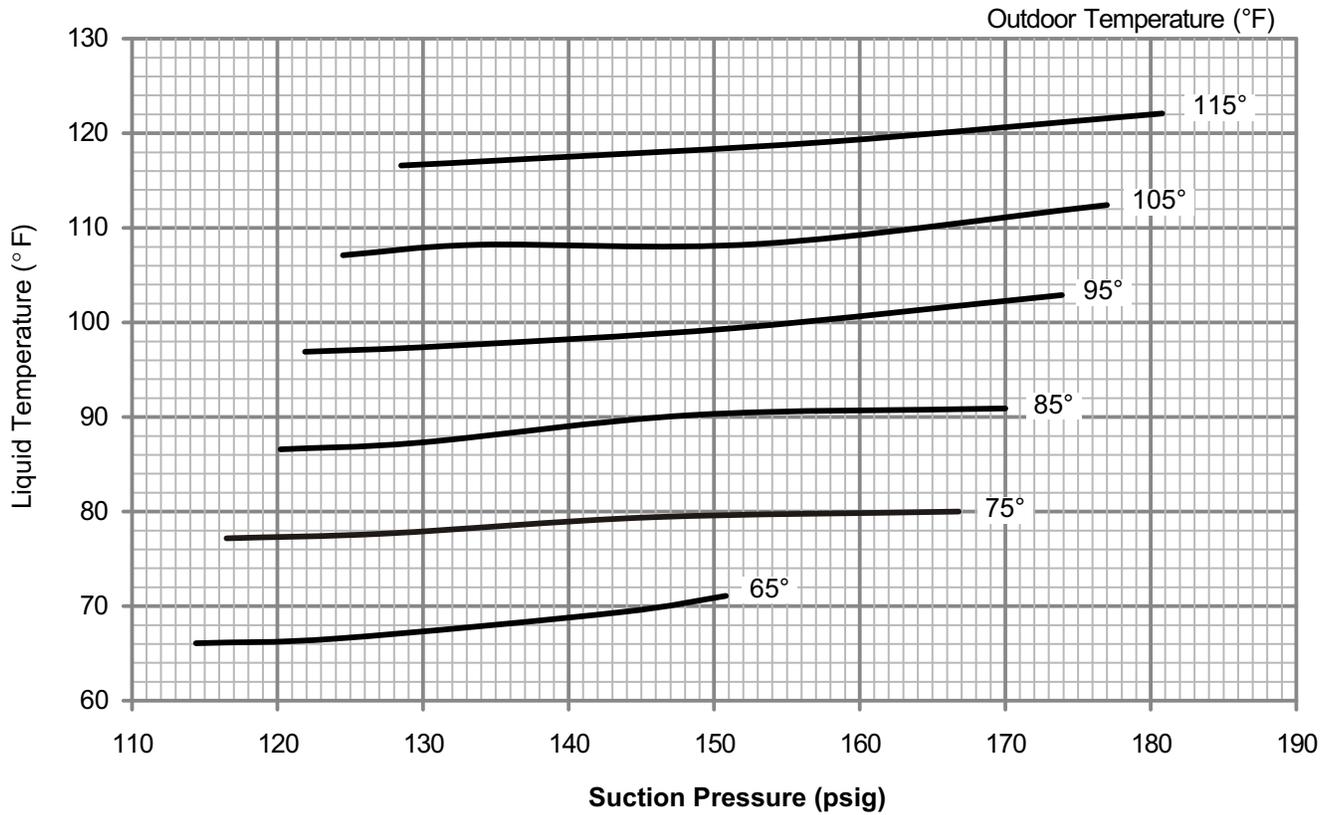
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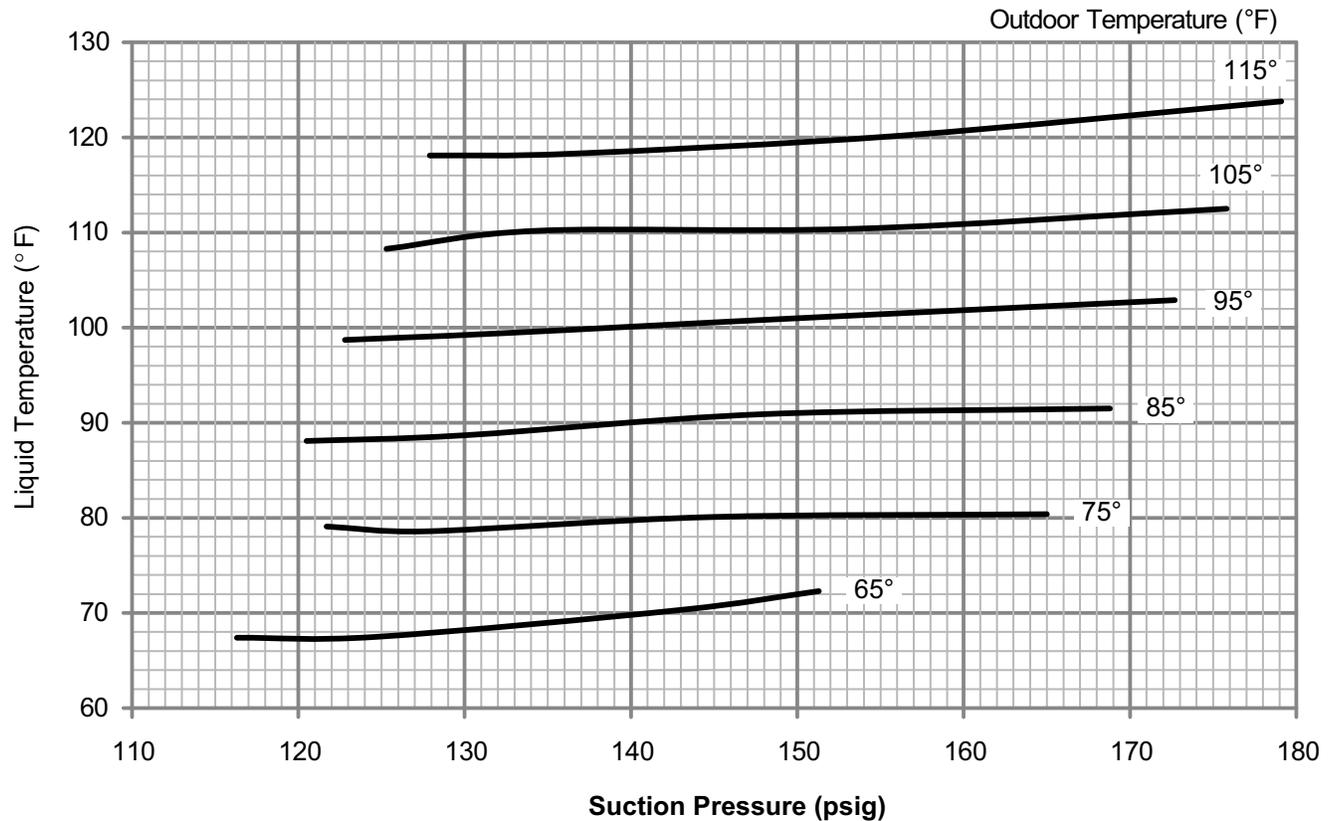
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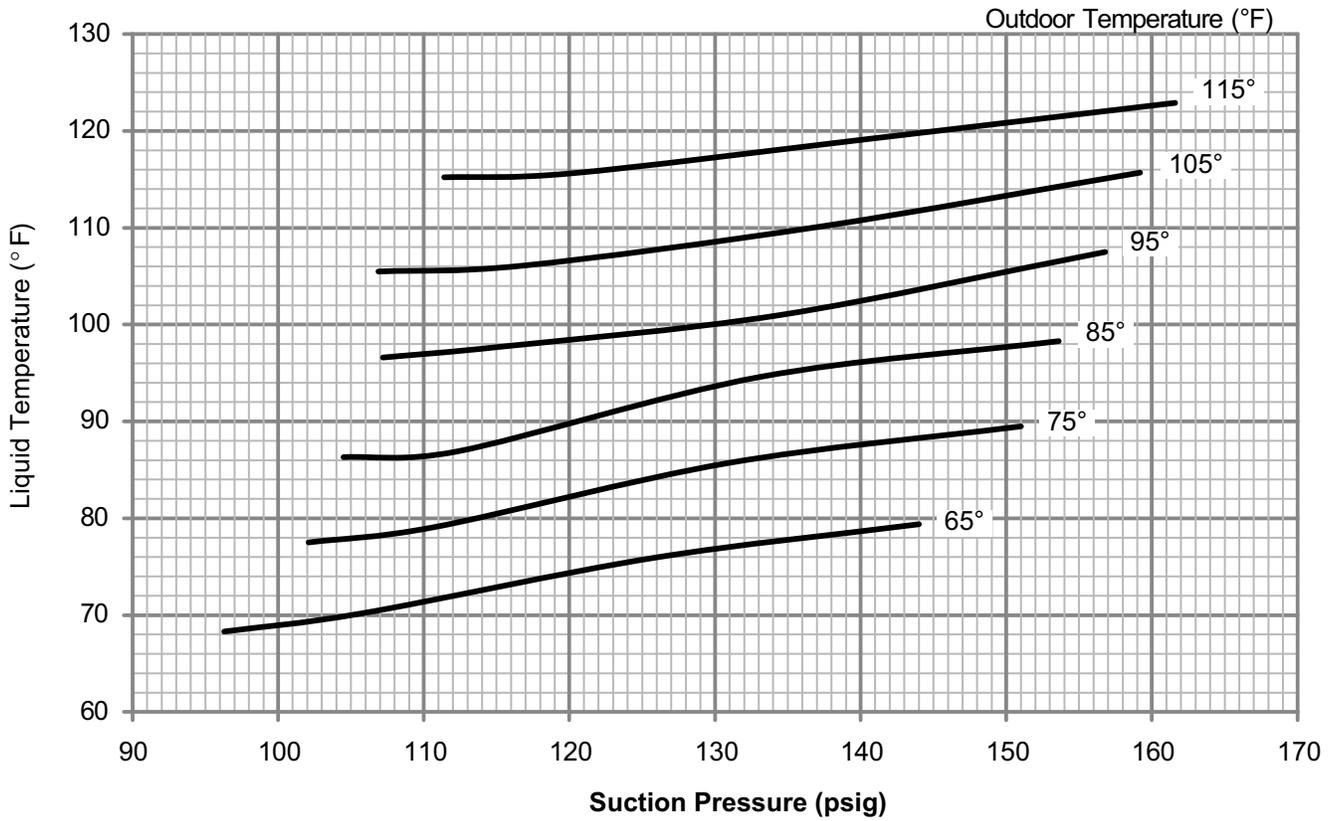
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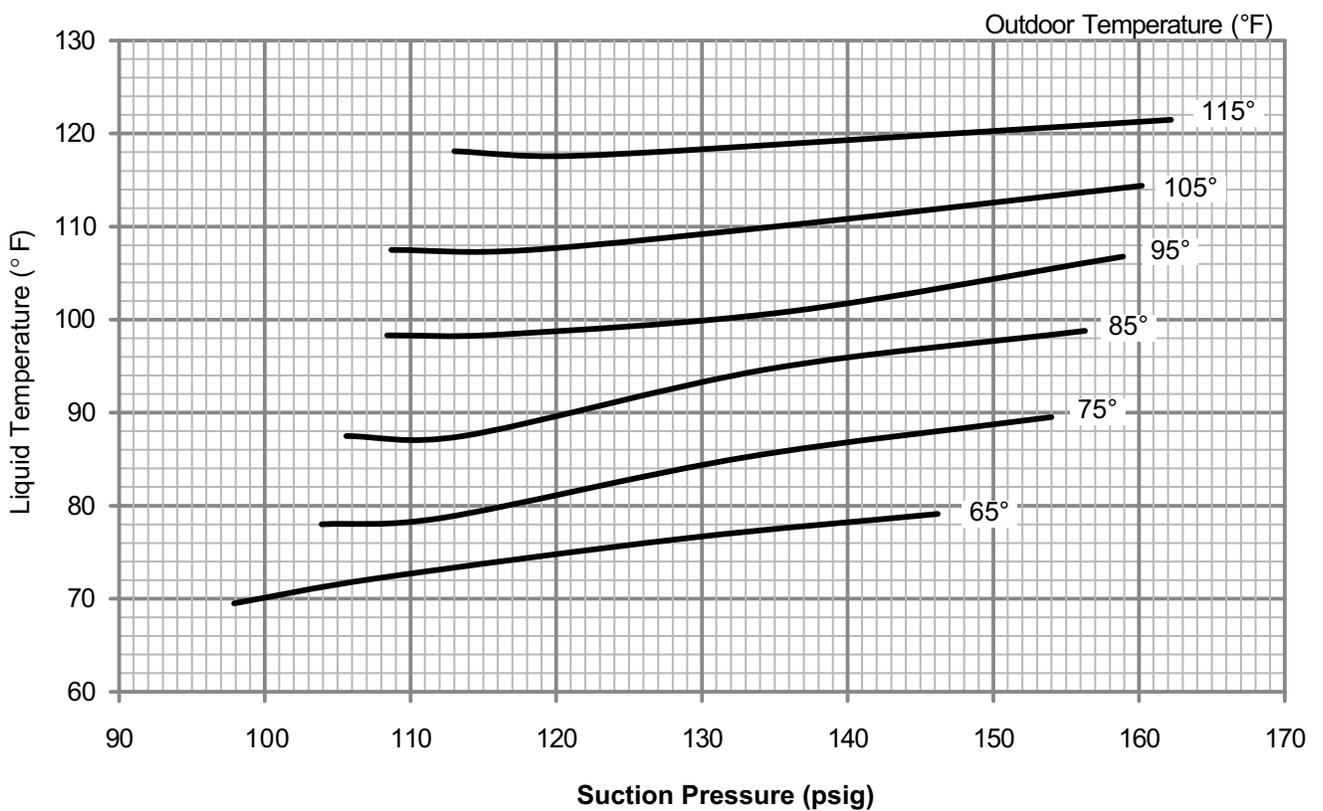
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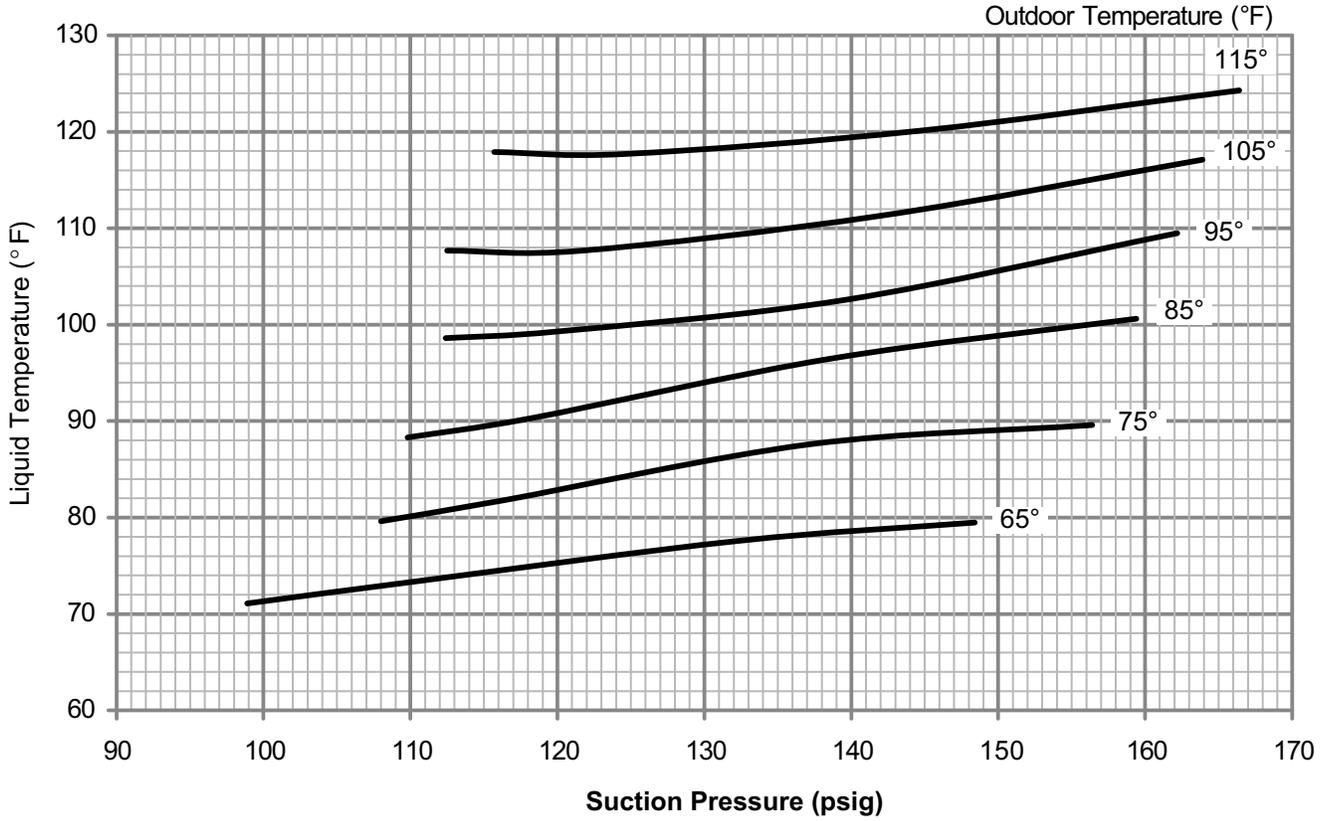
### LGH/LCH360 CAV Circuit 1 Charging Curve



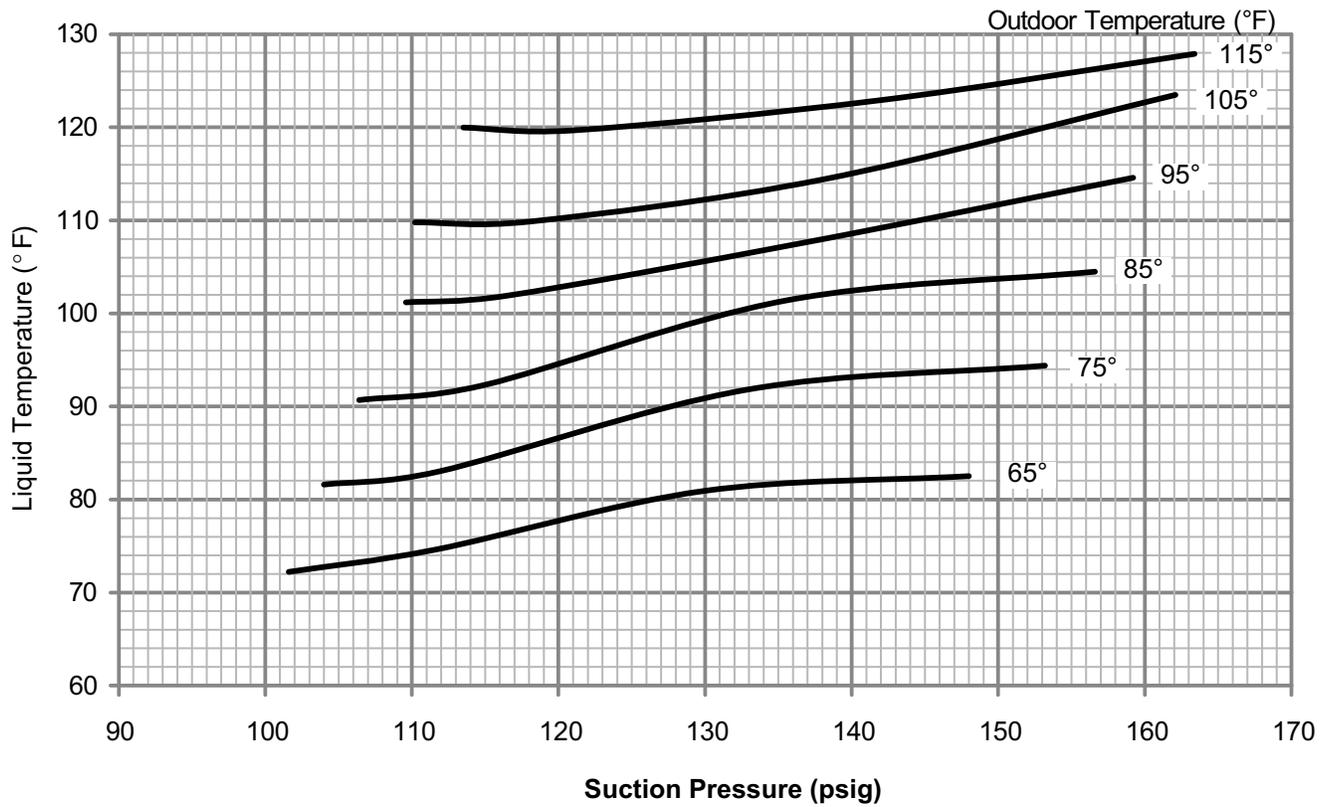
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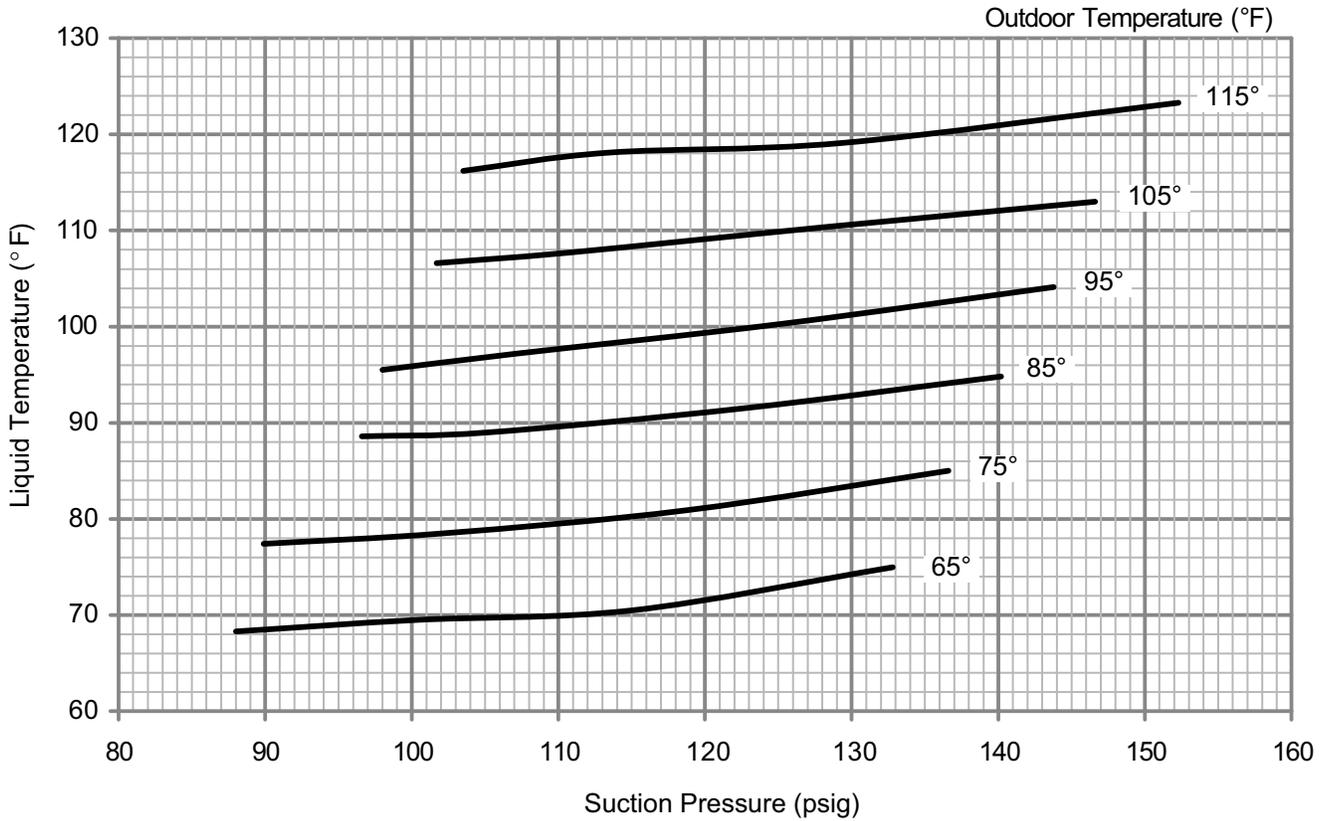
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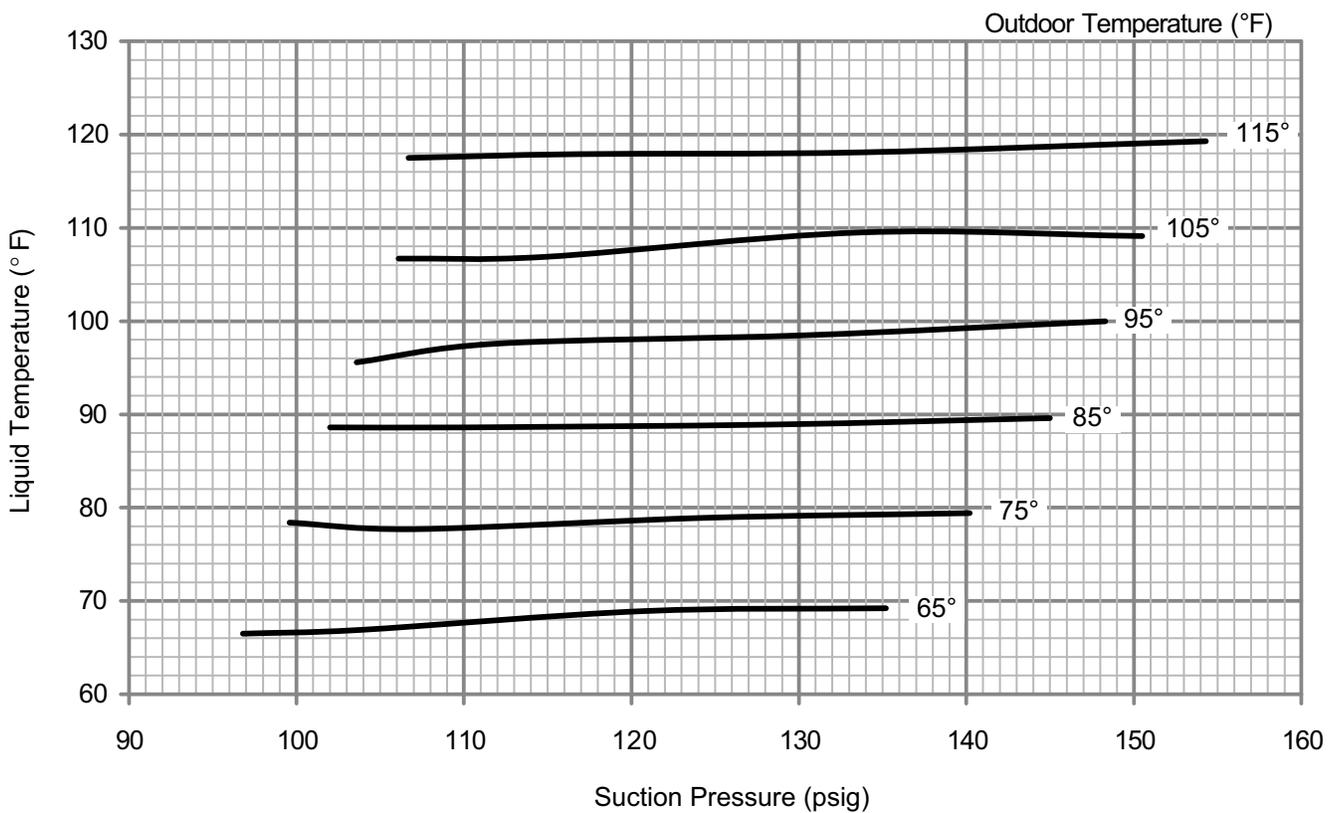
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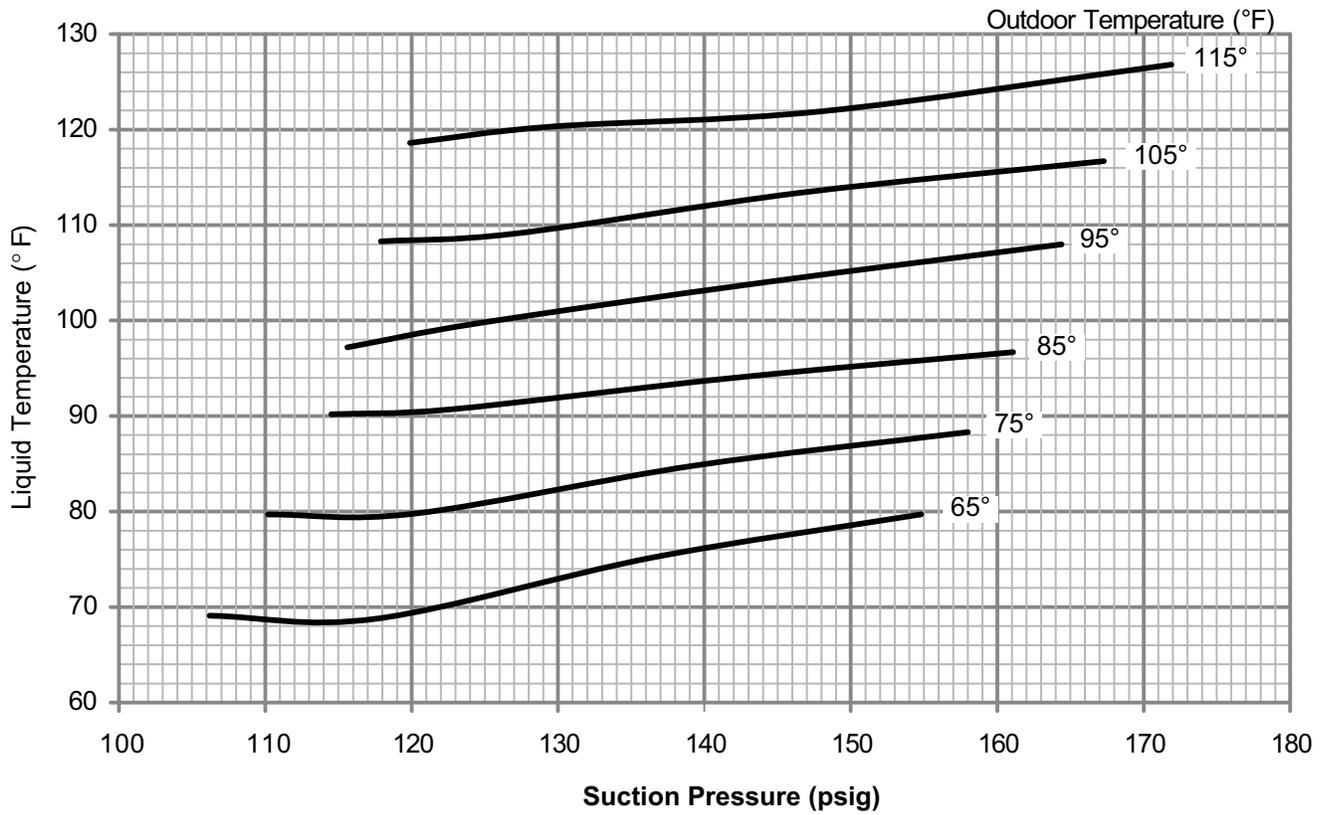
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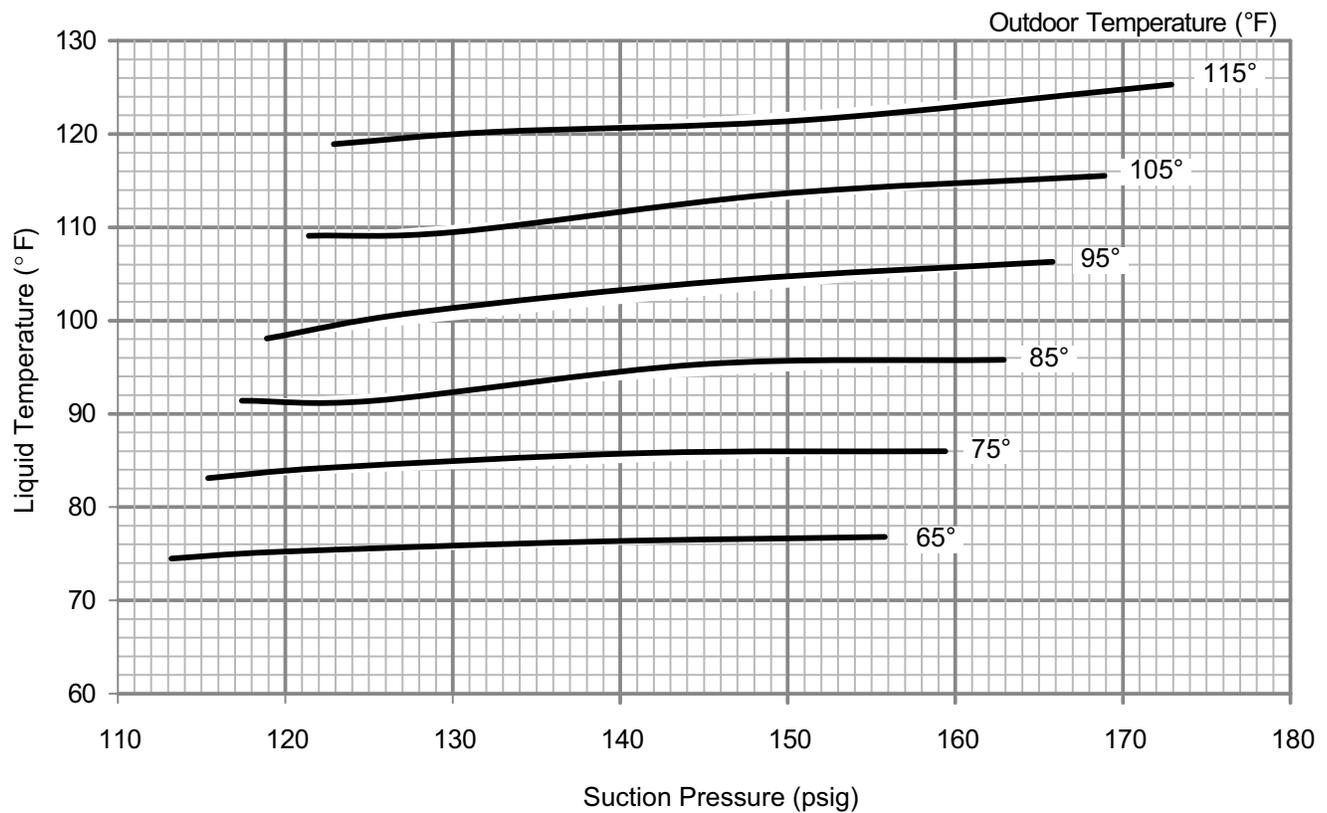
### LGH/LCH360 Variable and Staged Supply Air Circuit 2 Charging Curve



### LGH/LCH360 Variable and Staged Supply Air Circuit 3 Charging Curve



### LGH/LCH360 Variable and Staged Supply Air Circuit 4 Charging Curve



## F-Compressor Controls

See unit wiring diagram to determine which controls are used on each unit.

- 1- High Pressure Switch (S4, S7, S28, S96)  
The compressor circuit is protected by a high pressure switch which opens at 610 psig  $\pm$  15 psig (4206 kPa  $\pm$  103 kPa) and automatically resets at 475 psig  $\pm$  15 psig (3275kPa  $\pm$  103 kPa).
- 2- Low Pressure Switch (S87, S88, S97, S98)  
The compressor circuit is protected by a loss of charge switch. Switch opens at 40 psig  $\pm$  5 psig (276  $\pm$  34 kPa) and automatically resets at 90 psig  $\pm$  5 psig (621 kPa  $\pm$  34 kPa).
- 3- Crankcase Heater (HR1, HR2, HR5, HR11)  
Units have compressors which contain a belly band compressor oil heater 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.
- 4- Freezestats (S49, S50, S53, S95)  
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).
- 5- Low Ambient Pr. Sw. (S11, S84, S85, S94)  
Switch maintains adequate discharge pressure by de-energizing condenser fan when liquid pressure falls below 240 psig  $\pm$ 10 (1655 kPa $\pm$ 69). Switch closes to energize condenser fan when pressure rises to 450 psig  $\pm$ 10 (3103kPa  $\pm$  69).
- 6- Thermal Protector (S5, S8, S31, S180)  
The compressors used on 242H units are protected by an external temperature switch. The n.c. switch opens at 248°F + 9 (120°C + 5) and automatically resets at 169°F + 18 (76°C + 10). The compressors used on 300H and 360H units are protected by an internal thermal protector switch.

### Condenser Fan Operation

Condenser fans 1, 2, and 3 are energized on a Y1 cooling demand; condenser fans 4, 5, and 6 are energized on a Y2 cooling demand. Condenser fans 1, 2, 5, and 6 are energized after a 2 second delay. See figure 26.

Condenser fans 2 and 5 are de-energized when outdoor temperature drops below 55°F (13°C). Condenser fans 1 and 6 are de-energized when outdoor air temperature is below 40°F (4°C).

Condenser fan 3 is de-energized when both S11 and S84 pressure switches (via K149) open due to low pressure. S11 and S84 are located in refrigerant circuits 1 and 2 respectively.

Condenser fan 4 is de-energized when both S85 and S94 pressure switches (via K150) open due to low pressure. S85 and S94 are located in refrigerant circuits 3 and 4.

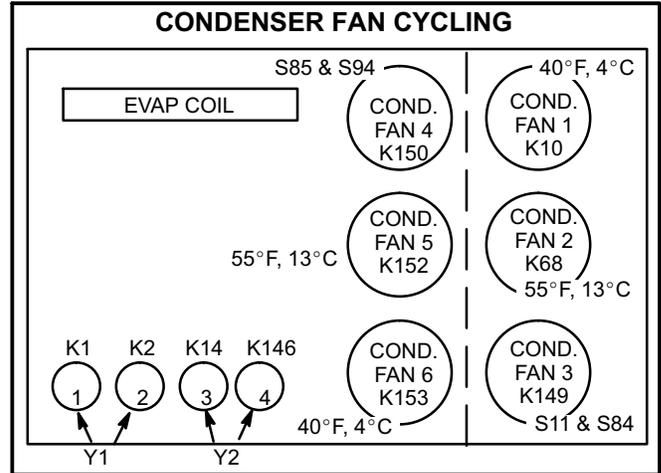


FIGURE 26

## Gas Heat Start-Up (Gas Units)

### FOR YOUR SAFETY READ BEFORE LIGHTING

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.

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.

## ⚠ WARNING



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

## ⚠ 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

### 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.

## ⚠ 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.

### A-Placing Unit In Operation

## ⚠ WARNING

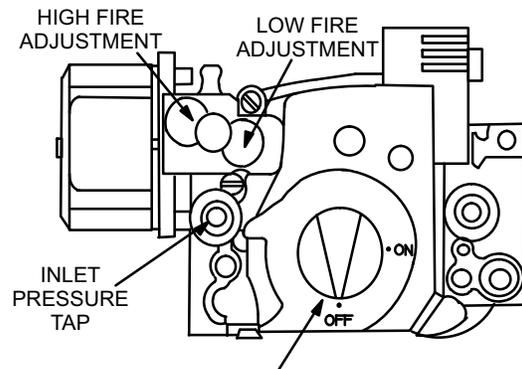


Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

### Gas Valve Operation for Honeywell VR8305Q (Figure 27) Series Gas Valve

- 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.

### HONEYWELL VR8305Q SERIES GAS VALVE



Gas valve knob is shown in OFF position.

FIGURE 27

- 5- Turn the knob on the gas valve clockwise  to **OFF**. Do not force.
- 6- Wait five 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 the knob on the gas valve counterclockwise  to **ON**. Do not force.
- 8- Close or replace the heat section access panel.
- 9- Turn on all electrical power to unit.
- 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 unit.
- 3- Open or remove the heat section access panel.
- 4- Turn the knob on the gas valve clockwise  to **OFF**. Do not force.
- 5- Close or replace the heat section access panel.

## Heating Operation and Adjustments

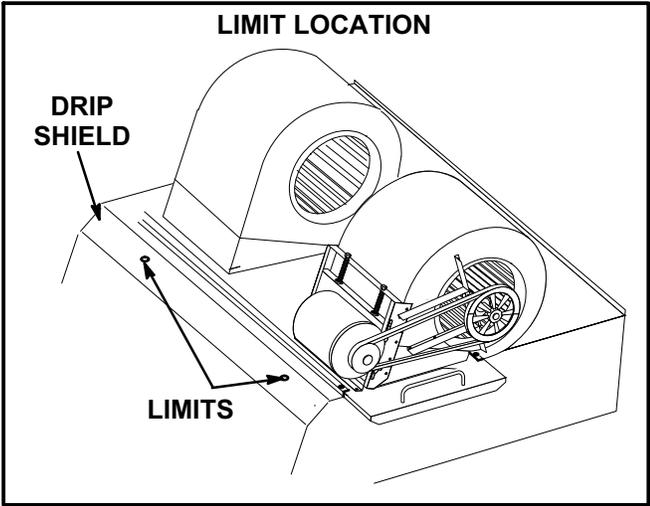
**(Gas Units)**

**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-Limit Controls**

Limit controls are factory-set and are not adjustable. Two limits are located on the drip shield in the blower compartment. See figure 28.



**FIGURE 28**

**C-Heating Adjustment**

Main burners are factory-set and do not require adjustment. Gas manifold pressures should match pressures shown in table 11.

**TABLE 11**

Natural Gas		Propane (LP) Gas	
1st Stage ± 0.2	2nd Stage ± 0.3	1st Stage ± 0.2	2nd Stage ± 0.3
1.6	3.7	5.5	10.5

## Electric Heat Start-Up (LCH Units)

**Factory- or Field-Installed Option**

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.

## Variable Air Volume Start-Up

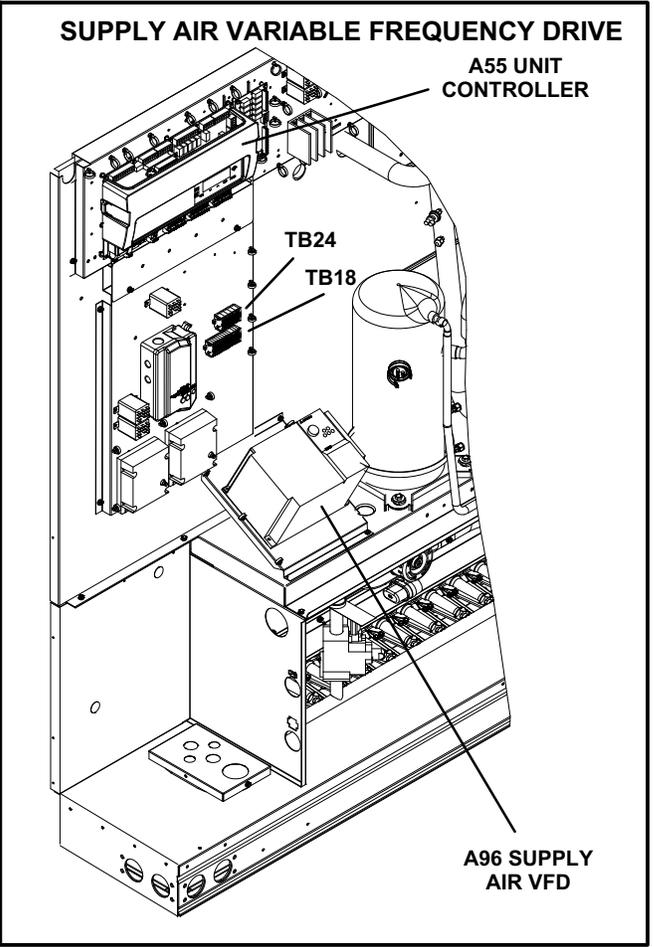
Units may contain an optional supply air blower equipped with a variable frequency drive A96 (VFD) which varies supply air CFM.

The supply air VFD (A96) is located near the compressors. See figure 29.

**A-Start-Up**

- 1- A pressure transducer (A30) is shipped in a box in the blower compartment. Install the transducer according to manufacturer's instructions.

*Note - Make sure the transducer is installed in the main duct at least 2/3 of the distance away from the unit.*



**FIGURE 29**

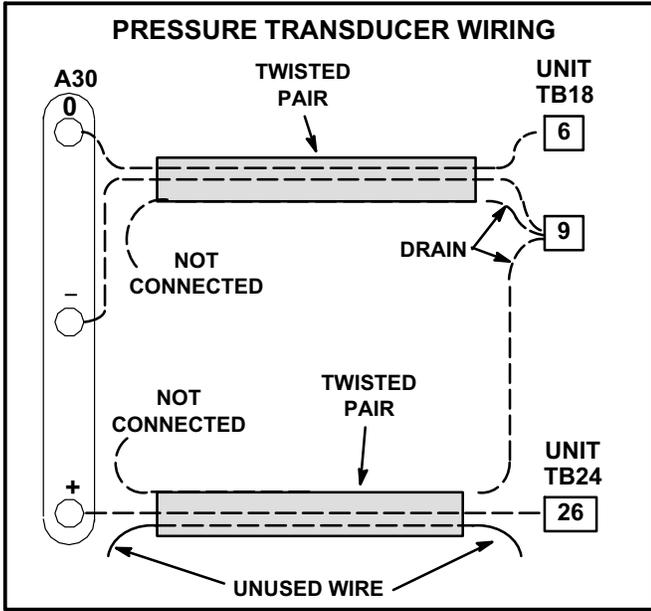


FIGURE 30

- 2- Two twisted pairs of shielded cable must be used to connect the pressure transducer. See figure 30.
- 3- Open all zone dampers and/or boxes.
- 4- Locate the A55 Unit Controller. Refer to figure 29.
- 5- Use the Unit Controller to calibrate the blower CFM. Select the **SETUP->TEST & BALANCE->BLOWER** menu to start the blower. The Unit Controller will display the percent of blower speed. Adjust blower speed percentage to meet design airflow specifications. Allow blower speed to stabilize.
- 6- Press SAVE to display the current static pressure. If the static pressure meets the design specification, press SAVE again to set the setpoint. If the static pressure does not meet the design specification, adjust the pressure and press SAVE to set the setpoint.
- 7- Record new setpoints in table 12.

*Note - The Unit Controller will lock-out the unit for 5 minutes if static pressure exceeds 2.0" w.c. for 20 seconds. The Unit Controller will permanently shut down the unit after three occurrences. See Unit Controller parameters 110, 42, and 43 to adjust default values.*

- 8- If the desired CFM cannot be met with current pulley setup, refer to the *Blower Operation and Adjustments* section to adjust CFM.

**B-Unit Operation**

Use the Unit Controller to check unit mechanical operation. See the *Service - Test* section of the Unit Controller manual.

**TABLE 12  
RECORD ADJUSTED SETPOINTS**

Parameter	Setpoint Description	Setpoint "w.c.	Display Setting
386	Smoke		
387	Ventilation		
388	Heating		
389	Cooling		

**C-Supply Air VFD Bypass (Optional)**

**IMPORTANT - All dampers must be open to prevent damage to duct work and dampers.**

- 1- Turn off all power to unit.
- 2- Locate J/P247 and J/P248 connectors near the VFD. See figure 31.
- 3- Disconnect P247 from J247 and connect J249 to P247. See figure 32.

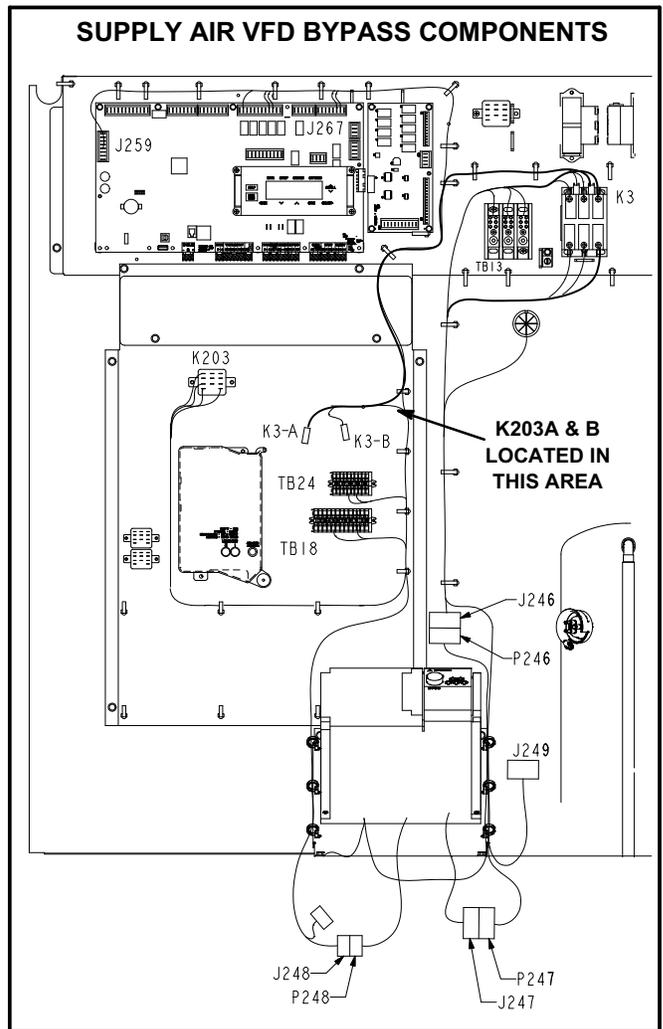
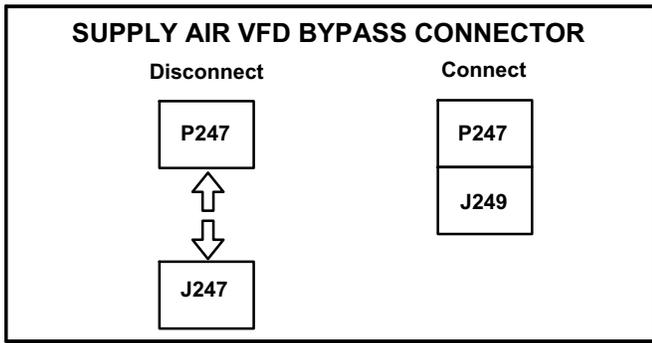
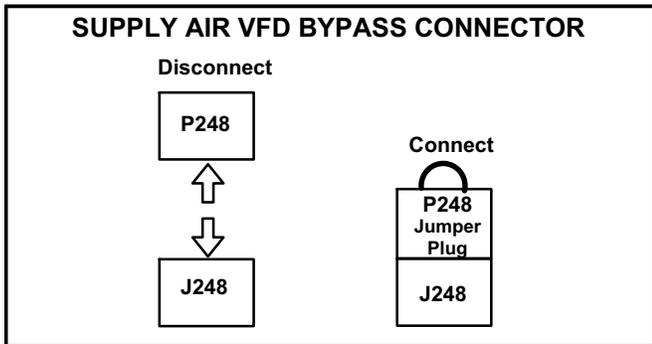


FIGURE 31



**FIGURE 32**

- 4- Disconnect J248 from P248 and connect connect P248 jumper plug to J248. P248 jumper plug is attached to the J248 wire harness near the J248 jack connector. See figure 33.



**FIGURE 33**

- 5- Locate VFD control relay K203 on the lower control panel next to terminal strip TB24. See figure 31.
- 6- Locate wires labeled K203-A and K203-B in area shown in figure 31. Disconnect insulated terminals.
- 7- Locate wires labeled K3-A and K3-B coming from K3 blower relay. Connect to K203-A to K3-A and K203-B to K3-B.
- 8- Restore power to unit. Blower will operate in constant air volume (CAV) mode.
- 9- Check the indoor blower motor nameplate for full load amperage (FLA) value. Measure the amp readings from the indoor blower motor operating in bypass mode. If measured amps are higher than nameplate FLA value, decrease the CFM by opening (turning counterclockwise) the motor pulley. See figure 18. Do not exceed minimum and maximum number of pulley turns as shown in table 4.

**Multi-Staged Air Volume Start-Up**

**LGH/LCH300 & 360 Units Only**

Units may contain an optional supply air blower equipped with a variable frequency drive A96 (VFD) which stages supply air CFM.

The supply air VFD (A96) is located near the compressors. See figure 29.

**A-Design Specifications**

Use table 13 to fill in field-provided, design specified blower CFM for appropriate unit.

If only high and low cooling design specifications are provided, set the medium cooling CFM at the high or low cooling design spec or any CFM between.

**B-Set Maximum CFM**

Use table 13 to determine highest blower CFM for appropriate unit. Adjust the blower pulley to deliver that amount of CFM with only the blower operating. See the Blower Operation and Adjustment section.

**TABLE 13  
CFM DESIGN SPECIFICATIONS -  
300 & 360 UNITS WITH STAGED BLOWER**

No. Of Stages / Control Type	Blower Speed <sup>1</sup>	Design Specified CFM
2 Stages / T'Stat	Htg.	
	Clg. High	
	Clg. Low	
	Ventilation	
3 Stages / T'Stat <sup>2</sup>	Htg.	
	Clg. High	
	Clg. Med.	
	Clg. Low	
4 Stages / Room Sensor OR Discharge Air Control	Htg.	
	Clg. High	
	Clg. Med. High	
	Clg. Med. Low	
	Clg. Low	
	Ventilation	

<sup>1</sup>Available blower speeds vary by unit and thermostat stages.

<sup>2</sup>Requires a transfer relay (K27) and three-stage thermostat.

**C-Set Blower Speeds**

1- Use the following menu to enter the blower design specified CFM into the Unit Controller. Make sure blower CFM is within limitations shown in table 14. Refer to the Unit Controller manual provided with unit.

**SETUP > TEST & BALANCE > BLOWER >**

2- Enter the following design specifications as shown in table 13.

Blower / Heat CFM  
Cooling High CFM<sup>1</sup>  
Cooling Low CFM<sup>1</sup>  
Vent CFM

<sup>1</sup>The Unit Controller will prompt when more cooling stages are available depending on the number of compressors and the control mode.

3- Adjust the blower RPM to deliver the target CFM based on the measured static pressure using the blower table.

4- Measure the static pressure again and apply the static pressure and RPM to the blower tables to determine adjusted CFM.

5- Repeat adjustments until design CFM is reached.

**D-Inverter Bypass Option**

The supply air inverter is factory-set to bypass the inverter manually. To bypass the inverter and operate the blower in the constant air volume mode, use the following Unit Controller menu and set to “engaged”:

**SETTINGS > RTU OPTIONS > BLOWER > VFD BYPASS**

To configure the unit to bypass the inverter automatically, use the following Unit Controller menu.

**SETUP > INSTALL**

Press SAVE until the menu reads:

**CONFIGURATION ID 1**

Change the 6<sup>th</sup> character position to A for automatic bypass option.

**Press SAVE**

*Caution - Units not equipped with an inverter will have the 6<sup>th</sup> character set to N, indicating the inverter is not bypassed. The blower motor could be damaged and/or result in product or property damage if the setting is changed to automatic or manual.*

**TABLE 14  
MINIMUM AND MAXIMUM CFM -  
300 & 360 UNITS WITH STAGED BLOWERS**

Gas Heat Minimum CFM		
Unit	Gas Heat Size	Airflow CFM
LGH300	Std., Med.	5950
LGH300	High	7125
LGH360	Std., Med.	5950
LGH360	High	7125
Electric Heat Minimum CFM		
Unit	Heat Size (kW)	Airflow CFM
LCH300, 360	All	10,500
Cooling Minimum CFM		
Unit	Blower Speed	Airflow CFM
LGH/LCH300	Cool 1; Clg. Low	4000
LGH/LCH300	Cool 2; Clg. Med. Low	4000
LGH/LCH300	Cool 3; Clg. Med. High	4000
LGH/LCH300	Cool 4; Clg. High	7000
Cooling Minimum CFM		
Unit	Blower Speed	Airflow CFM
LGH/LCH360	Cool 1; Clg. Low	4800
LGH/LCH360	Cool 2; Clg. Med. Low	4800
LGH/LCH360	Cool 3; Clg. Med. High	4800
LGH/LCH360	Cool 4; Clg. High	8400
Smoke and Ventilation Minimum CFM		
Unit	Not Applicable	Airflow CFM
LGH/LCH300	NA	3750
LGH/LCH360	NA	4500
Heating and Cooling Maximum CFM		
Unit	Blower Speed	Airflow CFM
LGH/LCH300	High	12000
LGH/LCH360	High	14400

## 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 valves, L14 and L30, route 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 34 for reheat refrigerant routing. See figure 35 for cooling only refrigerant routing.

### L14/L30 Reheat Coil Solenoid Valve

When Unit Controller input (Unit Controller J298-5 or J299-8) indicates room conditions require dehumidification, L14/L30 reheat valve is energized (Unit Controller P269-3 or P269-4) and refrigerant is routed to the reheat coil.

### Reheat Setpoint

Reheat is factory-set to energize when indoor relative humidity rises above 60% (default). The reheat setpoint can be adjusted by changing Unit Controller Settings - Control menu. A setting of 100% will operate reheat from an energy management system digital output.

Reheat will terminate when the indoor relative humidity falls 3% (57% default) or the digital output de-energizes. The reheat deadband can be adjusted at Settings - Control menu.

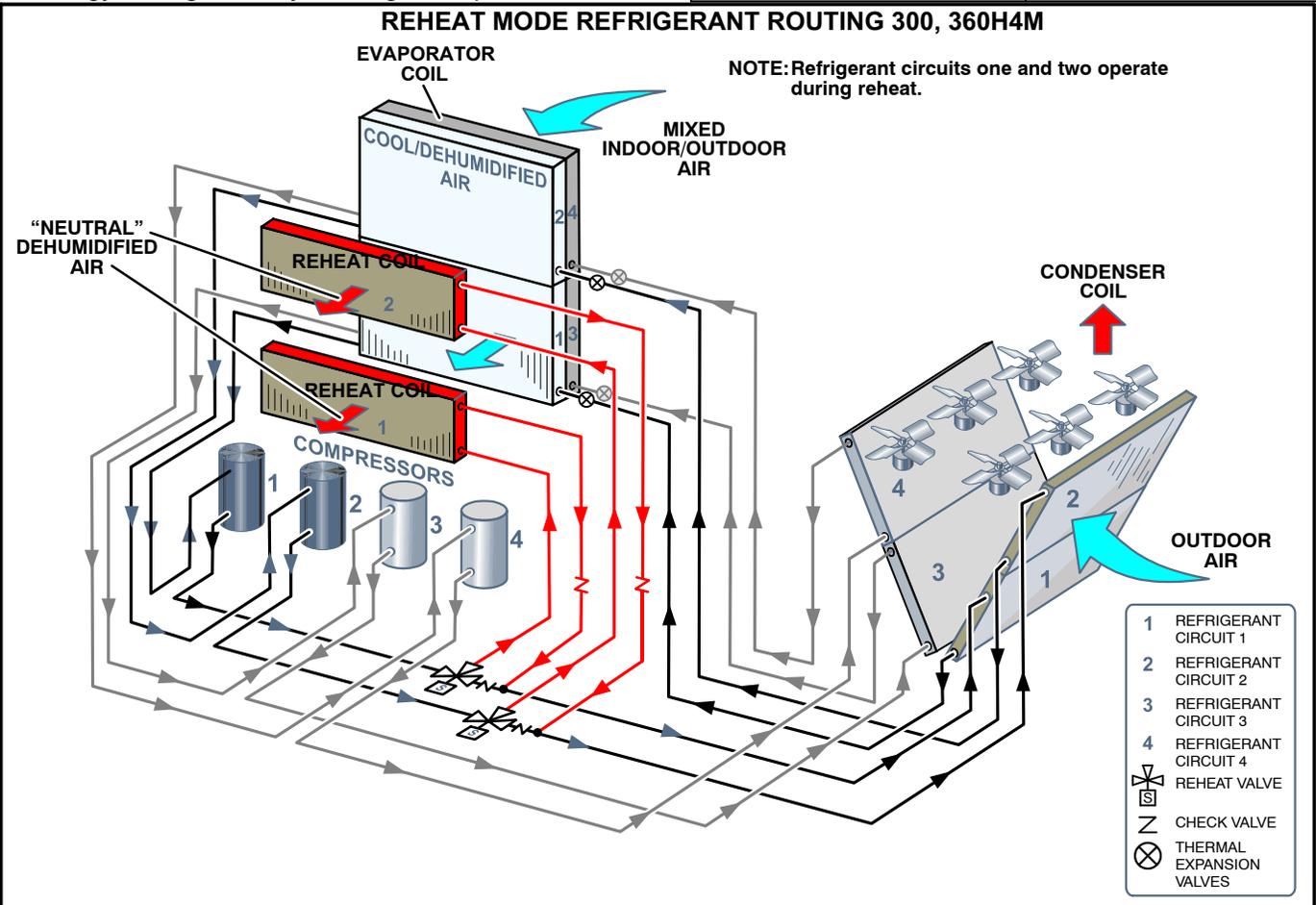
### A91 Humidity Sensor

Relative humidity should correspond to the sensor (A91) output voltage listed in table 15. For example: if indoor air relative humidity is  $80\% \pm 3\%$ , the humidity sensor output should read 8.00VDC.

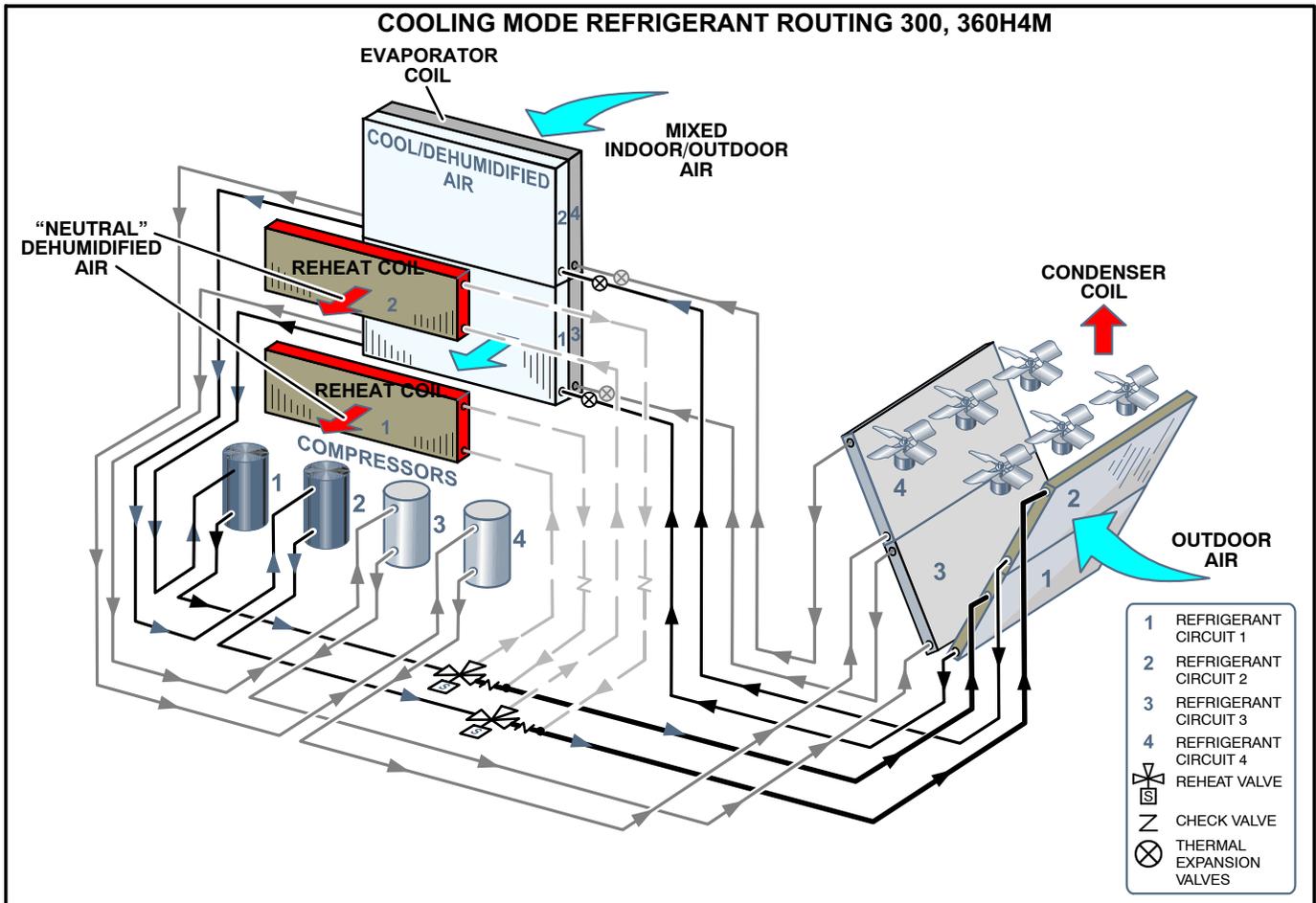
Check the sensor output annually for accuracy. Keep the air intake openings on the sensor clean and free of obstructions and debris.

**TABLE 15**

Relative Humidity (%RH $\pm$ 3%)	Sensor Output (VDC)
20	2.00
30	3.00
40	4.00
50	5.00
60	6.00
70	7.00
80	8.00
90	9.00



**FIGURE 34**



**Check-Out**

Test reheat operation using the following procedure.

- 1- Make sure reheat is wired as shown in wiring section.
- 2- Make sure unit is in local thermostat mode.
- 3- Use Unit Controller key pad to elect SERVICE > TEST > DEHUMIDIFIER.

300, 360 -

The blower, compressor 1, and compressor 2 (reheat) should be operating. L14 and L30 LEDs on the Unit Controller should also be ON, indicating the reheat valves are energized. REHEAT MODE will be appear on the Unit Controller display.

- 4- Press BACK on the Unit Controller display to stop the testing mode.

**Default Reheat Operation**

Reheat will operate as shown in table 16 once three conditions are met:

- 1- Blower must be operating.
- 2- System must be in occupied mode.
- 3- System must NOT be operating in heating mode.

**IMPORTANT - Free cooling does not operate during reheat.**

For other reheat control options, refer to the Unit Controller manual.

**Additional Cooling Stages**

Units are shipped from the factory to provide two stages of cooling.

Three stages of cooling is available in zone sensor mode. Three stages of cooling is also available by installing a transfer relay and a three-stage thermostat. Refer to the Main Control Operation section in the Unit Controller manual when using the transfer relay.

**Additional Cooling Stages**

Four stages of cooling is available in zone sensor mode on units with four compressors.

Compressors are not de-energized when unit operation changes from cooling to reheat or from reheat to cooling. Instead, L14 and L30 reheat valves are energized (reheat) or de-energized (cooling).

*NOTE - Another thermostat staging option is available which allows both compressors to be energized during free cooling. See Unit Controller manual for details.*

**TABLE 16  
REHEAT OPERATION**

<b>Two-Stage Thermostat - Default</b>	
T'stat and Humidity Demands	Operation
	300, 360 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling <sup>1</sup>
Reheat & Y1 & Y2	Compressor 1, 2, 3 & 4 Cooling <sup>3</sup>
<b>Three-Stage Thermostat (Transfer relay required)</b>	
T'stat and Humidity Demands	Operation
	300, 360 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling <sup>1</sup>
Reheat Y1 & Y2	Compressor 1 & 2 Reheat and Compressor 3, & 4 Cooling <sup>3</sup>
Reheat Y1 & Y2 & Y3	Compressor 1, 2, 3, & 4 Cooling <sup>4</sup>
<b>Four-Stage Zone Sensor Mode</b>	
Cooling* and Humidity** Demands	Operation
	300, 360 (4-Compressors)
Reheat Only	Compressor 1 & 2 Reheat
Reheat & Y1	Compressor 1 & 2 Reheat and Compressor 3 Cooling <sup>1</sup>
Reheat & Y1 & Y2	Compressor 1 & 2 Reheat and Compressor 3 & 4 Cooling <sup>2</sup>
Reheat & Y1 & Y2 & Y3	Compressor 1 Reheat, Compressor 2, 3, & 4 Cooling <sup>3</sup>
Reheat & Y1 & Y2 & Y3 & Y4	Compressor 1, 2, 3, & 4 Cooling <sup>5</sup>

\*Cooling stage is initiated when zone temperature is higher than the cooling setpoint plus the appropriate stage differential.

\*\*Reheat demand is initiated when relative humidity is higher than relative humidity setpoint.

<sup>1</sup>If there is no reheat demand and outdoor air is suitable, free cooling will operate.

<sup>2</sup>If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 will operate.

<sup>3</sup>If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 and 2 will operate.

<sup>4</sup>If there is no reheat demand and outdoor air is suitable, free cooling, compressor 1, 2 and 3 will operate.

<sup>5</sup>If there is no reheat demand and outdoor air is suitable, free cooling, compressor 1, 2, 3 and 4 will operate.

The following conditions must be met before reheat will be energized:  
(factory-default; see Unit Controller manual for other options)

1- Blower must be operating.

2- System must be in occupied mode.

3- System must NOT be operating in heating mode.

## Optional Economizer Settings

### A-Control Settings

The economizer, when configured, controls:

- Damper position, which determines how much outdoor air is used to meet free cooling or indoor air quality requirements, and
- Can be used to control optional power exhaust fans.

On a cooling demand, outdoor air is used for free cooling instead of first-stage compressor(s) when outdoor air is suitable.

To enable the economizer, if installed, go to **SETUP > INSTALL** and go through the wizard. When reaching **Configuration ID 1**, position **2** will need to be set to the applicable type of economizer. Valid types are as indicated below:

- **M** = Motorized Outdoor Air Damper Only
- **T** = Economizer - Temperature (*Note: Used for both set point and offset temperature control.*)
- **G** = Economizer - Global
- **S** = Economizer - Single Enthalpy
- **D** = Economizer - Dual Enthalpy

The following options are available depending on economizer set above. These settings are available through the main menu at **SETUP > TEST & BALANCE > DAMPER**.

### B-Damper Minimum Position Setting

Use the following menu path to modified the minimum damper positions for both high and low operations.

**SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON HIGH = .%**

**SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION BLOWER ON LOW = .%**

### C-Economizer Operation

*Note - Use indicating lights on Unit Controller to determine thermostat demand.*

See table 21 for economizer operation with a standard two-stage thermostat

Table 22 shows economizer operation with an energy management system which uses a global sensor.

Both tables show the occupied and unoccupied time period. The occupied time period is determined by the thermostat or energy management system.

Table 23 shows economizer operation in zone sensor mode.

### D-IAQ Damper Operation

The Unit Controller has a 0-10VDC IAQ input for a standard 0-2000ppm CO<sub>2</sub> sensor. The economizer starts opening at a CO<sub>2</sub> level of 500 ppm (default) and reaches full open at a CO<sub>2</sub> level of 1000ppm. Adjustments may be made to the indoor air quality parameters to alter operation or meet required specifications. Use the user interface to change Parameter 117 through 119. Go to **SETTINGS > RTU OPTIONS > EDIT PARAMETER**.

If the economizer is operating in the free cooling mode and the IAQ sensor demands more fresh air, the IAQ demand will override the free cooling demand to open the dampers further or to keep them open.

The IAQ function is not energized during the unoccupied or night time period.

**TABLE 17**  
**MENU INTERFACE (LEVEL 1 - SETTINGS) - M (MOTORIZED OUTDOOR AIR DAMPER ONLY)**

Level 2	Level 3	Level 4	Level 5	USE THE <b>ADJUST AND SET VALUES</b> ARROWS TO SCROLL UP OR DOWN FOR SELECTION OPTIONS.	
<b>RTU OPTION</b>	<b>DAMPER</b>	MIN DAMPER POSITION BLOWER ON HIGH = X.X %			
		MIN DAMPER POSITION BLOWER ON LOW = X.X %			
		DEMAND CONTROL VENT DAMPER START OPEN = XXXX.X PPM			
		DEMAND CONTROL VENT DAMPER FULL OPEN = XXXX.X PPM			
		DEMAND CONTROL VENT DAMPER MAX OPENING = XXX.X%			
		FRESH AIR HEATING ENABLE FAH = YES OR NO	FRESH AIR HEATING FAH SETPOINT = XX F		
		FRESH AIR COOLING ENABLE AFC = YES OR NO	FRESH AIR COOLING AFC SETPOINT = XX F		

**TABLE 18  
MENU INTERFACE (LEVEL 1 - SETTINGS) - T (TEMPERATURE ECONOMIZER)**

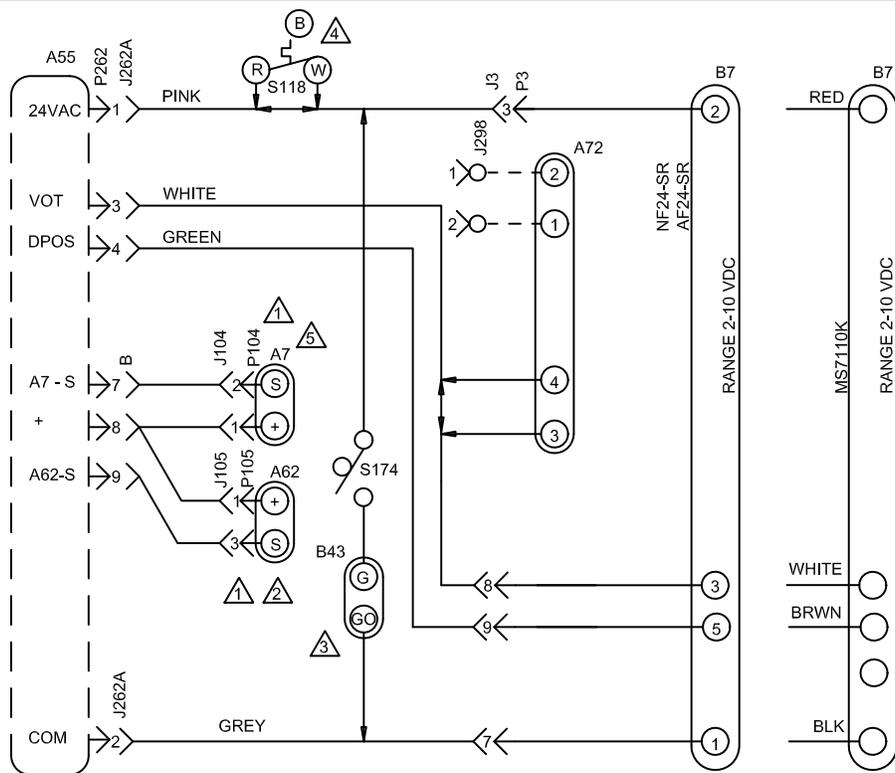
Level 2	Level 3	Level 4	Level 5	USE THE <b>ADJUST AND SET VALUES</b> ARROWS TO SCROLL UP OR DOWN FOR SELECTION OPTIONS.
<b>RTU OPTION</b>	<b>DAMPER</b>	ECONOMIZER TEMP ECON TYPE = TEMPERATURE OFFSET OR TEMPERATURE SETPT		
		ECONOMIZER OAT SETPOINT = XX.X F		
		FREE COOLING SUPPLY AIR SETPOINT = XX F		
		MIN DAMPER POSITION BLOWER ON HIGH = X.X %		
		MIN DAMPER POSITION BLOWER ON LOW = X.X %		
		DEMAND CONTROL VENT DAMPER START OPEN = XXXX.X PPM		
		DEMAND CONTROL VENT DAMPER FULL OPEN = XXXX.X PPM		
		DEMAND CONTROL VENT DAMPER MAX OPENING = XXX.X%		
		FRESH AIR HEATING ENABLE FAH = YES OR NO	FRESH AIR HEATING FAH SETPOINT = XX F	
		FRESH AIR COOLING ENABLE AFC = YES OR NO	FRESH AIR COOLING AFC SETPOINT = XX F	

**TABLE 19  
MENU INTERFACE (LEVEL 1 - SETTINGS) - G (GLOBAL ECONOMIZER)**

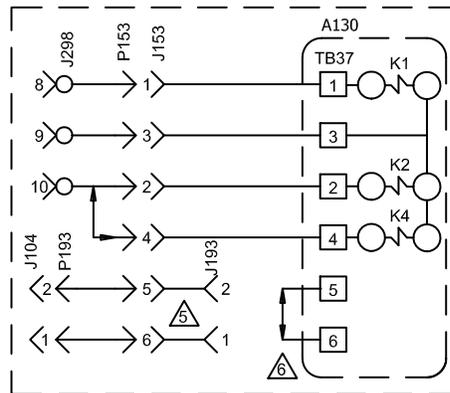
Level 2	Level 3	Level 4	Level 5	USE THE <b>ADJUST AND SET VALUES</b> ARROWS TO SCROLL UP OR DOWN FOR SELECTION OPTIONS.
<b>RTU OPTION</b>	<b>DAMPER</b>	FREE COOLING SUPPLY AIR SETPOINT = XX F		
		MIN DAMPER POSITION BLOWER ON HIGH = X.X %		
		MIN DAMPER POSITION BLOWER ON LOW = X.X %		
		DEMAND CONTROL VENT DAMPER START OPEN = XXXX.X PPM		
		DEMAND CONTROL VENT DAMPER FULL OPEN = XXXX.X PPM		
		DEMAND CONTROL VENT DAMPER MAX OPENING = XXX.X%		
		FRESH AIR HEATING ENABLE FAH = YES OR NO	FRESH AIR HEATING FAH SETPOINT = XX F	
		FRESH AIR COOLING ENABLE AFC = YES OR NO	FRESH AIR COOLING AFC SETPOINT = XX F	

**TABLE 20  
DEMAND CONTROL VENTILATION PARAMETERS**

Control Parameter			Control Value			Units	Description
No	Screen Name	Parameter Short Description	Min.	Default	Max.		
117	DCV MAX DAMPER OPEN	Demand Control Ventilation Maximum Damper Open	0	100	100	%	Maximum allowed demand control ventilation damper open position.
118	DCV DAMP START OPEN	Demand Control Ventilation Damper Start Open	0	700	2000	PPM	<p>☒ Damper "start open" CO<sub>2</sub> set point for Demand Control Ventilation.</p> <p>☒ Level where fresh air damper begins to open.</p>
119	DCV DAMP FULL OPEN	Demand Control Ventilation Maximum Damper Full Open Set Point	0	1200	2000	PPM	<p>☒ Damper "full open" CO<sub>2</sub> set point for Demand Control Ventilation.</p> <p>☒ Level where fresh air damper is opened to maximum.</p>
120	DCV HI TMP OV FL CL	Demand Control Ventilation Outdoor Air Control Hi Temperature Override Full Closed	-31.0	105.0	132.0	°F	High outdoor air temp. where fresh air damper is closed to minimum position.
121	DCV HI TMP OV ST CL	Demand Control Ventilation Outdoor Air Control Hi Temperature Override Start Closing	-31.0	75.0	132.0	°F	High outdoor air temperature where fresh air damper begins to close.
122	DCV LO TMP OV FL CL	Demand Control Ventilation Outdoor Air Control Low Temperature Override Full Closed	-31.0	10.0	132.0	°F	Low outdoor air temperature where fresh air damper is closed to minimum position
123	DCV LO TMP OV ST CL	Demand Control Ventilation Outdoor Air Control Low Temperature Override Start Closing	-31.0	40.0	132.0	°F	Low outdoor air temp. where fresh air damper begins to close.
134	IAQ INPUT MODE	Indoor Air Quality Input Mode	0	1	6	Option	<p>IAQ input source and mode (0-3 operate only when blower is on).</p> <p>0- Demand Control Ventilation System Indoor Air Quality. Either P298-3 or network indoor air quality.</p> <p>1- Demand Control Ventilation System Indoor Air Quality. Either P298-3 or network Indoor Air Quality with no outdoor air temperature limits.</p> <p>2- Outdoor Air Control Sensor A24 (A133_P194-6) (TB22-6).</p> <p>3- Outdoor Air Control Sensor A24 (A133_P194-6) (TB22-6) with no outdoor air temperature limits.</p> <p>4- Demand Control Ventilation System Indoor Air Quality. Either P298-3 or network Indoor Air Quality with blower on/auto operation.</p> <p>5- Demand Control Ventilation System Indoor Air Quality. Either P298-3 or network Indoor Air Quality with blower on/auto operation with no outdoor air temperature limits.</p>



DESCRIPTION	
KEY	COMPONENT
A7	SENSOR, SOLID STATE ENTHALPY
A130	CONTROL, ERS
A55	CONTROL, MAIN PANEL LENNOX
A62	SENSOR, ENTHALPY INDOOR
A72	CONTROL, REMOTE MIN POS (OPT)
B7	MOTOR, DAMPER ECONOMIZER
B43	MOTOR, EXHAUST DAMPER
J3	JACK, UNIT ECONOMIZER
J104	JACK, SENSOR OUTDOOR ENTHALPY
J105	JACK, SENSOR RETURN AIR ENTHALPY
J153	JACK, ENTHALPY / DAMPER MOTOR
J193	JACK, ENTHALPY SENSOR
J298A	JACK, IAQ INTERFACE
J262A	JACK, DAMPER MOTOR
J262B	JACK, ENTHALPY SENSORS
P3	PLUG, ECONOMIZER BYPASS
P153	PLUG, ENTHALPY / DAMPER MOTOR
P193	PLUG, ENTHALPY SENSOR
P262	PLUG, ECONOMIZER OUTPUT
S118	THERMOSTAT, DESICANT DEFROST
S174	SWITCH, EXHAUST DAMPER



ENERGY RECOVERY WHEEL HOOK UP

NOTE - THIS DIAGRAM USED ONLY WHEN ECONOMIZER OR MOTORIZED OUTDOOR AIR DAMPERS ARE INSTALLED.

- ① DELETE A7 AND A62 (IF USED) FOR EITHER GLOBAL ENTHALPY OR SENSIBLE TEMPERATURE CONTROL
- ② FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR
- ③ OPTIONAL EXHAUST DAMPER ACTUATOR TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED
- ④ S118 USED ON 35 TO 50 TON EMERGENCE UNITS WITH ENERGY RECOVERY WHEEL (ERW)
- ⑤ REPOSITION A7 ENTHALPY SENSOR FROM ROOFTOP UNIT ECONOMIZER INTO INTAKE HOOD OF THE ERW ROOFTOP UNIT
- ⑥ REMOVE JUMPER WHEN INSTALLING OPTIONAL LOW AMBIENT SWITCH

←————→ DESIGNATES OPTIONAL WIRING  
 - - - - - CLASS II FIELD WIRING

04/14		WIRING DIAGRAM	04/14
		537189-01	
ACCESSORIES			
ENERGENCE SERIES ECONOMIZER AND MOTORIZED OAD PIVOTING WHEEL ENERGY RECOVERY SYSTEM OPTION			
SECTION D			REV 2
Supersedes		New Form No. 537189-01	

**TABLE 21**  
**ECONOMIZER OPERATION - Standard Two-Stage Thermostat (Default Option)**

THERMOSTAT DEMAND	DAMPER POSITION UNOCC.	DAMPER POSITION OCCUPIED	MECHANICAL COOLING
<b>OUTDOOR AIR IS NOT SUITABLE FOR FREE COOLING</b>			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	CLOSED	MINIMUM	STAGE 1
Y2	CLOSED	MINIMUM	STAGES 1 AND 2
<b>OUTDOOR AIR IS SUITABLE FOR FREE COOLING</b>			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	MODULATING	MODULATING	NO
Y2	MODULATING	MODULATING (1)	STAGE 1

Note - Modulating dampers adjust to control supply air (RT6) to 55°F (13°C). (1) The Unit Controller goes into a "cool down" or "warm-up" mode when the occupied time period starts. (2) Units with two-stage compressor operation will operate only stage 1 with a Y2 demand.

**TABLE 22**  
**ECONOMIZER OPERATION WITH GLOBAL SENSING - Energy Management System (Default Option)**

THERMOSTAT DEMAND	DAMPER POSITION UNOCC.	DAMPER POSITION OCCUPIED	MECHANICAL COOLING
<b>GLOBAL INPUT OFF</b>			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Y1	CLOSED	MINIMUM	STAGE 1
Y2	CLOSED	MINIMUM	STAGES 1 AND 2
<b>GLOBAL INPUT ON</b>			
OFF	MODULATING	MODULATING	NO
G	MODULATING	MODULATING	NO
Y1	MODULATING	MODULATING	STAGE 1
Y2	MODULATING	MODULATING (1)	STAGES 1 AND 2 (2)

Note - Modulating dampers adjust to control supply air (RT6) to 55°F (13°C). (1) The Unit Controller goes into a "cool down" or "warm-up" mode when the occupied time period starts. (2) Units with two-stage compressor operation will operate only stage 1 with a Y2 demand (default).

**TABLE 23**  
**ECONOMIZER OPERATION - Zone Sensor Mode**

DEMAND	DAMPER POSITION UNOCC.	DAMPER POSITION OCCUPIED	MECHANICAL COOLING
<b>OUTDOOR AIR IS NOT SUITABLE FOR FREE COOLING</b>			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Cooling Stage 1	CLOSED	MINIMUM	COMPRESSOR 1
Cooling Stage 2	CLOSED	MINIMUM	COMPRESSOR 1 & 2
Cooling Stage 3	CLOSED	MINIMUM	COMPRESSOR 1, 2, & 3
Cooling Stage 4	CLOSED	MINIMUM	COMPRESSOR 1, 2, 3, & 4
<b>OUTDOOR AIR IS SUITABLE FOR FREE COOLING</b>			
OFF	CLOSED	CLOSED	NO
G	CLOSED	MINIMUM	NO
Cooling Stage 1	MODULATING	MODULATING	NO
Cooling Stage 2	FULL OPEN*	FULL OPEN*	COMPRESSOR 1
Cooling Stage 3	FULL OPEN*	FULL OPEN*	COMPRESSORS 1 & 2
Cooling Stage 4	FULL OPEN*	FULL OPEN*	COMPRESSORS 1, 2, 3, & 4

\*Damper will modulate to maintain 55°F supply air when parameter 164 is changed to setting "0". Note - Modulating dampers adjust to control supply air (RT6) to 55°F (13°C).

## Optional Outdoor Air CFM Control

Outdoor Air CFM Control is a factory-installed option available on units equipped with a supply air variable frequency drive (VFD) and economizer.

The Unit Controller modulates outdoor air dampers to maintain a constant amount of outdoor air regardless of blower speed. This ensures minimum ventilation requirements are met at lower supply air speeds.

The Unit Controller uses a velocity sensor (A24) to modulate dampers. The sensor is located in the outdoor air stream. See figure 36.

### Set Damper Minimum Position

- 1- Enable the Outdoor Air Control feature and set the velocity sensor range using the M3 Unit Controller **SETUP > INSTALL** menu. Navigate to **Configuration ID 1**. Set position **8** to:

**H** - Outdoor air control installed with A24 control set for low range (0-1968ft/min)

*Note - The configuration ID setting (H) must be paired with the "low" jumper position on the A24 control (see figure 37). The jumper is factory-set at low range (0-1968ft/min).*

- 2- Operate the blower in high speed and adjust the minimum damper position. Use **SETUP > TEST & BALANCE > DAMPER > MIN DAMPER POSITION** menu. Adjust minimum damper position and press **SAVE**. The Unit Controller will automatically save and display the velocity setpoint. Press **SAVE** again to confirm.

*Note - The minimum damper position setting MUST be set lower than the OAC max damper position setting (50% default). To modify the max damper position setting, navigate to **SETTINGS > EDIT PARAMETERS** and select parameter 117 (DCV MAX DAMPER OPEN).*

Additional outdoor air CFM control settings are available. See parameters 117 and 134 in the Unit Controller manual. Make adjustments through the **SETTINGS > EDIT PARAMETERS** menu; select the required parameter.

- 3- Replace A24 control cover.

*Note - Refer to local codes or authorities having jurisdiction when determining design minimum outdoor air requirements.*

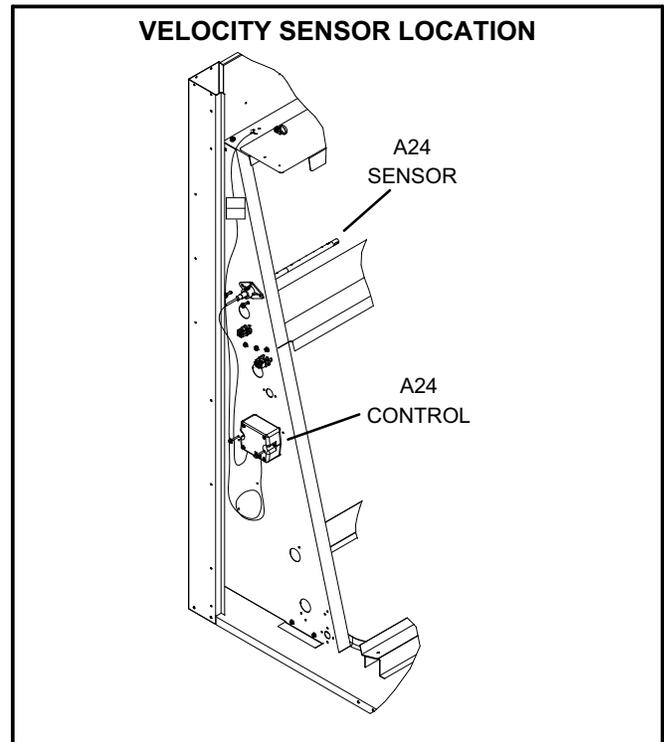


FIGURE 36

### Velocity Sensor Settings

The A24 control is factory-set for 0-10m/s (0-1968ft/min).

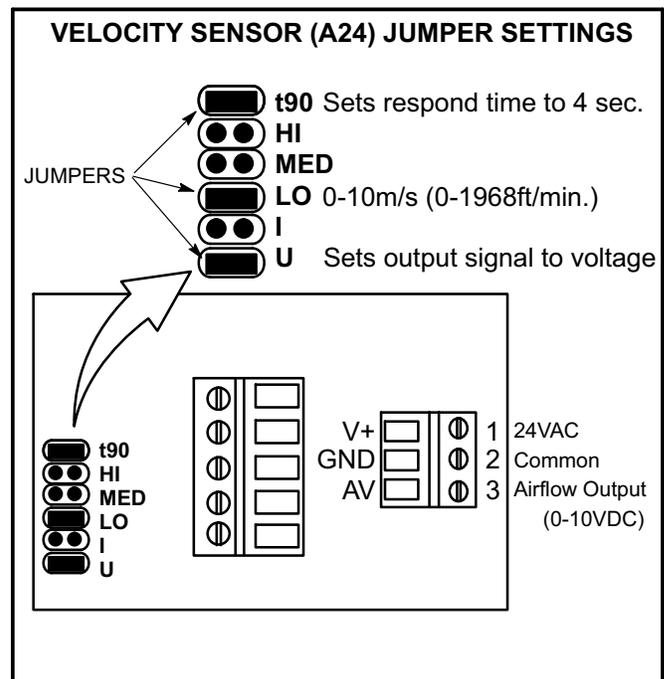


FIGURE 37

## 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 twelve 20 X 20 X 2" (508 X 508 X 51mm) 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 38.

*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.

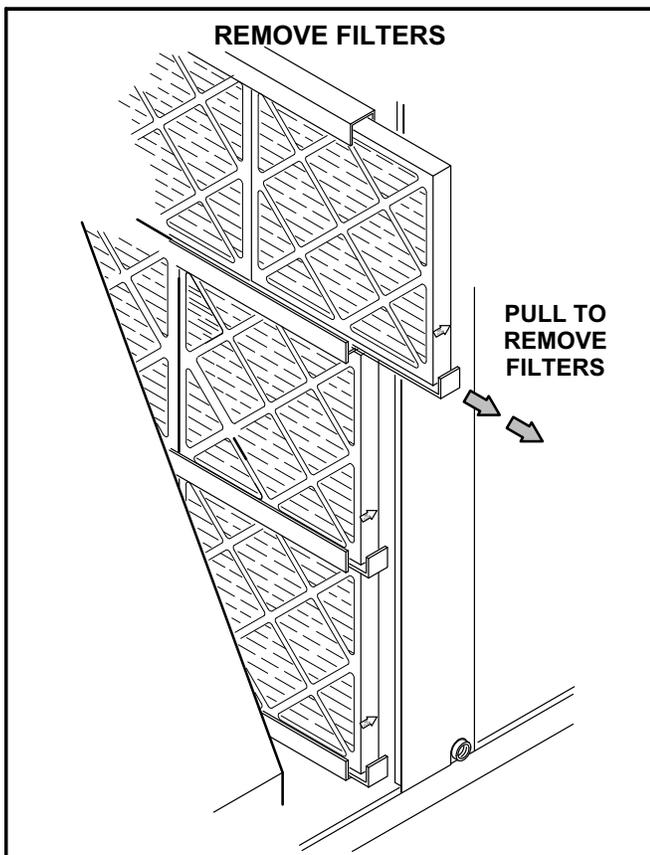


FIGURE 38

Blower shaft bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease, such as Alvania 3 (Shell Oil), Chevron BRB2 (Standard Oil) or Regal AFB2 (Texas Oil). Use a hand grease gun for relubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts.

### 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- Open burner compartment access panel.
- 3- Remove screws securing burner assembly to burner support and remove assembly. See figure 39. Clean as necessary.

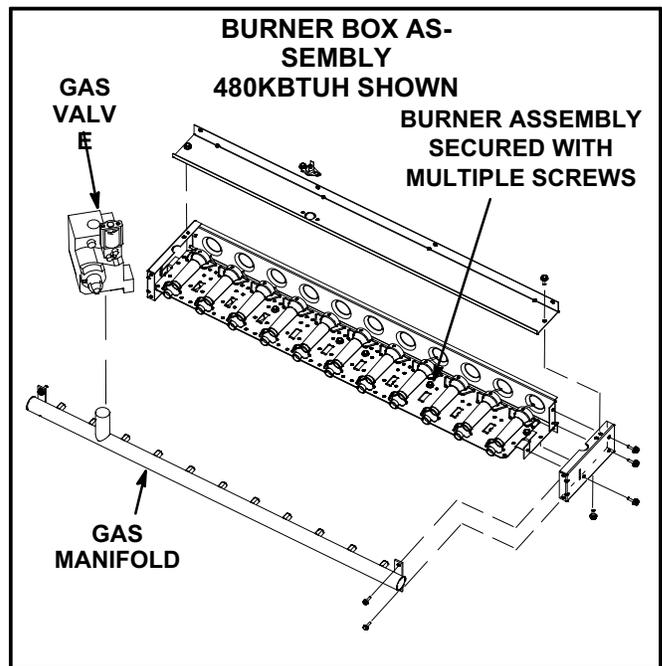


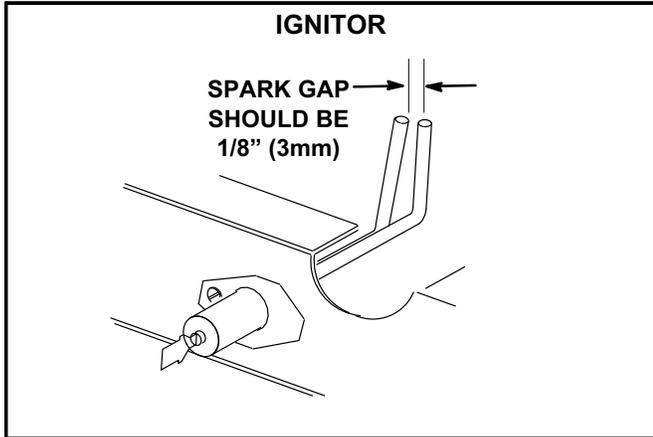
FIGURE 39

- 4- Locate the ignitor under the left burners. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See figure 40.
- 5- Check the alignment of the ignitor and the sensor as shown in figure 41 and table 24.
- 6- Replace burners and screws securing burner.

## ⚠ WARNING



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



**FIGURE 40**

**TABLE 24**

Dimension	Unit Btuh Input	Length - in. (mm)	
		Ignitor	Sensor
A	260K	7-3/4 (197)	11 (279)
B	360K	5 (127)	5-1/2 (140)
C	480K	2-1/4 (57)	2-3/4 (70)

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.

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

A combustion air blower 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.

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 and retain two screws from bracket supporting vent connector. See figure 42.
- 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.

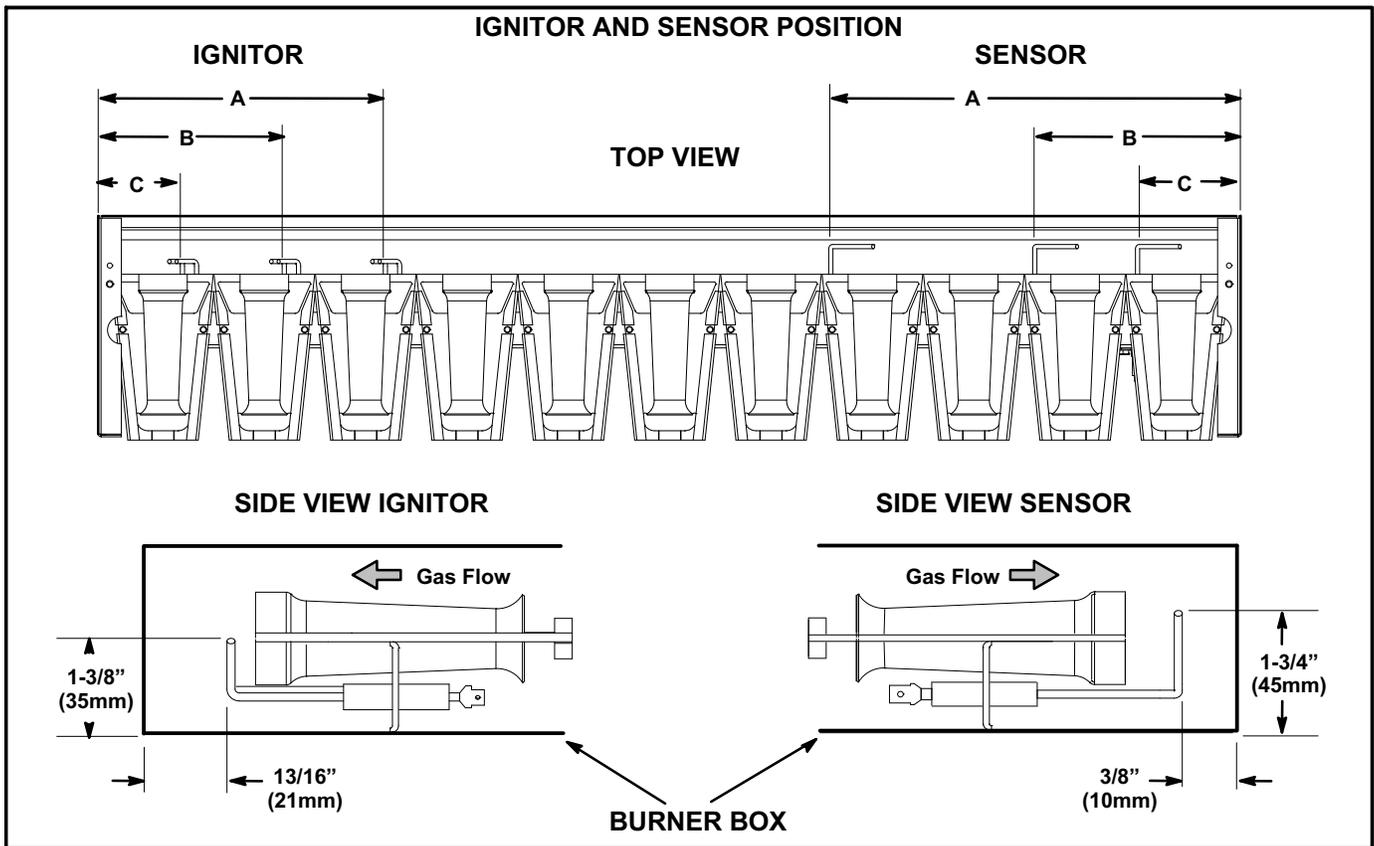


FIGURE 41

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.

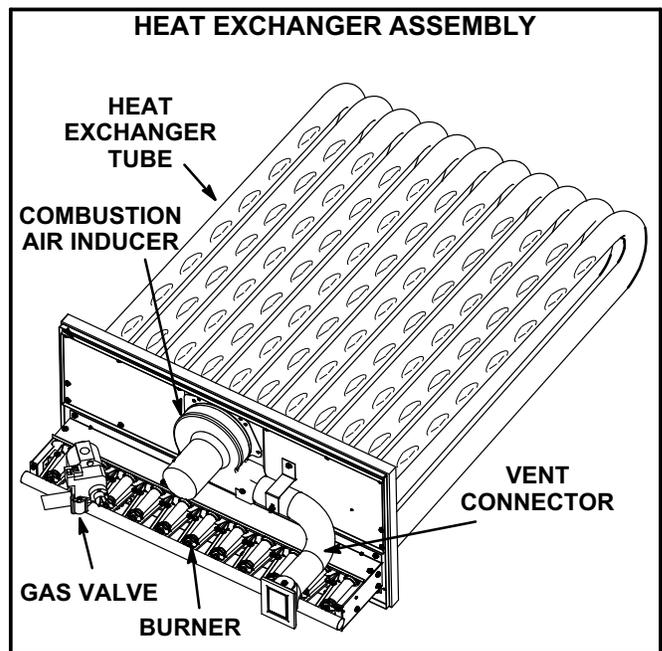


FIGURE 42

**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-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.

**H-Condenser Coil**

Clean condenser coil annually with water and inspect monthly during the cooling season. Access panels are provided on front and back of condenser section.

Clean the all-aluminum 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.

## 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 - 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			

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		

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"/>

Control Type