

INSTALLATION INSTRUCTIONS

⚠ WARNING

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

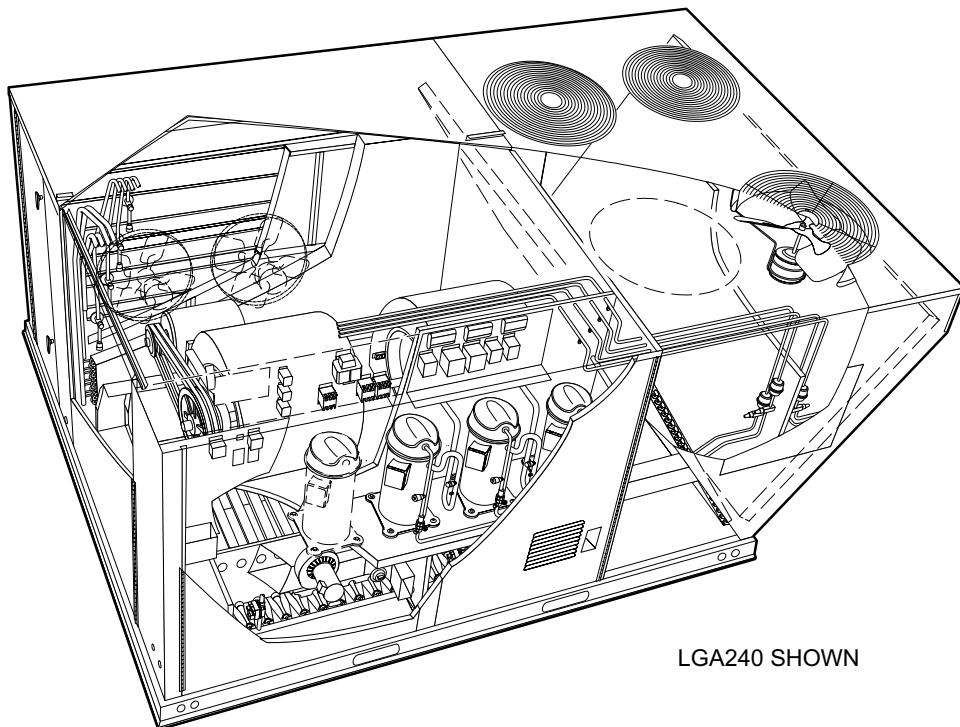
- LGA156, LCA156** (13 TON)
- LGA180, LCA180** (15 TON)
- LGA210, LCA210** (17.5 TON)
- LGA240, LCA240** (20 TON)
- LGA300S, LCA300S** (25 TON)

L SERIES PACKAGED UNITS
504,351M
4/2001
Supersedes 10/2000

Table of Contents

DIMENSIONS	1	PRESSURE TEST GAS PIPING	6
PARTS ARRANGEMENTS	2	HIGH ALTITUDE DERATE	6
SHIPPING AND PACKING LIST	3	FACTORY-INSTALLED OPTIONS	6
GENERAL	3	ELECTRICAL CONNECTIONS	7
REQUIREMENTS	3	BLOWER OPERATION AND ADJUSTMENTS	8
UNIT SUPPORT	3	COOLING START-UP	12
DUCT CONNECTION	4	GAS HEAT START-UP	16
RIGGING UNIT FOR LIFTING	4	HEATING OPERATION AND ADJUSTMENTS	17
CONDENSATE DRAINS	5	ELECTRIC HEAT START-UP	17
GAS PIPING	5	SERVICE	18

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

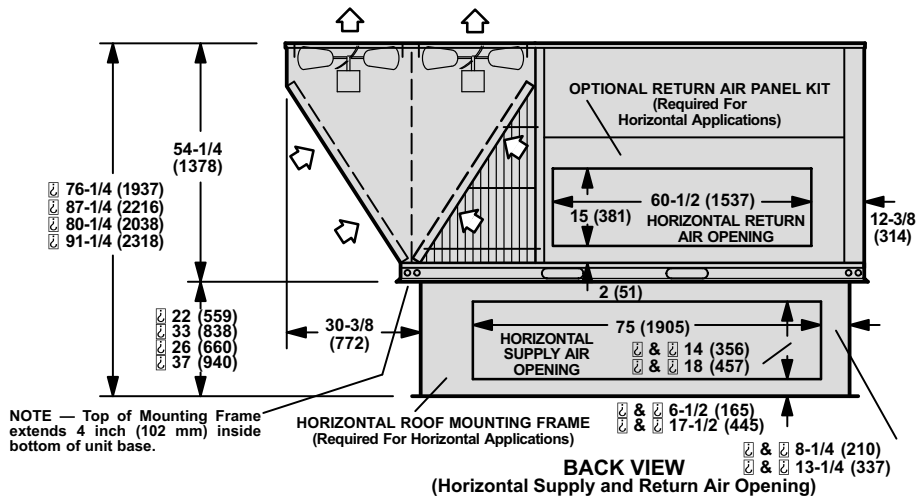
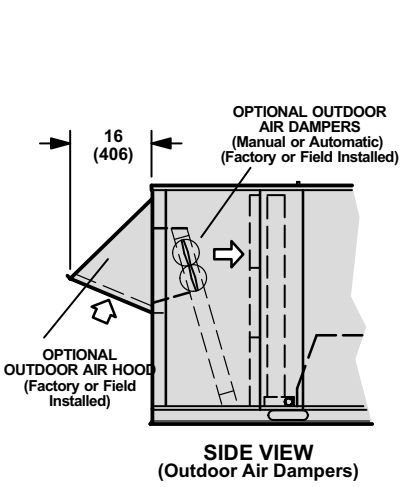
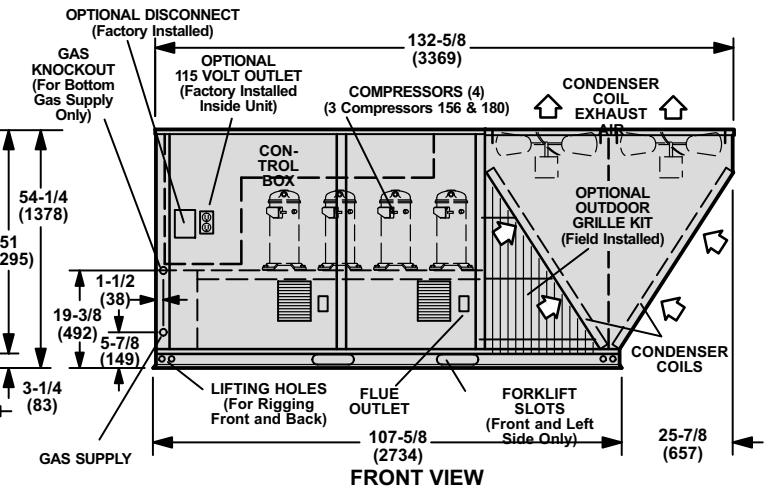
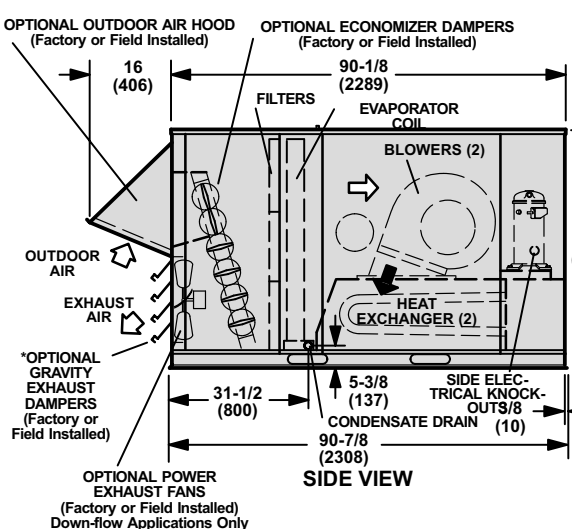
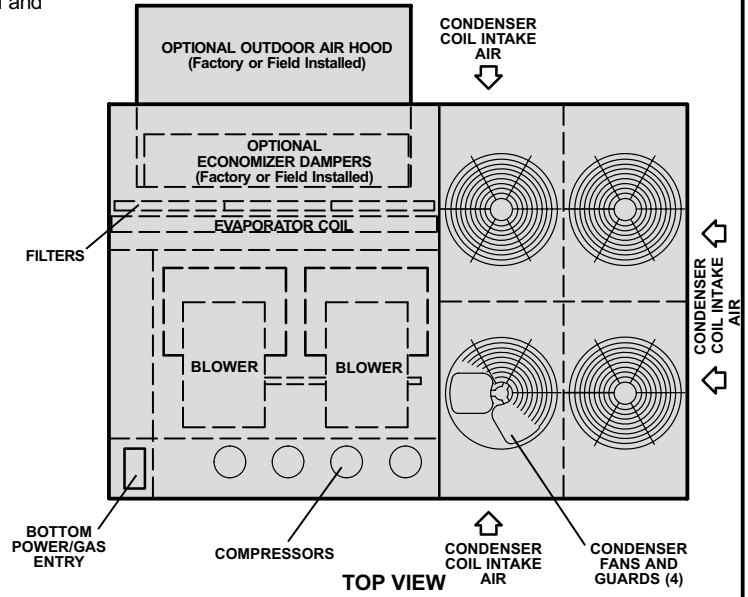
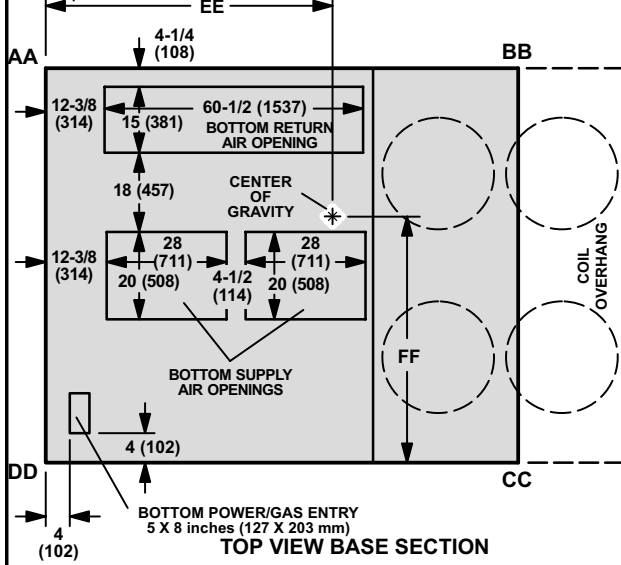


LGA240 SHOWN



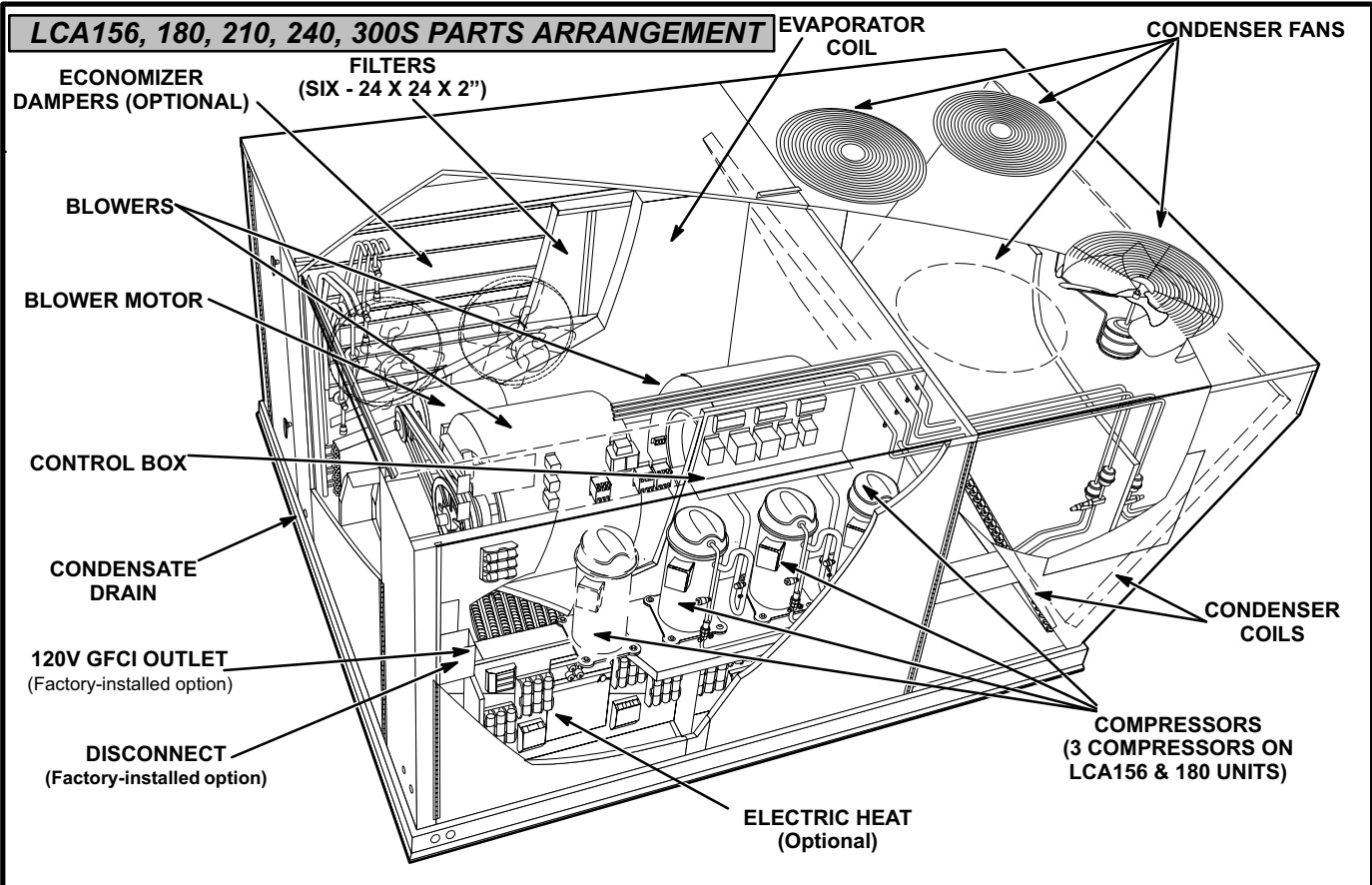
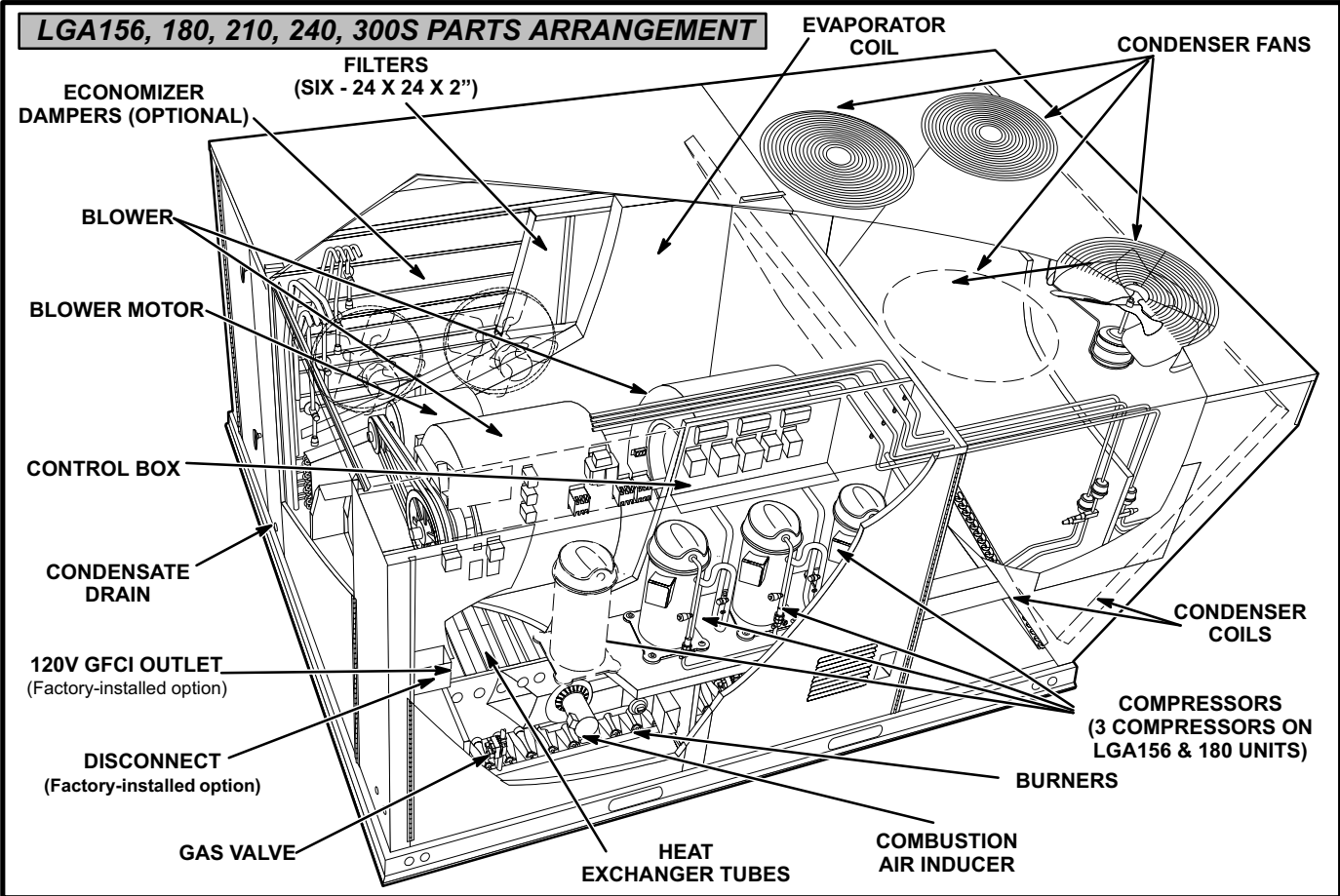
LGA/LCA156, 180, 210, 240, 300S Unit Dimensions - Inches (mm) - LGA Heat Section Shown

Note: All options shown; see Engineering Handbook for standard and optional features.



NOTE — Top of Mounting Frame extends 4 inch (102 mm) inside bottom of unit base.

- ☒ LARMFH18/24-26 ☒ LARMFH18/24-37 ☒ LARMFH30/36-30 (used with 300S Models Only) ☒ LARMFH30/36-40 (used with 300S Models Only)



Shipping and Packing List

Package 1 of 1 contains:

1- Assembled unit

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

General


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

The LGA156 gas/electric packaged rooftop unit is available in 260,000 Btuh heating input. The LGA180, 210, 240, & 300S gas/electric packaged rooftop units are available in 260,000 Btuh or 470,000 Btuh heating inputs.

The LCA156, 180, 210, 240, & 300S cooling packaged rooftop unit is the same basic design as the LGA unit except for the heating section. Optional electric heat is factory- or field-installed in LCA units.

LGA and LCA units have identical refrigerant circuits with respective 13, 15, 17-1/2, 20, and 25 ton cooling capacities. LGA/LCA156, 180 units contain three compressors; LGA/LCA210, 240, and 300S units contain four compressors.

⚠ 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.

⚠ CAUTION

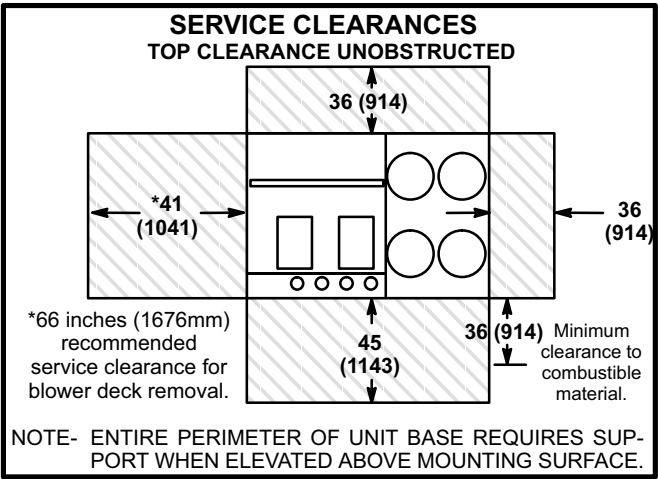
Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

Requirements

See figure 1 for unit clearances.

⚠ 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.



NOTE - These units must not be used as a "construction heater" at any time during any phase of construction. Very low return air temperatures, harmful vapors, and misplacement of the filters will damage the unit and its efficiency.

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 LARMF18/36 roof mounting frame.

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

A-Downflow Discharge Application

Roof Mounting with LARMF18/36

- 1- The LARMF roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The LARMF 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 LARMF18/36 roof mounting frame is required.

B-Horizontal Discharge Applications

- 1- Units installed in horizontal airflow applications must use an LARMFH18/24 horizontal roof mounting frame. The supply air duct connects to the horizontal supply air opening on the LARMFH18/24. 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 top of unit.)

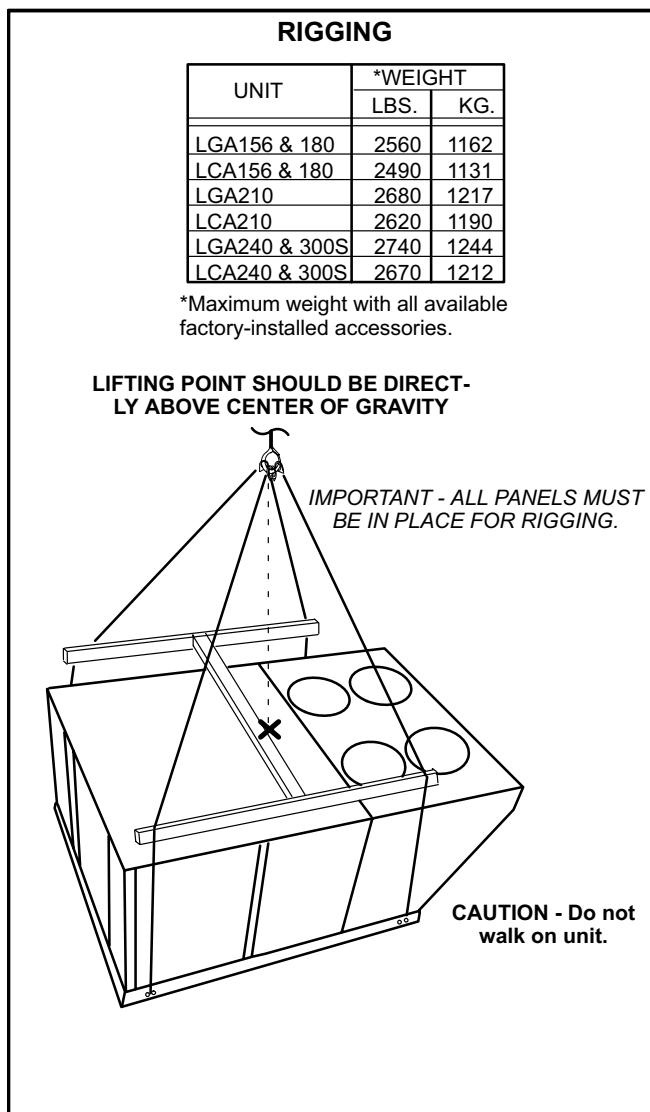


FIGURE 2

Condensate Drains

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.

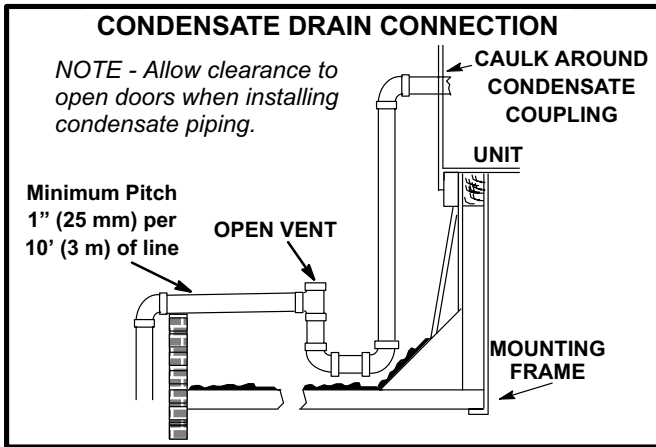


FIGURE 3

Connect Gas Piping

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 4.5" w.c. (1.19kPa) and a maximum of 10.5" (2.60kPa) w.c. For LP/propane gas units, operating pressure at the unit gas connection must be a minimum of 11" w.c. (2.74kPa) and a maximum of 13.5" 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 in field piping accessible for test gauge connection must be provided upstream of gas supply connection to the unit. 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. Adapt existing piping as shown in figure 5 for bottom gas entry. Figure 6 shows complete bottom gas entry piping.

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

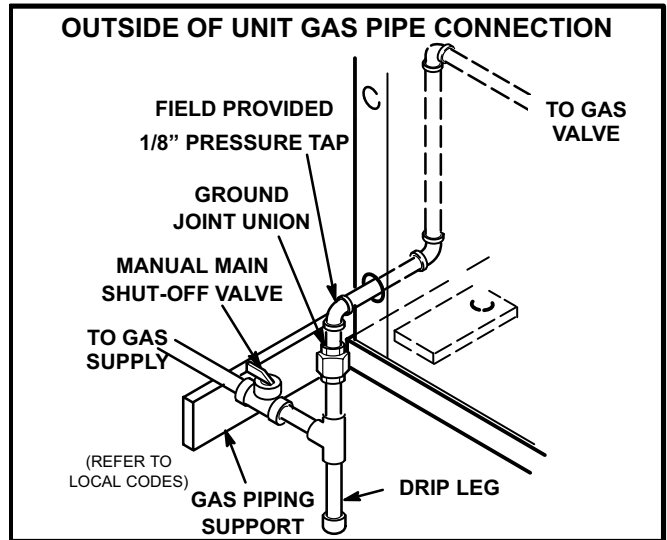


FIGURE 4

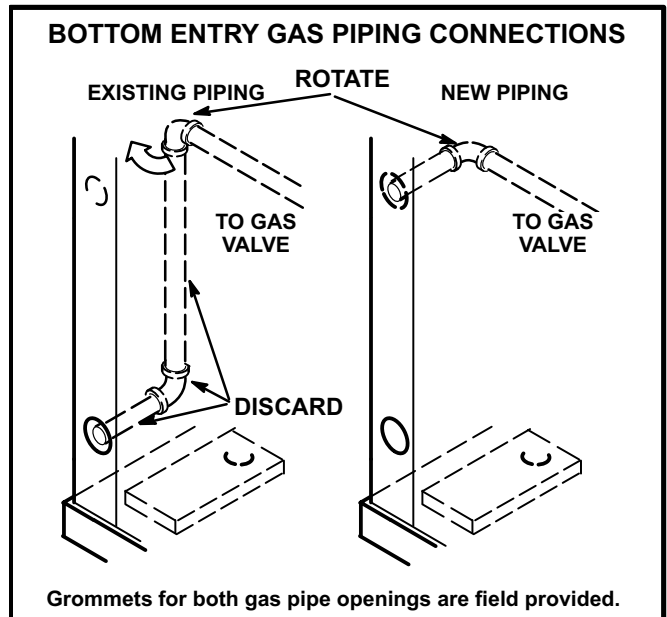


FIGURE 5

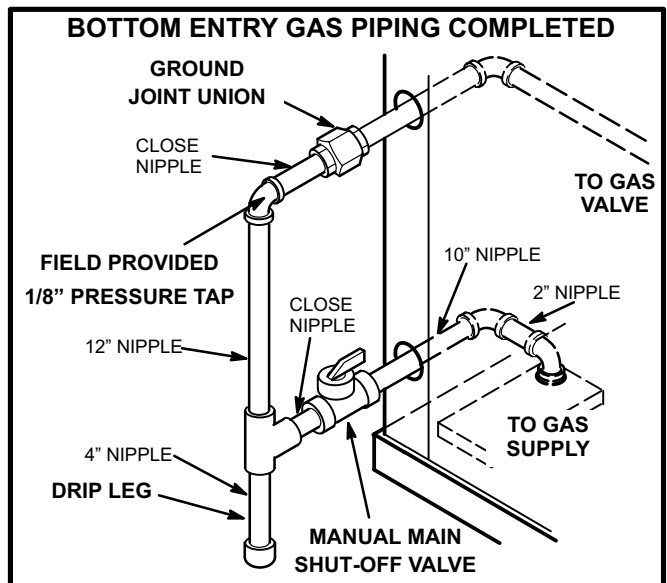


FIGURE 6

Pressure Test Gas Piping

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 7.

If the test pressure is equal to or less than 0.5 psig (3.481kPa), use the main manual shut-off valve before pressure testing to isolate the unit from the gas supply system.

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 gas connections up to the gas valve; loosening may occur during installation. Use a soap solution or other preferred means. Do not use matches candles or other sources of ignition to check for gas leaks.

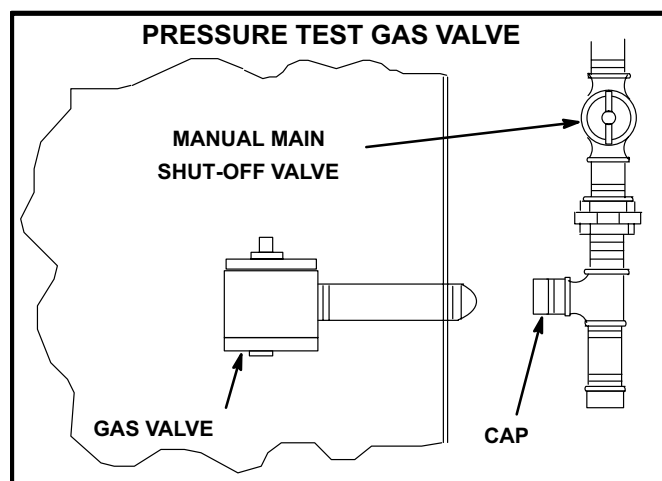


FIGURE 7

CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed.

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

Units may be installed at altitudes up to 2000 feet (610 m) above sea level without any modification. At altitudes above 2000 feet (610 m), units must be derated to match the gas manifold pressures shown in table 1.

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

TABLE 1

Altitude - ft. (m)	Gas Manifold Pressure in. w.g. (kPa)	
	Natural	LP (Propane)
2001 - 3000 (610 - 915)	3.6 (0.90)	10.2 (2.54)
3001 - 4000 (915 - 1220)	3.5 (0.87)	9.9 (2.46)
4001 - 5000 (1220 - 1525)	3.4 (0.85)	9.6 (2.39)
5001 - 6000 (1525 - 1830)	3.3 (0.82)	9.4 (2.34)
6001 - 7000 (1830 - 2135)	3.2 (0.80)	9.1 (2.26)
7001 - 8000 (2135 - 2440)	3.1 (0.77)	8.8 (2.19)

Factory-Installed Options

A-Economizer

The A56 EM1 economizer board controls economizer operation and provides potentiometers to control minimum damper position and enthalpy control adjustments. The economizer board is positioned on the A55 M1 main control board in the unit control box. See the Integrated Modular Control Guide for economizer operation and adjustments.

B-Intake Hood

The intake hood top panel is secured to the unit. The intake hood sides, filters, and three support brackets are shipped unassembled in the blower compartment. Assemble hoods and install as follows:

- 1- Remove screws securing side flanges of top hood to unit. See figure 8.
- 2- Pivot top hood open and secure sides of intake hood to top of hood using three sheet metal screws on each side. See figure 8.
- 3- Align two holes on intake hood side panel with two holes on bottom (longer) filter bracket. See figure 9. Secure both sides of bottom filter bracket to hood sides with sheet metal screws.
- 4- Secure intake hood sides to unit.
- 5- Position hood stiffener underneath hood top and align screw holes with hood top screw holes. Secure with sheet metal screws.
- 6- Secure the longer top filter bracket to top of hood as shown in figures 8 and 9. Install two filters.
- 7- Slide third filter into bottom filter bracket and hold in place at the top of the opening with the shorter filter bracket. Align holes on hood with bracket holes and secure filter bracket with sheet metal screws.

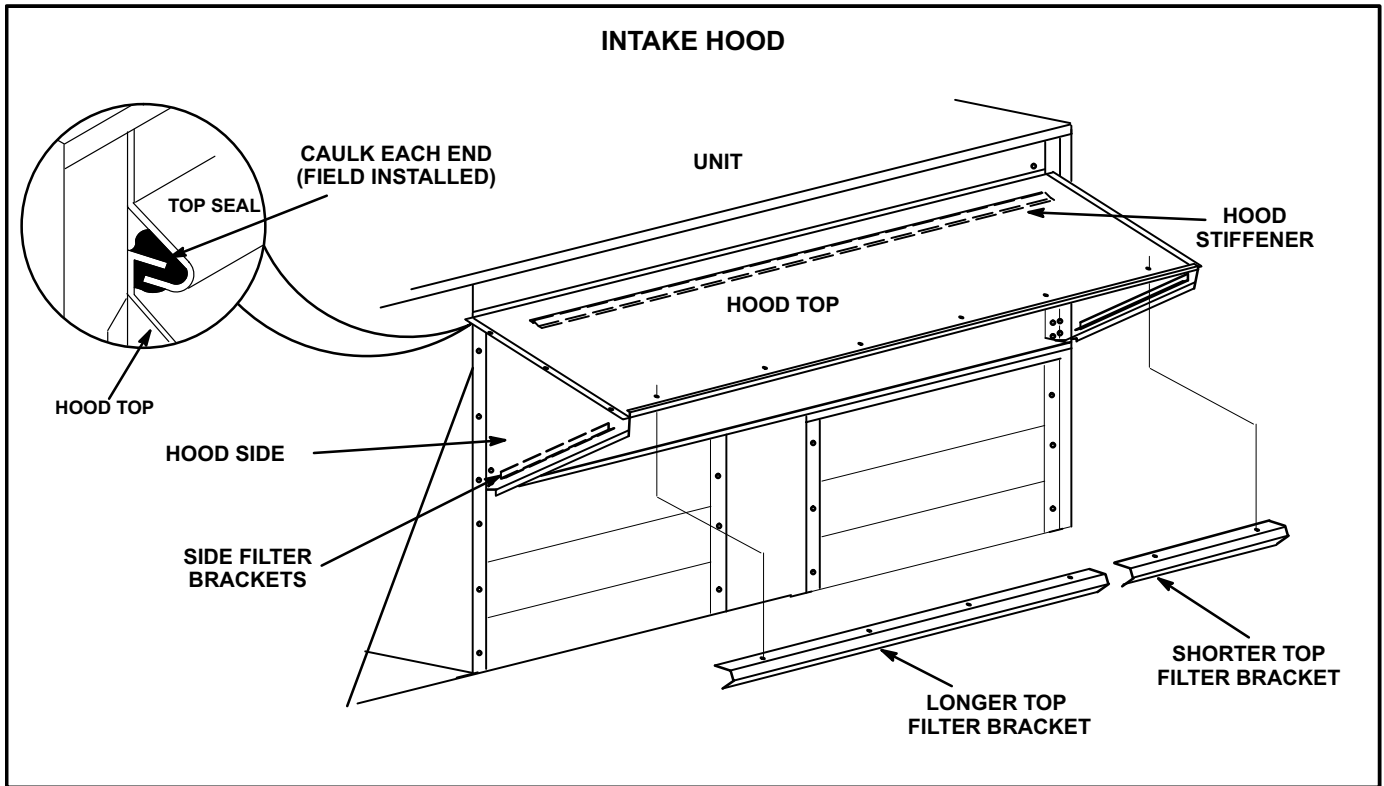


FIGURE 8

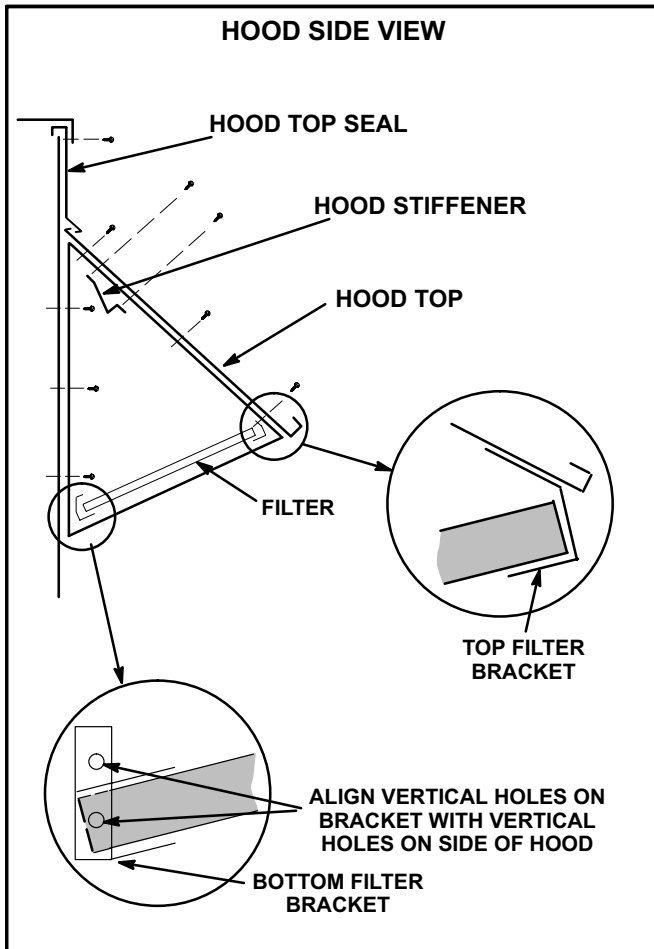


FIGURE 9

Electrical Connections

POWER SUPPLY

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

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

- 1- 230/460/575 volt units are factory wired. For 208V supply, disconnect the orange wire (230V) at control power transformer(s). Reconnect the red wire (208V). Tape the exposed end of the 230V orange wire.
- 2- Route power through the bottom power entry area and connect to line side of unit disconnect. If unit does not contain optional controls package, connect power wiring to TB13. 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.

CONTROL WIRING

A-Thermostat Location

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

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

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

B-Control Wiring

- 1- Route thermostat cable or wires from subbase through knockout provided in unit. Use 18 AWG wire for all applications using remotely installed electro-mechanical and electronic thermostats.
- 2- Install thermostat assembly in accordance with instructions provided with thermostat. See figure 10 for field wiring electronic and electro-mechanical thermostats. If using other temperature control devices or energy management systems see instructions and wiring diagram provided by manufacturer.

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

Blower Operation and Adjustments

▲ IMPORTANT

Three phase scroll compressors must be phased sequentially for correct compressor and blower rotation. Follow “COOLING START-UP” section of installation instructions to ensure proper compressor and blower operation.

A-Blower Operation

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

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

B-Blower Access

- 1- Disconnect jack/plug connector to blower motor. Also disconnect jack/plug connector heating limit switches on LGA units.

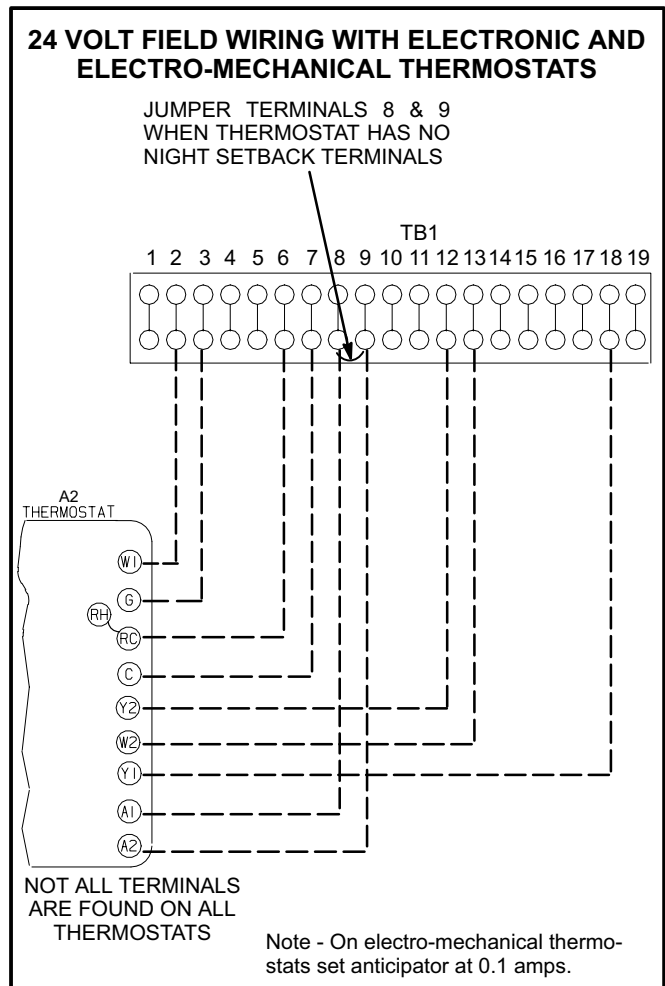


FIGURE 10

- 2- Remove screws on either side of blower assembly sliding base. See figure 11.
- 3- Pull base toward outside of unit.

C-Determining Unit CFM

- 1- The following measurements must be made with a dry indoor coil. Run blower without a cooling demand. 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).
- 3- Measure the indoor blower shaft RPM.
- 4- Referring to table 2, use static pressure and RPM readings to determine unit CFM. Use table 3 when installing units with any of the optional accessories listed.
- 5- 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 11.

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.

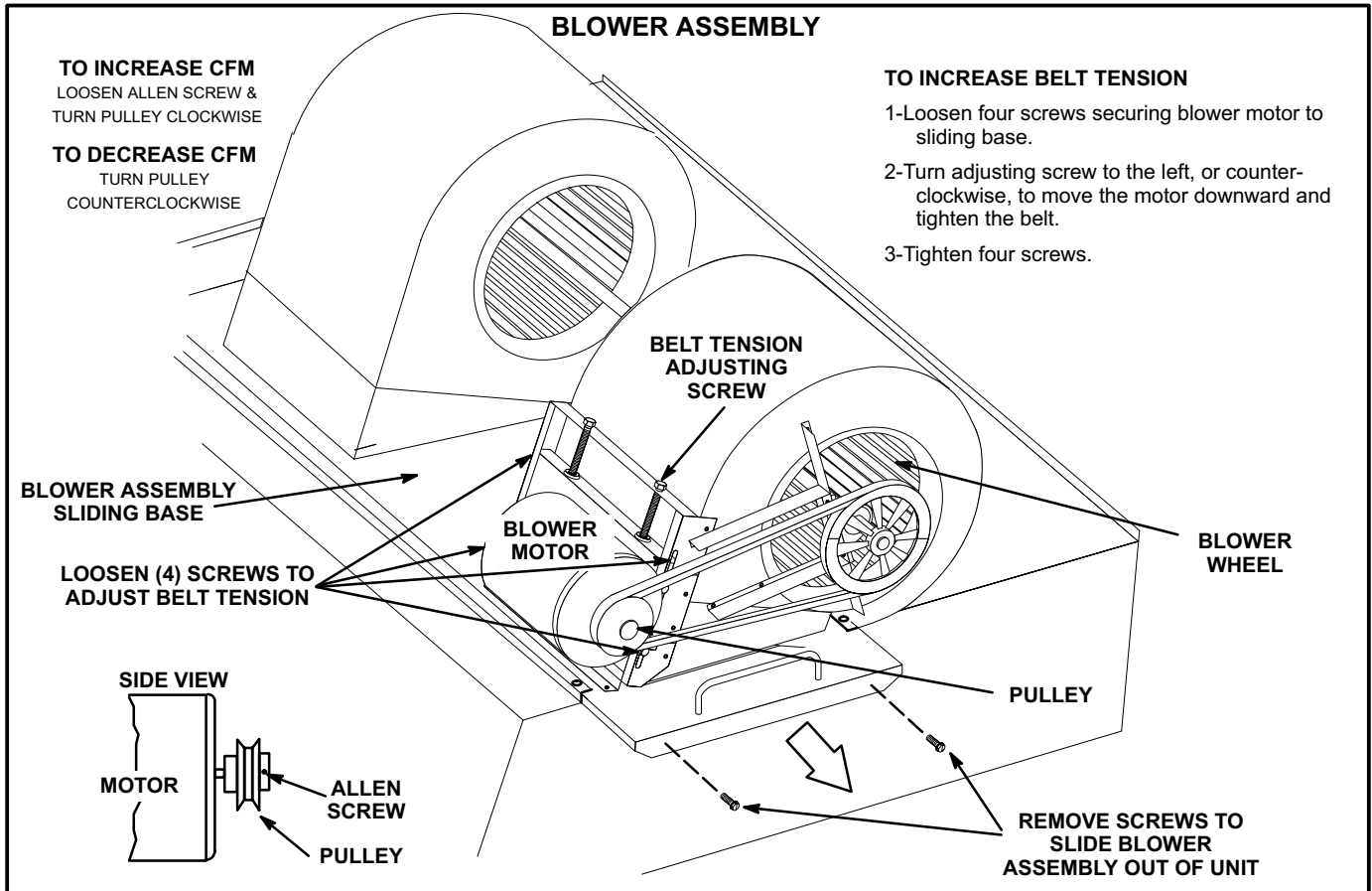


FIGURE 11

- 1- Loosen four screws securing blower motor to sliding base. See figure 11.
- 2- *To increase belt tension -*
 Turn belt tension adjusting screw to the left, or counterclockwise, 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 right, or clockwise to loosen belt tension.
- 3- Tighten four screws securing blower motor to sliding base once adjustments have been made.

E-Check Belt Tension

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

- 1- Measure span length X. See figure 12.
- 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 and undertensioned belt. A force above these values indicates an overtensioned belt.

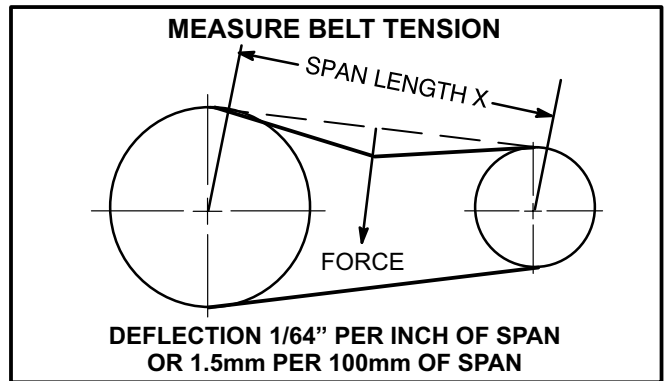


FIGURE 12

F-Blower Table Notes

Blower table includes resistance for LCA180 base unit only with dry indoor coil and air filters in place. For all other 180, 210, 240, and 300S units:

Determine total system design static pressure, then add:

- 1 - Wet indoor coil air resistance of selected unit.
- 2- Any factory installed options air resistance (heat section, economizer, etc.).
- 3- Any field installed accessories air resistance (horizontal roof frame, diffuser, etc.). Determine from blower table blower motor output and drives required.

G-Field-Furnished Blower Drives

For field-furnished blower drives, use tables 2 and 3 to determine BHP and RPM required. Reference table 4 to

determine the drive number and table 5 to determine the manufacturer's model number.

TABLE 2

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT • LCA156H units require 5200 cfm (2455 L/s) minimum air with electric heat. • All other LCA units require 6000 cfm (2830 L/s) minimum air with electric heat. **BOLD ITALICS INDICATE FIELD FURNISHED DRIVE**

Air Volume cfm (L/s)	TOTAL STATIC PRESSURE — Inches Water Gauge (Pa)												
	.20 (50)	.40 (100)	.60 (150)	.80 (200)	1.00(250)	1.20(300)	1.40(350)	1.60(400)	1.80(450)	2.00(495)	2.20(545)	2.40 (595)	2.60 (645)
	RPM BHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPM BHP (kW)	RPM BHP (kW)
3500 (1650)	395 0.35 (0.26)	495 0.55 (0.41)	590 0.80 (0.60)	670 1.05 (0.78)	745 1.30 (0.97)	810 1.55 (1.16)	870 1.85 (1.38)	930 2.15 (1.60)	980 2.40 (1.79)	1030 2.70 (2.01)	1080 3.00 (2.24)	1125 3.30 (2.46)	1165 3.55 (2.65)
3750 (1770)	395 0.40 (0.30)	495 0.60 (0.45)	595 0.90 (0.67)	675 1.15 (0.86)	750 1.40 (1.04)	815 1.70 (1.27)	875 1.95 (1.45)	930 2.25 (1.68)	985 2.55 (1.90)	1035 2.85 (2.13)	1080 3.15 (2.35)	1130 3.50 (2.61)	1170 3.75 (2.80)
4000 (1890)	400 0.45 (0.34)	500 0.65 (0.48)	595 0.95 (0.71)	680 1.20 (0.90)	755 1.50 (1.12)	820 1.80 (1.34)	880 2.10 (1.57)	935 2.40 (1.79)	990 2.70 (2.01)	1040 3.00 (2.24)	1085 3.35 (2.50)	1130 3.65 (2.72)	1175 4.00 (2.98)
4250 (2005)	405 0.50 (0.37)	505 0.75 (0.56)	600 1.00 (0.75)	685 1.30 (0.97)	755 1.60 (1.19)	825 1.95 (1.45)	885 2.25 (1.68)	940 2.55 (1.90)	990 2.85 (2.13)	1040 3.15 (2.35)	1090 3.50 (2.61)	1135 3.85 (2.87)	1180 4.20 (3.13)
4500 (2125)	405 0.55 (0.41)	510 0.80 (0.60)	605 1.10 (0.82)	690 1.40 (1.04)	760 1.70 (1.27)	825 2.05 (1.53)	885 2.35 (1.75)	945 2.70 (2.01)	995 3.00 (2.24)	1045 3.35 (2.50)	1095 3.70 (2.76)	1140 4.05 (3.02)	1185 4.45 (3.32)
4750 (2240)	410 0.60 (0.45)	515 0.85 (0.63)	610 1.20 (0.90)	695 1.50 (1.12)	765 1.85 (1.38)	830 2.15 (1.60)	890 2.50 (1.87)	950 2.85 (2.13)	1000 3.20 (2.39)	1050 3.55 (2.65)	1100 3.90 (2.91)	1145 4.30 (3.21)	1185 4.60 (3.43)
5000 (2360)	415 0.65 (0.48)	520 0.95 (0.71)	615 1.25 (0.93)	695 1.60 (1.19)	770 1.95 (1.45)	835 2.30 (1.72)	895 2.65 (1.98)	950 3.00 (2.24)	1005 3.40 (2.54)	1055 3.75 (2.80)	1100 4.10 (3.06)	1145 4.45 (3.32)	1190 4.85 (3.62)
5250 (2475)	420 0.70 (0.52)	525 1.00 (0.75)	620 1.35 (1.01)	700 1.70 (1.27)	775 2.10 (1.57)	840 2.45 (1.83)	900 2.80 (2.09)	955 3.15 (2.35)	1010 3.55 (2.65)	1060 3.95 (2.95)	1105 4.30 (3.21)	1150 4.70 (3.51)	1195 5.10 (3.80)
5500 (2595)	425 0.75 (0.56)	530 1.10 (0.82)	625 1.45 (1.08)	705 1.85 (1.38)	775 2.20 (1.64)	845 2.60 (1.94)	905 2.95 (2.20)	960 3.35 (2.50)	1010 3.70 (2.76)	1065 4.15 (3.10)	1110 4.55 (3.39)	1155 4.95 (3.69)	1200 5.35 (3.99)
5750 (2715)	430 0.80 (0.60)	535 1.15 (0.86)	630 1.55 (1.16)	710 1.95 (1.45)	780 2.35 (1.75)	845 2.70 (2.01)	905 3.10 (2.31)	965 3.55 (2.65)	1015 3.90 (2.91)	1065 4.35 (3.25)	1115 4.75 (3.54)	1160 5.15 (3.84)	----
6000 (2830)	430 0.85 (0.63)	540 1.25 (0.93)	635 1.65 (1.23)	715 2.05 (1.53)	785 2.45 (1.83)	850 2.85 (2.13)	910 3.30 (2.46)	965 3.70 (2.76)	1020 4.10 (3.06)	1070 4.55 (3.39)	1120 5.00 (3.73)	1165 5.40 (4.03)	----
6250 (2950)	435 0.95 (0.71)	545 1.35 (1.01)	640 1.80 (1.34)	720 2.20 (1.64)	790 2.60 (1.94)	855 3.05 (2.28)	915 3.45 (2.57)	970 3.90 (2.91)	1025 4.35 (3.25)	1075 4.75 (3.54)	1120 5.20 (3.88)	1165 5.65 (4.21)	----
6500 (3065)	445 1.05 (0.78)	550 1.45 (1.08)	640 1.85 (1.38)	725 2.35 (1.75)	795 2.75 (2.05)	860 3.20 (2.39)	920 3.65 (2.72)	975 4.10 (3.06)	1030 4.55 (3.39)	1080 5.00 (3.73)	1125 5.45 (4.07)	1170 5.90 (4.40)	----
6750 (3185)	450 1.10 (0.82)	555 1.55 (1.16)	645 2.00 (1.49)	725 2.45 (1.83)	800 2.90 (2.16)	865 3.40 (2.54)	925 3.85 (2.87)	980 4.30 (3.21)	1035 4.75 (3.54)	1085 5.25 (3.92)	1130 5.70 (4.25)	1175 6.15 (4.59)	----
7000 (3305)	455 1.20 (0.90)	560 1.65 (1.23)	650 2.10 (1.57)	730 2.60 (1.94)	805 3.10 (2.31)	870 3.55 (2.65)	930 4.05 (3.02)	985 4.50 (3.36)	1035 4.95 (3.69)	1085 5.45 (4.07)	1135 5.95 (4.44)	1180 6.45 (4.81)	----
7250 (3420)	460 1.25 (0.93)	565 1.75 (1.31)	655 2.25 (1.68)	735 2.75 (2.05)	810 3.25 (2.42)	875 3.75 (2.80)	935 4.25 (3.17)	990 4.70 (3.51)	1040 5.20 (3.88)	1090 5.70 (4.25)	1140 6.20 (4.63)	1185 6.70 (5.00)	----
7500 (3540)	465 1.35 (1.01)	570 1.85 (1.38)	660 2.35 (1.75)	740 2.90 (2.16)	815 3.40 (2.54)	880 3.95 (2.95)	935 4.40 (3.28)	995 4.95 (3.69)	1045 5.45 (4.07)	1095 5.95 (4.44)	1140 6.45 (4.81)	1190 7.00 (5.22)	----
7750 (3655)	470 1.45 (1.08)	575 2.00 (1.49)	665 2.50 (1.87)	745 3.05 (2.28)	820 3.60 (2.69)	880 4.10 (3.06)	940 4.60 (3.43)	995 5.15 (3.84)	1050 5.70 (4.25)	1100 6.20 (4.63)	1145 6.70 (5.00)	1190 7.25 (5.41)	----
8000 (3775)	480 1.60 (1.19)	585 2.15 (1.60)	675 2.70 (2.01)	750 3.20 (2.39)	820 3.75 (2.80)	885 4.30 (3.21)	945 4.85 (3.62)	1000 5.35 (3.99)	1055 5.95 (4.44)	1105 6.50 (4.85)	1150 7.00 (5.22)	1195 7.55 (5.63)	----
8250 (3895)	485 1.70 (1.27)	590 2.25 (1.68)	680 2.85 (2.13)	755 3.35 (2.50)	825 3.95 (2.95)	890 4.50 (3.36)	950 5.05 (3.77)	1005 5.60 (4.18)	1060 6.20 (4.63)	1110 6.75 (5.04)	1155 7.30 (5.45)	1200 7.85 (5.86)	----
8500 (4010)	490 1.80 (1.34)	595 2.40 (1.79)	685 3.00 (2.24)	760 3.55 (2.65)	830 4.10 (3.06)	895 4.70 (3.51)	955 5.30 (3.95)	1010 5.85 (4.36)	1065 6.45 (4.81)	1110 7.00 (5.22)	1160 7.60 (5.67)	----	----
8750 (4130)	500 1.90 (1.42)	600 2.50 (1.87)	690 3.15 (2.35)	765 3.75 (2.80)	835 4.30 (3.21)	900 4.95 (3.69)	960 5.55 (4.14)	1015 6.10 (4.55)	1065 6.70 (5.00)	1115 7.30 (5.45)	1165 7.90 (5.89)	----	----
9000 (4245)	505 2.05 (1.53)	610 2.70 (2.01)	695 3.30 (2.46)	770 3.90 (2.91)	840 4.55 (3.39)	905 5.15 (3.84)	965 5.75 (4.29)	1020 6.40 (4.77)	1070 6.95 (5.18)	1120 7.60 (5.67)	1170 8.25 (6.15)	----	----
9250 (4365)	515 2.20 (1.64)	615 2.85 (2.13)	700 3.50 (2.61)	775 4.10 (3.06)	845 4.75 (3.54)	910 5.40 (4.03)	970 6.00 (4.48)	1025 6.65 (4.96)	1075 7.25 (5.41)	1125 7.90 (5.89)	1170 8.50 (6.34)	----	----
9500 (4485)	525 2.35 (1.75)	620 3.00 (2.24)	705 3.65 (2.72)	785 4.35 (3.25)	850 4.95 (3.69)	915 5.60 (4.18)	975 6.30 (4.70)	1030 6.90 (5.15)	1080 7.55 (5.63)	1130 8.20 (6.12)	----	----	----
9750 (4600)	530 2.50 (1.87)	630 3.20 (2.39)	715 3.85 (2.87)	790 4.55 (3.39)	855 5.20 (3.88)	920 5.85 (4.36)	980 6.55 (4.89)	1035 7.20 (5.37)	1085 7.85 (5.86)	1135 8.50 (6.34)	----	----	----
10,000 (4720)	540 2.65 (1.98)	635 3.35 (2.50)	720 4.05 (3.02)	795 4.75 (3.54)	860 5.40 (4.03)	925 6.10 (4.55)	985 6.80 (5.07)	1035 7.45 (5.56)	1090 8.15 (6.08)	----	----	----	----
10,250 (4835)	550 2.85 (2.13)	645 3.55 (2.65)	725 4.25 (3.17)	800 4.95 (3.69)	865 5.65 (4.21)	930 6.40 (4.77)	990 7.10 (5.30)	1040 7.75 (5.78)	1095 8.45 (6.30)	----	----	----	----
10,500 (4955)	555 3.00 (2.24)	650 3.75 (2.80)	730 4.45 (3.32)	805 5.20 (3.88)	875 5.95 (4.44)	935 6.65 (4.96)	995 7.40 (5.52)	1045 8.05 (6.01)	----	----	----	----	----
10,750 (5075)	565 3.15 (2.35)	655 3.90 (2.91)	740 4.70 (3.51)	810 5.40 (4.03)	880 6.20 (4.63)	940 6.90 (5.15)	1000 7.65 (5.71)	1050 8.35 (6.23)	----	----	----	----	----
11,000 (5190)	575 3.35 (2.50)	665 4.15 (3.10)	745 4.90 (3.66)	820 5.70 (4.25)	885 6.45 (4.81)	945 7.20 (5.37)	1005 7.95 (5.93)	----	----	----	----	----	----

**TABLE 3
FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE**

Air Volume		Total Resistance — inches water gauge (Pa)						
		Wet Indoor Coil		Gas Heat Exchanger (LGA Models)		Electric Heat (LCA/LHA Models)	Economizer	Horizontal Roof Mounting Frame
cfm	L/s	180S 156 & 180H 210S 240S	210H 240H 300S	Std. Heat	High Heat			
3500	1650	.03 (7)	--	.03 (7)	--	.01 (2)	.04 (10)	.05 (12)
3750	1770	.03 (7)	--	.04 (10)	--	.01 (2)	.04 (10)	.06 (15)
4000	1890	.04 (10)	--	.04 (10)	--	.01 (2)	.05 (12)	.06 (15)
4250	2005	.04 (10)	--	.04 (10)	--	.01 (2)	.05 (12)	.07 (17)
4500	2125	.04 (10)	.08 (20)	.05 (12)	.09 (22)	.01 (2)	.05 (12)	.07 (17)
4750	2240	.05 (12)	.09 (22)	.05 (12)	.10 (25)	.01 (2)	.05 (12)	.08 (20)
5000	2360	.05 (12)	.10 (25)	.05 (12)	.11 (27)	.01 (2)	.06 (15)	.08 (20)
5250	2475	.06 (15)	.10 (25)	.06 (15)	.12 (30)	.02 (5)	.06 (15)	.09 (22)
5500	2595	.06 (15)	.11 (27)	.06 (15)	.13 (32)	.02 (5)	.06 (15)	.10 (25)
5750	2715	.06 (15)	.12 (30)	.06 (15)	.14 (35)	.02 (5)	.07 (17)	.11 (27)
6000	2830	.07 (17)	.13 (32)	.07 (17)	.15 (37)	.02 (5)	.07 (17)	.11 (27)
6250	2950	.07 (17)	.14 (35)	.07 (17)	.16 (40)	.02 (5)	.08 (20)	.12 (30)
6500	3065	.08 (20)	.14 (35)	.08 (20)	.17 (42)	.03 (7)	.08 (20)	.13 (32)
6750	3185	.08 (20)	.15 (37)	.08 (20)	.18 (45)	.03 (7)	.08 (20)	.14 (35)
7000	3305	.09 (22)	.16 (40)	.09 (22)	.19 (47)	.03 (7)	.09 (22)	.15 (37)
7250	3420	.09 (22)	.17 (42)	.09 (22)	.20 (50)	.03 (7)	.09 (22)	.16 (40)
7500	3540	.10 (25)	.18 (45)	.10 (25)	.21 (52)	.03 (7)	.10 (25)	.17 (42)
7750	3655	.10 (25)	.19 (47)	.10 (25)	.23 (57)	.04 (10)	.10 (25)	.18 (45)
8000	3775	.11 (27)	.20 (50)	.11 (27)	.24 (60)	.04 (10)	.11 (27)	.19 (47)
8250	3895	.11 (27)	.21 (52)	.11 (27)	.25 (62)	.04 (10)	.11 (27)	.20 (50)
8500	4010	.12 (30)	.22 (55)	.12 (30)	.26 (65)	.04 (10)	.12 (30)	.21 (52)
8750	4130	.12 (30)	.23 (57)	.12 (30)	.28 (70)	.05 (12)	.12 (30)	.22 (55)
9000	4245	.13 (32)	.24 (60)	.13 (32)	.29 (72)	.05 (12)	.13 (32)	.24 (60)
9250	4365	.14 (35)	.25 (62)	.14 (35)	.31 (77)	.05 (12)	.14 (35)	.25 (62)
9500	4485	.14 (35)	.26 (65)	.14 (35)	.32 (80)	.05 (12)	.14 (35)	.26 (65)
9750	4600	.15 (37)	.27 (67)	.15 (37)	.34 (85)	.06 (15)	.15 (37)	.27 (67)
10,000	4720	.15 (37)	.28 (70)	.16 (40)	.35 (87)	.06 (15)	.16 (40)	.29 (72)
10,250	4840	.15 (37)	.29 (72)	.16 (40)	.36 (90)	.06 (15)	.16 (40)	.30 (75)
10,500	4955	.16 (37)	.30 (75)	.17 (42)	.38 (94)	.07 (17)	.17 (42)	.31 (77)
10,750	5075	.16 (37)	.31 (77)	.18 (45)	.39 (97)	.07 (17)	.18 (45)	.33 (82)
11,000	5190	.16 (40)	.32 (80)	.18 (45)	.40 (99)	.07 (17)	.18 (45)	.34 (85)

**TABLE 4
FACTORY INSTALLED DRIVE KIT SPECIFICATIONS**

Motor		RPM Range													
hp	kw	Drive A		Drive 1		Drive 2		Drive 3		Drive 4		Drive 5		Drive 6	
		60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz
2	1.5	535/725	--	--	--	--	--	--	--	--	--	--	--	--	--
3 Std Eff	2.2	535/725	--	685/865	--	--	570/755	--	710/870	--	790/990	--	--	--	--
3 Hi Eff	2.2	--	--	--	--	685/865	--	--	--	--	--	--	--	--	--
5	3.7	--	--	--	--	685/865	570/755	850 / 1045	710/870	945/1185	790/990	--	--	--	--
7.5	5.6	--	--	--	--	--	--	--	--	--	--	945/1185	790/990	--	870/1070

**TABLE 5
MANUFACTURER'S NUMBERS**

DRIVE NO.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS (2 REQUIRED)	
	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.
A	1VP40x7/8	79J0301	1BK95X1-7/16	80K1601	BX59	59A5001
1	1VP50x7/8	P-8-2187	BK100x1-7/16	39L1301	BX62	57A7701
2	1VP50x1-1/8	P-8-1977	BK100x1-7/16	39L1301	BX62	57A7701
3	2VP65x1-1/8	97J6001	2BK110x1-7/16	P-8-5123	BX66	97J5901
4	2VP60x1-1/8	P-8-9161	2BK90x1-7/16	14K9101	BX62	57A7701
5	2VP60x1-3/8	97J5701	2BK90x1-7/16	14K9101	BX63	97J5501

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. Apply power to unit.

NOTE - These units must not be used as a "construction heater" at any time during any phase of construction. Very low return air temperatures, harmful vapors, and misplacement of the filters will damage the unit and its efficiency. Additionally, a unit which will be subject to cold temperatures when not in operation must have a vapor barrier installed to seal the duct connections. Failure to protect the unit from moisture laden air or harmful vapors (generated from the construction process and temporary combustion heating equipment) will cause corrosive condensation within the unit. Failure to properly protect the unit in this situation will cause electrical and electronic component failure and could affect the unit warranty status.

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

- 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 (fourth compressor on 17-1/2, 20, and 25 ton units only). 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.

B-Start-Up

3- LGA/LCA156 & 180 -

Units contain three refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuits 1 and 2 make up stage 1 cooling. Evaporator and condenser coil refrigerant circuit 3 makes up stage 2 cooling. See figure 13.

LGA/LCA210, 240, 300S -

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 14.

- 4- Each refrigerant circuit is separately charged with HCFC-22 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.

C-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.

LGA AND LCA156 & 180 REFRIGERANT CIRCUITS

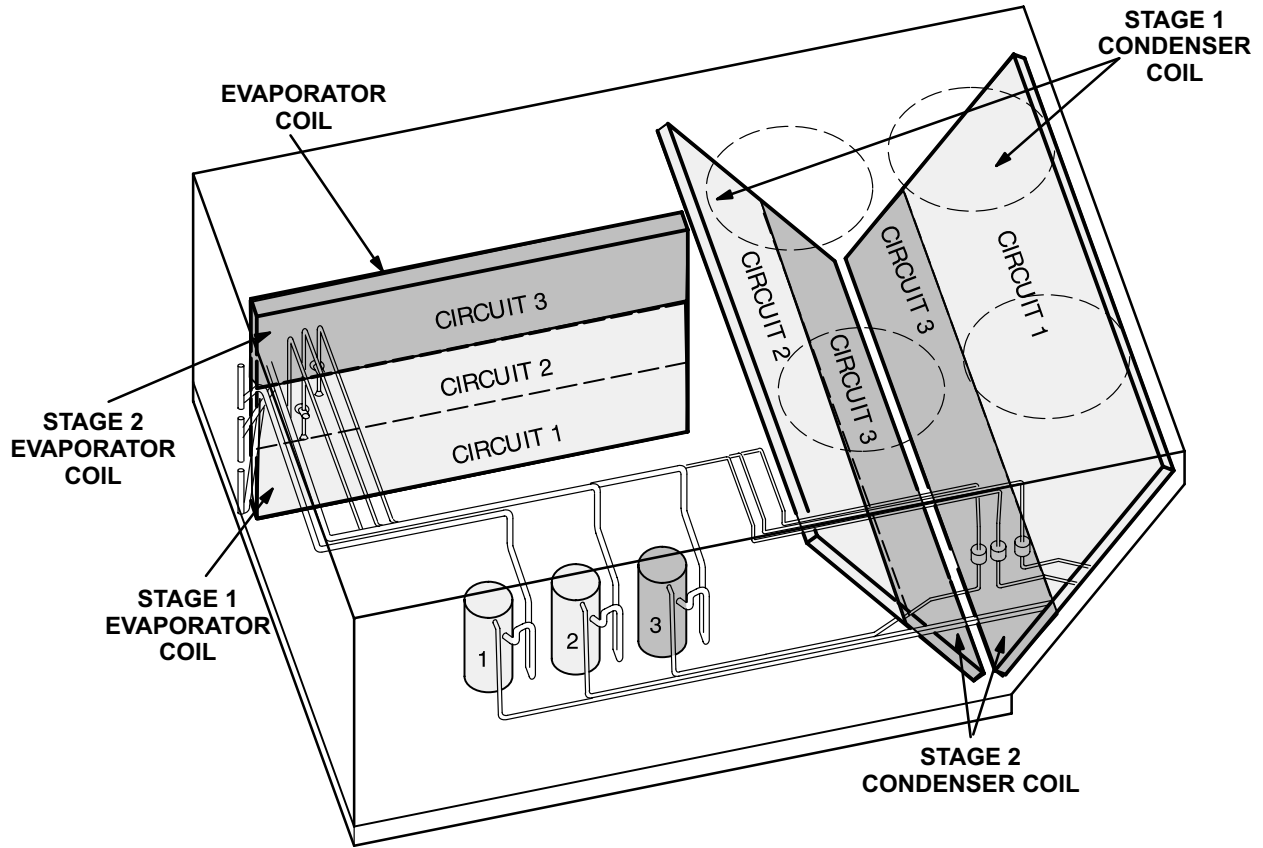


FIGURE 13

LGA AND LCA210, 240, & 300S REFRIGERANT CIRCUITS

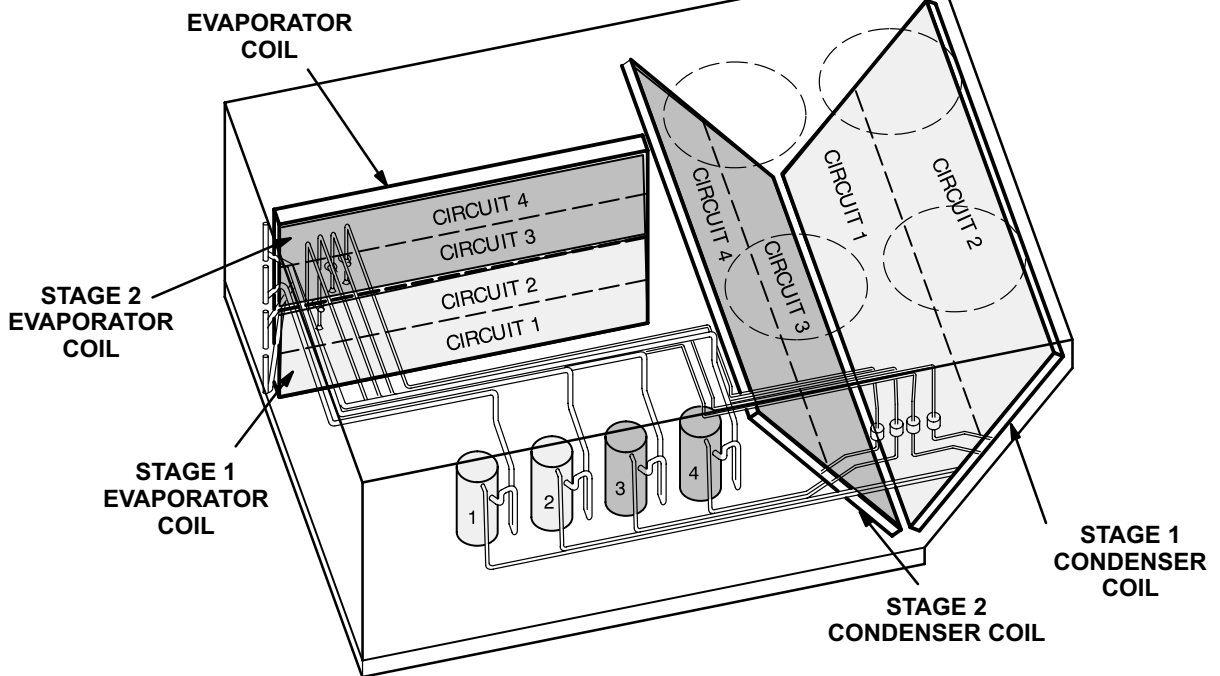


FIGURE 14

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 charge, 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:

- 1- Attach gauge manifolds and operate unit in cooling mode until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.
- 2- Check each system separately with all stages operating.
- 3- Use a thermometer to accurately measure the outdoor ambient temperature.
- 4- Apply the outdoor temperature to tables 6 through 13 to determine normal operating pressures.
- 5- Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. **Correct any system problems before proceeding.**
- 6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.
 - Add or remove charge in increments.
 - Allow the system to stabilize each time refrigerant is added or removed.
- 7- Use the following approach method along with the normal operating pressures to confirm readings.

TABLE 6
LGA/LCA156H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	Outdoor Fan Cycles					
75°F	171	77	168	81	180	82
85°F	196	78	194	92	206	83
95°F	228	79	227	84	237	84
105°F	262	80	260	85	272	85
115°F	301	82	299	86	309	86

TABLE 7
LGA/LCA180S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	191	74	193	76	200	75
75°F	217	76	222	77	225	76
85°F	245	78	252	79	250	78
95°F	279	80	288	81	290	79
105°F	312	82	324	83	332	81
115°F	354	85	368	85	372	83

TABLE 8
LGA/LCA180H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig	Dis. ±10 psig	Suct. ±5 psig
65°F	163	75	161	77	165	73
75°F	186	77	187	79	190	74
85°F	213	78	215	80	218	76
95°F	244	80	246	81	247	78
105°F	280	82	282	83	285	80
115°F	318	85	323	85	325	82

TABLE 9
LGA/LCA210S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	198	77	192	78	199	77	195	69
75°F	226	78	218	79	227	78	225	71
85°F	257	80	248	81	260	80	258	74
95°F	290	82	280	83	294	82	295	76
105°F	328	84	318	85	335	83	335	79
115°F	367	86	357	86	380	85	380	82

TABLE 10
LGA/LCA210H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	170	80	175	82	168	82	165	80
75°F	195	82	200	83	192	83	190	81
85°F	223	83	228	85	222	84	220	83
95°F	255	85	260	86	257	85	254	85
105°F	292	86	297	88	290	87	290	86
115°F	324	88	334	89	334	88	330	88

TABLE 11
LGA/LCA240S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	180	69	175	72	186	75	178	72
75°F	205	71	200	73	213	76	204	73
85°F	232	73	230	75	242	78	236	74
95°F	265	75	260	77	276	80	267	76
105°F	300	77	300	79	316	82	305	78
115°F	343	79	340	81	360	84	346	80

TABLE 12
LGA/LCA240H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dls ±10 psig	Suc ±5 psig	Dis ±10 psig	Suc ±5 psig	Dls ±10 psig	Suc ±5 psig	Dls ±10 psig	Suc ±5 psig
65°F	177	75	170	76	180	78	178	77
75°F	202	76	195	77	208	79	202	78
85°F	232	77	225	78	240	80	232	80
95°F	265	78	258	79	274	81	265	81
105°F	300	80	295	81	314	82	303	83
115°F	340	82	332	82	353	83	340	84

TABLE 13
LGA/LCA300S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dls ±10 psig	Suc ±5 psig	Dis ±10 psig	Suc ±5 psig	Dls ±10 psig	Suc ±5 psig	Dls ±10 psig	Suc ±5 psig
65°F	184	74	183	76	191	77	188	76
75°F	213	76	210	77	220	77	216	77
85°F	244	78	242	79	252	79	247	79
95°F	282	79	285	80	295	80	278	80
105°F	313	80	317	82	324	81	325	82
115°F	357	82	361	83	368	83	372	84

E-Charge Verification - Approach Method

8- Using the same thermometer, compare liquid temperature to outdoor ambient temperature.

Approach Temperature = Liquid temperature minus ambient temperature.

9- Approach temperature should match values in table 14. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

10- Do not use the approach method if system pressures do not match pressures in tables 2 through 9. The approach method is not valid for grossly over or undercharged systems.

TABLE 14
APPROACH TEMPERATURES

LGA/LCA Unit	Liquid Temp. Minus Ambient Temp.			
	1st Stage	2nd Stage	3rd Stage	4th Stage
156H	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	NA
180S	9°F ± 1 (5°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	NA
180H	10°F ± 1 (5.6°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	NA
210S	9°F ± 1 (5°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)
210H	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	6°F ± 1 (3.3°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
240S	12°F ± 1 (6.7°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)	13°F ± 1 (7.2°C ± 0.5)	14°F ± 1 (7.8°C ± 0.5)
240H	10°F ± 1 (5.6°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)
300S	11°F ± 1 (6.1°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)

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 cuts out at 410 psig ± 10 psig (2825 kPa ± 70 kPa) and automatically resets at 300 psig + 20 psig (2069kPa + 138kPa).
- 2- Low Pressure Switch (S87, S88, S97, S98)
The compressor circuit is protected by a low pressure switch. Switch cuts out at 25 psig (172 kPa) and automatically resets at 55 psig (379 kPa).
- 3- Crankcase Heater (HR1, HR2, HR5, HR11)
LGA/LCA156H, 180H, 210H, 240H and 300S 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.

NOTE - LGA/LCA180S, 210S, and 240S units contain an internal PTC heater.

- 4- Low Ambient Pressure Switch (S11, S84, S85, S94)
Switch maintains adequate discharge pressure by de-energizing condenser fan when liquid pressure falls below 150 psig (1034kPa). Switch closes to energize condenser fans when pressure rises to 275 psig (1896kPa).

LGA/LCA156 & 180

All four condenser fans are energized on a Y1 cooling demand and continue to operate when Y2 demand is initiated. See figure 15.

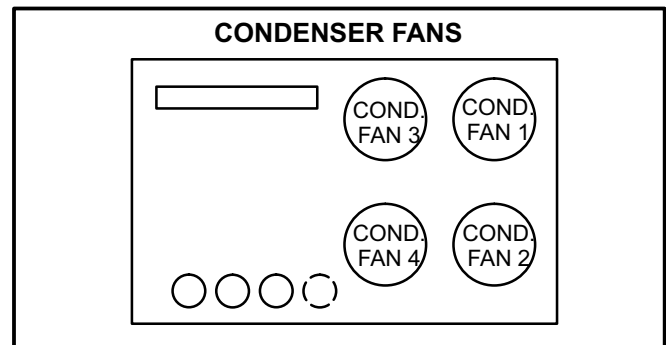


FIGURE 15

The C1 (A56) controller de-energizes condenser fan 2 and the C2 (A59) controller de-energizes condenser fan 4 when outdoor temperature drops below 55°F (13°C).

S11, S84, and S85 pressure switches (in refrigerant circuits 1, 2, and 3 respectively) are in parallel; any ONE switch will maintain operation of both condenser fans 1 and 3.

If S11, S84, and S85 pressure switches are open, condenser fans 1 and 3 are then cycled on when any ONE pressure switches closes.

LGA/LCA210, 240 & 300S

Condenser fans 1 and 2 are energized on a Y1 cooling demand. An increased Y2 demand will energize condenser fans 3 and 4.

The C1 (A56) controller de-energizes condenser fan 2 and the C2 (A59) controller de-energizes condenser fan 4 when outdoor temperature drops below 55°F (13°C).

Condenser fan 1 is cycled by S11 and S84 pressure switches (via K10) located in refrigerant circuits 1 and 2 respectively.

Condenser fan 3 is cycled by S85 and S94 pressure switches (via K149) located in refrigerant circuits 3 and 4.

5- Relay, Low Ambient (K159)-LGA/LCA156 & 180 Units Only


As S11, S84, and S85 pressure switches cycle, K159 energizes condenser fans 1 and 3 (via relays K10 and K149).

6- 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).

Gas Heat Start-Up (LGA Units)

FOR YOUR SAFETY READ BEFORE LIGHTING

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


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

⚠ 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.	

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

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


⚠ WARNING	
	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.

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

A-Placing Unit In Operation

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

Gas Valve Operation for White Rodgers 36C (figure 16) and Honeywell VR8205Q/VR8305Q (figure 17)

- 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.
- 5- Turn the knob on the gas valve clockwise  to **"OFF"**. Depress 36C knob slightly. Do not force.
- 6- Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.

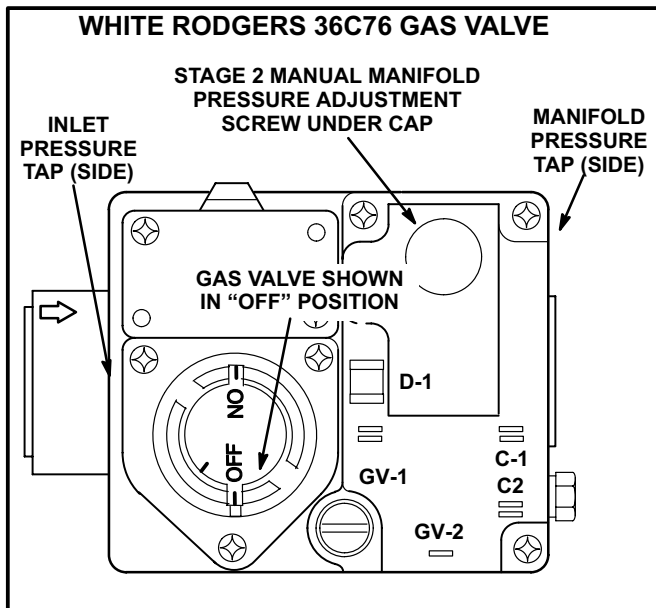


FIGURE 16

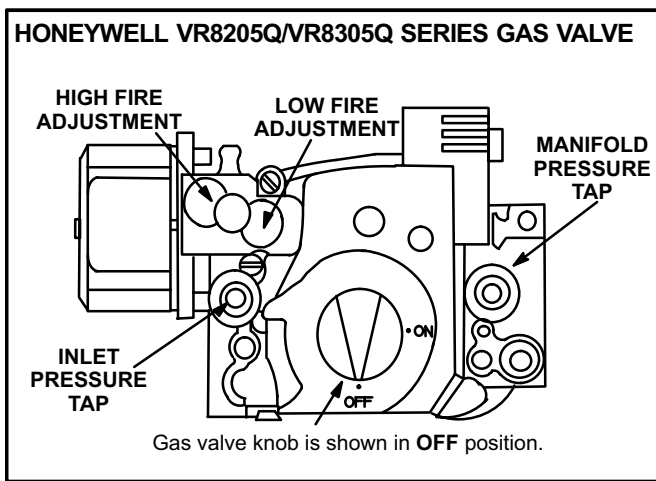




FIGURE 17

- 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 appliance.
- 10- Set thermostat to desired setting.
- 11- The combustion air inducer will start. The burners will light within 40 seconds.
- 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 Appliance

- 1- If using an electromechanical thermostat, set to the lowest setting.
- 2- Before performing any service, turn off all electrical power to the appliance.
- 3- Open or remove the heat section access panel.
- 4- Turn the knob on the gas valve clockwise  to "OFF". Depress 36C knob slightly. Do not force.

Heating Operation and Adjustments

(LGA 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, then allows power to ignition control. Switch is factory set and requires no adjustment.
- 3- After a 45-second prepurge, 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. One of the primary limits is located in the bottom right corner of blower section. The other primary limit is accessed from the condenser coil side of the heat section. The secondary limits are located on the back side of the blower housing.

C-Heating Adjustment

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

Spark gap on ignition electrode must be $1/8" \pm 1/32"$ (3.2mm \pm .8mm). Check spark gap as follows:

- 1- Loosen four screws and remove burner support cap. See figure 18.

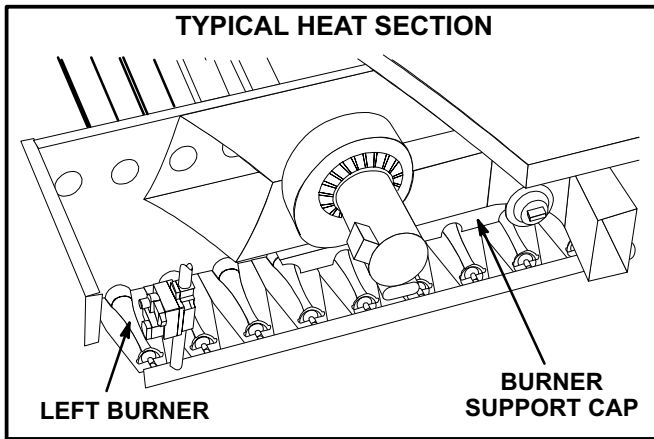


FIGURE 18

- 2- Remove left burner and check gap with appropriately sized twist drills or feeler gauges.
- 3- Replace burner and burner support cap. Secure cap in place with retained screws.
- 4- The following manifold pressures are listed on gas valves.
 - Natural Gas Units - Low Fire - 1.6" w.c. (not adjustable)
 - Natural Gas Units - High Fire - 3.7" w.c.
 - LP Gas Units - Low Fire - 5.5" w.c. (not adjustable)
 - LP Gas Units - High Fire - 10.5" w.c.

Electric Heat Start-Up (LCA 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.

Service

⚠️ WARNING

Product contains fiberglass wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

**P.O. Box 799900
Dallas, TX 75379-9900**

⚠️ CAUTION

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

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

A-Filters

Units are equipped with six 24 X 24 X 2" filters. Filters should be checked 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 19.

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.

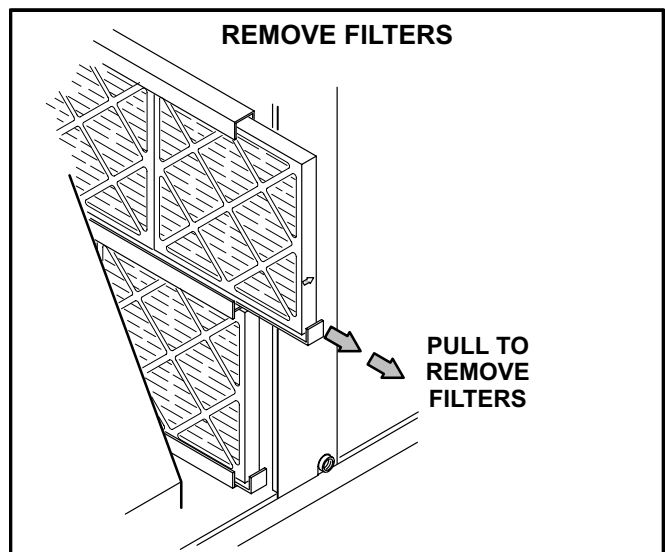


FIGURE 19

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 (LGA Units)

- 1- Periodically examine burner flames for proper appearance during the heating season.
- 2- Before each heating season examine the burners for any deposits or blockage which may have occurred.
- 3- Clean burners as follows:
 - a- Turn off both electrical power and gas supply to unit.
 - b- Open access panel to burner compartment.

c- Remove burner retaining bracket and lift burners from orifices.

d-Clean as necessary and replace burners. Refit retaining brackets. Make sure that burner heads line up correctly. Spark gap on ignition electrode must be properly set. Refer to Heating Adjustment section. Replace access panel.

⚠ WARNING



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

e- 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 (LGA Units)

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

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

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 20.
- 4- Clean inducer wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.
- 5- Return combustion air inducer motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.

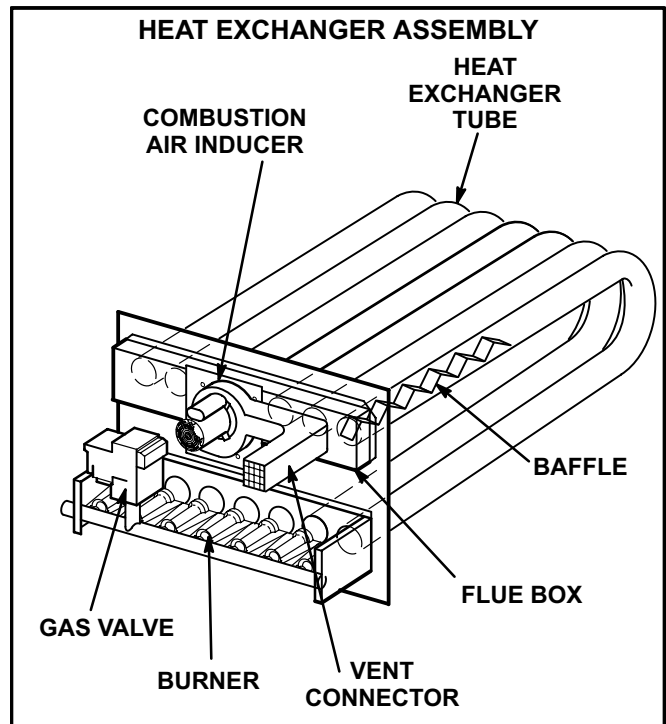


FIGURE 20

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

E-Flue Passageway and Flue Box (LGA 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- Remove flue baffle retaining bracket and pull tube baffles from heat exchanger tubes. Clean tubes and baffles with a wire brush.
- 4- Reinsert tube baffles, secure baffle retaining bracket, and reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

F-Evaporator Coil

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

G-Condenser Coil

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

H-Supply Air Blower Wheel

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