

INSTALLATION INSTRUCTIONS

⚠ CAUTION

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

⚠ 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

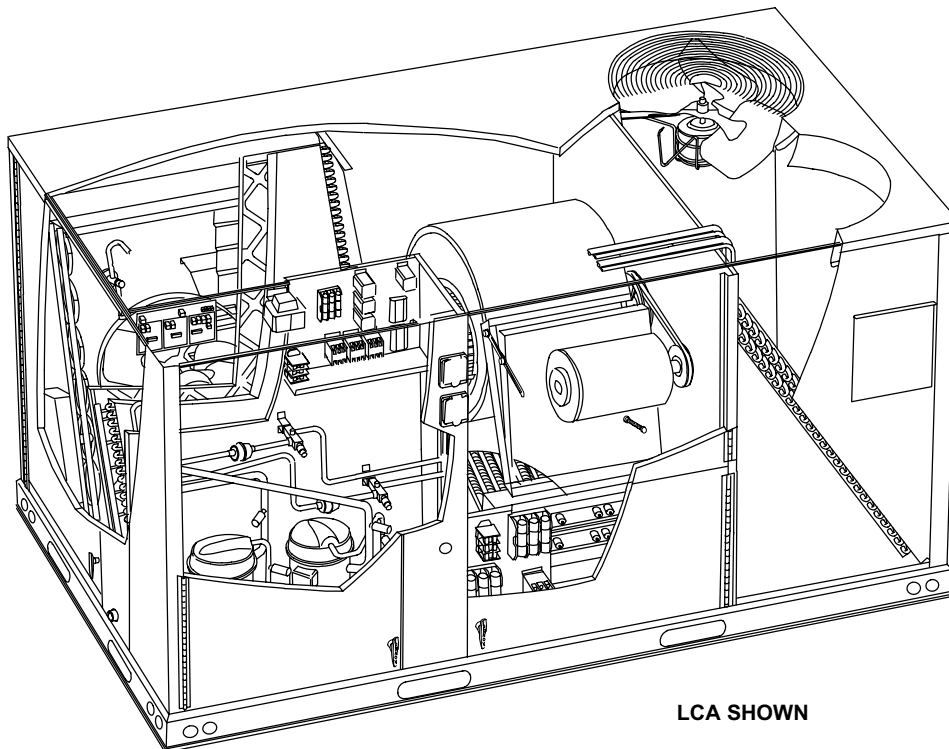
LGA090, LCA090 (7.5 TON)
LGA102, LCA102 (8.5 TON)
LGA120, LCA120 (10 TON)
LGA150, LCA150 (12.5 TON)

L SERIES PACKAGED UNITS
 504,378M
 4/2001
 Supersedes 504,350M

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	7
GENERAL	3	ELECTRICAL CONNECTIONS	8
REQUIREMENTS	3	BLOWER OPERATION AND ADJUSTMENTS	9
UNIT SUPPORT	3	COOLING START-UP	13
DUCT CONNECTION	4	GAS HEAT START-UP	16
RIGGING UNIT FOR LIFTING	4	HEATING OPERATION AND ADJUSTMENTS	17
CONDENSATE DRAINS	4	ELECTRIC HEAT START-UP	18
GAS PIPING	5	SERVICE	18

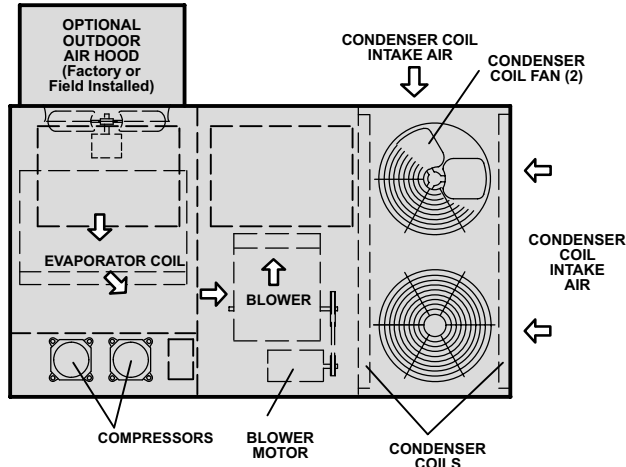
RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE



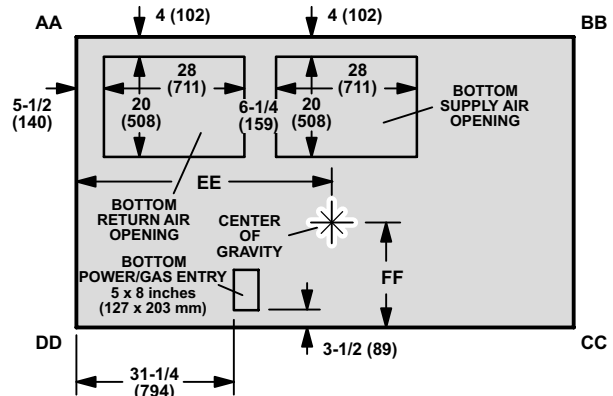
LCA SHOWN



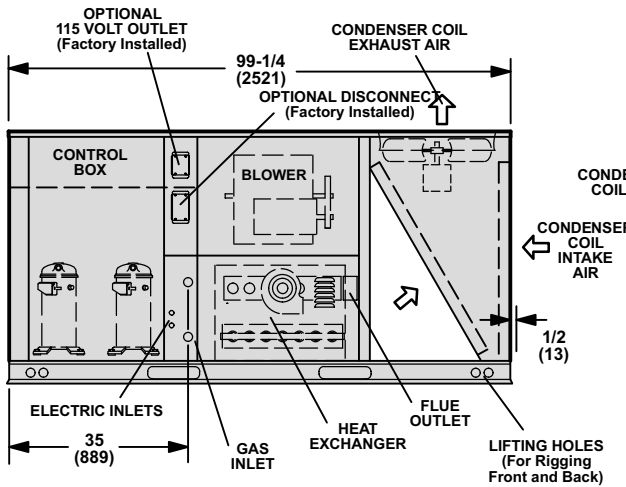
LGA/LCA090, 102, 120, & 150 DIMENSIONS - LGA HEAT SECTION SHOWN



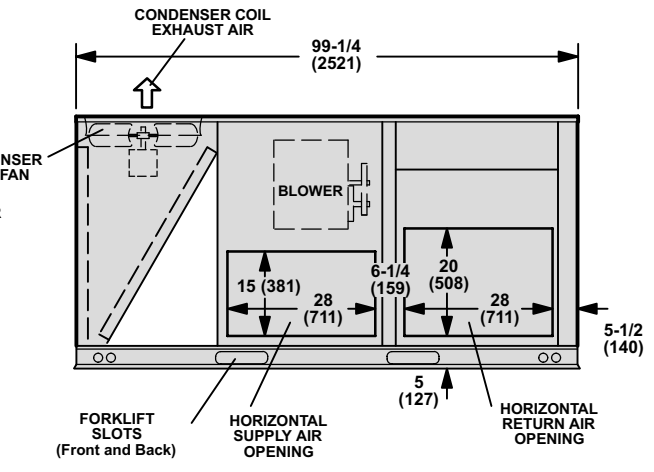
TOP VIEW



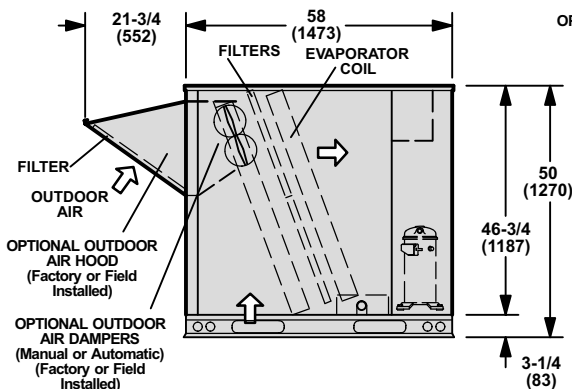
**TOP VIEW
Base Section**



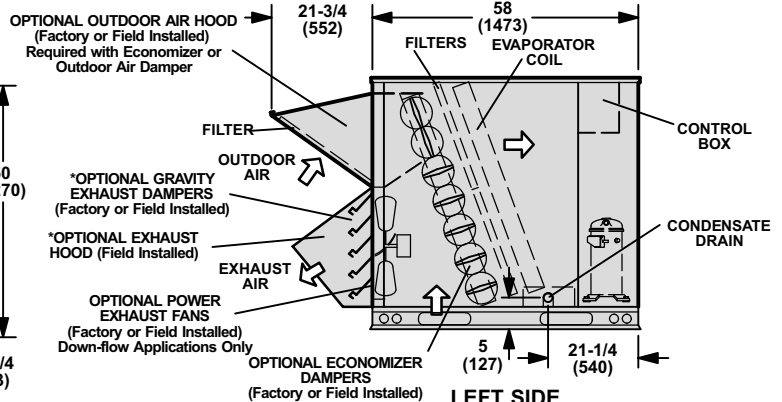
FRONT VIEW



BACK VIEW



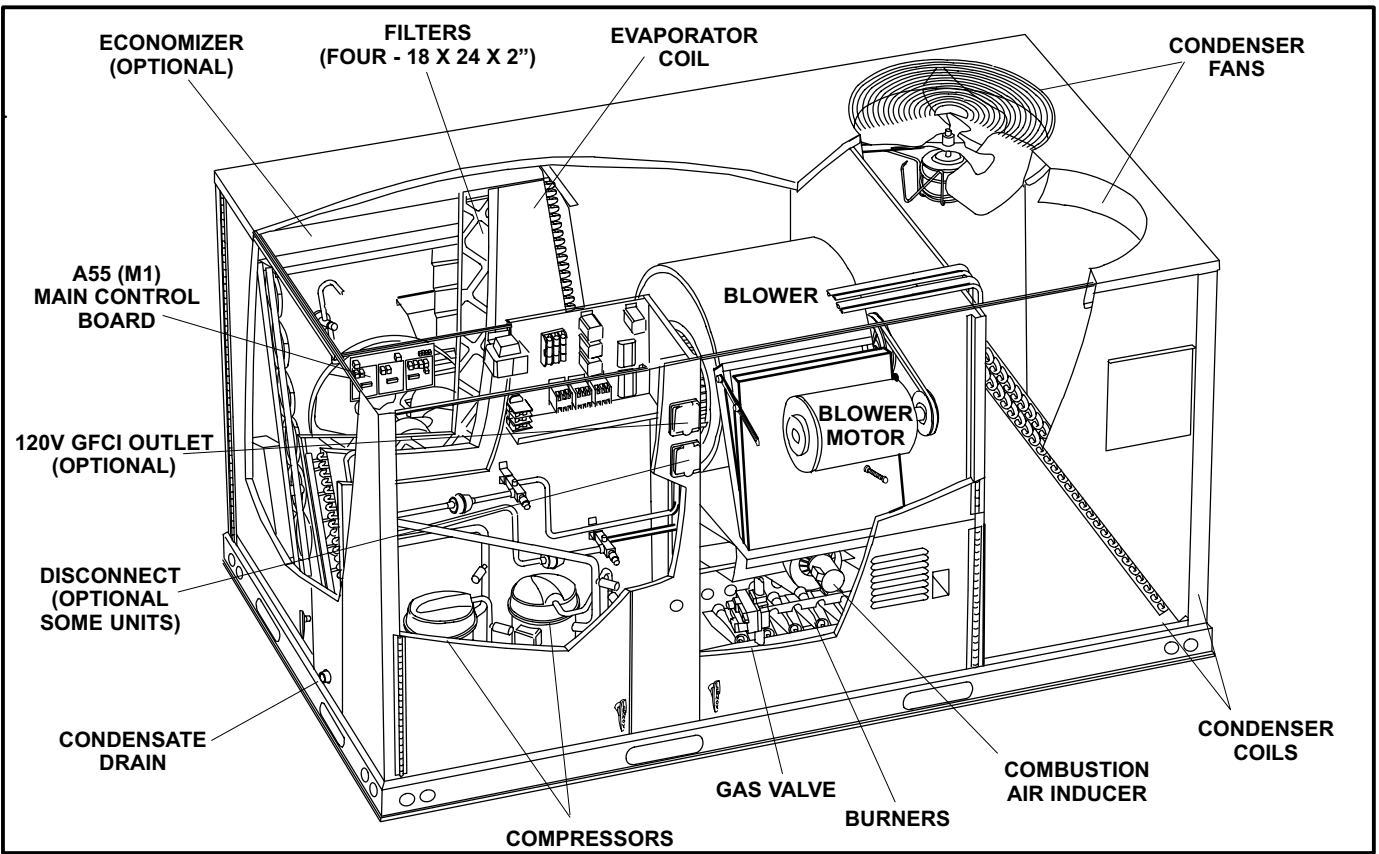
**LEFT SIDE
(Outdoor Air Dampers)**



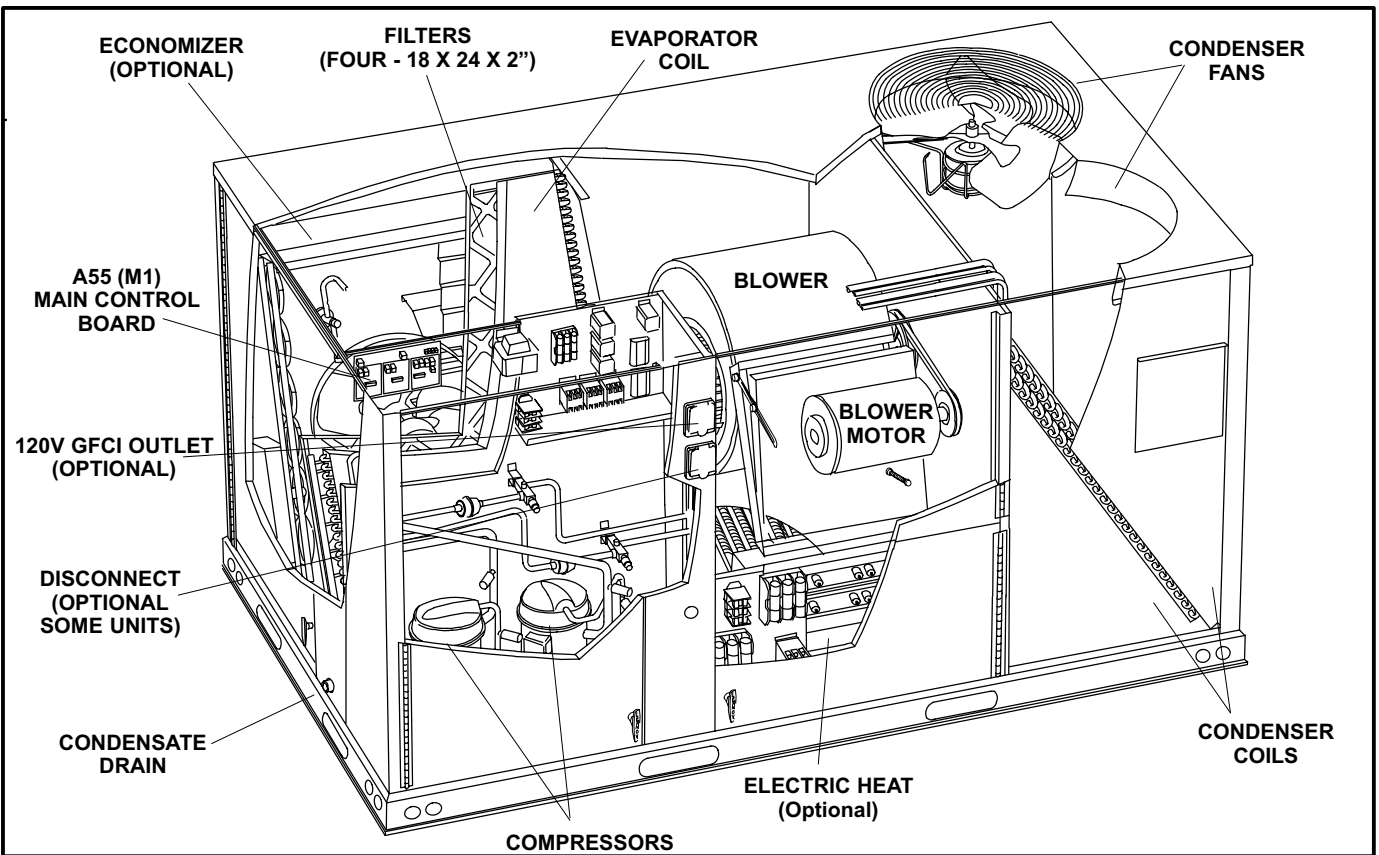
**LEFT SIDE
(Economizer)**

*NOTE — Field Installed in Return Air Duct for Horizontal Applications.

LGA090, 102, 120, & 150 PARTS ARRANGEMENT



LCA090, 102, 120, & 150 PARTS ARRANGEMENT



Shipping and Packing List

Package 1 of 1 contains:

1- Assembled unit

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

General

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

The LGA090, 102, 120, & 150 gas/electric packaged rooftop unit is available in 130,000 Btuh or 235,000 Btuh heating inputs. The LCA090, 102, 120 & 150 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 7-1/2, 8-1/2, 10, and 12-1/2 ton cooling capacities.

Requirements

See figure 1 for unit clearances.

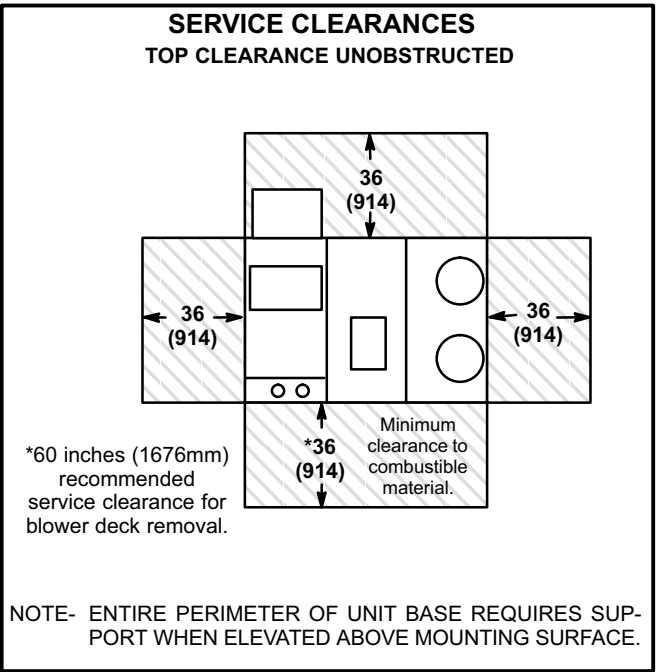


FIGURE 1

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.

⚠ 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.

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 LARMF10/15 roof mounting frame.

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

A-Downflow Discharge Application

Roof Mounting with LARMF10/15

- 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 LARMF10/15 roof mounting frame is required.

B-Horizontal Discharge Applications

- 1- Units installed in horizontal airflow applications must use a horizontal conversion kit (56K53).
- 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.)

RIGGING

UNIT	*WEIGHT	
	LBS.	KG.
LGA	1400	635
LCA	1330	603

*Maximum weight with all available factory-installed accessories.

LIFTING POINT SHOULD BE DIRECTLY ABOVE CENTER OF GRAVITY

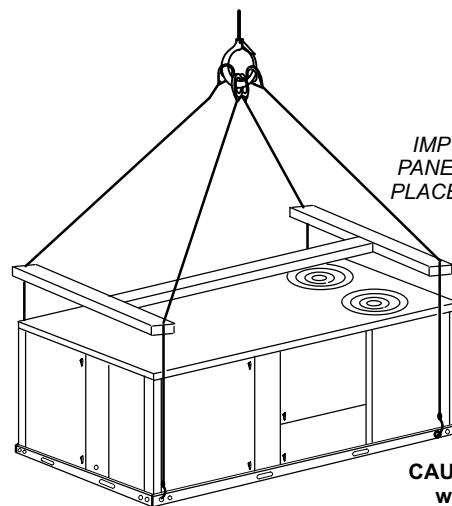


FIGURE 2

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.

CONDENSATE DRAIN CONNECTION

CAULK AROUND CONDENSATE COUPLING

NOTE - Allow clearance to open doors when installing condensate piping.

Minimum Pitch
1" (25 mm) per
10' (3 m) of line

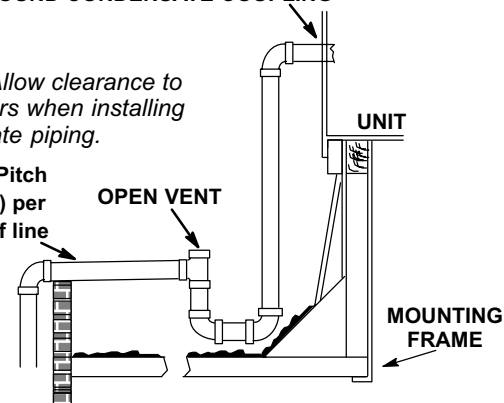


FIGURE 3

Connect Gas Piping (LGA 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 4.5" 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. Figure 5 shows complete bottom gas entry piping.

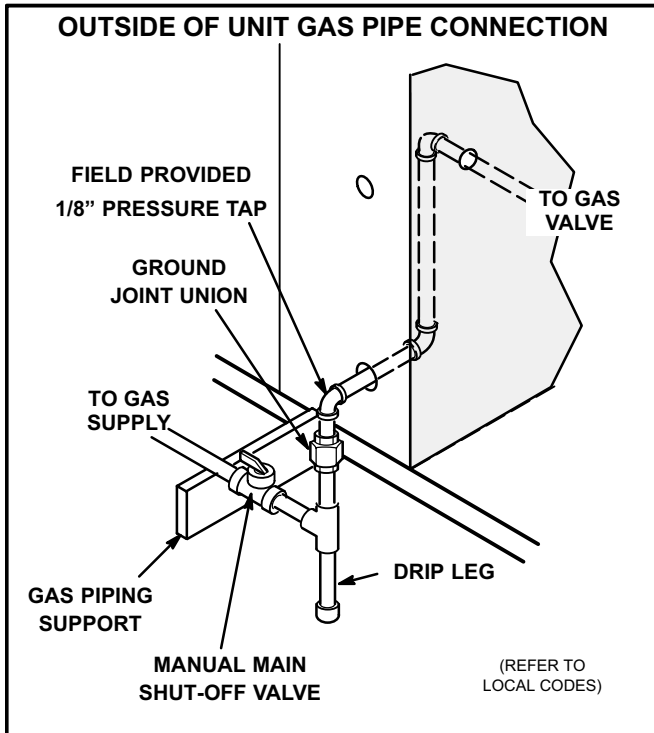


FIGURE 4

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

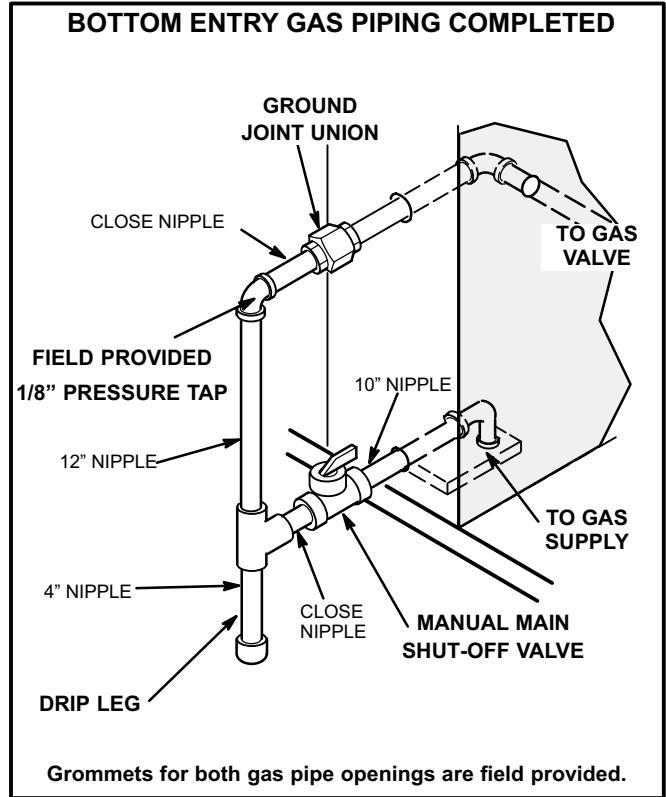


FIGURE 5

Pressure Test Gas Piping (LGA Units)

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 6.

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.

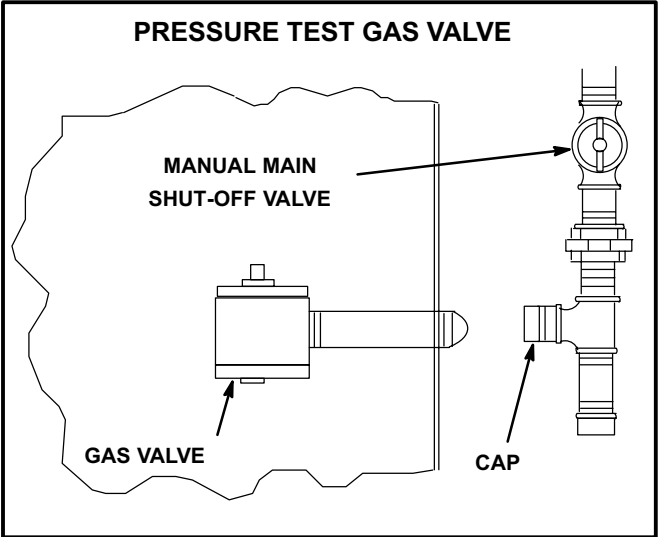


FIGURE 6

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)

⚠ 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.

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 hood and install as follows:

- 1- Remove screws securing side flanges of top hood to unit. See figure 7.

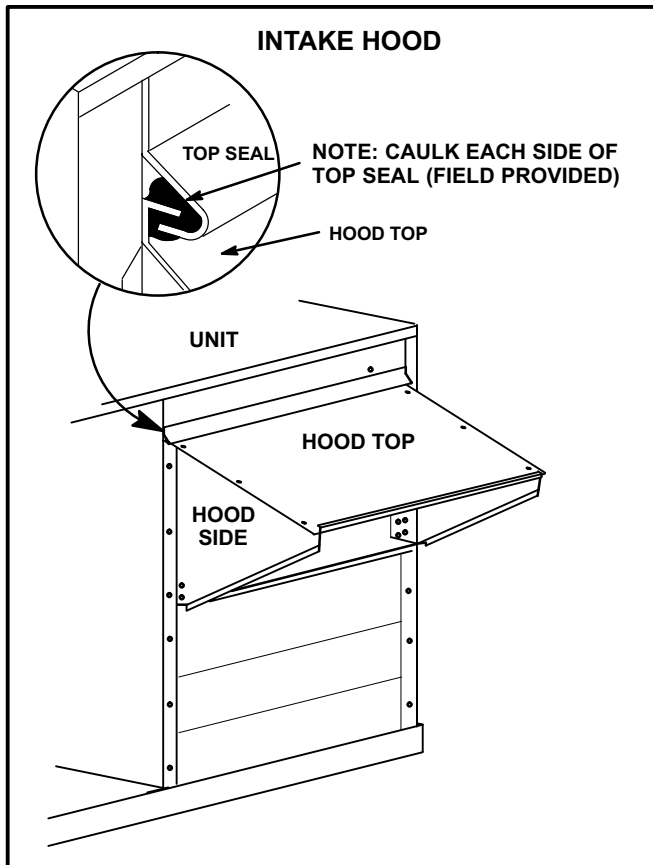


FIGURE 7

- 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 7.
- 3- Align two holes on intake hood side panel with two holes on bottom filter bracket. See figure 8. Secure both sides of bottom filter bracket to hood sides with sheet metal screws.
- 4- Secure intake hood sides to unit.
- 5- Slide two filters into bottom filter bracket. Position filler piece between filters with one end in bottom filter bracket.
- 6- Install top filter bracket as shown in figure 8. Secure with screws provided.

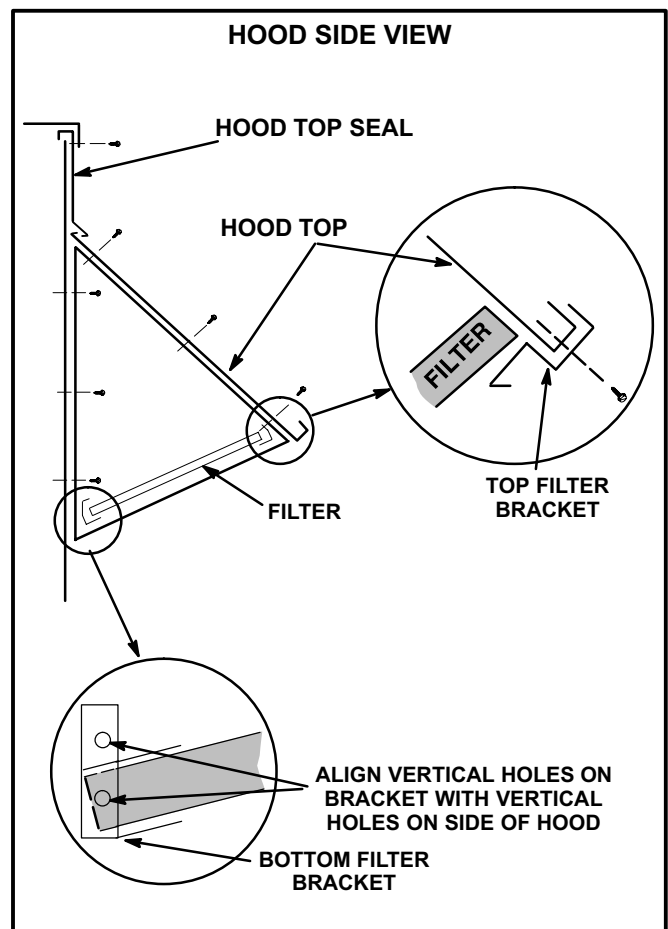


FIGURE 8

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 TB2 or TB13. If unit contains an optional factory-installed circuit breaker or disconnect switch, connect line voltage to CB10 or S48. See unit wiring diagram.
- 3- Connect separate 120v wiring to optional GFCI outlet pigtails.

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 9 for field wiring electro-mechanical and electronic 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.

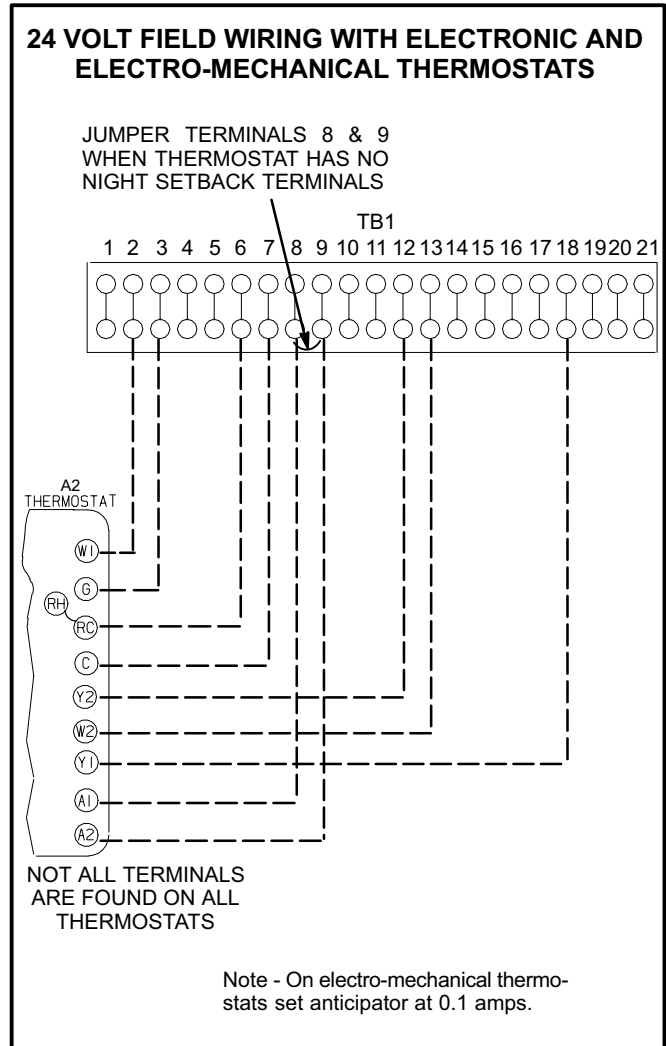


FIGURE 9

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.
- 2- Remove screws on either side of blower assembly sliding base. See figure 10.
- 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 10.

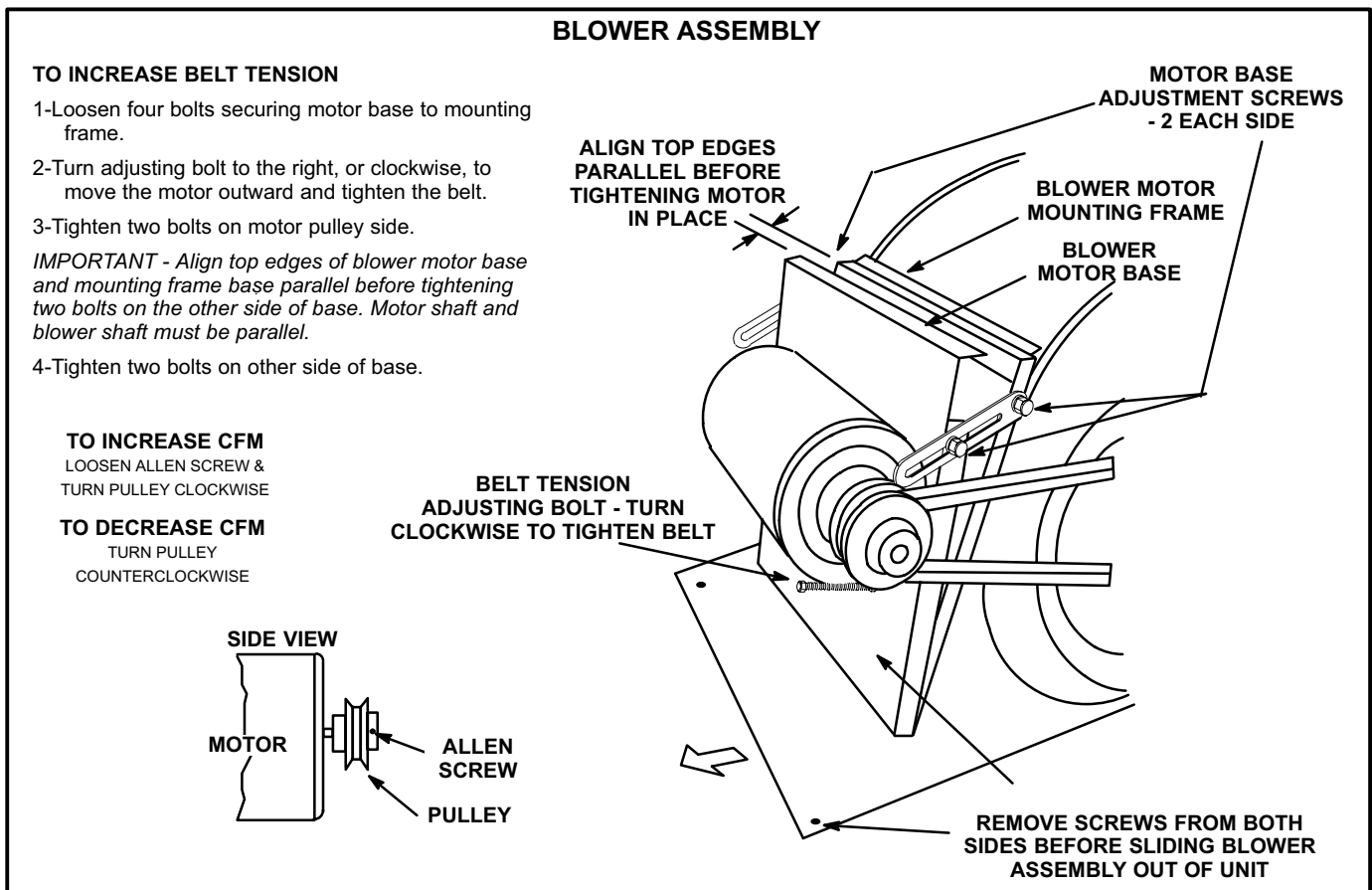


FIGURE 10

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.

- 1- Loosen four bolts securing motor base to mounting frame. See figure 10.
- 2- *To increase belt tension -*
Turn adjusting bolt to the right, or clockwise, to move the motor outward and tighten the belt. This increases the distance between the blower motor and the blower housing.

To loosen belt tension -
Turn the adjusting bolt to the left, or counterclockwise to loosen belt tension.
- 3- Tighten two bolts on motor pulley side.

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

- 4- Tighten two bolts on other side of base.

E-Check Belt Tension

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

- 1- Measure span length X. See figure 11.
- 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.

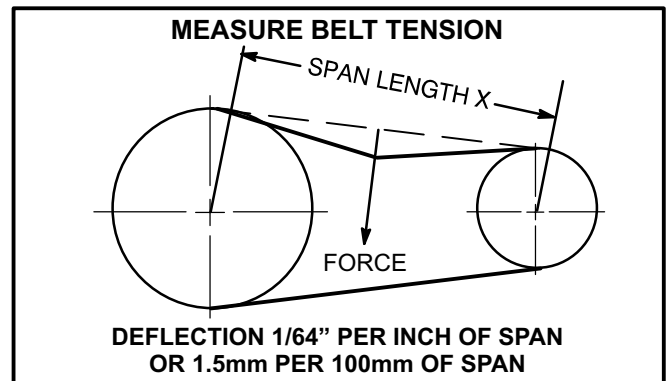


FIGURE 11

**TABLE 2
LGA/LCA090, 102, 120, 150 BASE UNIT BLOWER PERFORMANCE**

BLOWER TABLE INCLUDES RESISTANCE FOR LCA102 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 (heat section, economizer, etc.)
- 3 - Any field installed accessories air resistance (duct resistance, diffuser, etc.)

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

See table 3 for wet coil and option/accessory air resistance data.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

LCA090, 102 requires 3000 cfm (1415 L/s) minimum air with electric heat.

LCA120 & LCA150 models require 4000 cfm (1890 L/s) minimum air with electric heat.

BOLD ITALIC INDICATES FIELD FURNISHED DRIVE

Air Volume cfm (L/s)	Total Static Pressure - in. w.g. (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)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)
2250 (1060)	455 0.30 <i>(0.22)</i>	555 0.45 <i>(0.34)</i>	640 0.60 <i>(0.45)</i>	720 0.80 (0.60)	790 1.00 (0.75)	855 1.20 (0.90)	915 1.40 (1.04)	975 1.60 (1.19)	1030 1.85 (1.38)	1080 2.05 (1.53)	1130 2.30 (1.72)	1175 2.55 (1.90)	1220 2.80 (2.09)
2500 (1180)	475 0.40 <i>(0.30)</i>	575 0.55 <i>(0.41)</i>	660 0.70 <i>(0.52)</i>	735 0.90 (0.67)	805 1.10 (0.82)	870 1.30 (0.97)	930 1.55 (1.16)	985 1.75 (1.31)	1040 2.00 (1.49)	1090 2.25 (1.68)	1140 2.50 (1.87)	1185 2.75 (2.05)	1230 3.00 (2.24)
2750 (1300)	495 0.45 <i>(0.34)</i>	595 0.65 <i>(0.48)</i>	675 0.85 <i>(0.63)</i>	750 1.05 (0.78)	820 1.25 (0.93)	885 1.45 (1.08)	940 1.70 (1.27)	995 1.90 (1.42)	1050 2.20 (1.64)	1100 2.45 (1.83)	1145 2.65 (1.98)	1195 2.95 (2.20)	1240 3.25 (2.42)
3000 (1415)	525 0.55 <i>(0.41)</i>	615 0.75 <i>(0.56)</i>	695 0.95 (0.71)	770 1.20 (0.90)	835 1.40 (1.04)	895 1.60 (1.19)	955 1.85 (1.38)	1010 2.10 (1.57)	1060 2.35 (1.75)	1110 2.65 (1.98)	1160 2.90 (2.16)	1205 3.20 (2.39)	1250 3.45 (2.57)
3250 (1535)	550 0.65 <i>(0.48)</i>	640 0.90 <i>(0.67)</i>	715 1.10 (0.82)	790 1.35 (1.01)	855 1.60 (1.19)	915 1.80 (1.34)	970 2.05 (1.53)	1025 2.35 (1.75)	1075 2.60 (1.94)	1125 2.85 (2.13)	1170 3.15 (2.35)	1215 3.40 (2.54)	1260 3.70 (2.76)
3500 (1650)	580 0.80 <i>(0.60)</i>	665 1.05 <i>(0.78)</i>	740 1.25 (0.93)	810 1.50 (1.12)	870 1.75 (1.31)	930 2.00 (1.49)	985 2.25 (1.68)	1040 2.55 (1.90)	1090 2.85 (2.13)	1135 3.10 (2.31)	1185 3.40 (2.54)	1230 3.70 (2.76)	1270 4.00 (2.98)
3750 (1770)	605 0.95 <i>(0.71)</i>	690 1.20 (0.90)	760 1.45 (1.08)	830 1.70 (1.27)	890 1.95 (1.45)	950 2.25 (1.68)	1005 2.50 (1.87)	1055 2.80 (2.09)	1105 3.10 (2.31)	1150 3.35 (2.50)	1195 3.65 (2.72)	1240 3.95 (2.95)	1285 4.30 (3.21)
4000 (1890)	635 1.10 <i>(0.82)</i>	715 1.40 (1.04)	785 1.65 (1.23)	850 1.90 (1.42)	910 2.20 (1.64)	965 2.45 (1.83)	1020 2.75 (2.05)	1070 3.05 (2.28)	1120 3.35 (2.50)	1165 3.65 (2.72)	1210 3.95 (2.95)	1255 4.30 (3.21)	1295 4.60 (3.43)
4250 (2005)	665 1.30 <i>(0.97)</i>	740 1.60 (1.19)	810 1.85 (1.38)	870 2.15 (1.60)	930 2.45 (1.83)	985 2.75 (2.05)	1040 3.05 (2.28)	1090 3.35 (2.50)	1135 3.65 (2.72)	1185 4.00 (2.98)	1225 4.30 (3.21)	1270 4.65 (3.47)	1310 4.95 (3.69)
4500 (2125)	695 1.50 (1.12)	770 1.80 (1.34)	835 2.10 (1.57)	895 2.40 (1.79)	955 2.70 (2.01)	1005 3.00 (2.24)	1060 3.35 (2.50)	1105 3.65 (2.72)	1155 4.00 (2.98)	1200 4.30 (3.21)	1245 4.65 (3.47)	1285 5.00 (3.73)	1325 5.30 (3.95)
4750 (2240)	725 1.75 (1.31)	795 2.05 (1.53)	860 2.40 (1.79)	920 2.70 (2.01)	975 3.00 (2.24)	1030 3.35 (2.50)	1080 3.65 (2.72)	1125 3.95 (2.95)	1175 4.35 (3.25)	1215 4.65 (3.47)	1260 5.00 (3.73)	1300 5.35 (3.99)	1340 5.70 (4.25)
5000 (2360)	760 2.05 (1.53)	825 2.35 (1.75)	885 2.65 (1.98)	945 3.00 (2.24)	1000 3.35 (2.50)	1050 3.65 (2.72)	1100 4.00 (2.98)	1145 4.35 (3.25)	1190 4.70 (3.51)	1235 5.05 (3.77)	1280 5.45 (4.07)	-----	-----
5250 (2475)	790 2.30 (1.72)	855 2.65 (1.98)	910 2.95 (2.20)	970 3.35 (2.50)	1020 3.65 (2.72)	1070 4.00 (2.98)	1120 4.35 (3.25)	1165 4.70 (3.51)	1210 5.10 (3.80)	1255 5.45 (4.07)	-----	-----	-----
5500 (2595)	820 2.60 (1.94)	880 2.95 (2.20)	940 3.30 (2.46)	995 3.70 (2.76)	1045 4.05 (3.02)	1095 4.40 (3.28)	1145 4.80 (3.58)	1190 5.15 (3.84)	1230 5.50 (4.10)	-----	-----	-----	-----
5750 (2715)	850 2.95 (2.20)	910 3.30 (2.46)	965 3.70 (2.76)	1020 4.05 (3.02)	1070 4.45 (3.32)	1120 4.80 (3.58)	1165 5.20 (3.88)	1210 5.60 (4.18)	-----	-----	-----	-----	-----
6000 (2830)	885 3.35 (2.50)	940 3.70 (2.76)	995 4.10 (3.06)	1045 4.45 (3.32)	1095 4.85 (3.62)	1145 5.25 (3.92)	1190 5.65 (4.21)	-----	-----	-----	-----	-----	-----

F-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 3
FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE**

Air Volume		Wet Indoor Coil		Gas Heat Exchanger (LGA Models)		Electric Heat (LCA/LHA Models)	Economizer
cfm	L/s	090H, 102S, 102H, 120S, 150S	120H	Low Fire	High Fire		
2250	1060	.06 (15)	.10 (25)	.05 (12)	.09 (22)	.01 (2)	.035 (9)
2500	1180	.08 (20)	.12 (30)	.05 (12)	.11 (27)	.01 (2)	.04 (10)
2750	1300	.09 (22)	.14 (35)	.06 (15)	.13 (32)	.01 (2)	.045 (11)
3000	1415	.10 (25)	.16 (40)	.07 (17)	.16 (40)	.02 (5)	.05 (12)
3250	1535	.11 (27)	.19 (47)	.08 (20)	.19 (47)	.02 (5)	.06 (15)
3500	1650	.13 (32)	.21 (52)	.09 (22)	.22 (55)	.03 (7)	.07 (17)
3750	1770	.14 (35)	.23 (57)	.10 (25)	.26 (65)	.03 (7)	.075 (19)
4000	1890	.16 (40)	.26 (65)	.11 (27)	.30 (75)	.04 (10)	.08 (20)
4250	2005	.17 (42)	.28 (70)	.12 (30)	.34 (85)	.04 (10)	.09 (22)
4500	2125	.18 (45)	.31 (77)	.13 (32)	.38 (94)	.05 (12)	.10 (25)
4750	2240	.20 (50)	.33 (82)	.14 (35)	.42 (104)	.05 (12)	.11 (27)
5000	2360	.22 (55)	.36 (90)	.16 (40)	.47 (117)	.06 (15)	.12 (30)
5250	2475	.24 (60)	.39 (97)	.18 (45)	.52 (129)	.06 (15)	.13 (32)
5500	2595	.26 (65)	.42 (104)	.20 (50)	.57 (142)	.07 (17)	.14 (35)
5750	2715	.28 (70)	.45 (112)	.22 (55)	.62 (154)	.07 (17)	.15 (37)
6000	2830	.30 (75)	.68 (169)	.24 (60)	.68 (169)	.08 (20)	.16 (40)

**TABLE 4
FACTORY INSTALLED DRIVE KIT SPECIFICATIONS**

Motor		RPM Range											
hp	kW	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
2	1.5	680-940	560-775	---	---	850-1130	700-930	---	---	---	917-1152	---	---
3 Std.	2.2	680-940	---	---	560-775	850-1130	---	---	740-925	1105-1410	---	---	915-1150
3 Hi Eff	2.2	---	---	680-895	---	---	---	895-1120	---	---	---	1110-1395	---
5	3.7	---	---	---	---	---	---	895-1120	740-925	---	---	1110-1395	915-1150

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.

**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.
1	1VP40x7/8	79J0301	AK69x1	36K4701	AX46	31K7101
2	1VP44x1-1/8	36C0701	BK85x1	49K4101	BX52	P-8-8094
3	1VP44x7/8	53J9601	AK64x1	12L2501	AX46	31K7101
4	1VP60x1-1/8	41C1301	BK95x1	79J2701	BX56	P-8-10082
5	1VP50x7/8	P-8-2187	AK59x1	31K6801	AX46	31K7101
6	1VP60x1-1/8	41C1301	BK77x1	49K4001	BX53	49K3801

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 compressor 1. Second-stage thermostat demand will energize compressor 2. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1.
- 3- Units contain two refrigerant circuits or stages. See figure 12.

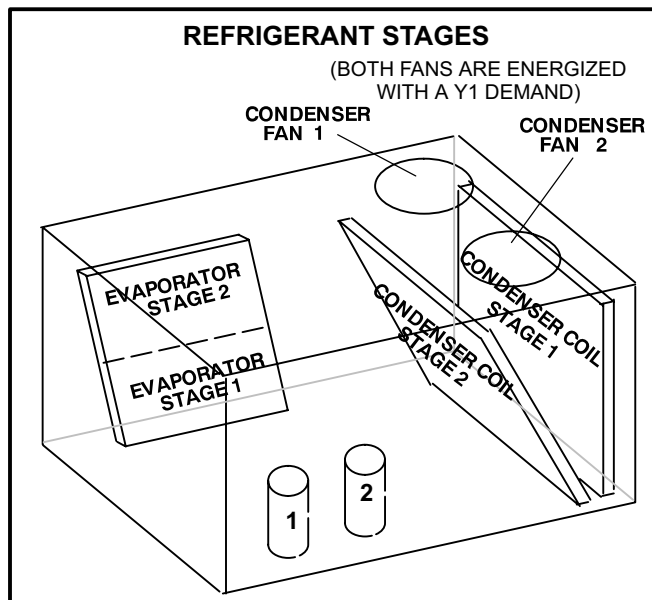


FIGURE 12

- 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.

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 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 7 through 11 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/LCA090H NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	160	78	165	78
75°F	184	80	190	80
85°F	211	82	218	81
95°F	241	83	248	82
105°F	272	84	279	83
115°F	310	86	319	85

**TABLE 7
LGA/LCA102S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	185	75	198	76
75°F	216	77	230	78
85°F	247	79	262	80
95°F	278	82	293	82
105°F	310	84	326	84
115°F	340	86	357	86

**TABLE 8
LCA/LGA102H NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	155	78	163	78
75°F	185	79	193	79
85°F	216	60	222	80
95°F	247	81	252	82
105°F	277	82	282	84
115°F	308	83	311	85

**TABLE 9
LCA/LGA120S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	183	76	186	73
75°F	212	78	215	75
85°F	242	80	246	77
95°F	272	82	276	79
105°F	303	84	306	81
115°F	333	85	337	83

**TABLE 10
LCA/LGA120H NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	166	75	172	74
75°F	197	76	203	75
85°F	227	78	233	77
95°F	258	80	264	79
105°F	288	82	295	82
115°F	320	84	326	84

**TABLE 11
LGA/LCA150S NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. ± 10 psig	Suct. ± 5 psig	Dis. ± 10 psig	Suc. ± 5 psig
65°F	183	65	187	66
75°F	215	68	219	69
85°F	248	71	252	72
95°F	281	74	285	74
105°F	313	77	317	77
115°F	347	79	350	80

E-Charge Verification - Approach Method

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

Approach Temperature = Liquid temperature minus ambient temperature.

- Approach temperature should match values in table 12. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.
- Do not use the approach method if system pressures do not match pressures in tables 7 through 11. The approach method is not valid for grossly over or undercharged systems.

**TABLE 12
APPROACH TEMPERATURE**

LGA/LCA Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
090H	6°F ± 1 (3.3°C ± 0.5)	5°F ± 1 (2.7°C ± 0.5)
102S	10°F ± 1 (5.6°C ± 0.5)	12°F ± 1 (6.6°C ± 0.5)
102H	6°F ± 1 (3.3°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)
120S	9°F ± 1 (5°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)
120H	6°F ± 1 (3.3°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)
150S	9°F ± 1 (5°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)

F-Compressor Controls

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

- High Pressure Switch (S4, S7)**
The compressor circuit is protected by a high pressure switch which cuts out at 450 psig ± 10 psig (3103 kPa ± 70 kPa) and automatically resets at 300 psig ± 20 psig (2069kPa ± 138 kPa).
- Low Pressure Switch (S87, S88)**
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).
- Crankcase Heater (HR1, HR2)**
Compressors have belly band compressor oil heaters which must be on 24 hours before running compressors. Energize by setting thermostat so that there is no cooling demand, to prevent compressor from cycling, and apply power to unit.
- Low Ambient Pressure Switch (S11, S84)**
Switch maintains adequate discharge pressure by de-energizing condenser fan when liquid pressure falls below 150 psig (1034kPa). S11 is installed in stage 1 liquid line and S84 is installed in stage 2 liquid line. Switch closes to energize condenser fans when pressure rises to 275 psig (1896kPa).

Both condenser fans are energized on a Y1 cooling demand and continue to operate when Y2 demand is initiated. If **BOTH** switches cut out due to low pressure, **ONLY** stage 1 condenser fan is cycled.

The C1 (A57) controller de-energizes condenser fan 2 when outdoor temperature drops below 55°F (13°C).
- Freezestats (S49, S50)**
Switches de-energize compressors when evaporator coil temperature falls below 29°F (-2°C) to prevent evaporator freeze-up. Switches reset when evaporator coil temperature reaches 58°F (15°C).

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 product or property damage. If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

⚠ WARNING



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

⚠ WARNING

SMOKE POTENTIAL

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

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

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

⚠ WARNING



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

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

A-Placing Unit In Operation

⚠ WARNING



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

Gas Valve Operation for White Rodgers 36C (figure 13) and Honeywell VR8205Q/VR8305Q (figure 14)

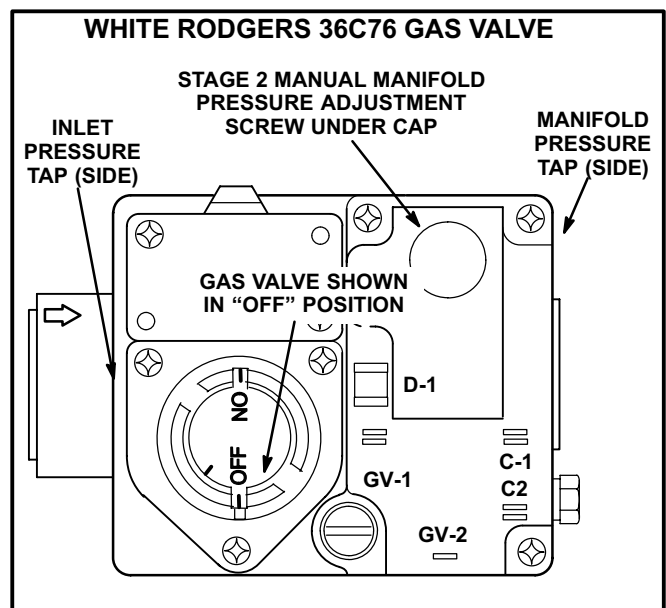


FIGURE 13

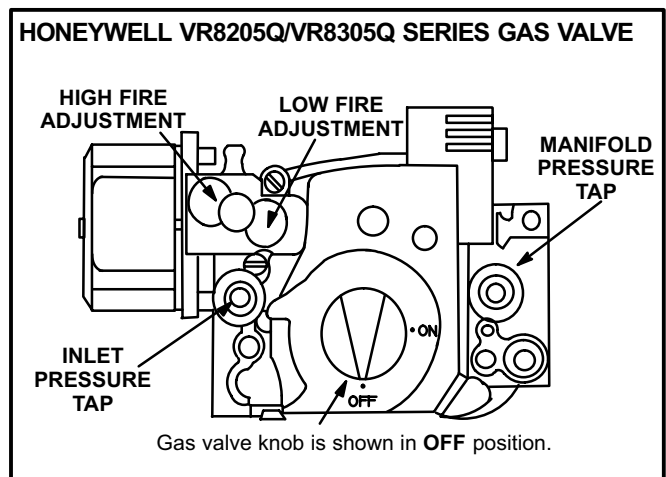





FIGURE 14


- 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.
- 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 Unit

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

WARNING

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

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. The primary limit is located on the blower deck behind the blower housing.

C-Heating Adjustment

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

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

- 1- Loosen four screws and remove burner support cap. See figure 15.

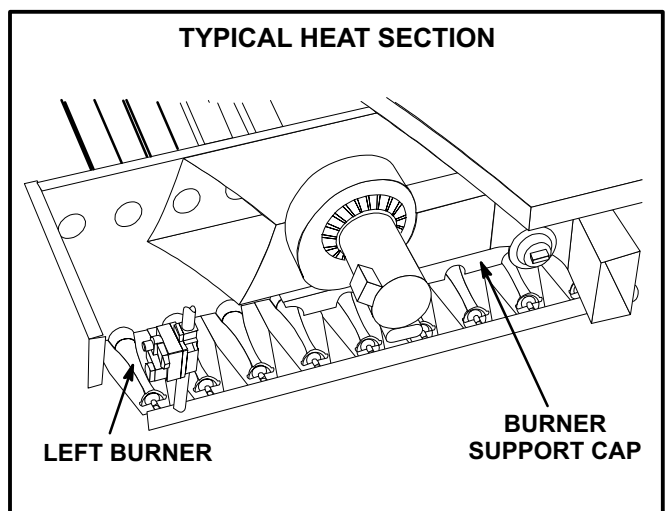


FIGURE 15

- 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 the gas valve.
 - Natural Gas Units - Low Fire - 1.6" w.c. (not adjustable)
 - Natural Gas Units - High Fire - 3.7" w.c.
 - LP Gas Units - Low Fire - 5.5" w.c. (not adjustable)
 - LP Gas Units - High Fire - 10.5" w.c.

Electric Heat Start-Up (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

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.

⚠ 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 on unit nameplate or contact your supervisor.

A-Filters

Units are equipped with four 18 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 16.

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

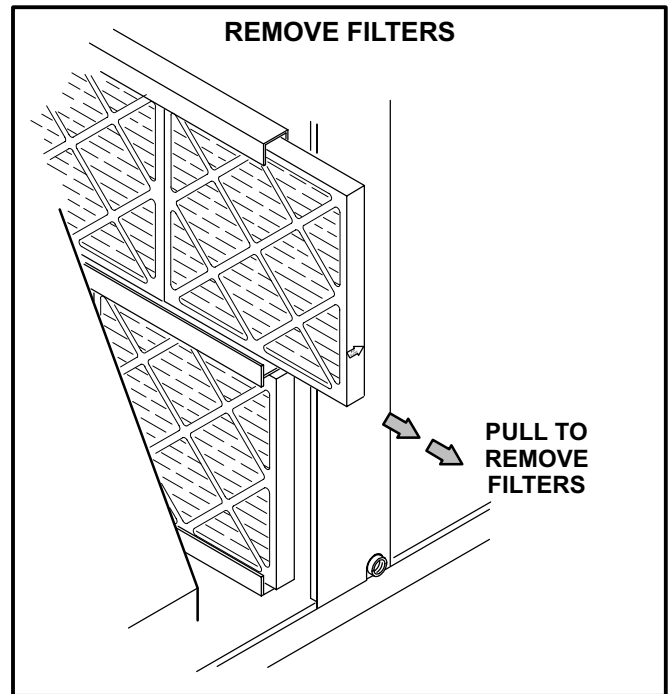


FIGURE 16

B-Lubrication

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

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 17.
- 4- Clean inducer wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.
- 5- Return combustion air inducer motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.
- 6- Clean combustion air inlet louvers on heat access panel using a small brush.

E-Flue Passageway and Flue Box (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.

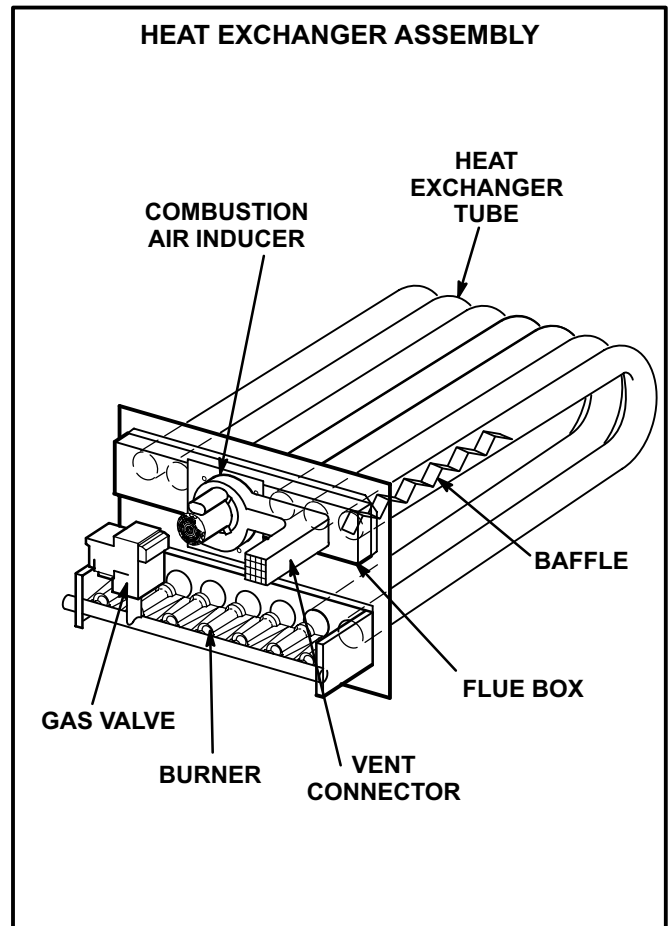


FIGURE 17

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.