

INSTALLATION INSTRUCTIONS

⚠ WARNING

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

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-
- ZGB/ZCB036** 3-Ton
 - ZGB/ZCB048** 4-Ton
 - ZGB/ZCB060** 5-Ton
 - ZGA/ZCA072** 6-Ton
 - ZGB/ZCB074** 6-Ton
-

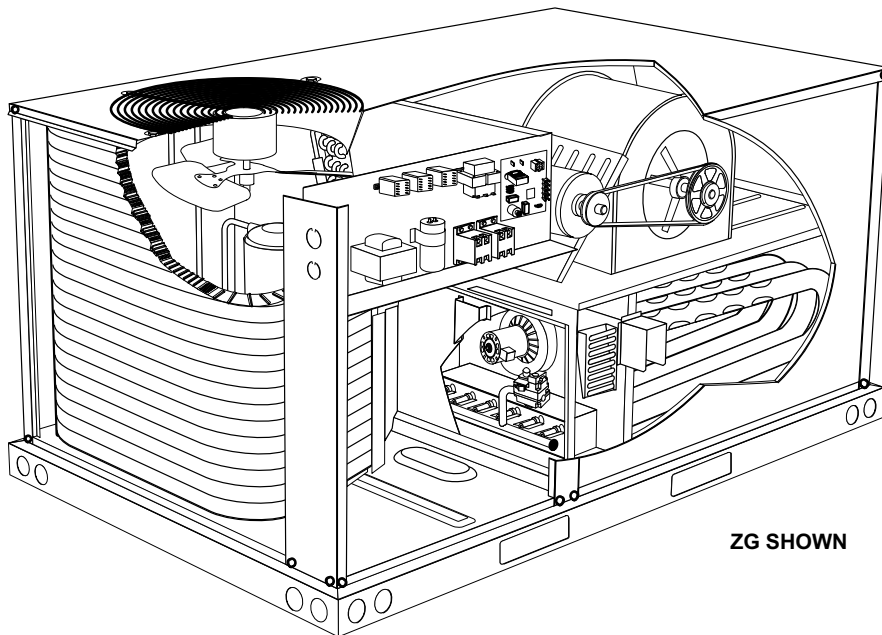
GAS AND COOLING PACKAGED UNITS
507252-05
5/2019
Supersedes 507252-04

- Heating Operation and Adjustments Page 35
- Electric Heat Start-Up Page 36
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⚠ CAUTION

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

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

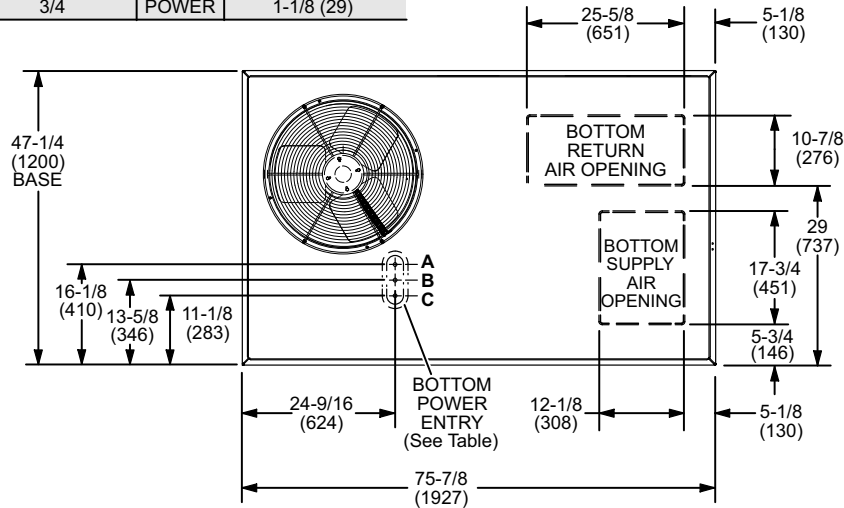


ZG SHOWN

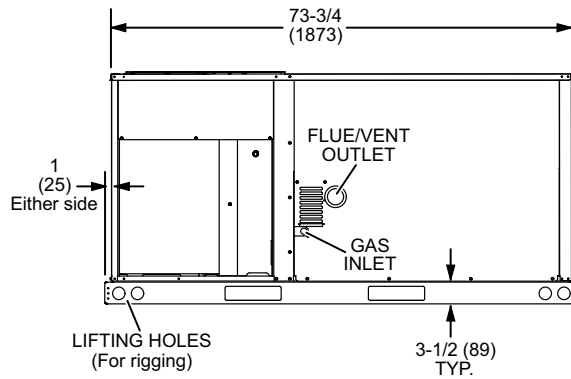
ZG/ZC 036, 048, 060, 072, 074 DIMENSIONS in. - Gas heat section shown

BOTTOM POWER ENTRY
Holes required for Optional Bottom Power Entry Kit

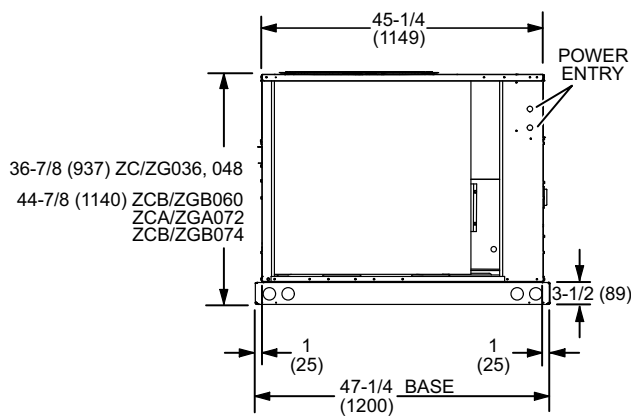
	Threaded Conduit Fittings (Provided in Kit)	Wire Use	Hole Diameter Required in Unit Base (Max.)
A	1/2	ACC.	7/8 (23)
B	1/2	24V	7/8 (23)
C	3/4	POWER	1-1/8 (29)



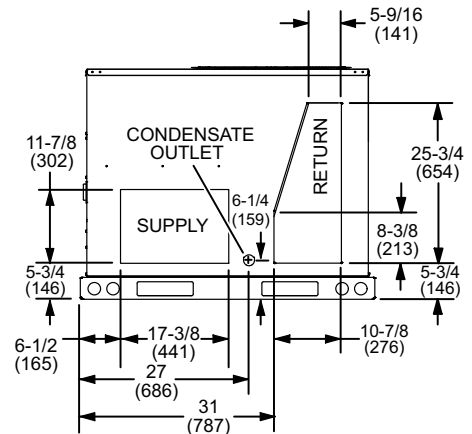
TOP VIEW (Base)



FRONT VIEW

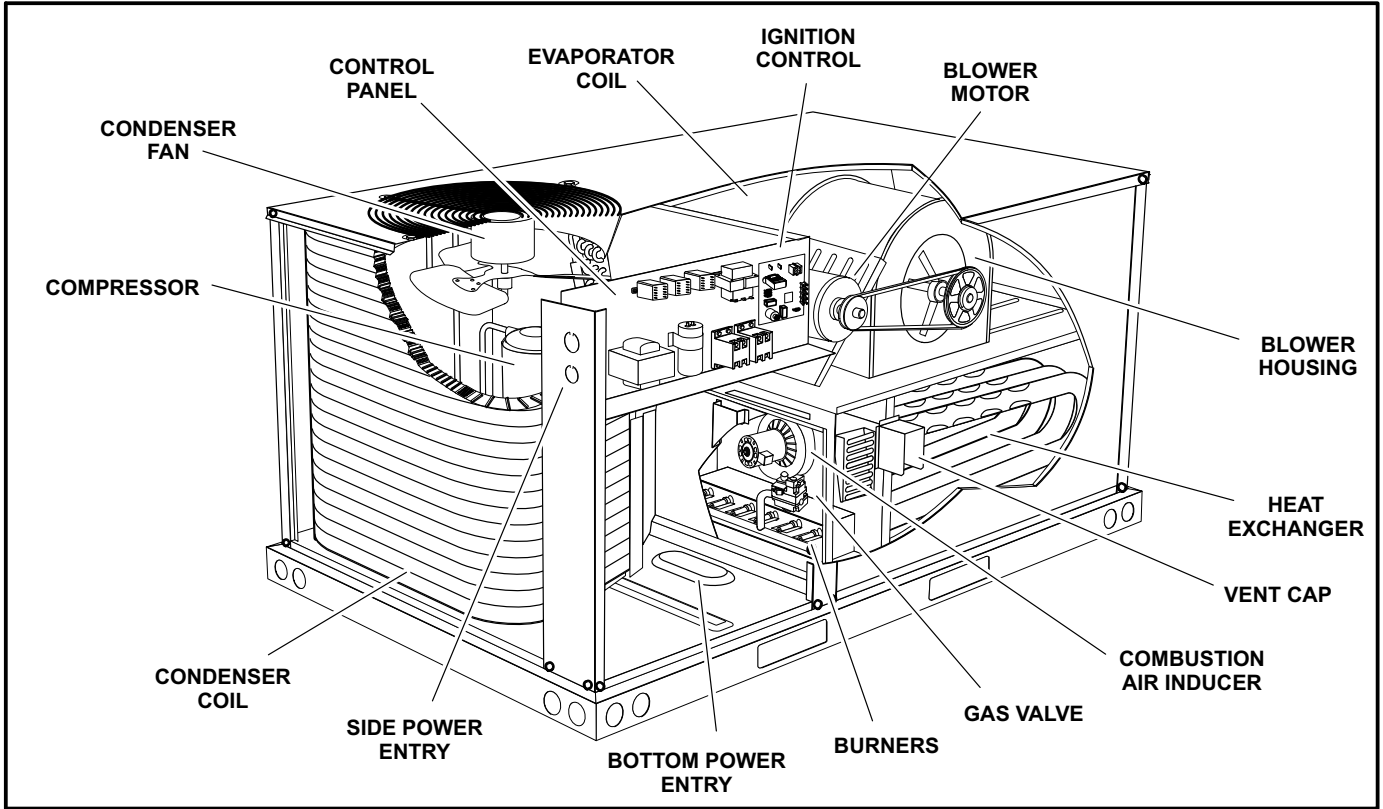


END VIEW

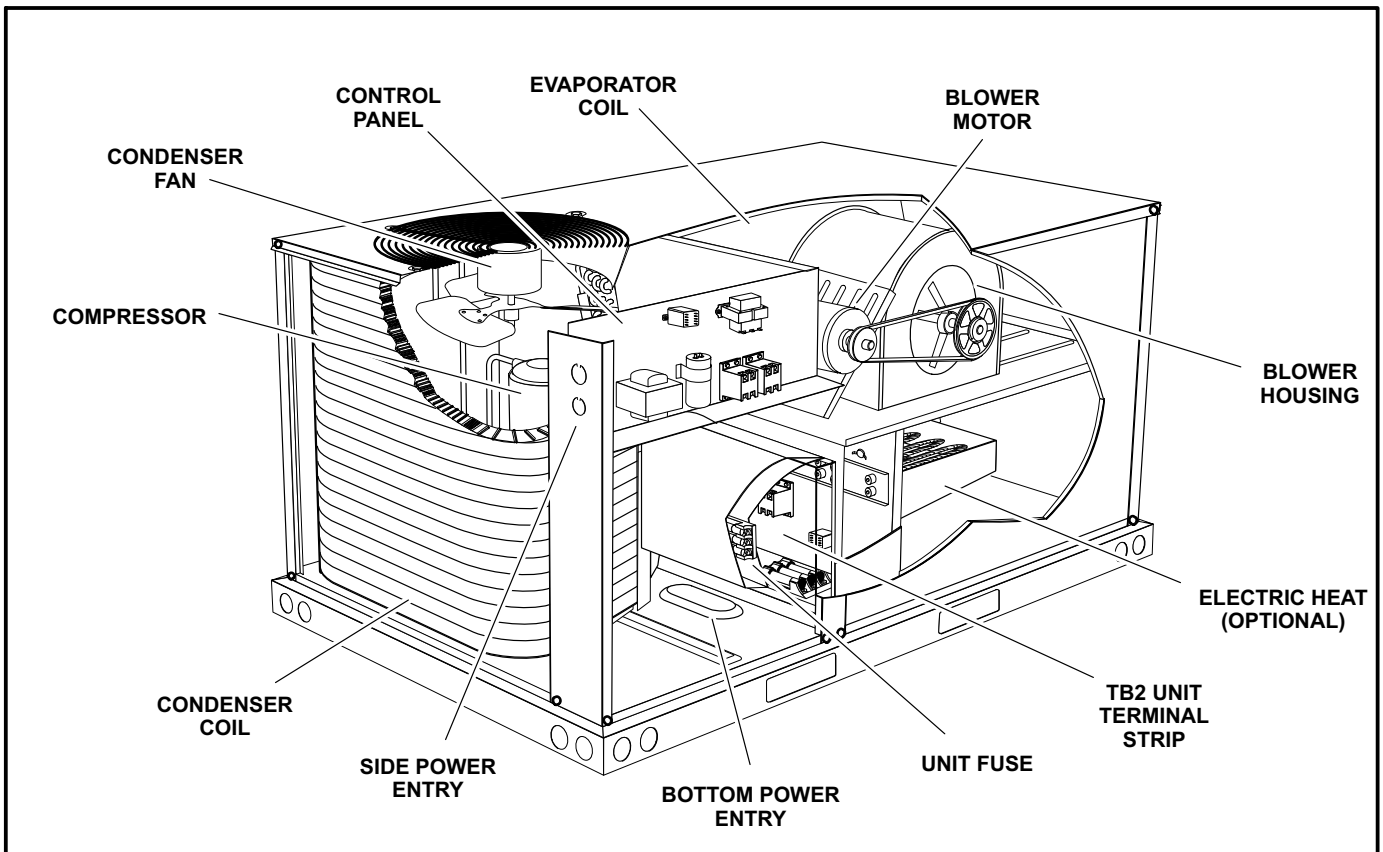


END VIEW

ZG 036, 048, 060, 072, 074 PARTS ARRANGEMENT



ZC 036, 048, 060, 072, 074 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 ZG units are available in three heating inputs. The ZC cooling packaged rooftop unit is the same basic design as the ZG unit except for the heating section. Optional electric heat is available for ZC units. ZG and ZC units have identical refrigerant circuits with respective 3-, 4- 5- and 6-ton cooling capacities.

Availability of units and options varies by brand.


Requirements

See figure 1 for unit clearances.

⚠ NOTICE

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

⚠ 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.

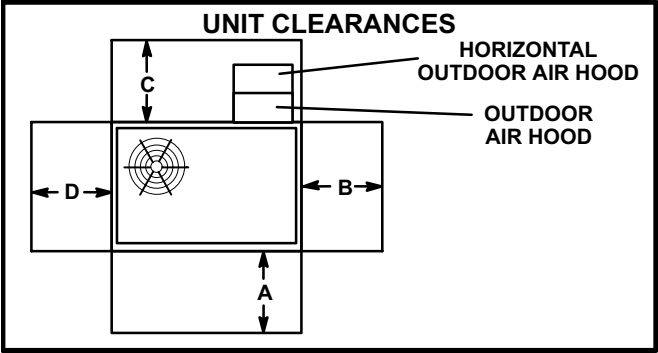


FIGURE 1

¹ Unit Clearance	A in.(mm)	B in.(mm)	C in.(mm)	D in.(mm)	Top Clearance
Service Clearance	36 (914)	36 (914)	36* (914)	36 (914)	Unob- structed
Clearance to Combustibles	36 (914)	1 (25)	1 (25)	1 (25)	Unob- structed
Minimum Operation Clearance	36 (914)	36 (914)	36* (914)	36 (914)	Unob- structed

*Clearance is 60 in. (1524mm) in horizontal air flow applications.
 Note - Entire perimeter of unit base requires support when elevated above mounting surface.

¹ **Service Clearance** - Required for removal of serviceable parts.
Clearance to Combustibles - Required clearance to combustible material (gas units).

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

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

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

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 a Z1CURB roof mounting frame.

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

⚠ CAUTION

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

A-Downflow Discharge Application

Roof Mounting with Z1CURB

- 1- The Z1CURB roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The Z1CURB 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 not insulated, so an enclosed, insulated frame is 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, a Z1CURB roof mounting frame is required.

B-Horizontal Discharge Applications

- 1- Specified installation clearances must be maintained when installing units. Refer to figure 1.

- 2- 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.

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

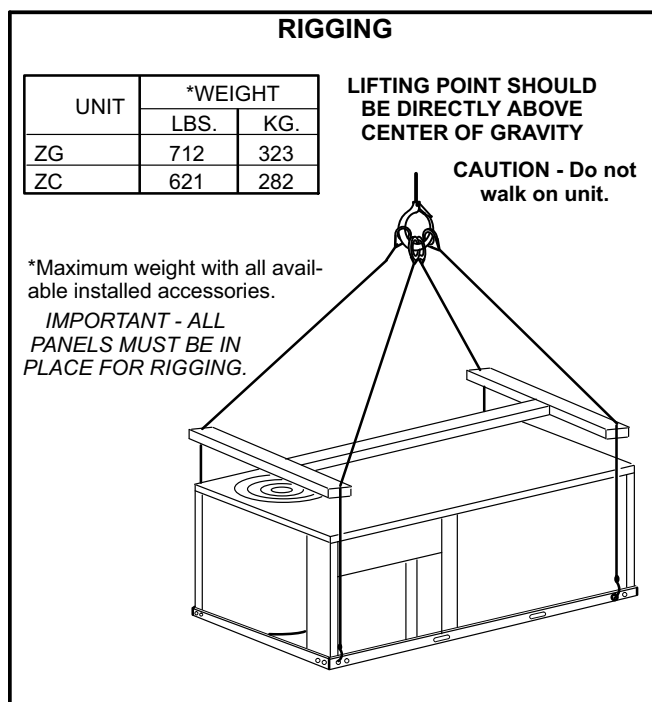


FIGURE 2

Horizontal Air Discharge

Unit is shipped with panels covering the horizontal supply and return air openings. See figure 3.

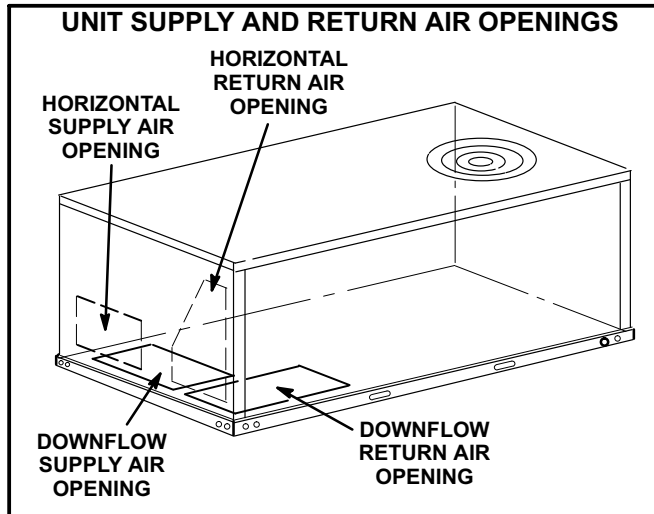


FIGURE 3

- 1- Remove horizontal covers and place a bead of silicone sealant on the underside of the duct cover flanges. See figure 4.
- 2- Position covers over downflow openings. Secure covers with self-drilling screws in at least two places on each cover. Drill through duct cover side into flange of base pan.
- 3- Place a bead of silicone between insulation and duct cover to seal in insulation edges. Let silicone dry before running gas or electric heat.

Units Equipped With An Optional Horizontal Economizer

- 1- Install the horizontal supply air cover over the down flow supply air opening as described above.
- 2- Leave the horizontal return air cover in place.
- 3- Locate the extra horizontal return cover that is included with the horizontal economizer kit. Install as described in previous section.

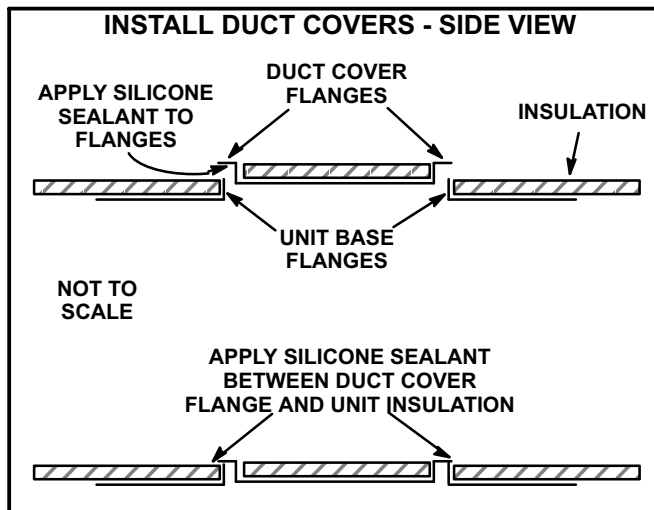


FIGURE 4

- 4- Install return air duct on the intake air side of the horizontal economizer. See figure 5.
- 5- Horizontal economizer and return air duct must be field-supported.

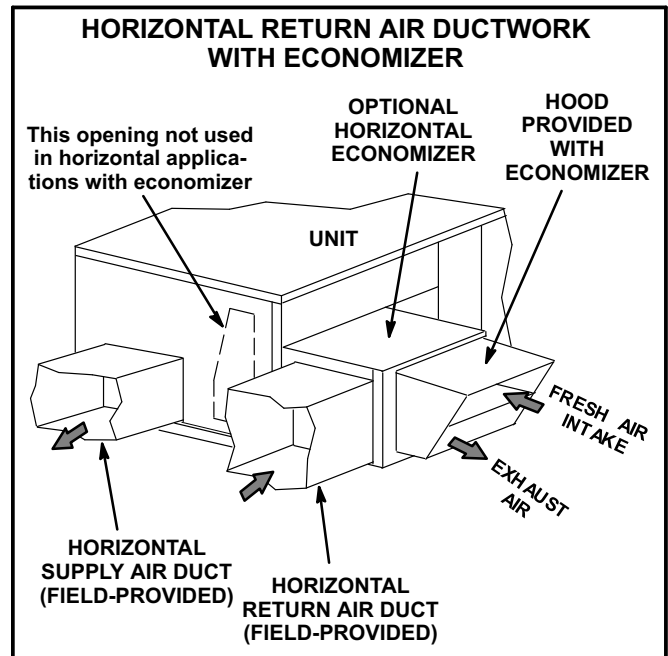


FIGURE 5

Condensate Drains

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

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

A trap must be installed between drain connection and an open vent for proper condensate removal. See figure 6. 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 page 2 for condensate drain location.

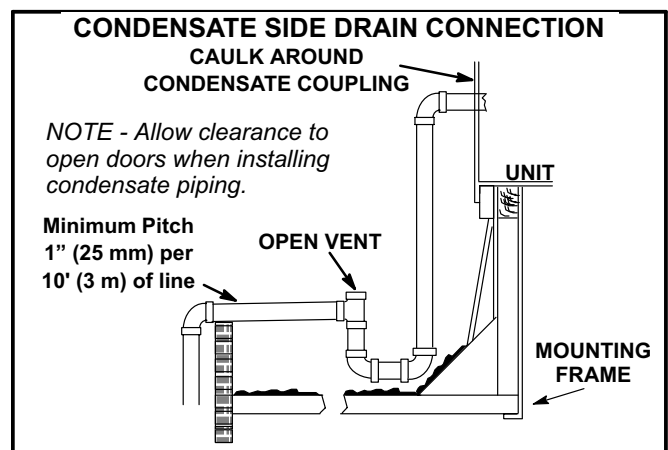


FIGURE 6

Connect Gas Piping (Gas Units)

Before connecting field-provided piping, check with gas company or authorities having jurisdiction for local code requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5" w.c. (.12kPa) maximum pressure drop. Do not use supply pipe smaller than unit gas connection. Operating pressures at the unit gas connection must be as shown in table 1.

**TABLE 1
OPERATING PRESSURE AT GAS CONNECTION "w.c."**

	Natural Gas		LP / Propane Gas	
	Min.	Max.	Min.	Max.
036-074	4.5	10.5	11	13

When making piping connections a drip leg should be installed on vertical pipe runs to serve as a trap for sediment or condensate. A 1/8" N.P.T. plugged tap is located on gas valve for test gauge connection. Refer to Heating Start-Up section for tap location. Install a ground joint union between the gas control manifold and the main manual shut-off valve. See figure 7 for gas supply piping entering outside the unit. Piping must be installed according to figure 7 and 8 to allow the door to open properly.

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

Pressure Test Gas Piping (Gas Units)

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 9.

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

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

CAUTION

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

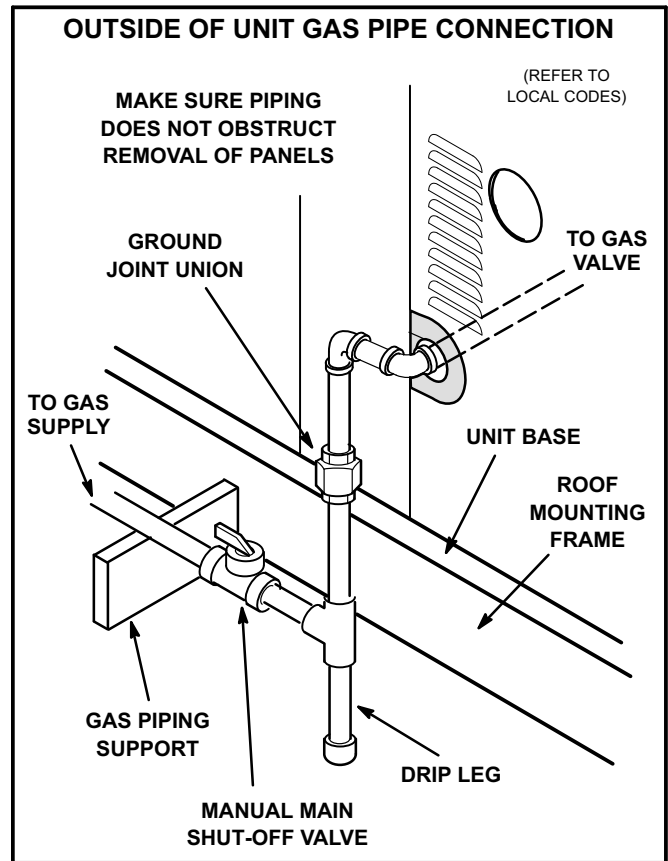


FIGURE 7

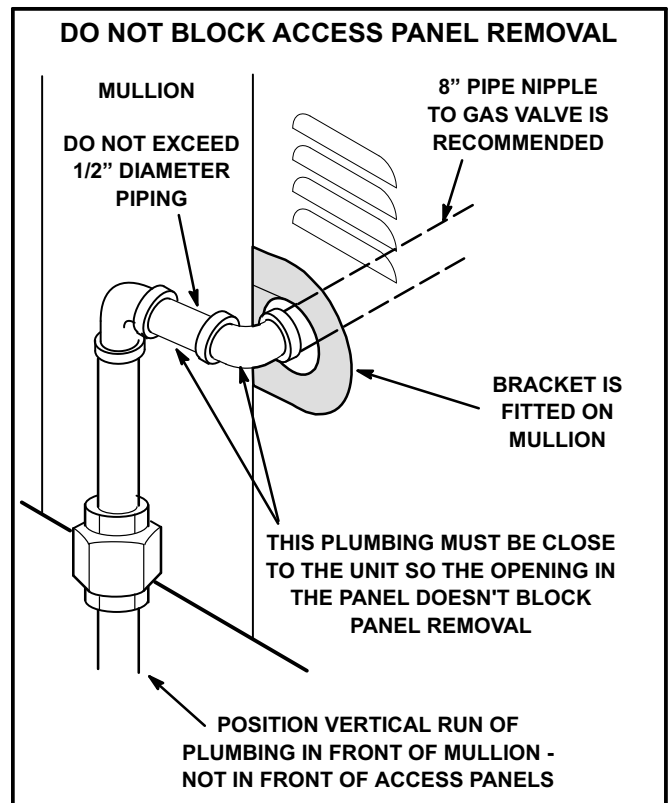


FIGURE 8

⚠ WARNING



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

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

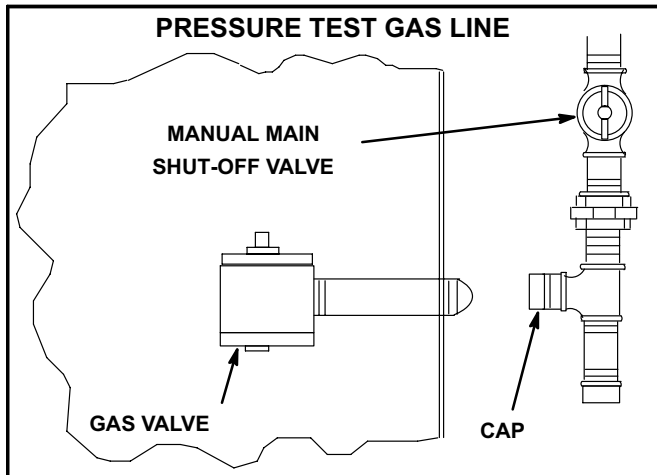


FIGURE 9

Install Vent Cap

Remove the vent cap from the shipping location and use existing screws to install the vent cap over the flue outlet. See figure 10. The installed vent cap is shown in the Parts Arrangement in the front of this manual.

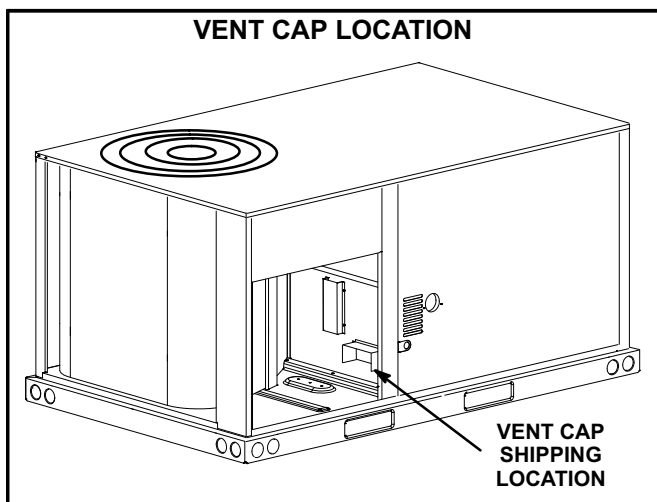


FIGURE 10

High Altitude Derate

Locate the high conversion sticker in the unit literature bag. Fill out the conversion sticker and affix next to the unit nameplate.

Refer to table 2 for high altitude adjustments.

**TABLE 2
HIGH ALTITUDE DERATE**

Altitude Ft.*	Gas Manifold Pressure
2000-4500	See Unit Nameplate
4500 And Above	Derate 2% / 1000 Ft. Above Sea Level

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

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

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- 1-Units are factory-wired for 230, 460, or 575 volt supply. **For 208V supply**, remove the insulated terminal cover from the 208V terminal on the control transformer. Move the wire from the transformer 240V terminal to the 208V terminal. Place the insulated terminal cover on the unused 240V terminal.
- 2- Route power through the side or bottom power entry area. For bottom power entry, a bottom power entry kit must be used. Connect power wiring to K1/K3 contactors in the control box. See figure 11 or 12. On ZC units equipped with electric heat, route power wiring to TB2; see parts arrangement for location. See unit wiring diagram.

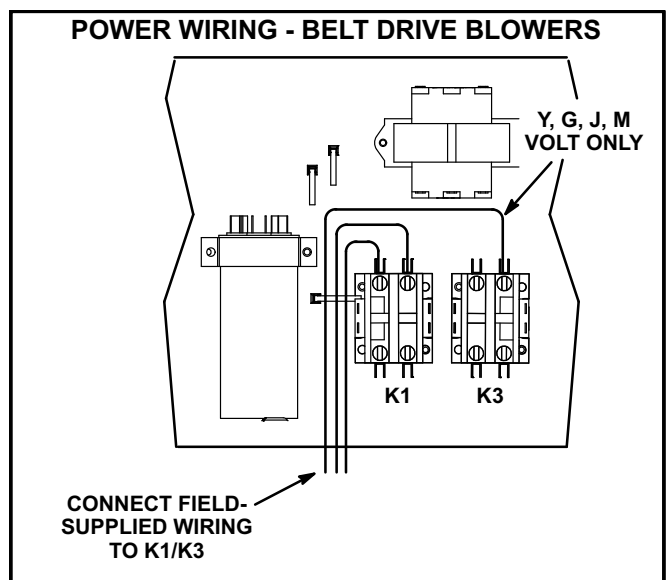


FIGURE 11

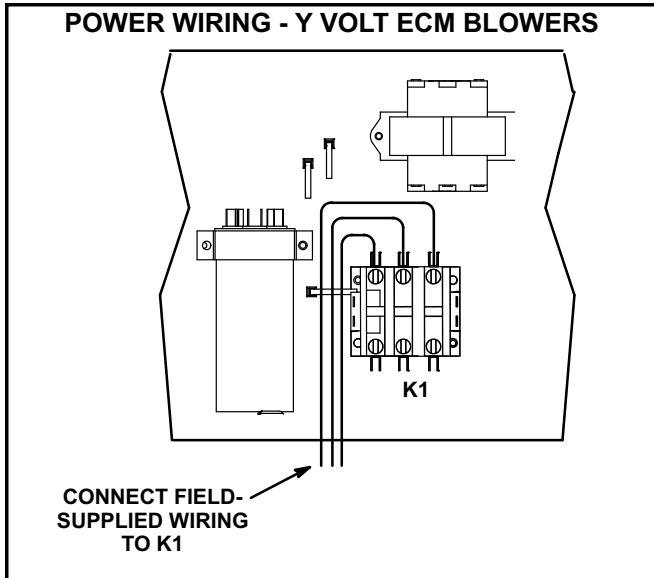


FIGURE 12

S4TCONTROL 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 to control panel (refer to unit dimensions to locate bottom and side power entry).

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

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

- 2- Install thermostat assembly in accordance with instructions provided with thermostat.
- 3- Connect thermostat wiring to leads in control panel. Wire as shown in figure 13 for electro-mechanical and electronic thermostats. If using other

temperature control devices or energy management systems see instructions and wiring diagram provided by manufacturer.

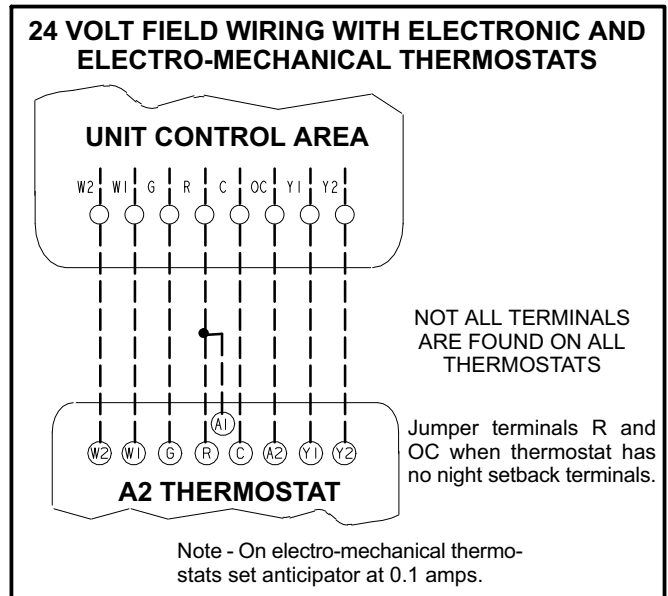


FIGURE 13

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

Blower Operation and Adjustments

Units are equipped with one of two factory-installed blower options. The ninth character in the model number identifies the blower as follows:

E= Three-, four- and five-ton units are equipped with a variable speed (ECM) direct drive blower.

B= Units are equipped with a single-stage belt drive blower

ZGB/ZCB074S4T units are equipped with two-stage blowers. The blower will operate at high speed with a Y2 thermostat demand and low speed with a Y1 thermostat demand. Low speed operation delivers approximately 2/3 of the air volume of high speed. Two-speed blower operation results in lower energy consumption.

⚠ 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-Determining Unit CFM - Belt Drive Blowers

IMPORTANT - ZGB/ZCB074S4T blower (G thermostat) **CFM MUST BE ADJUSTED IN HIGH SPEED**. Disconnect factory-installed J350 low speed connector from P350. Connectors are located near the bottom of the control box. Connect J351 high speed connector to P350. Once blower CFM is set, J350 can be reconnected to operate the blower on low during ventilation only demands. See table 3.

**TABLE 3
TWO-SPEED BLOWER OPERATION
ZGB/ZCB074S4T UNITS**

Thermostat	Blower Speed
G (P350/J350)*	Low
G (P350/J351)	High
W1	High
W2	High
Y1	Low
Y2	High

*Factory-installed jack/plug connection.

- 1- The following measurements must be made with air filters in place.
- 2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 14.

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

- 3- Referring to belt drive blower tables, use static pressure and RPM readings to determine unit CFM. Use page 27 when installing units with any of the options or accessories listed. Refer to table 6 for minimum airflow when electric heat is installed.
- 4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 15. Do not exceed minimum and maximum number of pulley turns as shown in table 4.

**TABLE 4
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT**

Belt	Min. Turns Open	Maxi. Turns Open
A Section	No minimum	5

- 5- *ZGB/ZCB074S4T Unit Only* -

If low speed during ventilation is desired, replace J351 connector with J350.

C-Determining Unit CFM - Direct Drive Blowers

- 1- Referring direct drive blower tables, use static pressure and RPM readings to determine unit CFM. Use page 27 when installing units with any of the options or accessories listed.
- 2- If the design CFM is too low, use figure 16 or 17 to move the control lead to a higher setting.

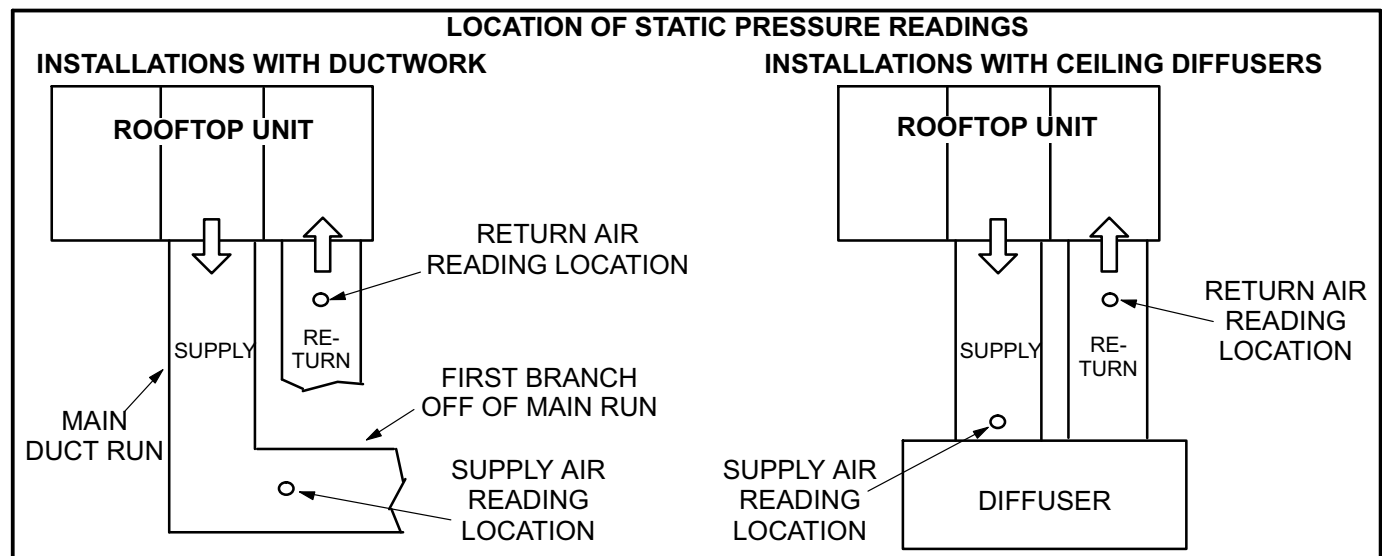


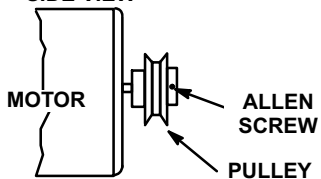
FIGURE 14

BLOWER ASSEMBLY

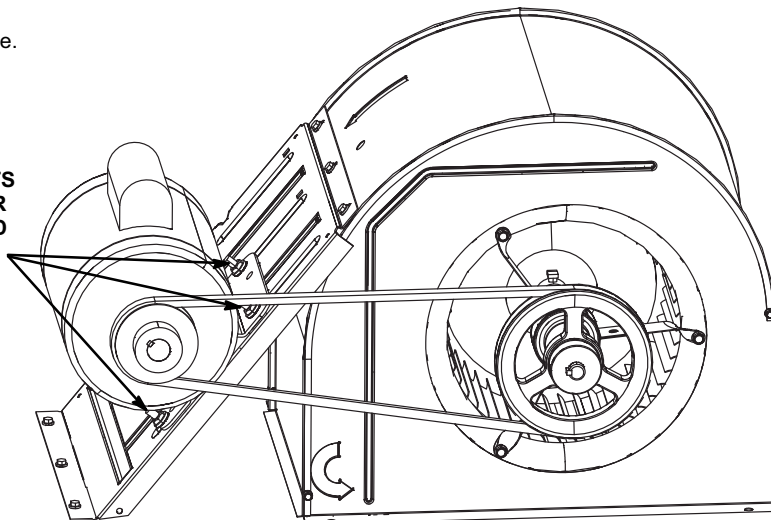
TO INCREASE BELT TENSION

- 1-Loosen four bolts securing motor base to mounting frame.
- 2-Slide the motor downward to tighten the belt.
- 3-Tighten four bolts on motor base.

SIDE VIEW



**LOOSEN FOUR BOLTS
AND SLIDE BLOWER
MOTOR DOWNWARD
TO TIGHTEN BELT**

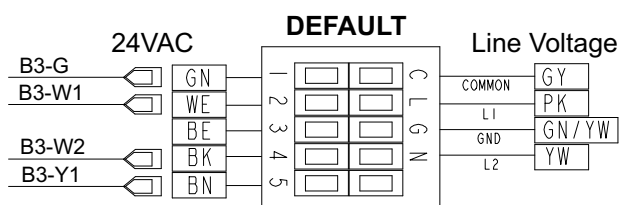


TO INCREASE CFM
LOOSEN ALLEN SCREW &
TURN PULLEY CLOCKWISE

TO DECREASE CFM
TURN PULLEY
COUNTERCLOCKWISE

FIGURE 15

DIRECT DRIVE BLOWER LEADS 1 PHASE



To increase the speed, move the lead labeled B3-W1 from the white (WE) wire to the blue (BE) wire.

INCREASE SPEED

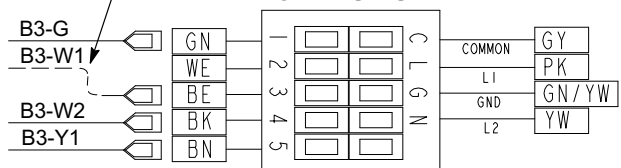
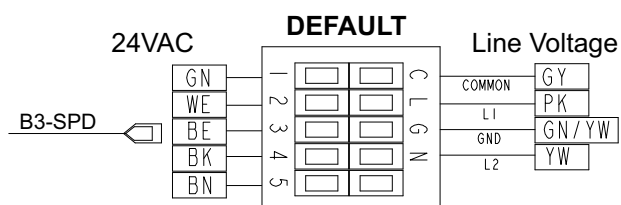


FIGURE 16

DIRECT DRIVE BLOWER LEADS 3 PHASE



To increase the speed, move lead labeled B3-SPD to the next highest terminal [from blue wire (BE) to black (BK) wire].

INCREASE SPEED

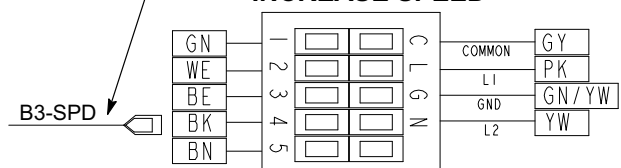


FIGURE 17

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 into grooves. Make sure blower and motor pulley are aligned as shown in figure 18.

- 1- Loosen four bolts securing motor base to mounting frame. See figure 15.
- 2- *To increase belt tension -*
Slide blower motor downward to tighten the belt. This increases the distance between the blower motor and the blower housing.
- 3- *To loosen belt tension -*
Slide blower motor upward to loosen the belt. This decreases the distance between the blower motor and the blower housing.
- 4- Tighten four bolts securing motor base to the mounting frame.

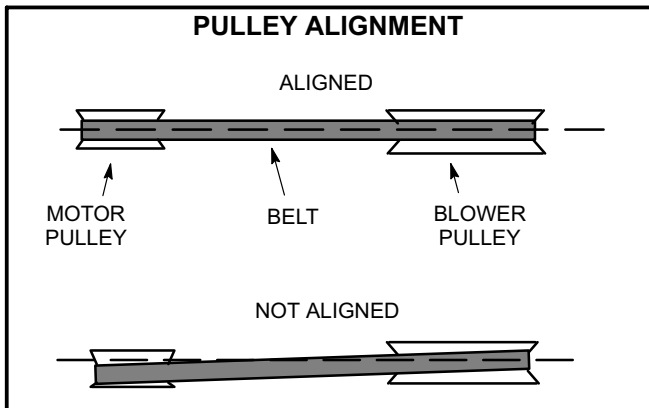


FIGURE 18

E-Check Belt Tension

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

- 1- Measure span length X. See figure 16.

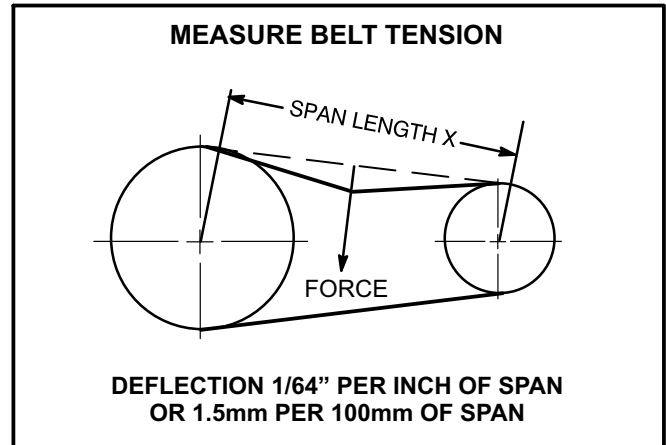


FIGURE 19

- 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.

F-Field-Furnished Blower Drives

For field-furnished blower drives, use belt drive blower tables to determine BHP and RPM required. Reference page 27 for additional air resistance and page 26 to determine the drive kit number. See table 5 for drive component manufacturers numbers.

TABLE
BELT DRIVE BLOWER PERFORMANCE

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TABLE
BELT DRIVE BLOWER PERFORMANCE

TABLE
BELT DRIVE BLOWER PERFORMANCE

**TABLE 5
DRIVE COMPONENT MANUFACTURER'S NUMBERS**

Drive No.	DRIVE COMPONENT PART NUMBERS					
	Motor Pulley		Blower Pulley		Belts	
	Browning	OEM	Browning	OEM	Browning	OEM
Z01	1VP34 X 7/8	31K6901	AK54 X 5/8	100244-30	A40	100245-17
Z02	1VP34 X 7/8	31K6901	AK46 X 5/8	100244-31	A39	100245-16
Z03	1VP34 X 7/8	31K6901	AK41 X 5/8	100244-28	A39	100245-16
Z04	1VP34 X 7/8	31K6901	AK39 X 5/8	100244-32	A38	100245-15
Z05	1VP44 X 7/8	P-8-1488	AK49 X 5/8	100244-26	A41	100245-18
Z06	1VP50 X 7/8	53J1501	AK51 X 5/8	100244-29	A42	100245-19
ZAA02	1VP40 X 7/8	79J03	BK80H	100788-03	A53	100245-40
ZAA03	1VP40 X 7/8	79J03	AK59 X 1	31K68	A50	100245-29
ZAA04	1VP44 X 7/8	P-8-1488	AK59 X 1	31K68	AX51	13H01

**TABLE 6
MINIMUM AIRFLOW
ZC UNITS WITH ELECTRIC HEAT**

kW	CFM - Downflow and Horizontal	
	036-060	072, 074
5	960	NA
7.5	960	1500
10	960	1500
15	960	1500
22.5	1280	1500
30	NA	2100

Units with electric heat (5-30kW) can operate up to 1.6" w.g. maximum static pressure.

Cooling Start-Up

▲ IMPORTANT

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

A-Operation

- 1- Initiate first and second stage cooling demands according to instructions provided with thermostat. See table 7 for operation.

Note - ZG/ZC 074 units are equipped with two-stage compressors.

- 2- Units contain one refrigerant circuit or stage.
- 3- Unit is charged with R-410A refrigerant. See unit rating plate for correct amount of charge.
- 4- Refer to Refrigerant Charge and Check section for proper method to check refrigerant charge.

**TABLE 7
COOLING OPERATION**

T*Stat Demand	Energized	
024-072 No Economizer or Outdoor Air Unsuitable		
Y1	Compressor	Condenser Fan
Y2	Compressor	Condenser Fan
024-072 Unit Equipped With An Economizer		
Y1	Economizer	na
Y2	Economizer + Compressor	Condenser Fan
074 No Economizer or Outdoor Air Unsuitable		
Y1	Compressor Low Speed*	Condenser Fan
Y2	Compressor High Speed**	Condenser Fan
074 Unit Equipped With An Economizer		
Y1	Economizer	na
Y2	Economizer + Compressor Low Speed*	Condenser Fan

*67% of full capacity **100% of full capacity

B-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 K1 contactor. 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.

C-Refrigerant Charge and Check

WARNING-Do not exceed nameplate charge under any condition.

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

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

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

IMPORTANT - Charge unit in standard cooling mode high stage only.

1- Make sure outdoor coil is clean. Attach gauge manifolds and operate unit at full CFM in cooling mode with economizer disabled until system stabilizes (approximately five minutes). Make sure all outdoor air dampers are closed.

2- Compare the normal operating pressures (see tables 8 - 12) to the pressures obtained from the gauges.

Check unit components if there are significant differences.

3- Measure the outdoor ambient temperature and the suction pressure. Refer to the appropriate circuit charging curve to determine a target liquid temperature.

Note - Pressures are listed for sea level applications.

4- Use the same thermometer to accurately measure the liquid temperature (in the outdoor section).

- If measured liquid temperature is higher than the target liquid temperature, add refrigerant to the system.
- If measured liquid temperature is lower than the target liquid temperature, recover some refrigerant from the system.

5- Add or remove charge in increments. Allow the system to stabilize each time refrigerant is added or removed.

6- Continue the process until measured liquid temperature agrees with the target liquid temperature. Do not go below the target liquid temperature when adjusting charge. Note that suction pressure can change as charge is adjusted.

7- Example ZGB/ZCB036: At 95°F outdoor ambient and a measured suction pressure of 130psig, the target liquid temperature is 103°F. For a measured liquid temperature of 106°F, add charge in increments until measured liquid temperature agrees with the target liquid temperature.

**TABLE 8
ZGB/ZCB036 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
116	231	119	269	122	311	126	356	129	405	132	458
123	234	127	271	130	313	133	359	137	408	140	462
140	245	144	280	147	321	151	368	155	417	159	171
156	261	160	297	167	338	170	383	173	433	178	489

**TABLE 9
ZGB/ZCB048 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
112	244	115	283	118	326	121	373	124	423	127	480
118	248	122	288	126	331	130	379	133	429	136	177
135	258	138	298	142	341	145	389	150	441	153	496
149	272	154	311	158	355	162	402	166	455	171	193

**TABLE 10
ZGB/ZCB060 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
106	248	110	288	114	331	118	378	123	428	126	483
114	254	118	292	122	336	125	384	129	435	133	493
130	267	134	308	138	353	142	401	146	455	151	511
147	290	151	329	155	372	159	420	164	477	169	533

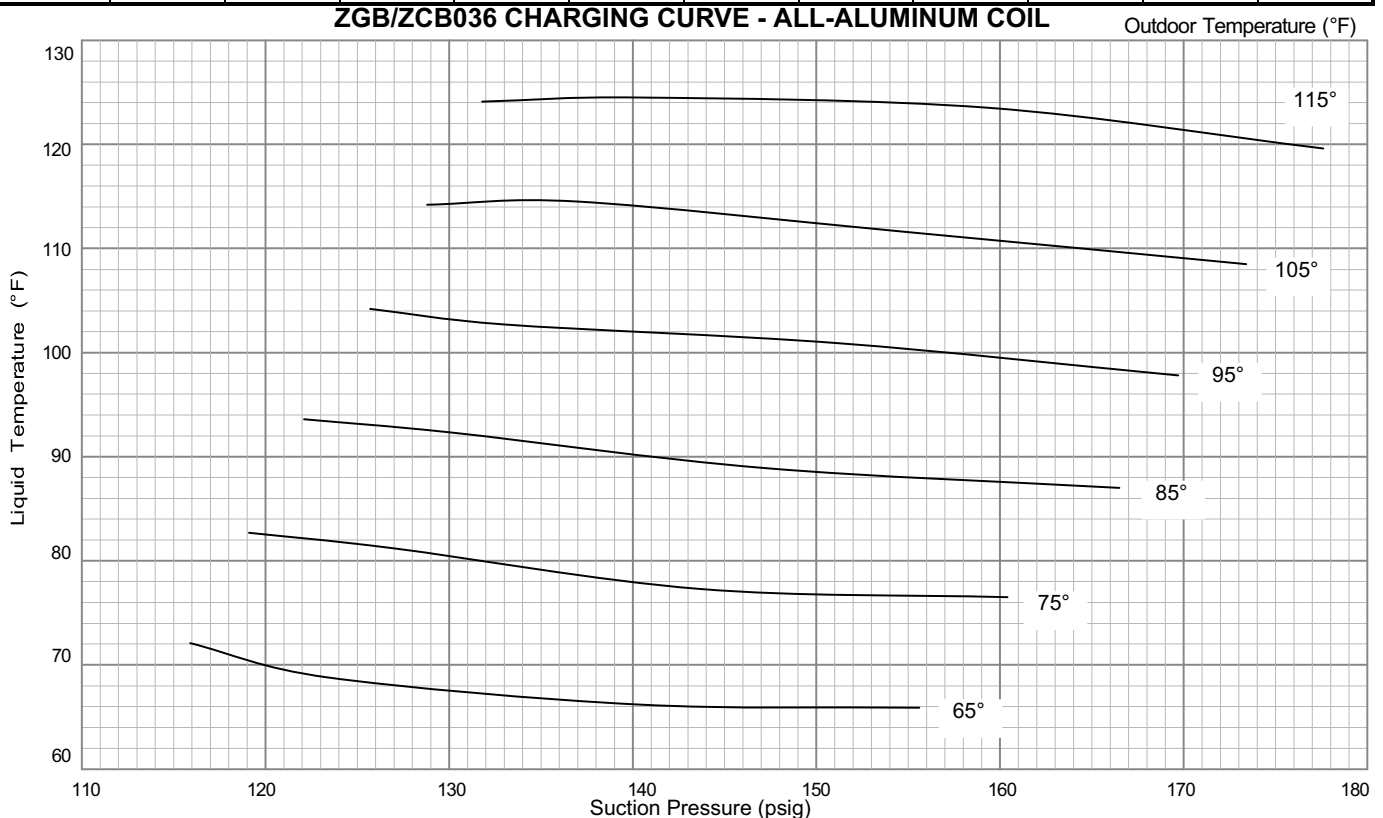
**TABLE 11
ZGA/ZCA072 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
108	259	111	299	116	134	118	391	120	440	123	498
114	266	119	306	123	351	126	397	129	448	131	508
129	283	134	323	138	368	142	415	145	465	148	516
145	302	151	344	155	390	159	436	163	490	167	543

**TABLE 12
ZGB/ZCB074 NORMAL OPERATING PRESSURES - ALL-ALUMINUM COIL**

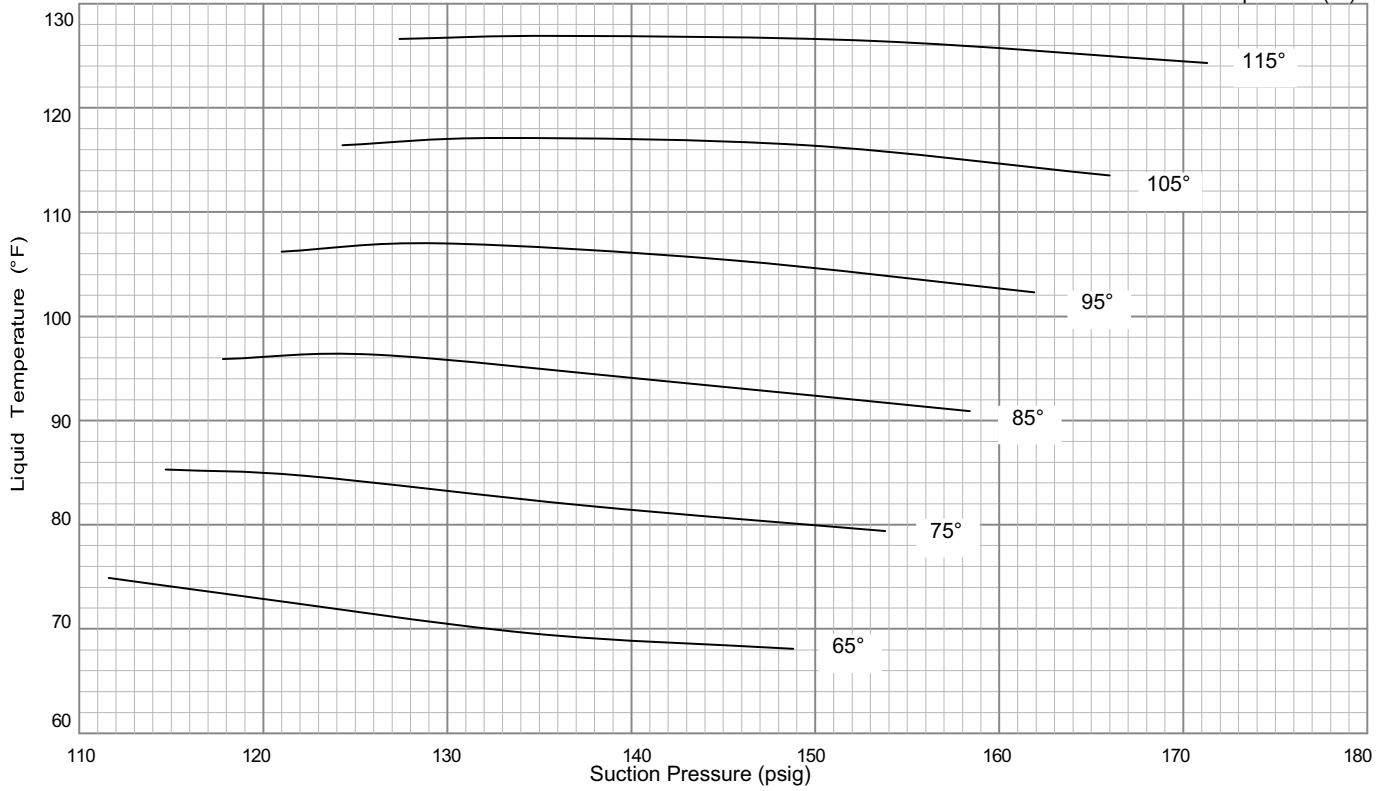
Outdoor Coil Entering Air Temperature											
65 °F		75 °F		85 °F		95 °F		105 °F		115 °F	
Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)	Suct (psig)	Disc (psig)
113	255	116	295	119	340	121	386	125	438	127	493
121	260	124	301	127	345	130	394	133	446	136	502
136	271	140	311	143	353	147	403	150	455	154	512
151	288	157	327	162	372	166	422	169	474	174	540

ZGB/ZCB036 CHARGING CURVE - ALL-ALUMINUM COIL



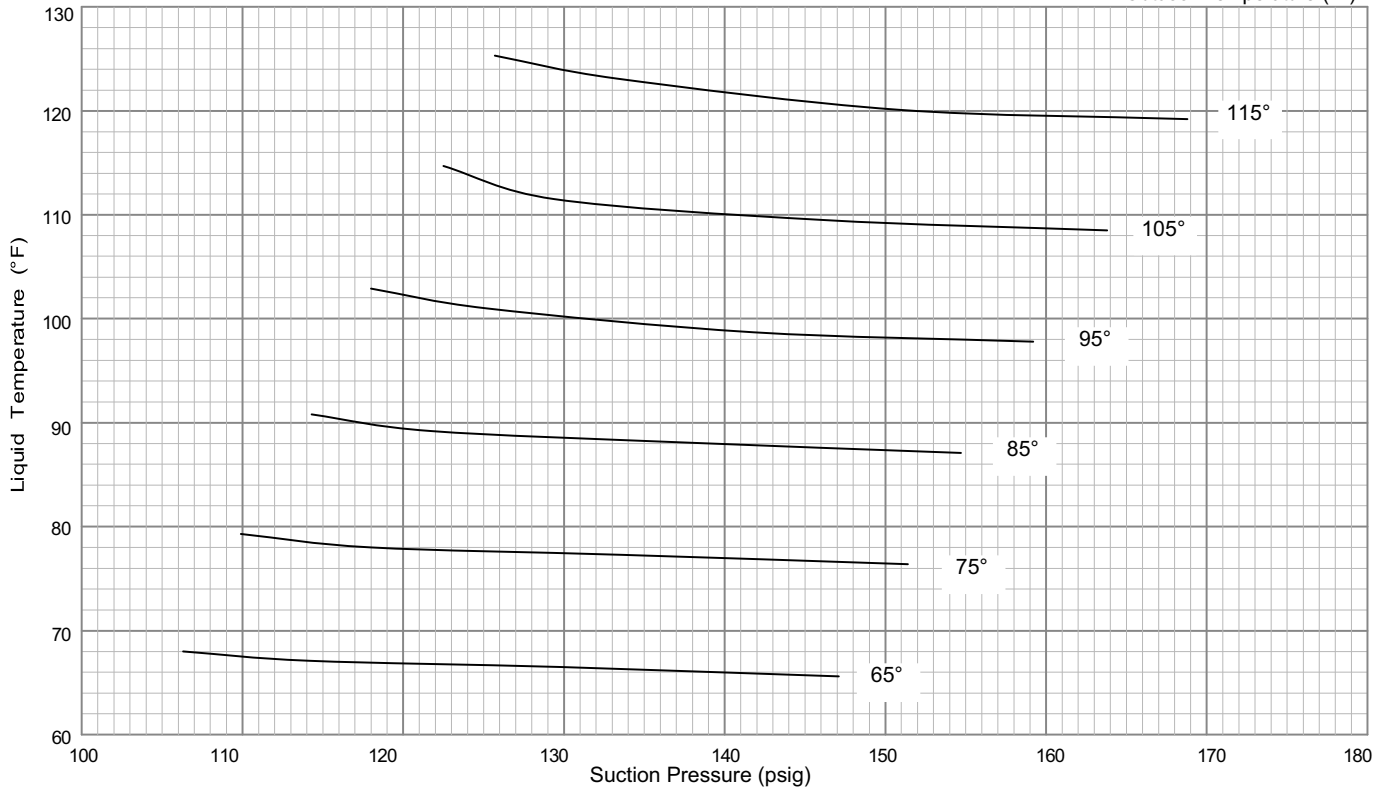
ZGB/ZCB048 CHARGING CURVE - ALL-ALUMINUM COIL

Outdoor Temperature (°F)



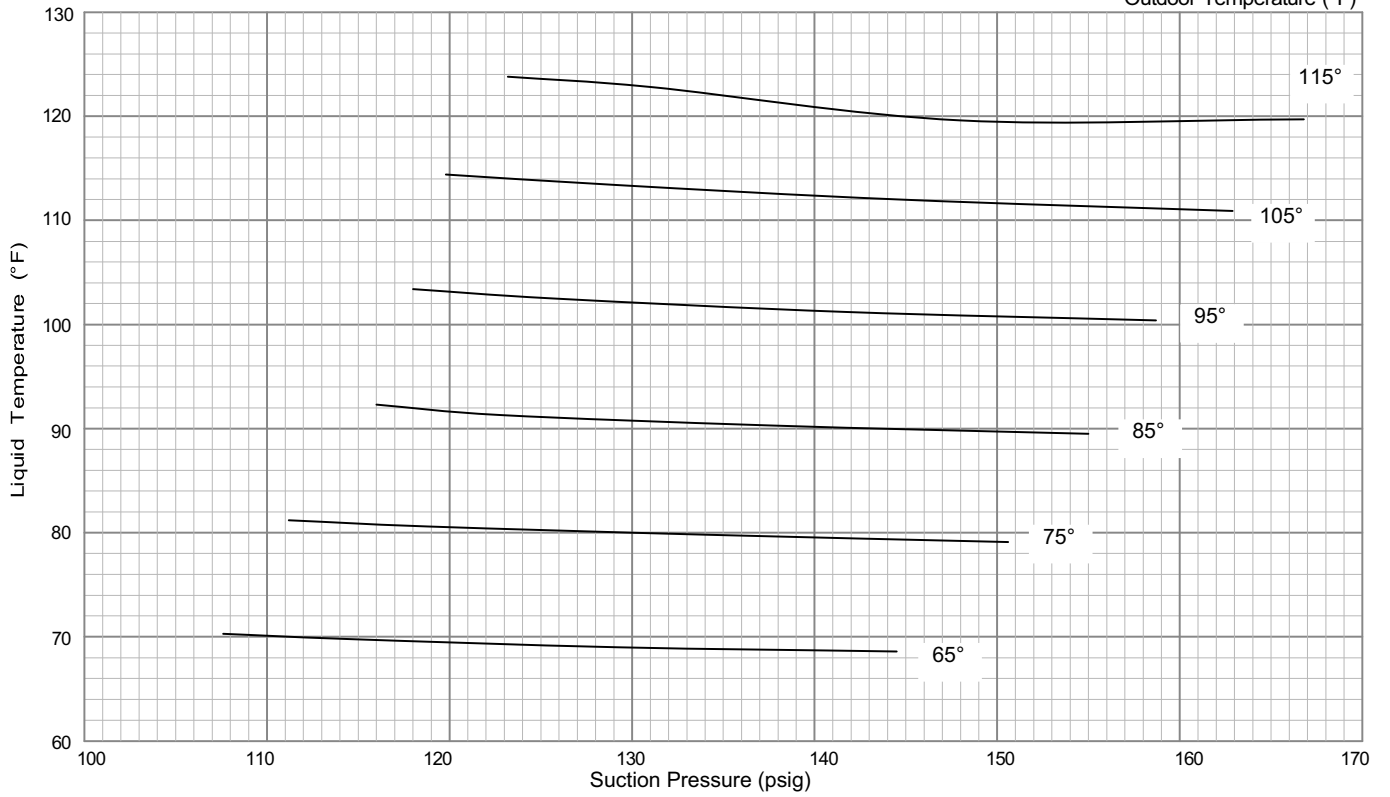
ZGB/ZCB060 CHARGING CURVE - ALL-ALUMINUM COIL

Outdoor Temperature (°F)



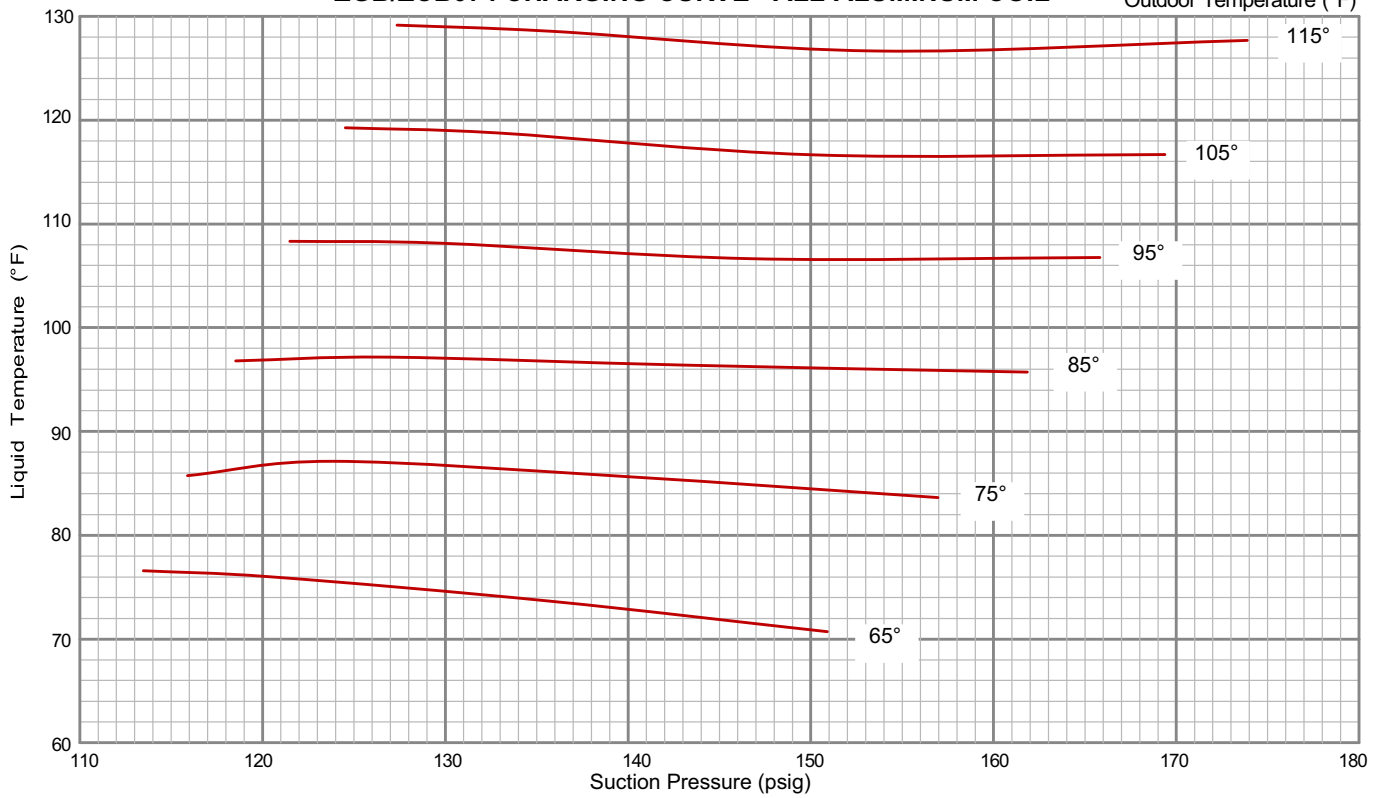
ZGA/ZCA072 CHARGING CURVE - ALL-ALUMINUM COIL

Outdoor Temperature (°F)



ZGB/ZCB074 CHARGING CURVE - ALL-ALUMINUM COIL

Outdoor Temperature (°F)



D-Compressor Controls

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

1- High Pressure Switch (S4)

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise.

S4 is located in the compressor discharge line and is wired in series with the compressor contactor coil.

When discharge pressure rises to 640 ± 10 psig (4412 ± 69 kPa), indicating a problem with the system, the switch opens. The respective compressor is de-energized but the economizer can continue to operate. Auto-reset switches close at 475 ± 20 psig (3275 ± 138 kPa).

2- Compressor High Temperature Limit (S5)

The temperature limit switch S5 is located on the top of Interlink compressors and is wired in series with the high pressure switch S4.

Gas Heat Start-Up (Gas Units)

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ WARNING



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

⚠ WARNING



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

⚠ WARNING



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

⚠ WARNING

SMOKE POTENTIAL

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

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

The gas valve may be equipped with either a gas control lever or gas control knob. Use only your hand to push the lever or turn the gas control knob. Never use tools. If the the lever will not move or 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 (figure 20 and 21)

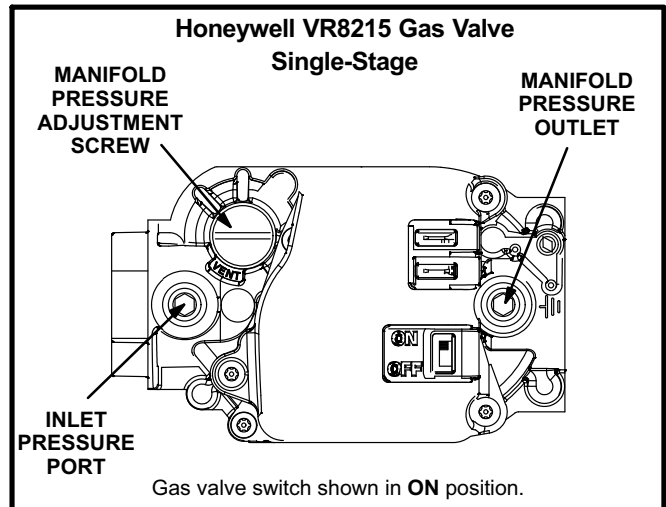


FIGURE 20

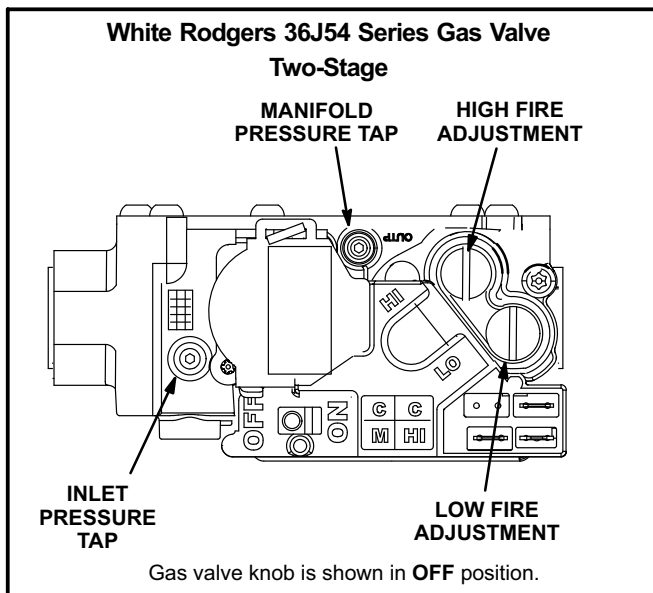




FIGURE 21


- 1- Set thermostat to lowest setting.
 - 2- Turn off all electrical power to appliance.
 - 3- This appliance is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.
 - 4- Open or remove the heat section access panel.
 - 5- *Honeywell VR8215 Gas Valve* - Switch gas valve lever to **OFF**. See figure 20.
White Rodgers 36J54 Gas Valve - Turn knob on gas valve clockwise  to **OFF**. Do not force. See figure 21.
 - 6- Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas, go to the next step.
 - 7- *Honeywell VR8215 Gas Valve* - Switch gas valve lever to **ON**. See figure 20.
White Rodgers 36J54 Gas Valve - Turn knob on gas valve counterclockwise  to **ON**. Do not force. See figure 21.
 - 8- Close or replace the heat section access panel.
 - 9- Turn on all electrical power to appliance.
 - 10- Set thermostat to desired setting.
- NOTE - When unit is initially started, steps 1 through 9 may need to be repeated to purge air from gas line.*
- 11- The ignition sequence will start.

12- If the furnace 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- *Honeywell VR8215 Gas Valve* - Switch gas valve lever to **OFF**.
White Rodgers 36J54 Gas Valve - Turn knob on gas valve clockwise  to **OFF**. 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

(Gas Units)

A-Heating Sequence of Operation

- 1- On a heating demand the combustion air inducer starts immediately.
- 2- Combustion air pressure switch proves inducer operation. After a 30-second pre-purge, power is allowed to ignition control. Switch is factory set and requires no adjustment.
- 3- Spark ignitor energizes and gas valve solenoid opens.
- 4- Spark ignites gas, ignition sensor proves the flame and combustion continues.
- 5- If flame is not detected after first ignition trial, ignition control will repeat steps 3 and 4 two more times before locking out the gas valve.
- 6- For troubleshooting purposes, an ignition attempt after lock out may be re-established manually. Move thermostat to "OFF" and return thermostat switch to "HEAT" position.

B-Ignition Control Diagnostic LED's

**TABLE 13
IGNITION CONTROL HEARTBEAT LED STATUS**

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

C-Limit Controls

Limit controls are factory-set and are not adjustable. The primary limit is located to the right of the combustion air inducer. See figure 27.

If the primary limit trips three times in the same heating cycle, heating operation will de-energize. Heating will automatically restart after one hour if a heating demand is present. To initiate heating during the one hour timed-off interval, reset the thermostat.

D-Heating Adjustment

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

The following manifold pressures are listed on the gas valve.

- Natural Gas Units - Low Fire - 2.0" w.c.
- Natural Gas Units - High Fire - 3.5" w.c.
- LP Gas Units - Low Fire - 5.9" w.c.
- LP Gas Units - High Fire - 10.5" w.c.

Electric Heat Start-Up (ZC Units)

Optional electric heat will stage on and cycle with thermostat demand. 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.

A-Filters

Units are equipped with temporary filters which must be replaced prior to building occupation. See table 14 for correct filter size. Refer to local codes or appropriate jurisdiction for approved filters.

**TABLE 14
UNIT FILTERS**

Unit	Filter Size - inches (mm)
ZCB/ZGB036, 048	4 - 14 X 20 X 2 (352 X 508 X 51)
ZCB/ZGB060 ZCA/ZGA072 ZCB/ZGB074	2 - 16 X 20 X 2 (406 X 508 X 51) 2 - 20 X 20 X 2 (508 X 508 X 51)

To change filters, open filter access panel on back side of unit. See figure 22. Lift filter stop to remove filters. See figure 23.

⚠ WARNING

Units are shipped from the factory with temporary filters. Replace filters before building is occupied. Damage to unit could result if filters are not replaced with approved filters. Refer to appropriate codes.

Approved filters should be checked monthly and replaced when necessary. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 23.

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

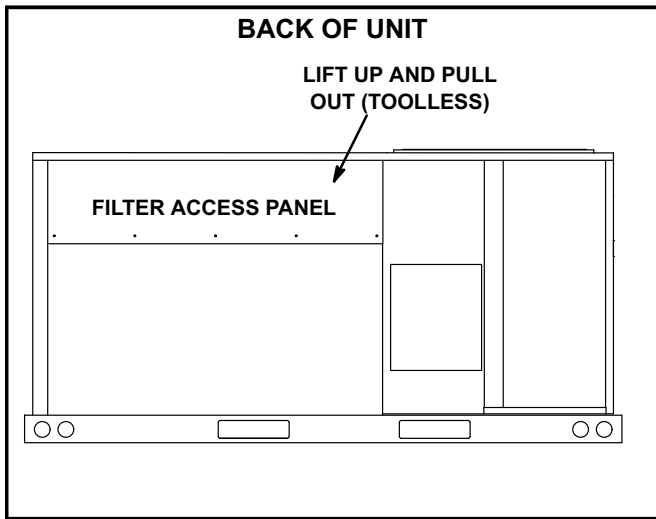


FIGURE 22

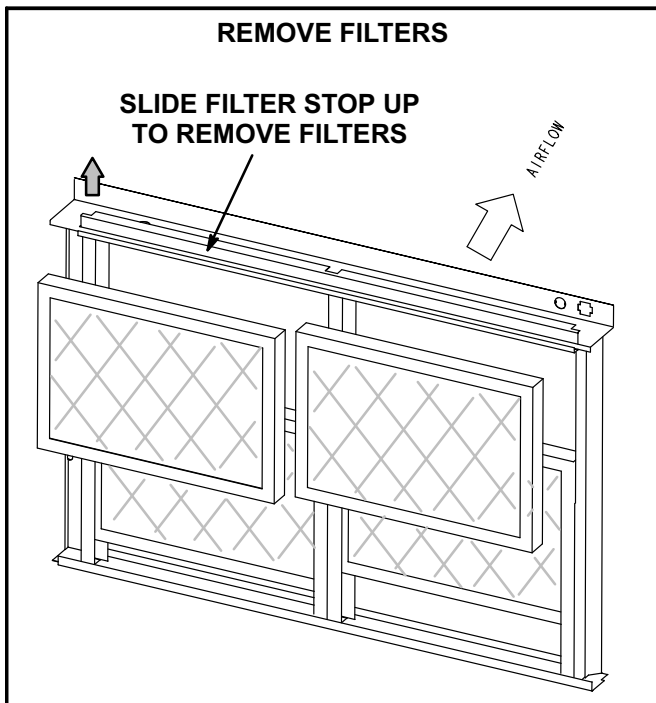


FIGURE 23

B-Lubrication

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

C-Burners (Gas Units)

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

Clean burners as follows:

- 1- Turn off both electrical power and gas supply to unit.
- 2- Remove burner compartment access panel.
- 3- Remove top burner box panel.

- 4- Remove screws securing burners to burner support and lift the individual burners or the entire burner assembly from the orifices. See figure 24. Clean as necessary.

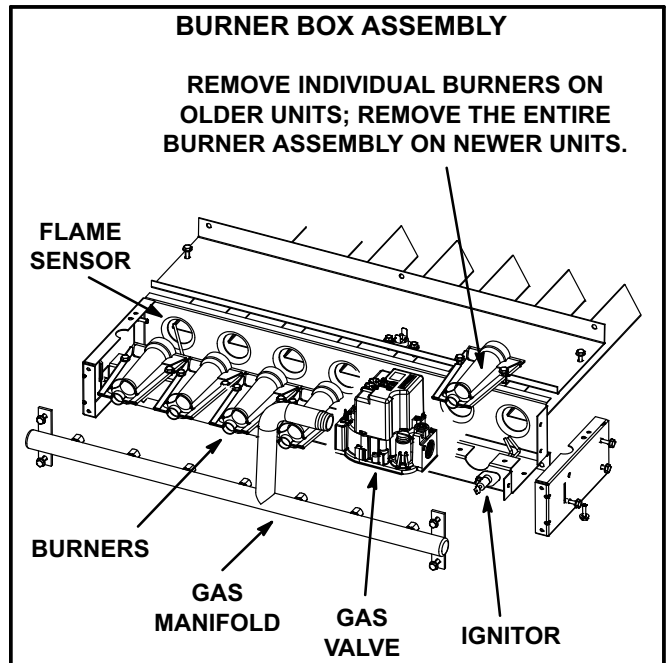


FIGURE 24

- 5- Locate the ignitor under the right burner. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See figure 25.

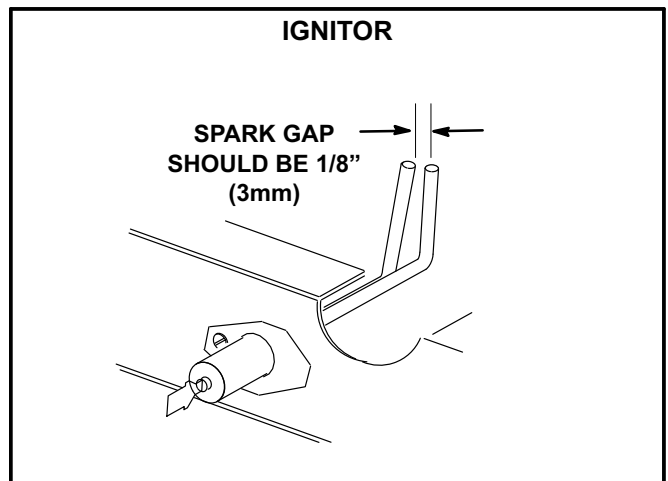


FIGURE 25

- 6- Replace burners and screws securing burner. See figure 26.

⚠ WARNING



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

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

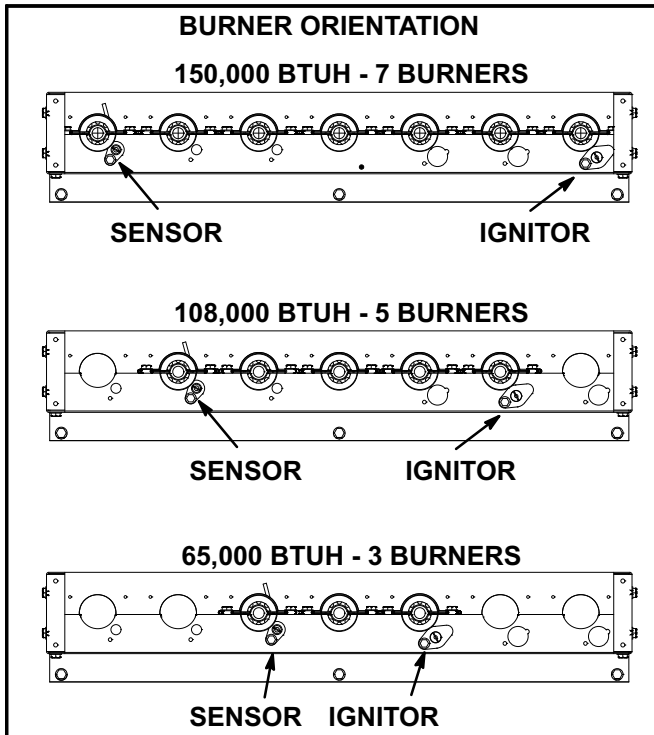


FIGURE 26

D-Combustion Air Inducer (Gas Units)

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

Under normal operating conditions, the combustion air inducer wheel should be checked and cleaned prior to the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule.

Clean combustion air inducer as follows:

- 1- Shut off power supply and gas to unit.
- 2- Remove the access panel located on the right side of the outdoor section under the control box.

- 3- Remove and retain screws securing combustion air inducer to flue box. Remove vent connector. See figure 27.
- 4- Clean inducer wheel blades with a small brush and wipe off any dust from housing. Take care not to damage exposed fan blades. 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 gaskets be replaced during reassembly.
- 6- Replace the access panel.
- 7- Clean combustion air inlet louvers on heat access panel using a small brush.

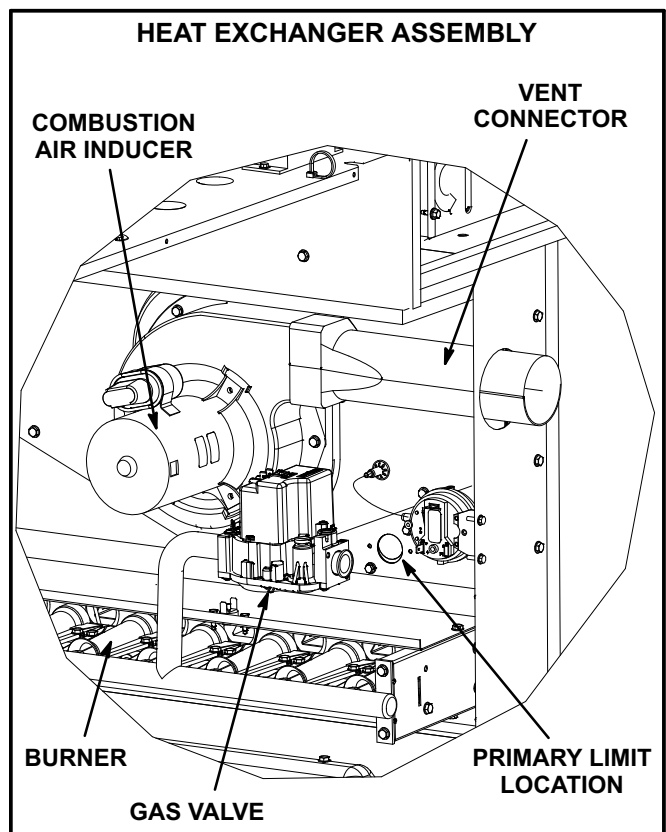


FIGURE 27

E-Flue Box (Gas Units)

Remove flue box cover only when necessary for equipment repair. Clean inside of flue box cover and heat exchanger tubes with a wire brush when flue box cover has to be removed. Install a new flue box cover gasket and replace cover. Make sure edges around flue box cover are tightly sealed.

F-Evaporator Coil

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

G-Condenser Coil

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

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

H-Compressor

If Interlink compressor replacement is necessary, call 1-800-4-LENNOX (1-800-453-6669).

⚠ IMPORTANT

Some scroll compressors have an internal vacuum protector that will unload scrolls when suction pressure goes below 20 psig. A hissing sound will be heard when the compressor is running unloaded. Protector will reset when low pressure in system rises above 40 psig. DO NOT REPLACE COMPRESSOR.

J-Supply Air Blower Wheel

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

START-UP REPORT

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

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

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

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

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

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

Control Type

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