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Dallas, Texas, USA

# INSTALLATION INSTRUCTIONS

## 13GEP UNITS



RETAIN THESE INSTRUCTIONS  
FOR FUTURE REFERENCE

**GAS PACKAGED UNITS (2-5 TONS)**  
506751-02  
08/11  
Supersedes 07/11



Litho U.S.A.

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### **WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.

Installation and service must be performed by a licensed professional installer (or equivalent), service agency or the gas supplier.



### **WARNING**

#### FIRE OR EXPLOSION HAZARD.



Failure to follow safety warnings exactly could result in serious injury, death, or property damage.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

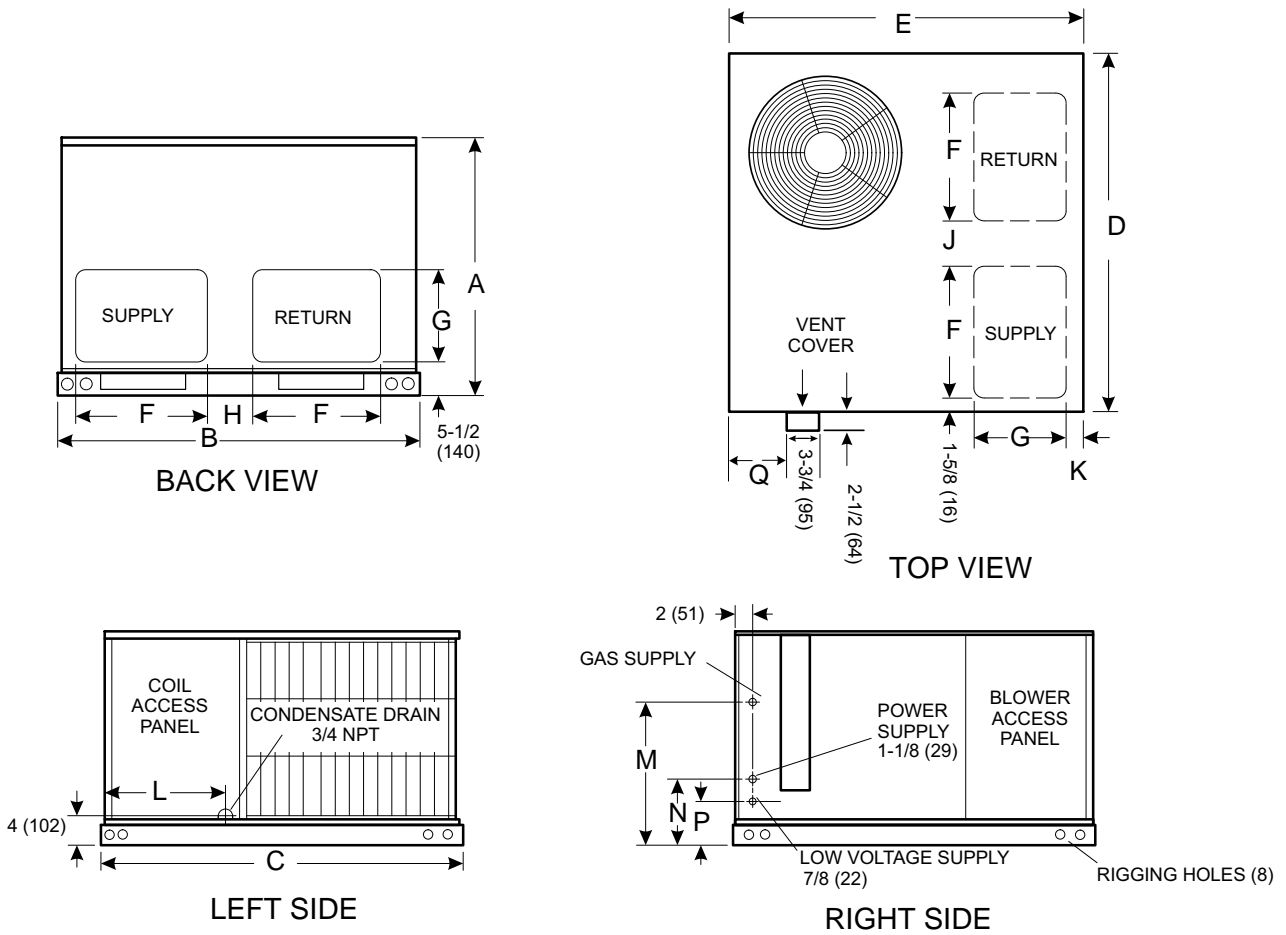
Installation and service must be performed by a qualified installer, service agency or the gas supplier.

#### WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.



**Unit Dimensions - inches (mm)**



Model No.	A		B		C		D		E		F		G	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
13GEP24050ALP 13GEP30050ALP 13GEP30075ALP 13GEP36075ALP 13GEP36100AP	32-1/2	826	46-1/2	1181	46-1/2	1181	45-5/8	1159	45-5/8	1159	17-1/2	445	11-1/2	292
13GEP42075ALP 13GEP48100ALP 13GEP60100ALP 13GEP60125AP	34-1/2	876	55-1/2	1410	50-1/2	1283	54-5/8	1387	49-5/8	1260	21-1/2	546	12	305

Model No.	H		J		K		L		M		N		P		Q	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
13GEP24050ALP 13GEP30050ALP 13GEP30075ALP 13GEP36075ALP 13GEP36100AP	4	102	4	102	1-3/4	44	15-5/8	397	20-1/2	521	9-7/8	251	9-3/8	238	4-1/8	105
13GEP42075ALP 13GEP48100ALP 13GEP60100ALP 13GEP60125AP	6-1/4	159	5-5/8	143	2-3/8	60	17-1/8	435	20-3/4	527	10-3/8	264	6	152	5-1/4	133

# Parts Arrangement

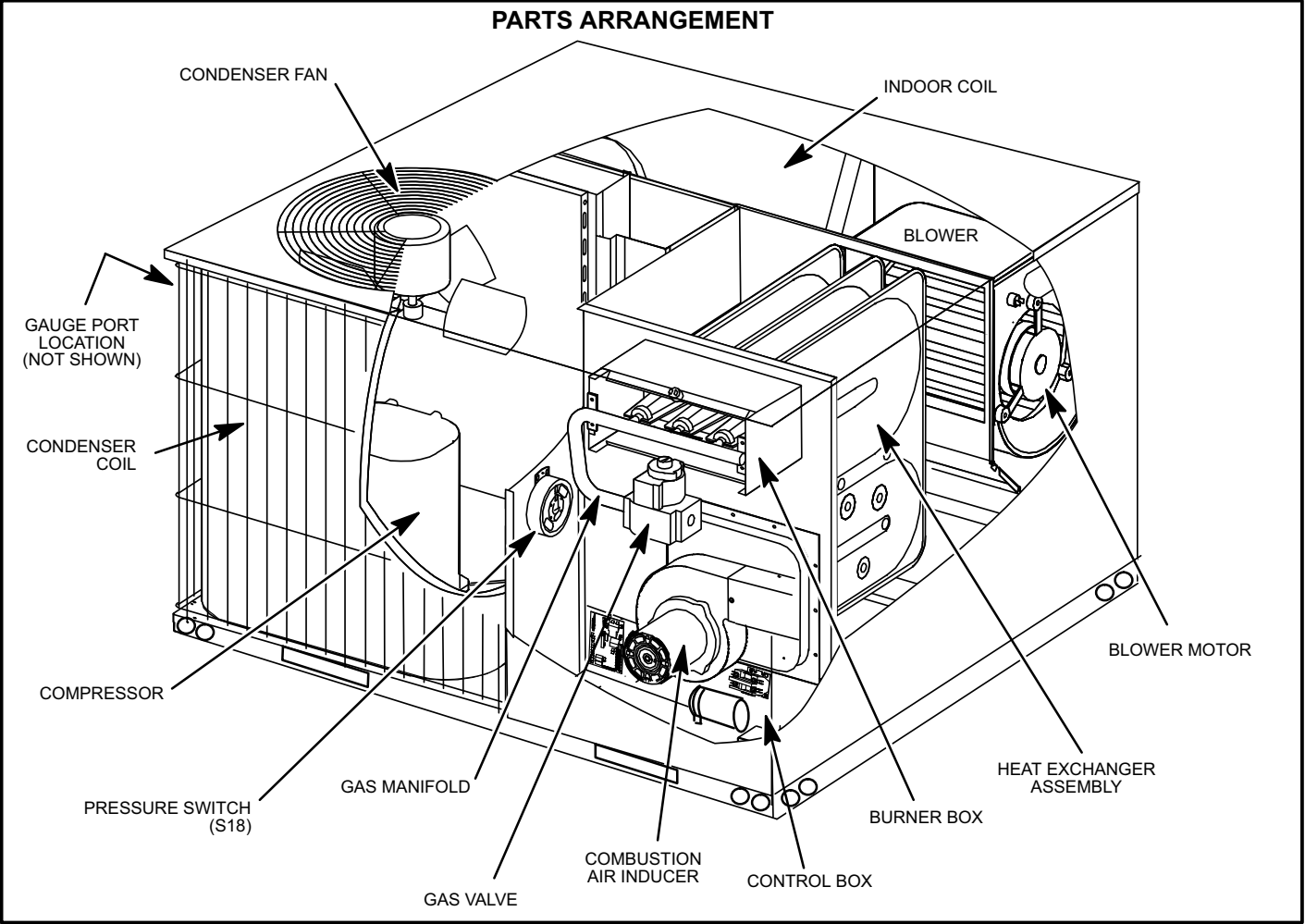


FIGURE 1

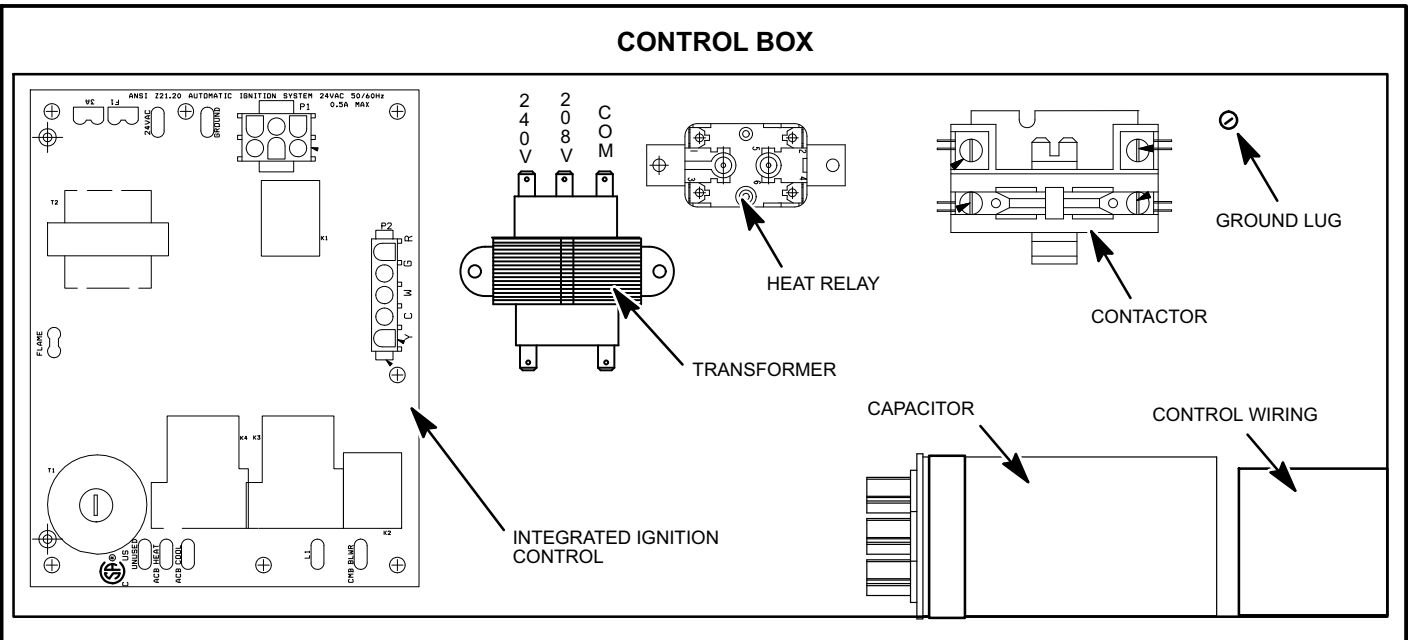


FIGURE 2

## **⚠ WARNING**

If this unit is to be installed in a mobile or manufactured home application, the duct system must be sized to achieve static pressures within the manufacturer's guidelines. All other installation guidelines must also be followed. Failure to do so may result in equipment damage, personal injury and improper unit performance.

### **Shipping and Packing List**

- 1 - Assembled gas package unit
- 1 - Vent hood assembly with screen and screws

As soon as the unit is received, it should be inspected for possible damage during transit. If you find any damage, immediately contact the last carrier.

### **General**

These installation instructions are intended as a general guide only, for use by an licensed professional installing contractor (or equivalent).

The 13GEP units are single-package air conditioners with gas heat sections, **designed for outdoor installation on a rooftop or a slab.**

This furnace is equipped with safety devices that protect you and your property. If one or more of these devices is activated, furnace operation will stop. If your home is left unattended for an extended period of time, equipment operation must be checked periodically. If this is not possible, the water supply to the house should be shut off and the pipes should be drained. This will prevent problems associated with a NO HEAT condition (frozen pipes, etc.)

The unit must be sized based on heat loss and heat gain calculations made according to the methods of the Air Conditioning Contractors of America (ACCA).

The units are shipped assembled. All piping, refrigerant charge, and electrical wiring are factory-installed and tested. The units require electric power, gas piping, condensate drain and duct connections at the point of installation. In addition, the heating vent hood must be installed before the unit is placed into operation.

### **Safety Information**

## **⚠ CAUTION**

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

## **⚠ IMPORTANT**

This unit is charged with HFC-410A refrigerant. Operating pressures for units charged with HFC-410A are higher than pressures in units charged with HCFC-22. All service equipment **MUST** be rated for use with HFC-410A refrigerant.

These units must be installed in accordance with all applicable national and local safety codes.

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

## **⚠ WARNING**

Product contains fiberglass wool.

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

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

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

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

These units are design-listed by ETL Testing Laboratories Inc. in both the United States and Canada as follows:

- For use as a forced air furnace with cooling.
- For outdoor installation only.
- For installation on combustible material.
- For use with natural gas or LP/propane gas only. Use of LP/propane gas requires installation of an LP conversion kit, which must be ordered separately.

**These units are not suitable for use with conventional venting systems.**

The following safety requirements must also be met when the 13GEP units are installed:

1. Use only with the type of fuel approved for use with this appliance. Refer to the unit rating plate.
2. Position, locate and install the 13GEP unit only as outlined in these instructions.
3. Provide adequate clearance around the vent hood as specified in these instructions.
4. Do not use an open flame to check for gas leaks. Use a commercially available soap solution, which has been designed specifically to check for gas leaks. Refer to the *Gas Supply and Piping* section.
5. Check the unit operation after start-up to make sure that the 13GEP is operating within the intended temperature rise range. The duct system must be designed to provide an external static pressure within the allowable range. Refer to the unit rating plate.

*NOTE — The Commonwealth of Massachusetts stipulates these additional requirements:*

- Gas furnaces shall be installed by a licensed plumber or gas fitter only.
- The gas cock must be *T handle* type.
- When flexible connectors are used, the maximum length shall not exceed 36 inches (914mm).

**Use of Unit as Construction Heater**

Lennox does not recommend the use of 13GEP units as a construction heater 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.

13GEP units may be used for heating of buildings or structures under construction, if the following conditions are met:

- The vent hood must be installed per these installation instructions.
- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating is not allowed.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- Air filter must be installed in the system and must be maintained during construction.
- Air filter must be replaced upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- One hundred percent (100%) outdoor air must be provided for combustion air requirements during

construction. Installation of this unit in its intended outdoor location will accomplish this.

- 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 ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.


**Location Selection**

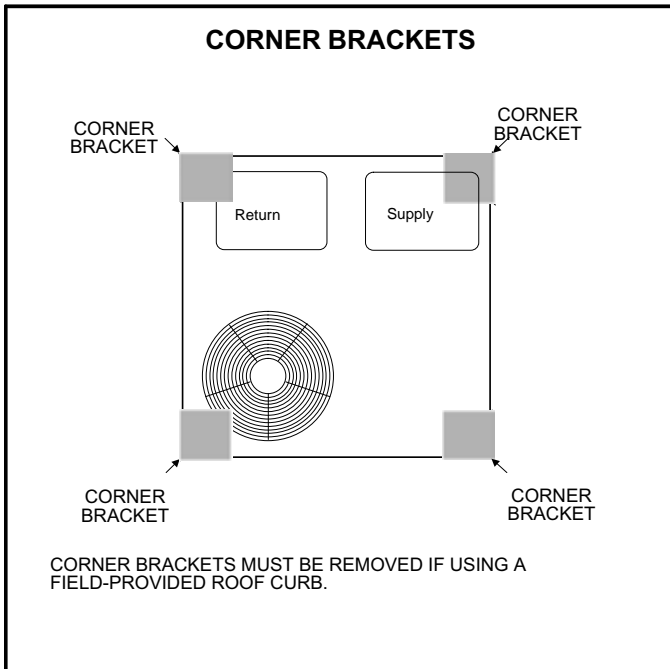
Use the following guidelines to select a suitable location for these units.

1. Unit is designed for outdoor installation only. Unit must be installed so all electrical components are protected from water.
2. Condenser coils must have an unlimited supply of air.
3. For ground level installation, use a level pre-fabricated pad or use a level concrete slab. The length and width should be at least 6 inches (152mm) greater than the unit base. Do not tie the slab to the building foundation.
4. Maintain level within a tolerance of 1/4 inch (6mm) maximum across the entire length or width of the unit.
5. Do not locate the unit where the combustion air supply will be exposed to any corrosive substance, including the following:
  - Permanent wave solutions
  - Chlorinated waxes or cleaners
  - Chlorine-based swimming pool chemicals
  - Water-softening chemicals
  - De-icing salts or chemicals
  - Carbon tetrachloride
  - Halogen-type refrigerants
  - Cleaning solvents (e.g., perchloroethylene),
  - Printing inks, paint removers, varnishes, etc.
  - Cements and glues
  - Anti-static fabric softeners used in clothes dryers
  - Masonry acid-washing materials
  - Chlorinated laundry products
  - Hydrochloric acid

**Rigging and Setting Unit**

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Spreaders whose length exceeds the largest dimension across the unit **MUST** be used across the top of the unit.

 **CAUTION**  
Before lifting a unit, make sure that the weight is distributed equally on the cables so that it will lift evenly.



**FIGURE 3**

Units may also be moved or lifted with a forklift while still in the factory-supplied packaging.

*NOTE* — Length of forks must be a minimum of 42 inches (1067mm).

This unit is shipped with four corner brackets in place on the underside of the unit (figure 3). **Corner brackets must be removed if using a field-provided roof curb.**

To avoid interference with field-provided roof curb, remove the outer most screw which attaches the outdoor coil filler panel to the unit base, and caulk the open hole to ensure a good seal.

### Clearances

All units require specific clearances for proper operation and service.

- Refer to figure 5 for standard installation clearances for servicing, and proper unit operation.
- Refer to figure 6 for the clearances required for combustible construction.

*NOTE* — Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet or vent outlet.

In the U.S. units may be installed on combustible floors made from wood or class A, B, or C roof covering material. In Canada, units may be installed on combustible floors.

- The products of combustion are discharged through a screened vent outlet in the right side panel.
- Install the unit so that the products of combustion will not damage the outer building structure.

- The vent outlet must be a minimum of the following clearances from any door, window or gravity air inlet into the building:
  - A** Four (4) feet (1219mm) below
  - B** Four (4) feet (1219mm) horizontally
  - C** One (1) foot (305mm) above.

In addition, a minimum three (3) feet (914mm) above any forced air inlet located within ten (10) feet (3048mm).

Clearances to the vent outlet must also be consistent with the requirements of the current National Fuel Gas Code (Z223.1) and/or the standards of the current CSA B149 codes.

Install the unit so that snow accumulation will not restrict the flow of the flue products. Allow a required minimum horizontal clearance of four (4) feet (1219mm) from electric meters, gas meters, regulators and relief equipment. In addition to the above requirements, ensure that unwanted ice caused by condensate is not allowed to accumulate around the unit. Do not locate the unit on the side of the building where the prevailing winter winds could trap moisture, causing it to freeze on the walls or on overhangs (under eaves). The vent outlet should not discharge flue products on a sidewalk, patio or other walkway where the condensate could cause the surface to become slippery.

**Do not install the unit so that the products of combustion will be allowed to accumulate within a confined space and recirculate.**

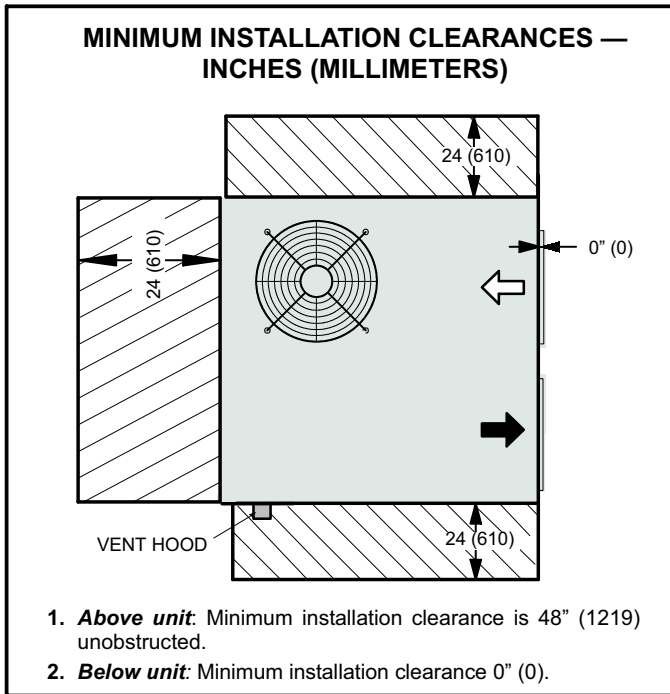
### Vent Hood Installation

For shipping purposes, the unit is shipped with the vent hood packaged is secured to the duct cover on right-hand side if facing the rear of the unit (see figure 4).

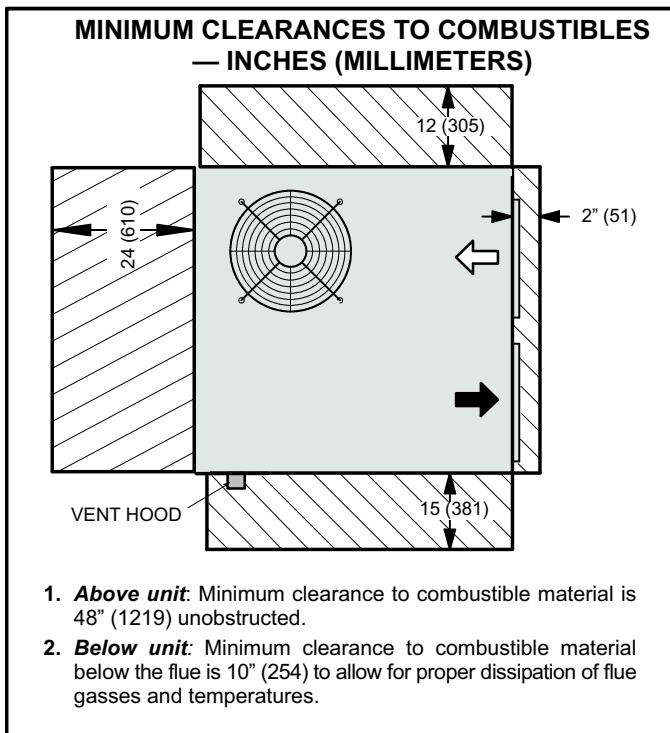


**FIGURE 4**

1. Locate the vent screen. It is packed in the plastic bag that contains these Installation Instructions.

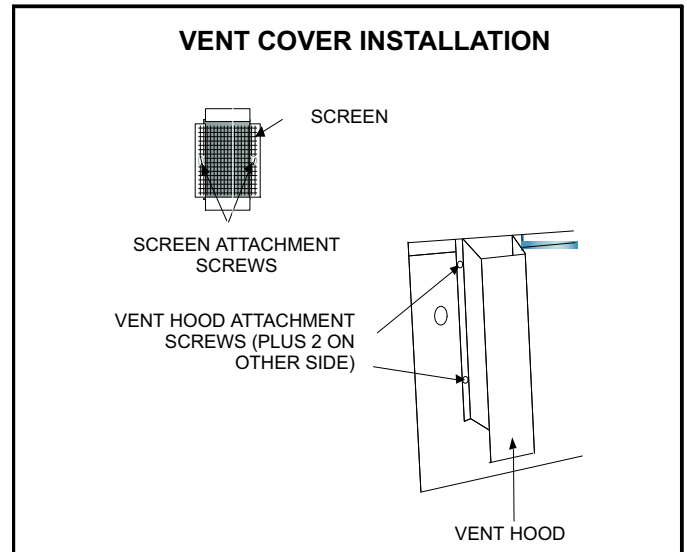


**FIGURE 5**



**FIGURE 6**

- Remove the two screws that will be used to attach the screen to the unit (figure 7).
- Center the screen over the hole and re-insert the screws removed in step 2.
- Remove the four screws that will be used to attach the vent hood (figure 7). Secure the vent hood to the cabinet using these screws. A properly installed vent cover will not extend above the top of the unit.



**FIGURE 7**

### Existing Common Vent Systems

The 13GEP packaged unit may replace an existing furnace which is being removed from a venting system commonly run with separate gas appliances. In this case, the existing vent system is likely to be too large to properly vent the remaining attached appliances.

Conduct the following test while each appliance is operating and the other appliances (which are not operating) remain connected to the common venting system. If the venting system has been installed improperly, you **must** correct the system.

- Seal any unused openings in the common venting system.
- Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
- Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
- After the main burner has operated for five minutes, test for leaks of flue gases at the draft hood relief opening. Use the flame of a match or candle.
- After determining that each appliance connected to the common venting system is venting properly, (step 3) return all doors, widows, exhaust fans, fireplace dampers, and any other gas-burning appliances to their previous mode of operation.

7. If a venting problem is found during any of the preceding tests, the common venting system must be modified to correct the problem.

Resize the common venting system to the minimum vent pipe size determined by using the appropriate tables in Appendix G. (These are in the current standards of the National Fuel Gas Code ANSI-Z223.1/NFPA 54 in the USA, and the appropriate Category 1 Natural Gas and Propane appliances venting sizing tables in the current standards of the CSA B149 Natural Gas and Propane Installation Codes in Canada.)

### Condensate Drain

The 13GEP unit is equipped with a 3/4 inch (19mm) FPT coupling for condensate line connection. Plumbing must conform to local codes. Use a sealing compound on male pipe threads.

The drain line must be properly trapped and routed according to local codes. See figure 8 for proper drain arrangement. The drain line must pitch a minimum of one inch per 10 feet (3048mm) to prevent clogging of the line. Seal around drain connection with suitable material to prevent air leakage into return air system.

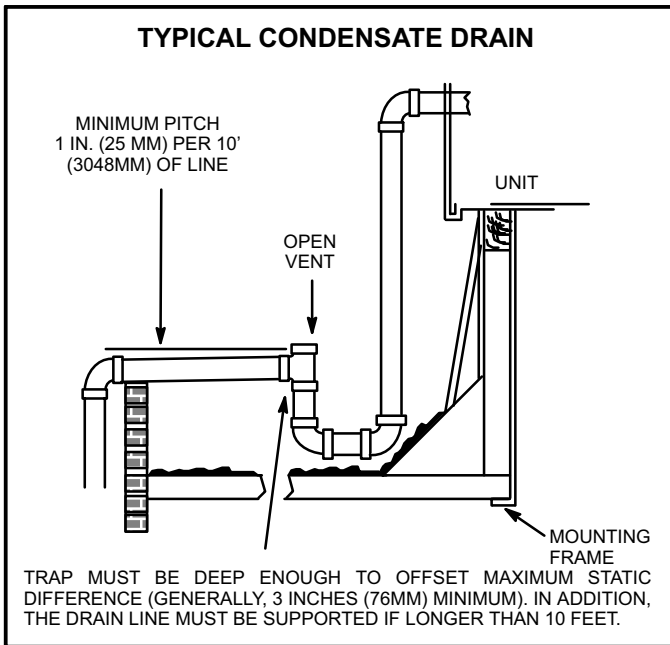


FIGURE 8

*NOTE* — Drain line connection may not carry the weight of the unsupported drain line. Support the drain line, if necessary.

*NOTE* — Condensate must never drain on a rubberized roof.

Drain piping should not be smaller than drain connection at coil. An open vent in drain line will some times be required due to line length, friction and static pressure. Drains should be constructed in a manner to facilitate future cleaning.

*NOTE* — The condensate drain line **MUST** be trapped to provide proper drainage.

## ⚠ CAUTION

Condensate line connection must be hand-tightened. Do not use tools.

### Air Filter

An air filter is not factory-supplied with the unit. A field-provided air filter must always be in place during unit operation. Air filter sizes are shown in table 1.

This unit is equipped with an internal air filter clip which is located in the indoor coil compartment attached to the side of the unit drain pan.

TABLE 1  
UNIT AIR FILTER SIZES — INCHES (MM)

Unit Model	Filter Size	Filter Quantity
-24, -30, -36	28 in. (711) X 24 in. (610) x 1 in. (26)	1
-42, -48, -60	30 in. (762) X 30 in. (762). x 1 in. (26)	1

### Supply and Return Duct Connections

The duct system should be designed and sized according to the methods in Manual Q of the Air Conditioning Contractors of America (ACCA).

A closed return duct system shall be used. It is recommended that supply and return duct connections at the unit be made with flexible joints.

The supply and return air duct systems should be designed for the CFM and static requirements of the job. **They should NOT be sized by simply matching the dimensions of the duct connections on the unit.**

## ⚠ CAUTION

When fastening duct system to side duct flanges on unit, insert screws through duct flanges only. Do not insert screws through casing. Outdoor duct must be insulated and waterproofed.

### Gas Supply and Piping

1. Check the unit rating plate to confirm whether unit is equipped for use with natural gas or LP/propane. If conversion is required, use the approved conversion kit.

*NOTE* — Units are shipped equipped for natural gas, but can be converted to LP/propane with a conversion kit. **Conversion must be performed by licensed professional pipe fitter or technician.**

2. When converting a low NO<sub>x</sub> unit (designated by an L in the model number) to propane, the NO<sub>x</sub> inserts must be removed. After removing the burners, remove the screw holding each insert and pull the insert from the combustion chamber. The screws must be reinstalled in the vent panel after the inserts are removed.
3. For satisfactory operation, LP/propane gas pressure must be a minimum of 11 inches w.c. at the unit under full load.

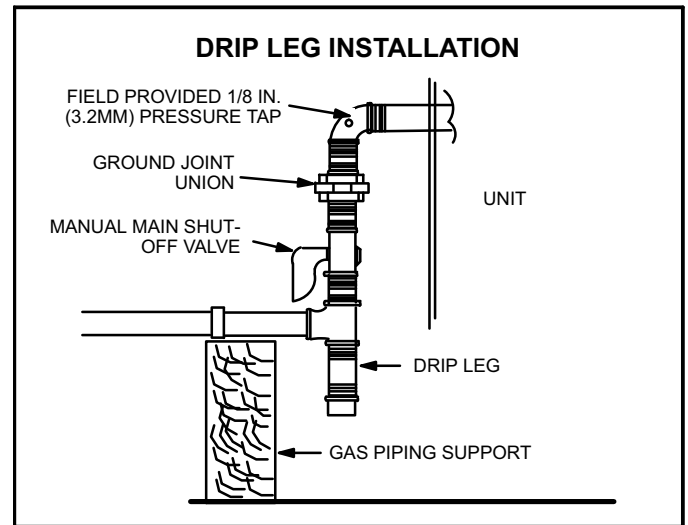


4. All LP/propane gas equipment must conform to the safety standards of the National Fire Protection Association.
5. Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and LP/propane gas suppliers.
6. Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and length of run. In the United States, the current National Fuel Gas Code Z223.1 should be followed in all cases unless superseded by local codes or gas company requirements (refer to tables 2 and 3). In Canada, refer to the current CSA B.149 installation codes.
7. Before connecting piping, check with gas company or authorities having jurisdiction for local codes or requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5 inches w.c. maximum pressure drop. Do not use supply pipe smaller than unit gas connection. See table 13 for minimum and maximum pressures requirements.

8. The gas supply piping should be routed through the grommet on the side of the unit.
9. When making piping connections, a drip leg should be installed on vertical runs to serve as a trap for sediment or condensate. A 1/8 inch N.P.T. tap accessible for test gauge connection must be provided in field piping upstream from gas supply connection to unit. Install a ground joint union between gas control manifold and the manual main shut-off valve (see figure 9).
10. When required by local codes, a manual shut-off valve may have to be installed outside of the unit.
11. Use pipe thread-sealing compound resistant to propane gas sparingly on male threads.
12. The gas supply should be a separate line and installed in accordance with all safety codes. After the gas connections have been completed, open the unit shut-off valve admitting normal gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose.

**TABLE 2  
GAS PIPE CAPACITY-FT<sup>3</sup> / HR**

Length in Feet	Nominal Iron Pipe Size (inches)			
	1/2 in.	3/4 in.	1 in.	1-1/4 in.
10	132	278	520	1050
20	92	190	350	730
30	73	152	285	590
40	63	130	245	500
50	56	115	215	440
60	50	105	195	400
70	46	96	180	370
80	43	90	170	350
90	40	84	160	320
100	38	79	150	305



**FIGURE 9**

Compounds used on threaded joints of gas piping shall be resistant to the action of propane/LP gases.

**TABLE 3  
GAS HEAT APPLICATION DATA**

Unit Model Number	Heat Option	13GEP24 13GEP30	13GEP30 13GEP36 13GEP42	13GEP36	13GEP48 13GEP60	13GEP60P
		050	075	100	100	125
Heating Capacity BTUH	Input	50,000	75,000	100,000	100,000	125,000
	Output	40,000	60,000	80,000	100,000	100,000
<sup>1</sup> A.F.U.E.		80%	80%	80%	80%	80%
Temperature Rise - °F		30 - 60	35 - 65	45 - 75	40 - 70	45 - 75
Gas Supply Connection (FPT) - in.		1/2	1/2	1/2	1/2	1/2
Minimum Recommended Gas Supply Pressure		5 in. w.c. Natural Gas, 11 in. w.c. LPG/Propane				

<sup>1</sup> Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations.

## PRESSURE TEST GAS PIPING

### **⚠ WARNING**

The unit and its individual manual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 PSIG (3.48kPa).

If test pressure is equal to or less than 0.5 psig (14 inches w.c.) shut-off the manual main shut-off valve before pressure testing to isolate unit from gas supply system.

#### ISOLATE GAS VALVE TO PRESSURE TEST

MANUAL MAIN SHUT-OFF VALVE WILL NOT HOLD TEST PRESSURES IN EXCESS OF 0.5 PSIG (14 IN. W.C.)

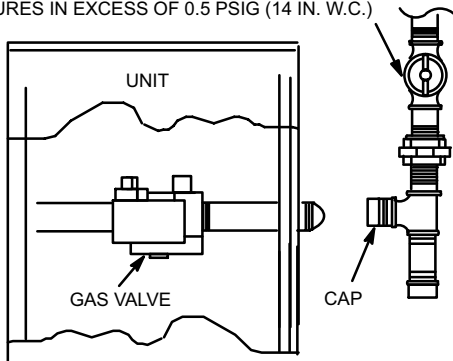


FIGURE 10

*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.*

### **⚠ 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 of emergency shutdown, shut off main manual gas valve and disconnect main power to unit. These devices should be properly labeled by installer.*

The heating value of the gas may differ. The value should be checked with the local gas utility.

*NOTE — There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 1/2 inch (12.7mm) pipe connection at the gas valve.*

After gas piping is complete, carefully check all piping connections (factory and field) for gas leaks. Use soap solution or other preferred means.

### **⚠ 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 other sources of ignition to check for gas leaks.

#### Electrical

All wiring should be done in accordance with the current National Electric Code ANSI/NFPA No. 70 in the United States. In Canada, wiring must be done in accordance with the current CSA C22.2 Part 1. Local codes may take precedence.

Use wiring with a temperature limitation of 75°C minimum. Run the 208 or 230 volt, 60 hertz electric power supply through a disconnect switch to the unit control box of unit and connect as shown in the wiring diagram located on the inside of the control access panel. The electrical power supply must be properly protected by either a fuse or circuit breaker, see unit nameplate.

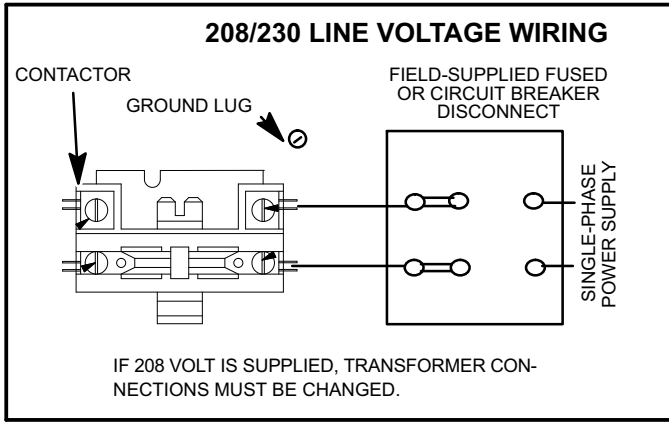
Unit must be electrically grounded in accordance with local codes or in the absence of local codes with the National Electric Code, ANSI/NFPA No. 70 (latest edition) or CSA C22.2 Part 1 (latest edition).

Power supply to the unit must be NEC Class 1, and must comply with all applicable codes. A fused disconnect switch should be field provided for the unit. The switch must be separate from all other circuits. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram.

Electrical wiring must be sized to carry minimum circuit ampacity marked on the unit. **USE COPPER CONDUCTORS ONLY.** Each unit must be wired with a separate branch circuit and be properly protected by either a fuse or circuit breaker.

### **⚠ WARNING**

Unit is equipped with a single-pole contactor. Line voltage is present at all components when unit is not in operation. Disconnect all remote electric power supplies before opening access panel. Unit may have multiple power supplies. Failure to disconnect all power supplies could result in personal injury or death.



**FIGURE 11**

**⚠ CAUTION**

When connecting electrical power and control wiring to the unit, waterproof type connectors **MUST** be used so that water or moisture cannot be drawn into the unit during normal operation.

See figure 11 for field connection of line voltage wiring. See figure 12 for typical wiring diagram.

**THERMOSTAT (S1)**

The room thermostat should be located on an inside wall where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow manufacturer's instructions enclosed with thermostat for general installation procedure. Color-coded insulated wires (#18 AWG) should be used to connect thermostat to unit. Five wires are required for cooling.


**HEAT ANTICIPATOR SETTING**

It is important that the anticipator setpoint be correct. A high setting will result in longer heat cycles and a greater temperature swing in the conditioned space. A setting that is too low will give shorter **ON** cycles and may result in the lowering of the temperature within the conditioned space.

**Heat Anticipator Setting: 0.70 AMP**

**Blower Speed Settings and Performance Data**

**⚠ 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.

Factory settings for the blower speed jumpers are given in the wiring diagram in figure 12. Use the following tables to determine the correct air volume for operation in heat and cool mode.

**TABLE 4  
MOTOR SPEED TAP SETTINGS**

Tap	Purpose
Tap 1	Fan Only
Tap 2*	Low Static Cooling
Tap 3	High Static Cooling
Tap 4 and 5 — Taps 4 and 5 designed for heating mid-point temperature rise:	
Tap 4*	Nominal 0.2 external static pressure
Tap 5	Nominal 0.5 external static pressure
* indicates factory default setting.	

**TABLE 5  
13GEP24 BLOWER PERFORMANCE  
(HORIZONTAL AIRFLOW<sup>1</sup>)**

External Static Pressure in. w.c.	Air Volume at Specific Blower Taps (cfm)		
	Tap 1 (Fan Only)	Tap 2 (Cool Low Static)	Tap 3 (Cool High Static)
0.10	500	830	950
0.20	480	790	920
0.30	420	760	890
0.40	340	710	850
0.50	290	640	810
0.60	240	600	740
0.70	---	560	700
0.80	---	520	660
NOTE — All air data measured external to unit with dry coil and less filter. <sup>1</sup> For downflow air volume, add 0.10 in. w.c. to duct static.			

**TABLE 6  
13GEP30 BLOWER PERFORMANCE  
(HORIZONTAL AIRFLOW<sup>1</sup>)**

External Static Pressure in. w.c.	Air Volume at Specific Blower Taps (cfm)		
	Tap 1 (Fan Only)	Tap 2 (Cool Low Static)	Tap 3 (Cool High Static)
0.10	630	1020	1100
0.20	550	990	1060
0.30	470	960	1030
0.40	420	920	1010
0.50	380	890	990
0.60	320	850	950
0.70	---	790	900
0.80	---	740	840
NOTE — All air data measured external to unit with dry coil and less filter. <sup>1</sup> For downflow air volume, add 0.10 in. w.c. to duct static.			

**TABLE 7  
13GEP36 BLOWER PERFORMANCE  
(HORIZONTAL AIRFLOW<sup>1</sup>)**

External Static Pressure in. w.c.	Air Volume at Specific Blower Taps (cfm)		
	Tap 1 (Fan Only)	Tap 2 (Cool Low Static)	Tap 3 (Cool High Static)
0.10	760	1250	1370
0.20	680	1210	1330
0.30	600	1180	1280
0.40	550	1130	1250
0.50	490	1090	1210
0.60	---	1060	1170
0.70	---	1010	1120
0.80	---	960	1040

NOTE — All air data measured external to unit with dry coil and less filter.  
<sup>1</sup> For downflow air volume, add 0.10 in. w.c. to duct static.

**TABLE 9  
13GEP48 BLOWER PERFORMANCE  
(HORIZONTAL AIRFLOW<sup>1</sup>)**

External Static Pressure in. w.c.	Air Volume at Specific Blower Taps (cfm)		
	Tap 1 (Fan Only)	Tap 2 (Cool Low Static)	Tap 3 (Cool High Static)
0.10	970	1680	1890
0.20	890	1640	1820
0.30	820	1590	1730
0.40	780	1540	1620
0.50	740	1450	1540
0.60	680	1330	1430
0.70	---	1260	1300
0.80	---	1180	1210

NOTE — All air data measured external to unit with dry coil and less filter.  
<sup>1</sup> For downflow air volume, add 0.10 in. w.c. to duct static.

**TABLE 8  
13GEP42 BLOWER PERFORMANCE  
(HORIZONTAL AIRFLOW<sup>1</sup>)**

External Static Pressure in. w.c.	Air Volume at Specific Blower Taps (cfm)		
	Tap 1 (Fan Only)	Tap 2 (Cool Low Static)	Tap 3 (Cool High Static)
0.10	860	1460	1490
0.20	780	1400	1440
0.30	710	1340	1390
0.40	660	1280	1340
0.50	600	1230	1300
0.60	560	1180	1240
0.70	---	1140	1200
0.80	---	1100	1120

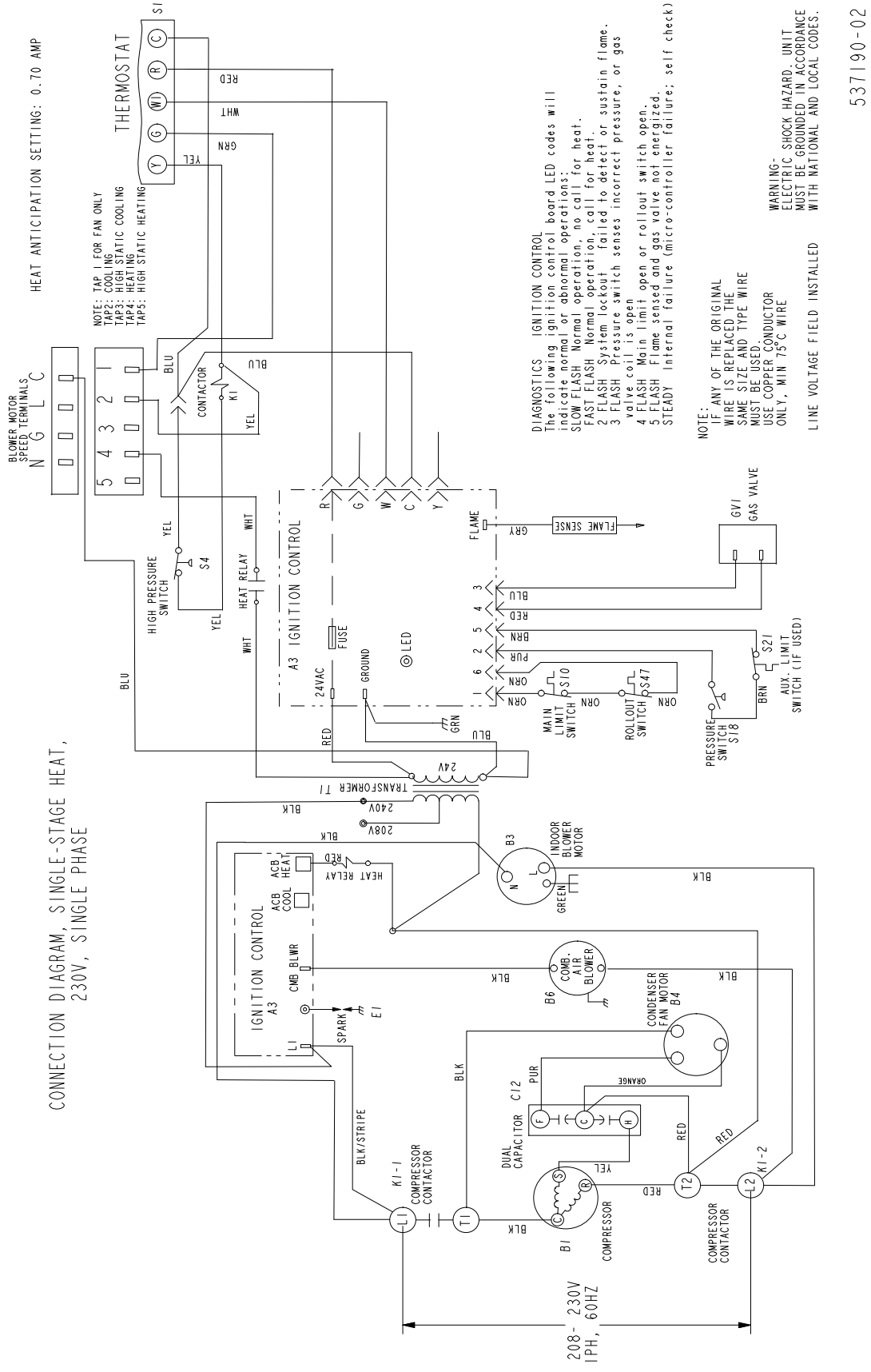
NOTE — All air data measured external to unit with dry coil and less filter.  
<sup>1</sup> For downflow air volume, add 0.10 in. w.c. to duct static.

**TABLE 10  
13GEP60 BLOWER PERFORMANCE  
(HORIZONTAL AIRFLOW<sup>1</sup>)**

External Static Pressure in. w.c.	Air Volume at Specific Blower Taps (cfm)		
	Tap 1 (Fan Only)	Tap 2 (Cool Low Static)	Tap 3 (Cool High Static)
0.10	1200	1870	2010
0.20	1130	1840	1970
0.30	1070	1800	1930
0.40	990	1760	1890
0.50	930	1700	1850
0.60	860	1650	1810
0.70	---	1600	1760
0.80	---	1550	1700

NOTE — All air data measured external to unit with dry coil and less filter.  
<sup>1</sup> For downflow air volume, add 0.10 in. w.c. to duct static.

# WIRING DIAGRAM - SINGLE PHASE



537190-02

FIGURE 12

## Cooling Start-Up

The cooling section is a complete factory package utilizing an air-cooled condenser. The system is factory-charged with HFC-410A refrigerant.

### PRE-START CHECKLIST:

1. Make sure refrigerant lines do not rub against the cabinet or each other.
2. Inspect all electrical wiring, both factory- and field-installed, for loose connections.
3. Check voltage at the disconnect switch. Voltage must be within the range listed on the unit nameplate. If not, consult power company and have voltage condition corrected before starting unit.
4. Recheck voltage with unit running. If power is not within the range listed on the unit nameplate, stop the unit and consult the power company. Check unit amperage. Refer to unit nameplate for correct running amps.
5. Make sure filter is in place before unit start-up.

### COOLING SEQUENCE OF OPERATION

When the thermostat calls for cooling, **R** is closed to **G** and **Y** (figure 12). This completes the low voltage control circuit, energizing the compressor, condenser fan motor and blower motor.

Unit compressors have internal protection. If there is an abnormal rise in the compressor temperature, the protector will open and the compressor will stop.

### BLOWER DELAY - COOLING

In cooling mode, the circulating air blower operation is delayed for five (5) seconds after the compressor starts. The blower continues to operate for 60 seconds after the compressor is de-energized. The feature is a function of the blower motor itself and cannot be changed.

*NOTE — There is no blower off delay when there is only a call for G (fan only).*

### COOLING SYSTEM PERFORMANCE

This equipment is a self-contained, factory-optimized fixed orifice metering refrigerant system, and should require no adjustments when properly installed. If unit performance is questioned, perform the following checks.

Ensure unit is installed per manufacturer's instructions and that line voltage and air flow are correct. Refer to table 11 for proper superheat values. Check superheat settings by measuring pressure at the suction line service port. If unit superheat varies by more than table allowance, check internal seals, service panels and duct work for air leaks, as well as restrictions and blower speed settings. If unit performance remains questionable, remove charge, evacuate to 500 microns, and weigh in refrigerant to name plate charge. It is critical that the exact charge is re-installed. Failure to comply will compromise system performance. If unit performance is still questionable, check for refrigerant related problems such as, blocked coil or circuits, malfunctioning metering devices or other system components.

**TABLE 11  
SUCTION SUPERHEAT VALUES**

Unit Model Number	Suction Superheat 82°F OD +/- 3 DEG @ ARI / 80°F IDDB / 67°F IDWB
13GEP24	21°
13GEP30, -36	17°
13GEP42	19°
13GEP48	15°
13GEP60	15°

**COOLING PRESSURE TABLE**

Verify system performance using table 12 as a general guide. Table 12 should not be used for charging unit. Minor variations in these pressures may be expected due to differences in installation. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system

Used carefully, this table could serve as a useful service guide. Data is based on 80°F dry bulb / 67°F wet bulb return air. Allow unit operation to stabilized before taking pressure readings.

**TABLE 12  
NORMAL OPERATING PRESSURES**

80°F DB/ 67°F WB DEGREE RETURN AIR		AIR TEMPERATURE ENTERING OUTDOOR COIL, DEGREES FAHRENHEIT.											
COOLING INPUT (1000 BTU)	PRESSURE	65°	70°	75°	80°	82°	85°	90°	95°	100°	105°	110°	115°
24	VAPOR	125	129	133	137	139	141	144	147	150	153	156	159
30		130	134	137	141	142	144	146	150	152	154	157	160
36		129	133	136	140	141	143	146	149	152	154	157	159
42		130	133	136	140	141	143	146	149	153	156	157	158
48		129	133	136	140	141	143	146	150	152	154	156	157
60		125	128	131	135	136	137	140	143	145	146	148	150
24	LIQUID	251	270	290	309	317	331	353	375	398	417	446	471
30		258	278	297	317	325	339	361	382	405	424	455	480
36		242	262	281	301	309	322	345	366	489	407	436	461
42		243	263	283	303	311	325	347	369	392	410	438	462
48		249	269	288	308	316	329	351	372	394	412	439	462
60		254	275	295	316	324	338	362	386	409	428	466	497

**Heating Start-Up**

**PRE-START CHECK LIST:**

1. Check the type of gas being supplied. Be sure it is the same as listed on the unit nameplate.
2. Make sure the vent hood has been properly installed.

**FOR YOUR SAFETY READ BEFORE LIGHTING**

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

**⚠ 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 and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

**⚠ 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.

The gas valve is equipped with a gas control switch. Use only your hand to move the switch. Never use tools. If the the switch will not move by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.

This unit is equipped with a direct ignition control. Do not attempt to manually light the burners.

## TO START-UP:

1. Turn off electrical power to unit.
2. Set thermostat to lowest setting.
3. Move the gas valve switch to the **ON** position (see figure 13).
4. Turn on electrical power to unit.
5. Set room thermostat to desired temperature. (If thermostat setpoint temperature is above room temperature after the pre-purge time expires, main burners will light.)

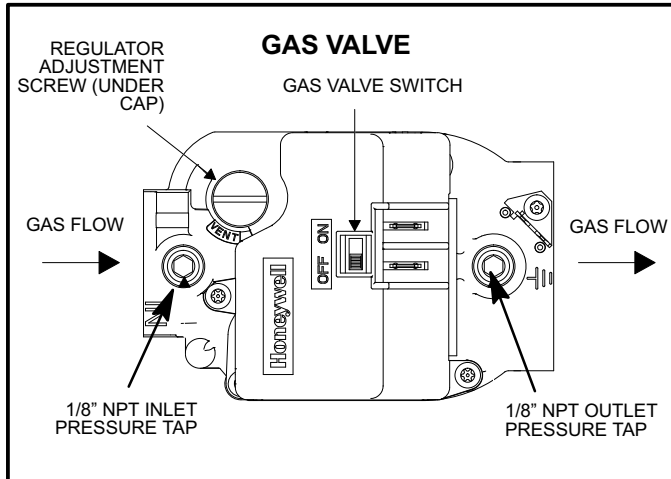


FIGURE 13

## TO SHUT DOWN:

1. Turn off electric power to unit.
2. Move the gas valve switch to the **OFF** position (figure 13).

## POST START-UP CHECK LIST (GAS)

After the control circuit has been energized and the heating section is operating, make the following checks:

1. Use soap solution to check for gas leaks in the unit piping as well as the supply piping.
2. Check for correct manifold gas pressures. See *Checking and Adjusting Gas Input*.
3. Check the supply gas pressure. It must be within the limits shown on rating nameplate or in table 13. Supply pressure should be checked with all gas appliances in the building at full fire.
4. Adjust temperature rise to the range specified on the rating plate.

## CHECKING AND ADJUSTING GAS INPUT

**NOTE** — Units must be converted for use with LP/propane gas. Conversion kit is ordered separately. **Conversion must be performed by a licensed professional pipe fitter or technician.**

Gas input must never exceed the input capacity shown on the rating plate.

TABLE 13  
GAS PRESSURES

Condition	Natural Gas	LP/Propane Gas
Minimum permissible gas supply pressure.	5 inches w.c.	11 inches w.c.
Maximum inlet gas supply pressure	10.5 inches w.c.	13 inches w.c.
Rated manifold pressure	3.5 inches w.c. (± 0.3" w.c.)	10 inches w.c. (± 0.5" w.c.)

## MANIFOLD GAS PRESSURE ADJUSTMENT

1. Shut off gas supply to the unit. Remove plug from pressure tap.
2. Connect manometer or gauge to the proper pressure tap, then turn on the gas supply.
3. The gas valve has an adjusting screw. See figure 13 for adjusting screw location. Remove the cap and turn the adjusting screw clockwise to increase pressure and input; turn counterclockwise to decrease pressure and input.
4. The pressure regulator adjustment is sensitive. One turn of the adjusting screw results in a large change in manifold pressure. Replace the adjusting screw cap.
5. After checking pressure, turn gas off, remove manometer fitting, and replace pipe lug and regulator cap.
6. Put furnace in operation and check plug for leaks using soapy solution.

Final manifold pressure must be within the allowable range for the gas being used.

**For Natural Gas:** Check the furnace rate by observing gas meter, making sure all other gas appliances are turned off. The test hand on the meter should be timed for at least one revolution. Note the number of seconds for one revolution.

$$\text{BTU/HR} = \frac{\text{Cubic Feet Per Revolution} \times 3600 \times \text{Heating Value}}{\text{Number of Seconds Per Revolution}}$$

The heating value of your gas can be obtained from your local utility.

**For LP/Propane Gas:** The only check for the output rate is to properly adjust the manifold pressure using a manometer. Typical manifold setpoint for installations at altitudes from 0 to 4500 feet above sea level is reference in table 13.

## HIGH ALTITUDE INFORMATION

Ratings shown on the rating plate for elevations up to 2000 feet and 5% de-rate from 2001 - 4500 feet. For elevations above 4,500 feet, ratings should be reduced at a rate of four percent for each 1,000 feet above sea level. See National Fuel Gas Code Z223.1 (latest edition) or the requirements of the CSA B149 installation codes.



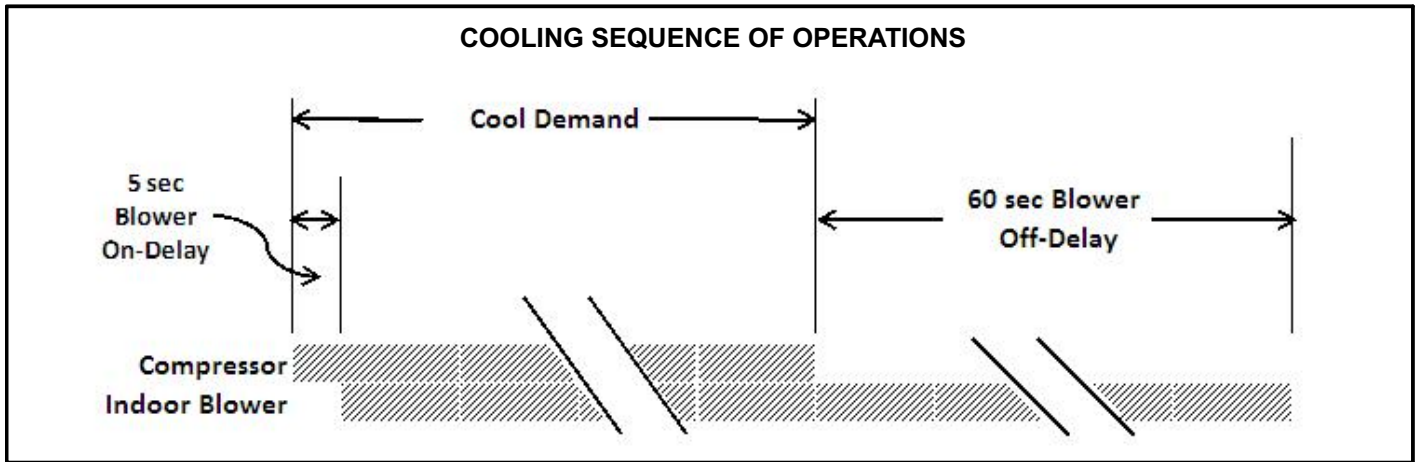


FIGURE 14

1. The thermostat closes circuit **R** and **Y** which:
  - A Engages the unit contactor
  - B Starts both the compressor and outdoor fan
  - C Starts the indoor fan after a five second delay at the selected speed.
2. Upon satisfying cooling demand, the thermostat opens **R** to **Y** circuit which:
  - A Disengages the main contactor
  - B Stops both the compressor and outdoor fan
  - C Stops the indoor fan after the built-in 60 second delay.

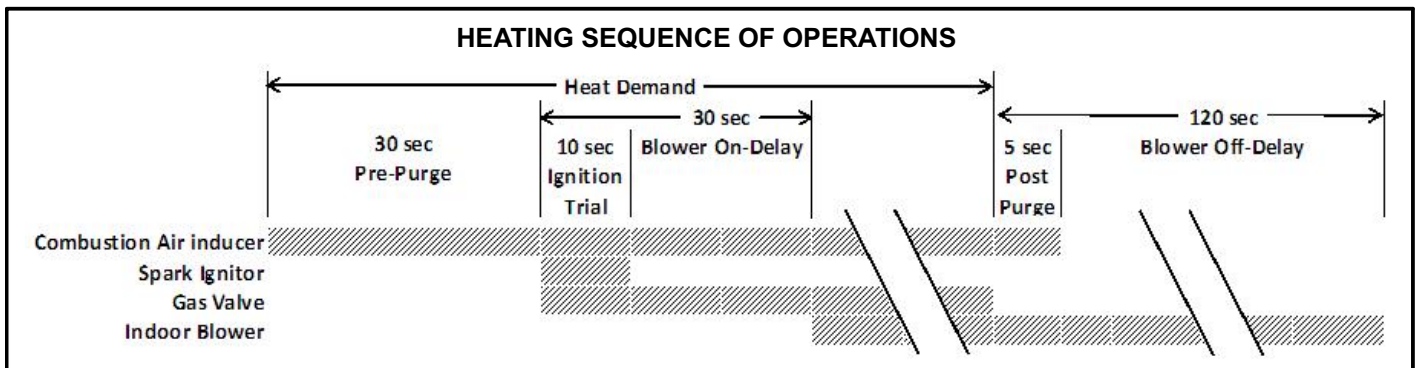


FIGURE 15

1. When the thermostat calls for heating, W1 is energized.
2. The ignition control checks high temperature limit and roll out switches to make sure they are closed. The control then verifies that the pressure switch is open. If the pressure switch is closed, the control will flash code 3 on the LED and will wait indefinitely for the pressure switch to open. If the pressure switch is open, the control proceeds to the 30-second pre-purge.
3. The ignition control energizes the combustion air inducer, flashes a code 3 on the LED, and waits for the pressure switch to close.
4. When the pressure switch has closed, the LED code 3 flash stops and the control begins the 30-second pre-purge period.
5. When the pre-purge time has expired, the control begins the 10 second ignition trial.

NOTE — The flame sensor is always active.

**Steps continued on next page.**

6. The ignition control energizes the gas valve and spark electrode. If the flame is established within 10 seconds, the control de-energizes the spark. If flame is not established within 10 seconds, the gas valve and spark are de-energized. The ignition control will initiate three ignition trials. If the flame sensor does not sense an established flame at the end of the third ignition trial, the ignition control will allow a 1-hour watch guard period to pass before allowing additional ignition trials.
7. Approximately 30 seconds after the gas valve is open, the circulating air blower starts.
8. The ignition control inputs are continuously monitored to ensure that limit switch(es), roll out switch and pressure switch are all closed, and that the flame remains established and heating demand is present.
9. When the heating demand is satisfied, the control immediately de-energizes the gas valve and combustion air inducer.
10. There is a five second post purge.
11. The circulating air blower operates for 120 seconds after the gas valve is de-energized.

## BLOWER DELAY — HEATING

In heating mode, the circulating air blower operation has a delayed of 30 seconds after the gas valve is open. The blower continues to operate for 120 seconds after the gas valve is de-energized. The feature is a function of the integrated ignition control (A3) and cannot be changed.

*NOTE — With the proper thermostat and subbase, continuous blower operation is possible by closing the R to G circuit.*

## Unit Control, Sensor and Switches

### INTEGRATED IGNITION CONTROL (A3)

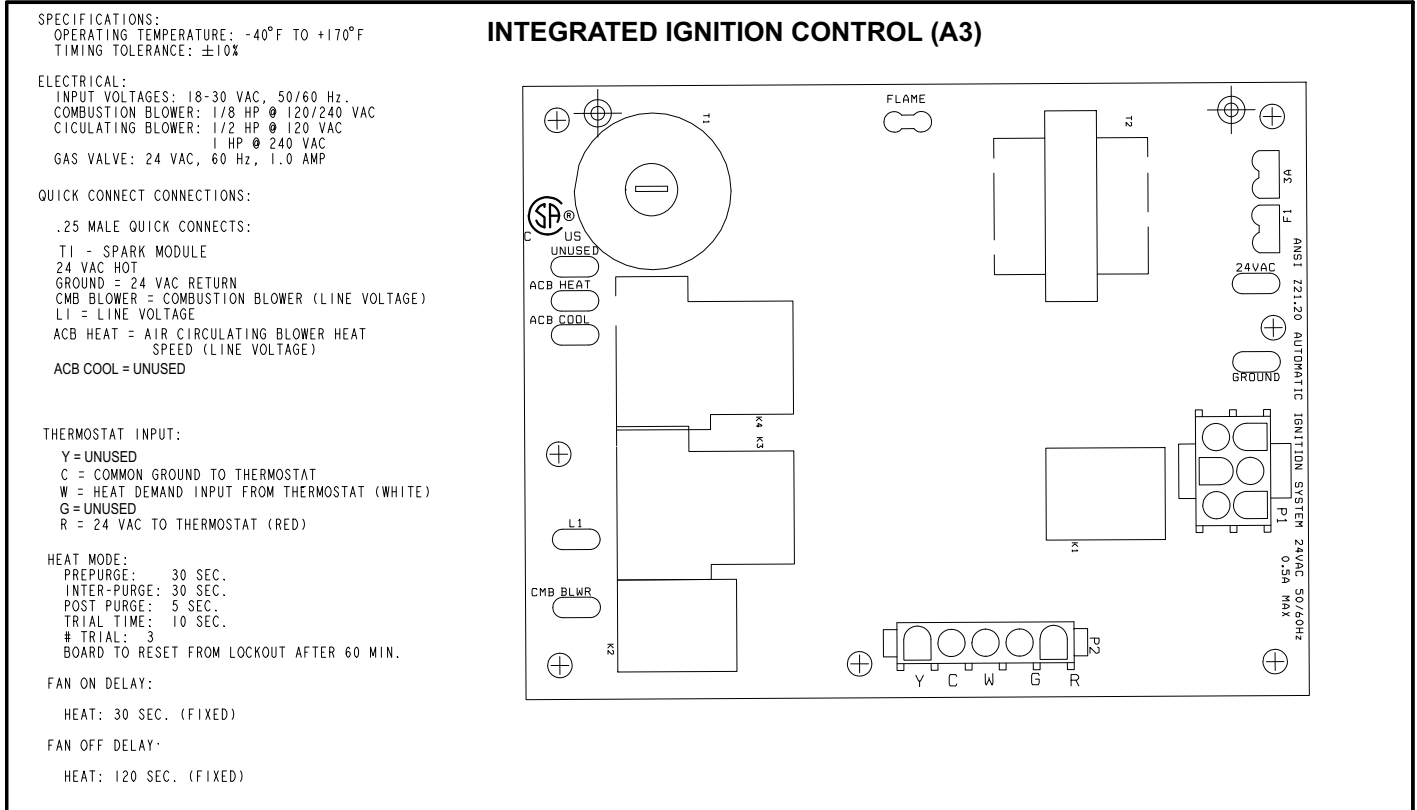
The 13GEP unit includes an integrated ignition control which controls the combustion air inducer, gas valve, and spark electrode. The control receives signals from the main and auxiliary limit switches, the rollout switch, the pressure switch and the flame sensor. LED codes and flash rates are given on page 16.

#### Integrated Ignition Control LED Codes

The ignition control LED flashes codes which indicate normal or abnormal operations:

**TABLE 14  
INTEGRATED IGNITION CONTROL (A3) SYSTEM DIAGNOSTICS**

LED Status	Flashing Rate	Fault Description
Slow Flash	One flash per second	Normal operation: No call for heat
Fast Flash	Two flashes per second	Normal operation: Call for heat
2 Flash	Two flashes in second with 1-second pause	Failed to detect or sustain flame. Minimum flame sense microamps is 0.5; normal microamps is 1.5 or greater. After five "low-flame senses within a single call for heat the unit will go into lockout.
3 Flash	Three flashes in 1.5 seconds with 1-second pause	Pressure switch senses incorrect pressure or auxiliary limit is open, or gas valve coil is open. Will automatically reset once the pressure switch or auxiliary limit closes. Inspection and correction of open gas valve will be required. Once corrected will automatically reset.
4 Flash	Four flashes in 2 seconds with 1-second pause	High limit or roll out switch open. Will reset automatically when the primary limit closes, The roll out switch will require a manual reset.
5 Flash	Five flashes in 2.5 seconds with 1-second pause	Flame sensed and gas valve not energized. This is a Watchguard type lockout and will automatically reset after one hour.
Steady	-	Internal failure: Micro-controller failure; self-check



**FIGURE 16**

**MAIN LIMIT SWITCH (S10)**

This automatically reset switch is located inside the heating compartment and is designed to open at abnormally high air temperatures. The limit switch operates when a high temperature condition caused by inadequate blower airflow occurs. The main gas valve is closed and the circulating air blower will continue to operate until the limit control closes and the blower off delay period has elapsed.

**PRESSURE SWITCH (S18)**

See figure 1 for location of pressure switch. If the combustion air inducer motor fails or if the vent system is blocked, the pressure switch prevents the gas valve from being energized.

**SPARK ELECTRODE AND FLAME SENSOR ROD**

The spark electrode and flame sensor rod are part of the burner assembly. The spark electrode is typically located on the far-left burner. The flame sensor rod is typically located on the far-right burner. If the ignition control does not receive a signal from the flame sensor indicating that the burners have established flame, the main gas valve will close after the 10-second ignition trial period built into the ignition control.

**ROLLOUT SWITCH (S47)**

The switch is located above the main burners. In the event of a sustained main burner rollout the main gas valve is closed. To reset, push the button on top of the switch.

**AUXILIARY LIMIT SWITCH (S21)**

This switch is located in the side of the circulating air blower housing. If the circulating air blower fails to operate, the temperature rises and opens the auxiliary limit. The main gas valve closes. This control resets automatically.

**Maintenance**

Periodic inspection and maintenance normally consists of changing or cleaning filter(s) and (under some conditions) cleaning the main burners.

**CONDENSER FAN CLEARANCES**

The hub of the condenser fan blade should be flush with the end of the motor shaft to ensure proper clearances and performance. This dimension should be checked and the fan should be adjusted accordingly any time servicing of the outdoor fan system is required.

**AIR FILTER**

Air filters are field-provided. Filters should be inspected monthly and replaced when necessary.

**MOTORS**

Indoor, outdoor fan and vent motors are permanently lubricated and require no further lubrication. Motors should be cleaned yearly to prevent the accumulation of dust and dirt on the windings or motor exterior.

## COIL

Dirt and debris should not be allowed to accumulate on the coil surfaces or other parts in the air conditioning circuit. Cleaning should be performed as often as necessary. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean the coil, be sure the power to unit is shut off prior to cleaning.

*NOTE — Care should be used when cleaning the coil so that the coil fins are not damaged.*

Do not permit the hot condenser air discharge to be obstructed by overhanging structures or shrubs.

## TO CLEAN BURNERS

Light the burners and allow unit to operate for a few minutes to establish normal burning conditions. Observe the burner flames. Compare this observation to figure 17 to determine if blue flame is properly adjusted. Flame should be predominantly blue in color and strong in appearance. Verify that all burners are lit and that the flame does not impinge on the sides of the heat exchanger.

Distorted flame or yellow tipping of the natural gas flame (or long yellow tips on LP/propane flame) may be caused by one or more of the following: lint or dirt inside the burner or burner ports; lint or dirt at the air inlet between the burner and manifold pipe; or an obstruction over the burner orifice.

Use a soft brush or vacuum to clean the affected areas.

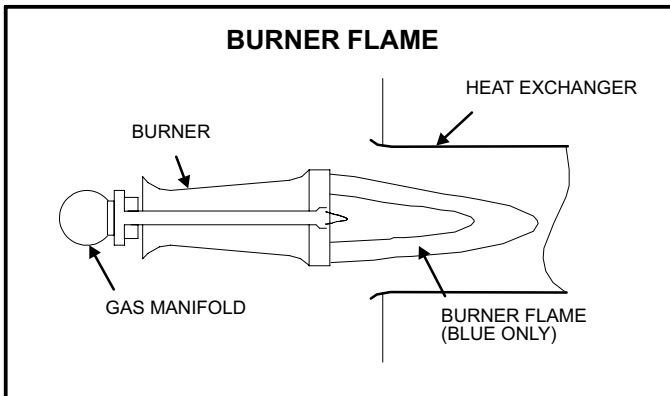


FIGURE 17

## VENT OUTLET

Visually inspect vent outlet periodically to make sure that there is no buildup of soot and dirt. If necessary, clean to maintain adequate opening to discharge flue products.

### Planned Service

You should expect a service technician to check the following items during an annual inspection. Power to the unit must be shut off for the service technician's safety.

- Fresh air grilles and louvers Must be open and unobstructed to provide combustion air.
- Burners must be inspected for rust, dirt, or signs of water.
- Exhaust pipe must be inspected for signs of water damaged, rust or disconnected joints.
- Unit appearance must be inspected for:
  - A** Rust, dirt or signs of water
  - B** Burnt or damaged wires
  - C** Burnt or damaged components.
- A good coat of auto wax can enhance the appearance of the cabinet.
- Blower access door must be properly in place.
- Return air duct must be properly attached and provide an air seal to the unit.
- Operating performance — Unit must be observed during operation to monitor proper performance of the unit and the vent system.
- Combustion gases — Flue products must be analyzed and compared to the unit specifications.

Problems detected during the inspection may make it necessary to temporarily shut down the furnace until the items can be repaired or replaced.

Pay attention to your unit. Situations can arise between annual furnace inspections that may result in unsafe operation. For instance, items innocently stored next to the unit may obstruct the combustion air supply. This could cause incomplete combustion and the production of carbon monoxide gas.