



GAS FURNACE

INSTALLATION AND SERVICE MANUAL

MODELS:

**PGT5-100, PGT11-125, PGT16-160,
PGL20-180, PGL33-250, PGL37-312, & PGL39-400**

⚠ WARNING: IF YOU DO NOT FOLLOW THE SAFETY PRECAUTIONS BELOW AND IN THIS MANUAL, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY, OR LOSS OF LIFE.

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

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.

INSTALLATION AND SERVICE MUST BE PERFORMED BY A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER. (REFERRED TO IN THESE INSTRUCTIONS AS A QUALIFIED HEATING CONTRACTOR).

PLEASE READ THESE INSTRUCTIONS PRIOR TO INSTALLATION, INITIAL FIRING, AND BEFORE PERFORMING ANY SERVICE OR MAINTENANCE. THESE INSTRUCTIONS MUST BE LEFT WITH THE HOMEOWNER AND SHOULD BE RETAINED FOR FUTURE REFERENCE BY QUALIFIED SERVICE PERSONNEL.

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MADE IN USA

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All installations and services must be performed by qualified service personnel.

This page contains reproductions of the various warning and instruction labels placed on the Thermo Pride Power Gas Furnaces. Please read and comply with the contents of these labels.

! WARNING

The following items should be inspected every year by a qualified heating contractor. Correct any deficiencies at once.

Heat Exchanger: Inspect for corrosion, pitting, warpage, deterioration, carbon build up and loose gaskets.

Burner: Check for correct operation, proper combustion, no fuel leakage, and if provided, clean burner filter.

Chimney/Vent Pipe: Inspect for restriction, loose joints, abnormal carbon build up and condensation.

Controls: Check for correct operation and proper settings, (if manually adjustable).

Periodic visual inspections should also be made by the owner during the heating season. Call a qualified heating contractor to report suspected deficiencies. (Do not attempt to make repairs yourself!)

Further owner and heating contractor responsibilities are detailed in the installation and maintenance instruction manual. (Shut off power before inspecting.)

390399

THIS PANEL REMOVABLE BY QUALIFIED SERVICE PERSONNEL FOR ACCESS TO HEAT EXCHANGER CLEAN OUTS. BE CERTAIN CLEAN OUT GASKETS ARE INTACT AND THE COVERS IN PROPER POSITION TO ENSURE A COMPLETE SEAL PRIOR TO OPERATION.

390005

"DANGER— TO AVOID INJURY FROM MOVING PARTS SHUT OFF THE FURNACE BEFORE REMOVING THIS DOOR."

WHEN IT BECOMES NECESSARY TO REPLACE OR WASH FILTER, REMOVE THE DIRTY FILTER FROM THE RACKS PROVIDED AND WASH OR REPLACE WITH IDENTICAL NEW FILTERS.

THE BLOWER MOTOR LOCATED BEHIND THIS DOOR MAY OR MAY NOT REQUIRE LUBRICATION. IF LUBRICATION INSTRUCTIONS ARE NOT SHOWN ON THE MOTOR NAME PLATE THE MOTOR SHOULD NOT BE LUBRICATED. IF THE NAME PLATE INDICATES THAT THE MOTOR REQUIRES LUBRICATION, LUBRICATE THE MOTOR AS DIRECTED OR USE 30 DROPS OF SAE 20 WEIGHT OIL OR EQUIVALENT TWICE A YEAR. DO NOT USE A LIGHT HOUSEHOLD GRADE OIL.

390025

**OUTSIDE POWER SOURCE
115 V. 60 CYCLE TO BE
CONNECTED TO WIRES IN-
SIDE THIS BOX.
CONNECT WIRE #1 TO THE
"HOT" LINE.
CONNECT WIRE #2 TO THE
"COMMON" LINE.**

390004

SHOULD THIS UNIT BE DISASSEMBLED ALL COMPONENTS, PANELS, BLOCK OFFS, COLLARS, GASKETS, AND FASTENERS MUST BE REASSEMBLED AS ORIGINALLY FACTORY PRODUCED.

390056

WARNING: THIS UNIT MUST BE INSTALLED AND SERVICED BY A QUALIFIED CONTRACTOR ONLY.

390057

All installations and services must be performed by qualified service personnel.

This page contains various warnings and cautions reproduced from the Power Gas Furnace Manual. Please read and comply with the statements below .

CAUTION: When installing the burner, it should be noted that the loose fill insulation and fiber chambers are made with ceramic fibers. Currently, there are no known chronic health effects in humans associated with long term exposure to ceramic fibers. The International Agency for Research on Cancer (IARC) based on its review of studies that injected ceramic fiber into the abdomens of hamsters and rats have classified fibrous glass wool, mineral wool (both rock wool and slag wool) and ceramic fiber as group 2B carcinogens. A group 2B agent is considered by IARC to have the possibility of being carcinogenic to humans. IARC has also classified these fibrous materials as group 2A carcinogens when they have undergone long term exposure to temperatures greater than 1800⁰F. A group 2A agent is considered to have the probability of being carcinogenic to humans. For these reasons, we suggest the use of a 3M 9900, 3M 8710 or equivalent mask when working with any ceramic fiber products. For further information, contact the Manager of Customer Service for Rex Roto Corporation at (517) 324-7533.

WARNING: This furnace is not to be used as a construction heater.

WARNING: When common venting two appliances into a common vent, the smallest appliances must be vented into the top opening.

WARNING: A Category 1 appliance must never be connected to a chimney that is servicing a solid fuel appliance. If a fireplace chimney, lined with a metal liner is used to vent this appliance, the fireplace opening must be permanently sealed.

WARNING: The PG Series furnaces must not be installed with a manual or thermally actuated vent damper.

WARNING: **TURN OFF THE ELECTRICAL POWER** to the furnace before attempting to change blower speed wiring.

WARNING: For initial start-up, of the furnace after installation, it may be necessary to purge the air out of the gas line. This should be done by qualified service personnel. If excessive gas escapes when purging the supply at the union, allow the area to ventilate for at least 15 minutes before attempting to start the furnace. LP gas is especially dangerous because LP gas is heavier than air allowing it to accumulate at floor level at a dangerous concentration.

WARNING: Heat exchanger paint will cure on initial firing creating an odor.

WARNING: The heat exchanger must be cleaned by a qualified service technician.

WARNING: The power gas burner has its own transformer and no other electrical equipment should be operated from this transformer. If an electrical vent damper is used, a separate transformer and relay must be installed. Thermally actuated vent dampers cannot be used with this power burner because the damper must be in the open position before the burner ignites.

WARNING: Because of the potential of odorant fade, a gas leak may not be detected by smell. If this furnace is installed below grade, contact your gas supplier for a gas detector.

All installations and services must be performed by qualified service personnel.

I. GENERAL INSTRUCTIONS

These instructions must be read in their entirety before installing the furnace. It is the installer's responsibility to do the following:

1. Inform and demonstrate to the user, the correct operation and maintenance of the appliance.
2. Inform the user of the hazards of flammable liquids and vapors and to remove such liquids and vapors from the vicinity of the appliance.

II. GENERAL INSTALLATION

These furnaces are shipped with the power gas burner shipped separately. For parts shortage or damage, see the Dealer Receiving and Freight Claim Procedure Section of the price guide. After installation, the furnace and duct system must be adjusted to obtain a temperature rise of 50°F to 80°F through the furnace. The installation must conform with local codes or in the absence of local codes with the National Fuel Gas Codes ANSI Z223.1 LATEST EDITION and to these instructions.

WARNING: This furnace is not to be used as a construction heater.

A. CODES AND CLEARANCES:

The following items must be considered when choosing the size and location of the furnace.

1. All local codes and/or regulations take precedence over the instructions in this manual and should be followed accordingly. In the absence of local codes, installation must conform to these instructions, regulations of the National Fire Protection Association, provisions of National Electrical Code (ANSI/NFPA70 LATEST EDITION), and the National Fuel Gas Code (ANSI Z223.1 LATEST EDITION).
2. The BTU output capacity of the furnace proposed for installation should be based on a heat loss calculation made according to the manuals provided by the Air Conditioning Contractors of America (ACCA) or ASHRAE.
3. The furnace installed is to be level in a central location with respect to outlet registers and should be located near the chimney to minimize the numbers of elbows and the length of any horizontal run of connecting flue pipe which may be required.
4. Definitions of "COMBUSTIBLE MATERIAL" and "NON-COMBUSTIBLE" as issued by NFPA-Z11-1-3 is as follows:

B. CONSTRUCTION MATERIALS

a. COMBUSTIBLE MATERIAL:

Materials made of or surfaced with wood, compressed paper, plant fibers, plastics or other material that will ignite and burn whether flameproof, fire retardant treated, or plastered.

b. NON-COMBUSTIBLE MATERIAL:

Material which will not ignite and burn; such materials consisting entirely of steel, iron, brick, concrete, slate, glass, plaster or combination thereof.

All installations and services must be performed by qualified service personnel.

- MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS -

MODEL NO.	FROM SIDES OF FURNACE	FRONT	TOP & SIDES OF PLENUM	FROM THE FLUE OR VENT	REAR	BOTTOM
PGT5-100	1 IN.	24 IN.	1 IN.	4 IN.	1 IN.	1 IN.
PGT11-125	1 IN.	24 IN.	1 IN.	9 IN.	1 IN.	1 IN.
PGT16-160	1 IN.	24 IN.	1 IN.	9 IN.	1 IN.	1 IN.
PGL20-180	1 IN.	24 IN.	1 IN.	18 IN.	1 IN.	N/A
PGL33-250	1 IN.	24 IN.	1 IN.	18 IN.	1 IN.	N/A
PGL37-312	1 IN.	24 IN.	1 IN.	18 IN.	1 IN.	N/A
PGL39-400	1 IN.	24 IN.	1 IN.	18 IN.	1 IN.	N/A

The minimum clearances are listed for fire protection. Clearance for servicing the front of the furnaces and to all points on the furnace requiring access must be 24".

Equipment must be installed in accordance with regulations of the National Board of Fire Underwriters. Authorities having jurisdiction should be consulted before installations are made.

C. FURNACE LOCATION AND COMBUSTION AIR

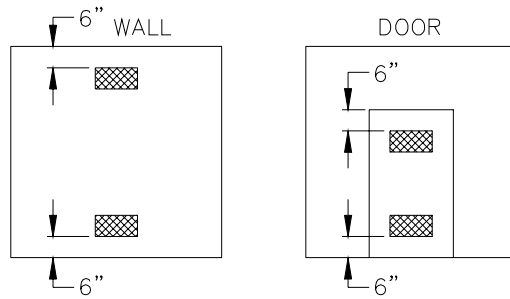
A furnace installed in a residential garage must be installed so the burners and ignition source are located higher than 18 inches above the floor. Also, the furnace must be located or protected to avoid physical damage by vehicles. The furnace must be located on a dry surface. If the surface becomes wet or damp at times, the furnace should be supported above the floor using a concrete base, bricks, patio blocks, etc.

The electrical components of this furnace should be protected against water or moisture.

The area in which the furnace is located must have an adequate supply of air for combustion and draft. Open non-partitioned basements, below grade utility room windows without storms or rooms with loose access doors will generally permit adequate air infiltration. However, if the furnace is located in an area of the building with tight doors and windows, outside ventilation or an opening into another room is recommended. This can be accomplished with two rectangular openings located in a wall or door, one 6" from the ceiling or at the top of the door and one 6" from the floor or at the bottom of the door each having a free area of not less than 1 square inch per 1,000 BTUH input but not less than 100 square inches total. These openings must be free and unobstructed. Maintain a minimum 24" clearance to ventilation openings, which provide combustion air to the furnace.

All installations and services must be performed by qualified service personnel.

EXAMPLE: 100,000 BTUH input furnaces requires "two" openings of 100 square inches each. A minimum opening of 100 square inches is required regardless of the input.



If the building is tightly constructed and or has an exhaust fan(s) that creates a negative pressure, air for combustion and ventilation must be supplied from the outdoors or from spaces freely communicating with the outdoors. When communicating directly with the outdoors or with vertical ducts to the outdoors, two openings each having a minimum free area of 1 square inch per 4,000 BTU of the input rating of all gas appliances in the area are required. When horizontal ducts are used to communicate with the outdoors, the free area must be based on 2,000 BTUH per square inch of the total input rating of all gas appliances in the area. The minimum dimension of an air duct must be at least 4 inches in diameter.

EXAMPLE: 100,000 BTU input furnace, 40,000 BTU input water heater and 30,000 BTU gas dryer would require two openings of 42.5 square inches each if ducted vertically to the outdoors or 85 square inches each if horizontal ducts are used.

MAKE-UP AIR

Today's emphasis on home insulation and tightness increases the problem of air supply to the furnace. Heavy insulation cuts off infiltration of outside air, which previously replaces inside air removed by bathroom, kitchen and laundry vent fans and air escaping up chimneys. This tightness can cause a negative pressure condition to develop within the home. For this reason, it is recommended that in tightly constructed and insulated homes, make-up air be provided. This can be done with Skuttle Mfg. Co. 200 Series make-up air control. This control installs quickly and easily on any warm air heating system and delivers controlled, fresh air automatically during the winter and summer. This type control helps solve a negative pressure problem in a structure.

D. VENTING:

NOTICE: A draft control (double acting (MG-1) or hood type) suitable for gas firing, certified by a nationally recognized testing laboratory and acceptable to local codes must be installed according to the control manufacturer's instructions.

The PGT and PGL series furnaces must be vented in accordance with local codes and the National Fuel Gas Code (ANSI-Z223.1 Latest Edition) Category 1 vent tables.

The vent connector must be galvanized or stainless steel metal pipe.

The following items are requirements:

1. Flue or vent connection materials must meet requirements of all applicable local codes and the National Fuel Gas Code (ANSI-Z223.1 LATEST EDITION).
2. A PVC pipe is not an acceptable substitute for a chimney or a flue connector. A chimney with an internal construction of stainless steel or some other material that will withstand the flue gas temperature of 500°F is required.
3. A type B venting system as well as some masonry systems are acceptable as described in the venting tables included in the NFGC. These venting tables also include venting combinations, which apply to common venting arrangements of two appliances.

WARNING: When common venting two appliances into a common vent, the smallest appliance must be vented into the top opening.

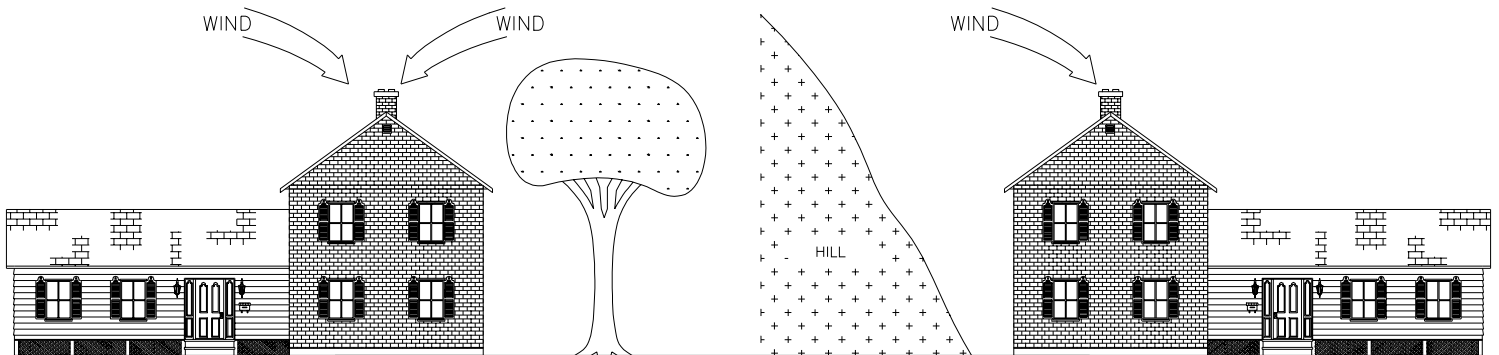
WARNING: A Category 1 appliance must never be connected to a chimney that is servicing a solid fuel appliance. If a fireplace chimney, lined with a metal liner is used to vent this appliance, the fireplace opening must be permanently sealed.

4. The chimney height is determined by the height of the surrounding trees, roof, buildings and terrain. The chimney should extend 24" above any surrounding obstructions.

All installations and services must be performed by qualified service personnel.



Trim or remove nearby trees that could interfere with chimney draft.



5. In cases where the chimney flue extends to the basement floor, the draft can usually be improved by filling the base of the chimney with sand to within 12" of the flue pipe after relocating the cleanout cover.

6. All joints of the vent must be tightly sealed. The inside of the vent should be free of all obstructions.

7. All vents and vent connectors must fit tightly to avoid air leaks.

8. All vent connectors connecting the furnace to the vent must be rigidly supported with hangers and straps, in order to prevent movement after installation. The vent connector must be supported every four feet for the design and weight of the material used, to maintain clearances, and to prevent physical damage.

9. Vent connectors used in connecting the furnace to the vent cannot be channeled through floors, ceilings, and walls without the proper protective construction. This construction must be in accordance with the requirements of the National Fuel Gas Code (ANSI Z223.1 LATEST EDITION).

10. All single wall vent connectors connected to the PGT & PGL Series furnaces must have all seams and joints sealed with high temperature pressure sensitive aluminum tape or silicone rubber sealant.

EXAMPLE:

1. High temperature aluminum tape, temperature rating of 400°F or more.

2. Dow Corning RTV-732 rubber sealant or equivalent.
Temperature rating of 450°F or more.

11. Vent connectors installed in or passing through an unheated space must be insulated with 1.0" thick foil faced fiberglass or its equivalent to prevent condensate from forming in the connector or vent.

All installations and services must be performed by qualified service personnel.

NOTE: If this furnace replaces an appliance with a vent that was originally installed in a common vent system serving other appliances, the vent system is likely now too large to properly vent the remaining appliances only and must be modified accordingly. Refer to Natural Fuel Gas Code Appendix G Category I vent tables for common venting a PG Series furnace and another fan assisted or natural draft unit.

In order to common vent a PG Series furnace with a natural draft gas fired hot water heater; follow the recommendation of the NFGC Category I venting tables.

If the NFGC venting tables do not apply to a specific common venting system then refer to the section on replacing an existing furnace from a common vent in Section G of this manual.

NOTICE: Thermo Pride power gas units may be sidewall vented with a power sidewall venting system that is appropriate for the application and certified by a nationally recognized testing agency for use with gas fired warm air central furnaces.

NOTICE: An agency approved gas barometric control or draft diverter **must** be installed. The draft control device must also meet the approval of the local authorities. See the draft control manufacturers instructions for installation.

E. VENT DAMPERS

If a vent damper is installed, it must be certified by a nationally recognized testing agency. It must be an electro-mechanical type that opens completely before gas flows to the main burner and closes only after the gas valve has shut off gas flow to the main burner.

WARNING: The PG Series furnaces must not be installed with a manual or thermally actuated vent damper.

F. CONDENSING IN THE CHIMNEY:

Due to the increasing efficiencies of our furnaces, more heat is being placed into the home instead of up the chimney. This means that the stack temperature will be lowered which may result in condensing within the chimney under certain conditions. The following is an explanation on why and what to do if condensing occurs.

Moisture occurs in flue gases when hydrogen is mixed with oxygen from the chemical reaction produced by combustion. This mixture of hydrogen and oxygen produces water molecules.

The flue gas vapor may do one of two things as it escapes up the chimney:

1. Remain in a vapor state if the internal chimney wall temperature is above the dew point, or
2. Condense on the chimney walls if they are chilled below the dew point.

Condensing will always occur on chimney walls whose temperatures are below the dew point, but will evaporate once the walls are warmer than the dew point. If the chimney walls do not reach the dew point during the cycle of the furnace, the moisture may accumulate in large enough quantities to cause problems such as corrosion of the chimney or corrosion of the heat exchanger.

This condensation most likely will not occur at the bottom of the chimney, because the flue gas is heating the chimney walls as it rises and the bottom will be heated first. This heating of the walls will cause the flue gas temperature to drop, which in turn may reduce the wall temperature below the dew point causing condensation to appear on the upper part of the chimney first. This condensation may drip back as far as the flue pipe and heat exchanger, where corrosion may occur if not treated.

To prevent condensation, it is necessary that the internal chimney wall temperature always be kept above the dew point. The chimney may have to be lined with a flue liner if the temperature loss is too great for the furnace. A liner will act as an insulator and reduce the flue gas temperature loss. Insulation may be added around the liner for further

All installations and services must be performed by qualified service personnel.

temperature stability. If the chimney is on the homes exterior and condensing occurs, the chimney may be insulated around its exterior to help the flue hold its temperature. Also, check to see if the chimney is too large for the flue gases to heat, if so reduce to proper size by lining. Be sure to use stainless steel liners such as types 430, 304 or for the toughest corrosion resistant type 316. If the chimney is the correct size for the unit and condensing still occurs then further insulating of the chimney must occur or the efficiency of the furnace may have to be reduced to raise the chimney temperature.

More detailed information may be obtained from the current ASHRAE Equipment Handbook.

G. REPLACING AN EXISTING FURNACE FROM A COMMON VENT

When an existing furnace is removed from a common vent serving other appliances, the vent system is likely too large to safely vent the remaining attached appliances. If only two appliances remain on the venting system, then the system may be sized with the venting tables in the NFGC of this manual. If more than two appliances remain, then the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

- a. Seal off any unused opening(s) in the common venting system.
- b. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
- c. Insofar as is practical, 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 appliance 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.
- d. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.
- e. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle or smoke from a cigarette, cigar or pipe.
- f. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
- g. If the improper venting is observed on any of the appliances during the above testing, the common vent system must be corrected. Follow the steps outlined in the National Fuel Gas Code, NFPA 54/ANSI Z223.1-LATEST EDITION to resize the vent system. The National Fuel Gas Code may be obtained by writing the American Gas Association Laboratories, 8501 East Pleasant Valley Road, Cleveland, OH 44131 or the National Fire Protection Association, Battery march Park, Quincy, MA 02269.

H. GENERAL GAS PIPING

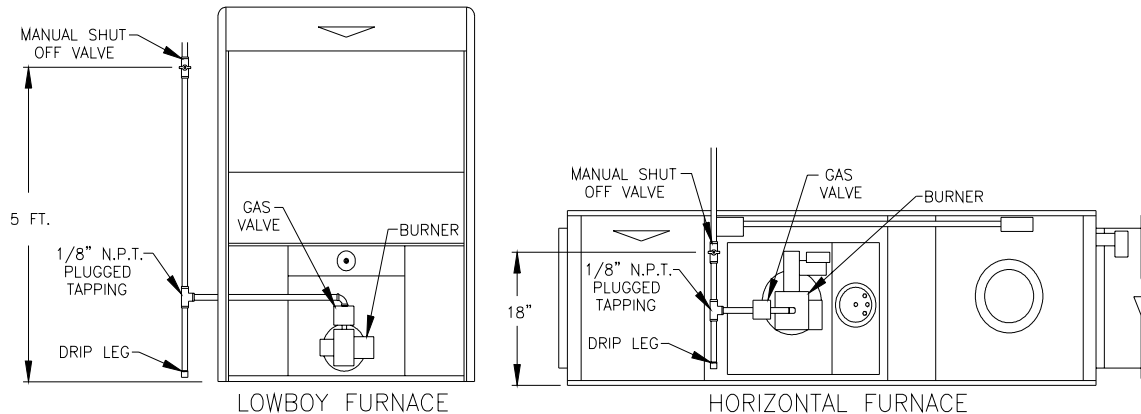
WARNING: Because of the potential of odorant fade, a gas leak may not be detected by smell. If this furnace is installed below grade, contact your gas supplier for a gas detector.

All gas piping and testing must be performed by a qualified installer or service person. The installation must comply with local codes, these instructions and The National Fuel Gas Code NFPA54/ANSI Z223.1-LATEST EDITION.

All installations and services must be performed by qualified service personnel.

Piping from the natural gas meter to the furnace shall be in accord with requirements of the local utility. Piping from the LP tank to the furnace must follow the recommendations of the gas supplier.

1. A readily accessible, certified manual shut off valve with a non-displaceable rotor member should be installed within six feet of the gas equipment it serves. A union or flanged connection shall be provided downstream from the manual valve to permit removal of controls. A 1/8" N.P.T. plugged tapping, that is accessible for connecting a test gage, must be installed immediately upstream of the gas connection to the furnace. Unions must be of a ground joint type or flanged-joint using a gasket resistant to LPG. Pipe dope or tape certified to be resistant to the action of liquified petroleum gases should be used on all threaded joints.



2. A drip leg must be used on both LP and natural gas installations prior to the furnace to trap oil, condensate and other impurities which might otherwise lodge in the gas valve or plug the burner orifice. When there is excessive condensation between the gas meter and the furnace, a drip leg shall be provided at the outlet of the gas meter. Failure to install a drip leg may void the limited warranty on the furnace.

NOTE: All gas piping must be leak tested using a soap and water solution (if the gas is turned on) following the procedure outline in this section (caution must be taken not to wet electronic components). A final test for gas leakage must be made after purging the gas line. This test must be conducted with the unit operating and should include the furnace piping and gas valve. Never use an open flame to check for a gas leak.

IMPORTANT: Care must be taken not to wet electronic components during leak test. Wetting the primary ignition module may damage its circuitry and cause a hazardous situation. If wetting occurs, dry moisture from all leads, terminals, and electronic components using a hair dryer or similar means or wait at least 24 hours for the circuit to fully dry before energizing the burner circuit.

The furnace and its individual gas valve must be disconnected from the gas supply during pressure testing of the gas supply system at pressures in excess of 1/2 PSIG or 14.0" wc.

I. INSTALLATION OF NATURAL GAS PIPING

The installation of the gas piping and the following test procedures must be performed by a qualified installer or service person.

1. The following chart is to be used as a guide in sizing natural gas supply piping. The input loading of all gas appliances installed on any main or trunk line must be totaled to determine its needed carrying capacity.

All installations and services must be performed by qualified service personnel.

EXAMPLE: A line must supply a furnace of 110,000 BTU/hr input, a hot water heater of 40,000 BTU/hr input and gas range with a 30,000 BTU/hr input capacity. The total BTU/hr input loading on the line is 180,000 BTU/hr. The 200,000 BTU/hr column on the chart must be used in sizing the pipe.

- BLACK PIPE SIZE FOR NATURAL GAS -

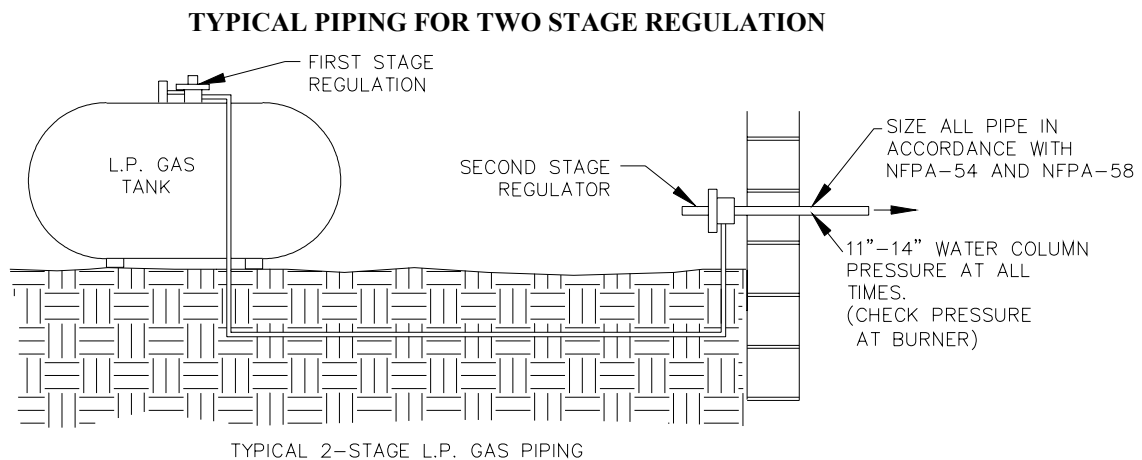
BURNER FIRING RATE, BTU/HR	FEET OF PIPE FROM METER TO BURNER				
	10'	20'	30'	40'	50'
50,000	1/2	1/2	3/4	3/4	3/4
100,000	3/4	3/4	3/4	3/4	1
150,000	3/4	1	1	1	1-1/4
200,000	1	1	1-1/4	1-1/4	1-1/4
250,000	1	1	1-1/4	1-1/4	1-1/4
300,000	1	1	1-1/4	1-1/4	1-1/4

Use black iron steel pipe and malleable iron fittings for Natural gas service lines. Provide rigid supports for the pipe. If the pipe size must be reduced, use reducing couplings only. Avoid the use of reducing bushings. Remove all burrs and inspect the pipe for dirt or other foreign material prior to connecting.

Maximum supply pressure for natural gas is 14" wc and minimum supply for purpose of input adjustment is 5-1/2" wc.

J. INSTALLATION OF LIQUIFIED PETROLEUM GAS (LP) PIPING

1. Experience has proved that the pressure drop in the gas line running from the outside propane gas tank to the gas appliances in a home, is the most frequent cause of equipment malfunctions. A single pressure regulator, located at the tank, will not reliably regulate the high tank pressures (up to 200 lbs.) down to 11" wc. Varying pressures will occur at the appliances as outside temperatures and usage demands vary. Two stage regulations are the only effective method of controlling these variables.



NOTE: Two stage regulation must be installed for liquified petroleum gas when used with any Thermo Pride LP furnace. See illustration above of a typical two stage piping system.

All installations and services must be performed by qualified service personnel.

- COPPER TUBING SIZE FOR LIQUIFIED PETROLEUM GASES -

TABLE I					TABLE II								
IF THE LENGTH OF LINE BETWEEN REGULATORS (TANK TO BUILDING) IS THIS LONG ---					IF LENGTH OF LINE BETWEEN SECOND STAGE REGULATOR AND FURNACE IS THIS LONG ---								
USE THIS SIZE TUBING TO KEEP PRESSURE DROP BELOW 2 LBS. FOR MAXIMUM FLOW SHOWN.	TOTAL INPUT LOAD(BTU) ON LINE	25'	50'	75'	100'	USE THIS TUBING OR PIPE TO KEEP PRESSURE DROP BELOW 1/2" WATER COLUMN FOR MAXIMUM FLOW SHOWN.	TOTAL INPUT LOAD(BTU) ON LINE	10'	20'	30'	40'	50'	
	125,000	3/8" O.D. COPPER					75,000	5/8" O.D. COPPER					
	250,000	3/8" O.D. COPPER			1/2" O.D. COPPER		125,000	5/8" O.D. COPPER	3/4" BLACK PIPE				
	375,000	1/2" O.D. COPPER					187,500	3/4" BLACK PIPE					
	500,000	1/2" O.D. COPPER					250,000	3/4" BLACK PIPE					
					375,000	3/4" BLACK PIPE	1" BLACK PIPE						
					500,000	1" BLACK PIPE							

All black pipe sizes shown are I.D.

Seamless copper tubing may only be used with gases that are not corrosive to it. See note below and check with your LP gas supplier before using. Seamless copper tubing must comply with standard type K or L for seamless copper water tube, ASTM B 88; or seamless copper tube for air conditioning field service, ASTM B 280.

NOTE: Copper and brass tubing and fittings (except tin lined) shall not be used if the gas contains more than a trace (0.3 grains per 100 cubic ft.) of hydrogen sulfide gas.

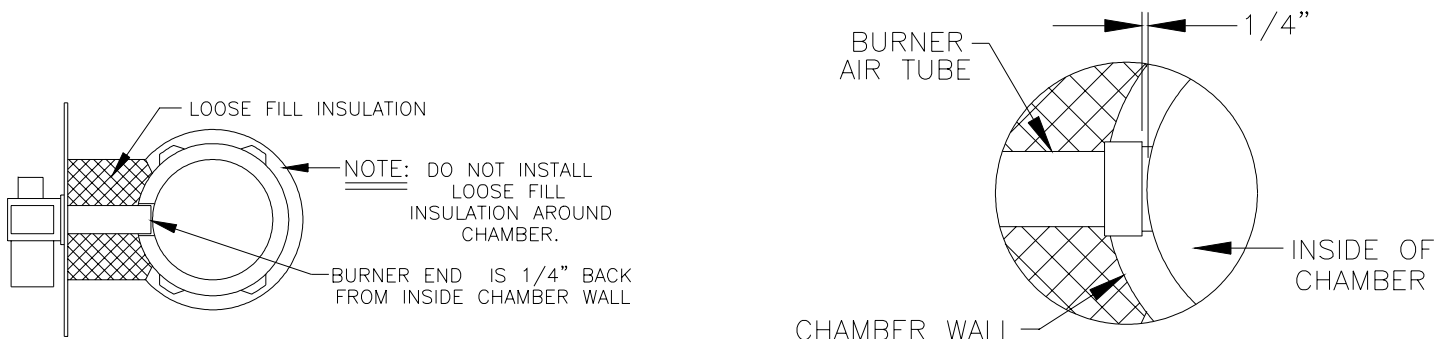
Maximum supply pressure for liquified petroleum (LP) gas is 14" wc and minimum supply for purpose of input adjustment is 11" wc.

K. BURNER INSTALLATION

The power gas burner will mount on three stud mounting bolts on the lower mounting plate covering the opening in the front of the heat exchanger. The end of the burner tube must be inserted no further than 1/4 inch back from the inside surface of the combustion chamber to ensure proper operation and performance.

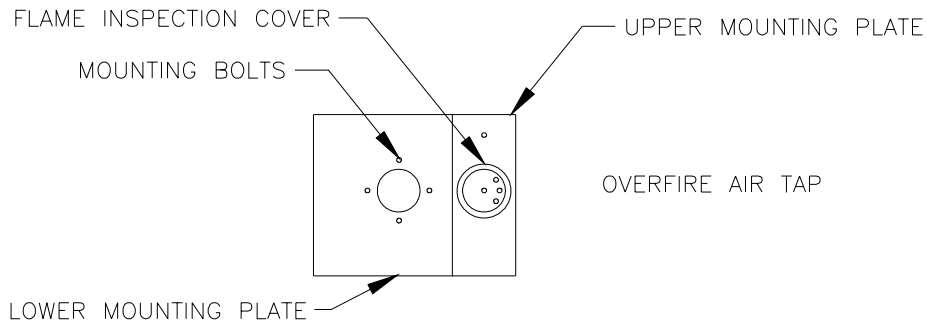
NOTE: OVERFIRE AIR TAP IS LOCATED ON LEFT SIDE OF FLAME INSPECTION COVER.

**(TOP VIEW)
BURNER INSERTION
ILLUSTRATION (PGL)**



All installations and services must be performed by qualified service personnel.

TWO PIECE MOUNTING PLATE

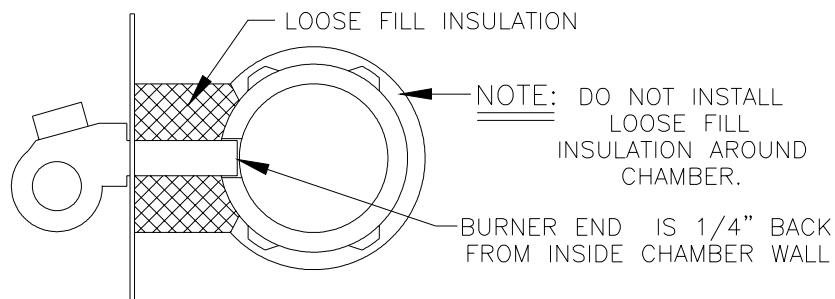


When mounting the burner, the upper mounting plate must be removed to provide access to the area in front of the combustion chamber. The combustion chamber can then be moved forward or backward slightly to allow for adjustment in positioning the burner tube. Do not allow the burner tube or end cone to physically touch the chamber, as excessive heat transfer could result in distortion of the tube or end cone, or both.

Once the burner tube is properly positioned, at most 1/4 inch back from the inside surface of the combustion chamber wall, the loose-fill insulation that is included should be lightly placed around the burner tube between the front of the combustion chamber and the burner mounting plate. **(DO NOT PACK THE INSULATION DOWN).** The loose-fill insulation should be placed in such a fashion that the surface of the insulation is sloped from the top of the combustion chamber to the top of the lower mounting plate. The purpose of the loose insulation is to help protect the burner tube, mounting plates and vestibule area from internal temperatures.

NOTE: Do not place loose insulation around chamber sides and back.

(SIDE VIEW) BURNER INSERTION ILLUSTRATION (PGT)



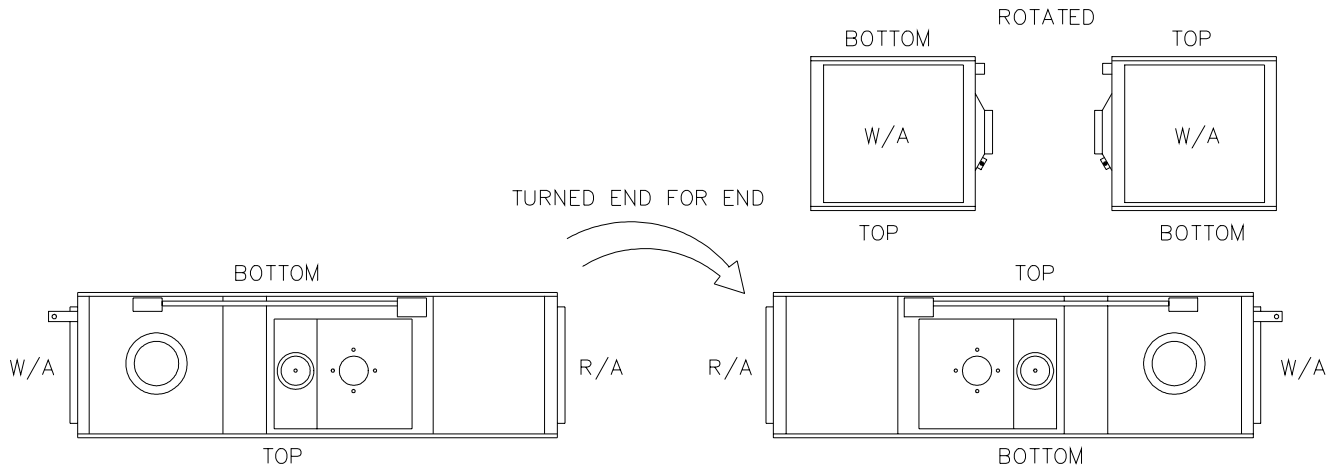
CAUTION: When installing the burner, it should be noted that the loose fill insulation and fiber chambers are made with ceramic fibers. Currently, there are no known chronic health effects in humans associated with long term exposure to ceramic fibers. The International Agency of Research on Cancer (IARC) based on its review of studies that injected ceramic fiber into the abdomens of hamsters and rats have classified fibrous glass wool, mineral wool (both rock wool and slag wool) and ceramic fiber as group 2B carcinogens. A group 2B agent is considered by IARC

All installations and services must be performed by qualified service personnel.

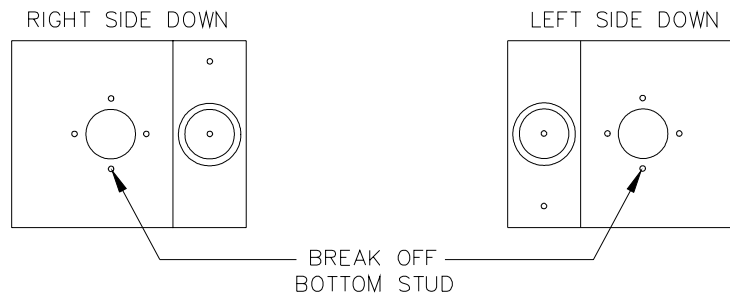
to have the possibility of being carcinogenic to humans. IARC has also classified these fibrous materials as group 2A carcinogens when they have undergone long term exposure to temperatures greater than 1800⁰F. A group 2A agent is considered to have the probability of being carcinogenic to humans. For these reasons, we suggest the use of a 3M 9900, 3M 8710, or equivalent mask when working with any ceramic fiber products. For further information, contact the Manager of Customer Service for Rex Roto Corporation at (517) 324-7533.

HORIZONTAL FURNACE POSITIONS:

The horizontal furnace may be turned end for end, or rotated, making the top into the bottom, as shown below.



After the furnace has been positioned, the bottom burner mounting stud must be removed before mounting the burner. Also, the fan & limit and its mounting bracket must be properly positioned once the unit is in place. (See section N on fan & limit position and location).



MIDCO RE32 BURNER ADJUSTMENT

In order to properly set-up a furnace with a Midco RE32 burner, Thermo Pride's recommendation is to utilize a Modified version of Midco's instruction together **with combustion equipment and a carbon monoxide detector**. It must be emphasized that the gas equipment is operating properly and safely **requires combustion equipment and a carbon monoxide detector**.

1. Check unit for signs of sooting and clean as necessary, the furnace heat exchanger, flue, and chimney.
2. Open the air adjustment completely. Turn adjustment screw counterclockwise until it stops.
3. To achieve a starting point for proper combustion, adjust the air adjustment screw according to the chart below for the applicable Thermo Pride furnace utilizing the Midco RE32 burner.

All installations and services must be performed by qualified service personnel.

Furnace Model	Orifice Size	Manifold Gas Pressure	No. Turns Closed*
** PGL16-160 Nat	#J (.277)	2.4" W.C.	24
PGL16-160 LP	#8(.199)	2.9"	24
PGL20-180Nat	#J(.277)	3.0"	20
PGL20-180 LP	#3(.213)	3.0"	20
AGL16-160LP	#8(.199)	2.9"	24
AGL20-180Nat	#J(.277)	3.0"	20
AGL20-180LP	#3(.213)	3.0"	20

*Air Adjustment screw: Number of turns closed from the **fully open position**.

**PG-160 or PG-180 Power Gas Conversion Burners- use chart for applicable settings.

4. Attach a manifold pressure gauge (Inches of W.C. scale) to the outlet of the gas valve.
5. Turn on the furnace and adjust the manifold pressure to the setting indicated above for the desired rate and orifice which applies to the unit being tested.
6. Let the furnace run until warm, approximately 10 minutes. Note: If the furnace required cleaning, you may wish to allow any residual dust or soot to burn off before taking measurements.
7. If the draft exceeds the recommended maximum of .1", a draft regulator should be used to reduce the draft to the recommended parameters of -.01 W.C. to -.1" W.C.
8. **IMPORTANT:** An accurate CO₂ or O₂ combustion analyzer is required when setting combustion. A carbon monoxide detector capable of measuring flue gas down to 50 PPM of CO is also required. After the unit has operated a minimum of 10 minutes and a proper draft is established-between-.01" W.C. and -.1" W.C., perform a combustion test and make final adjustment to the combustion air to achieve the CO₂ or O₂ as listed below.

NATURAL GAS		
	MIN.	MAX.
CO ₂	7.0%	11.0%
O ₂	2.0%	8.9%
CO	<50 PPM	
L.P. GAS		
	MIN.	MAX. **See
CO ₂	8.0%	10.4% Note Below
O ₂	5.5%	8.9% **See Note Below
CO	<50PPM	
DRAFTOVERFIRE		
	MIN.	.MAX.
	-.01	-.1

**Note!! Under absolutely no circumstances should the air adjustment screw (on LP units only) be closed more than the number of turns indicated by the chart on the previous page.

9. Once the CO₂ or O₂ is adjusted to the above parameters, a Carbon Monoxide test must be done to insure **less than 50 PPM in the flue gas**.

Any sign of soot or carboning during combustion indicates that there is insufficient primary air and the air shutter should be opened more until this condition is corrected. If soot or carboning of the burner is suspected, a smoke sample should be taken after the burner operates a minimum of 10 minutes. This would typically only occur in the LP units. Opening the air adjustment screw should reduce the carboning from the combustion process.

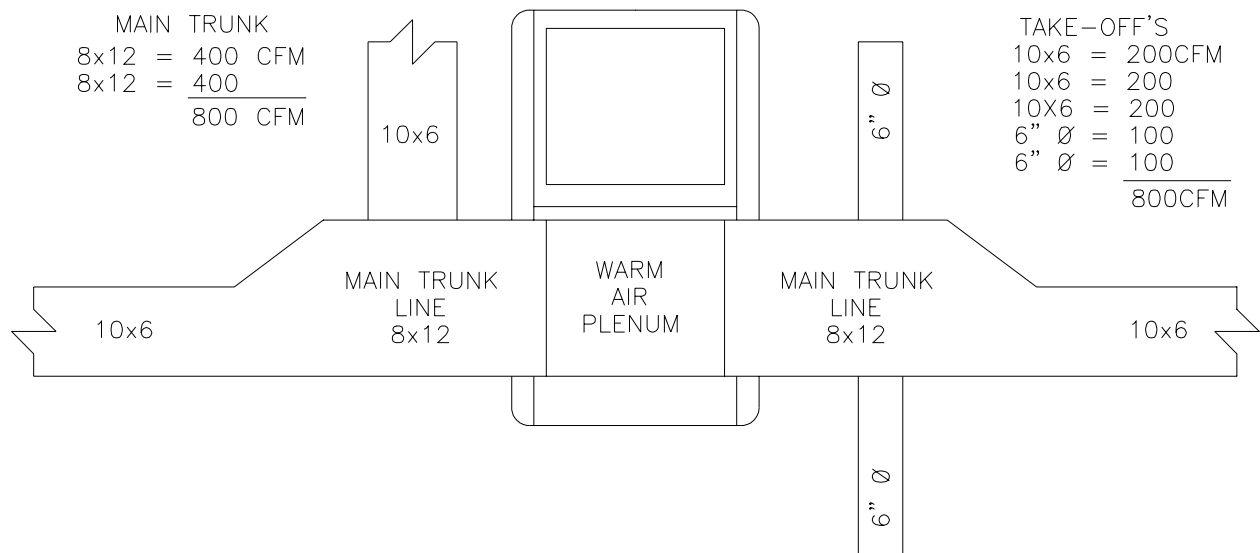
All installations and services must be performed by qualified service personnel.

In summary, setting the combustion air on the Thermo Pride Midco RE32 power gas conversion burner is extremely critical. This adjustment should only be made by following these instructions and confirming the set-up with the proper CO₂ or O₂ combustion analyzer and a carbon monoxide reading of less than 50 PPM.

L. REQUIREMENTS AND SIZING OF DUCT WORK

The duct system must be sized and installed by a qualified installer or service person, following the design standards of the Air Conditioning Contractors of America (ACCA) or ASHRAE.

1. When a return air register is located in the same room as the furnace, it must be installed a minimum of 20 feet away from the furnace.
2. If supply ducts carry circulated air to areas outside the space containing the furnace, the return air duct shall also be sealed to the furnace and also terminate outside of the furnace space.
3. The return air duct system must equal the supply air duct system in its CFM capabilities. Use a supplier's catalog for proper sizing of outlet and return air registers and grills to ensure that they meet the CFM requirements of the run to which they are connected.
4. If the furnace is used in connection with an air conditioning evaporator coil, the furnace must be installed parallel with or on the upstream side of the coil, to prevent condensation in the heat exchanger. If the evaporator coil is installed with a parallel flow arrangement, dampers or other means to control flow of air should prevent chilled air from entering the furnace. If such a device is manually operated, it must be equipped with a means to prevent operation of either the furnace or air conditioner unless it is in the full heat or cool position.



5. The duct system shall be sized for the maximum CFM requirement of the installation, whether it is for heating or cooling. Two common rules for heating and cooling follow:

A. 400 CFM (1200 BTU's) per ton of cooling is required.

B. 1.4 CFM of heating per 100 BTU's of furnace output based on its steady state efficiency and a 50° to 80° temperature rise.

All installations and services must be performed by qualified service personnel.

EXAMPLE: Heating output of furnace is $100,000 \times 1.4 \div 100 = 1400$ CFM. Air conditioning installed is 4 tons x 400 CFM = 1600 CFM or 48,000 BTU's. **NOTE:** The duct system must be sized for the larger CFM requirement for cooling. If only 3 tons 36,000 BTU's of cooling x 400 CFM = 1200 CFM was installed, the duct would have to be sized for the 1400 CFM heating requirement.

To insure obtaining the necessary air handling capacity of a duct system, each of the system components (trunk lines, take offs, runs and register and grill-free areas) must be properly sized and matched together. A 12"x8" duct with a 400 CFM capacity for example will not flow 400 CFM if the register(s) to which it connects only flow a total of 200 CFM.

To achieve proper air movement, the main trunk lines, take offs, registers and grills of the supply return air duct system must have an adequate square inch area to move the desired CFM. The chart shows the CFM air-handling capability based on a 0.1" SP loss, in the supply duct system.

DUCT SIZES FOR HOMES, QUIET OFFICES OR SIMILAR INSTALLATIONS

CFM	DIA.	SQ."	RECTANGULAR DUCT DIMENSIONS ... INCHES							
45	4	12.5								
65	5	19.6								
100	6	28							6x6	9x4
150	7	38							8x6	12x4
200	8	50							10x6	14x4
250	9	63						8x8	12x6	18x4
300	9	63						10x8	14x6	20x4
400	10	78						12x8	16x6	25x4
500	12	113					10x10	14x8	19x6	30x4
600	12	113					12x10	16x8	22x6	38x4
700	12	113					14x10	18x8	26x6	
800	14	154				12x12	15x10	20x8	28x6	
900	14	154				14x12	17x10	22x8	32x6	
1000	16	201				15x12	18x10	24x8	34x6	
1100	16	201			14x14	16x12	20x10	26x8	40x6	
1200	16	201			15x14	17x12	22x10	28x8	42x6	
1300	16	201			16x14	18x12	22x10	30x8	46x6	
1400	18	255			16x14	19x12	24x10	32x8	48x6	
1500	18	255			17x14	20x12	26x10	34x8	50x6	
1600	18	255		16x16	18x14	22x12	26x10	36x8	54x6	
1700	18	255		17x16	20x14	22x12	28x10	38x8	58x6	
1800	18	255		18x16	20x14	24x12	30x10	40x8	62x6	
1900	20	314		18x16	22x14	26x12	32x10	44x8	64x6	
2000	20	314		20x16	22x14	26x12	34x10	46x8		
2200	20	314	18x18	20x16	24x16	28x12	36x10	48x8		

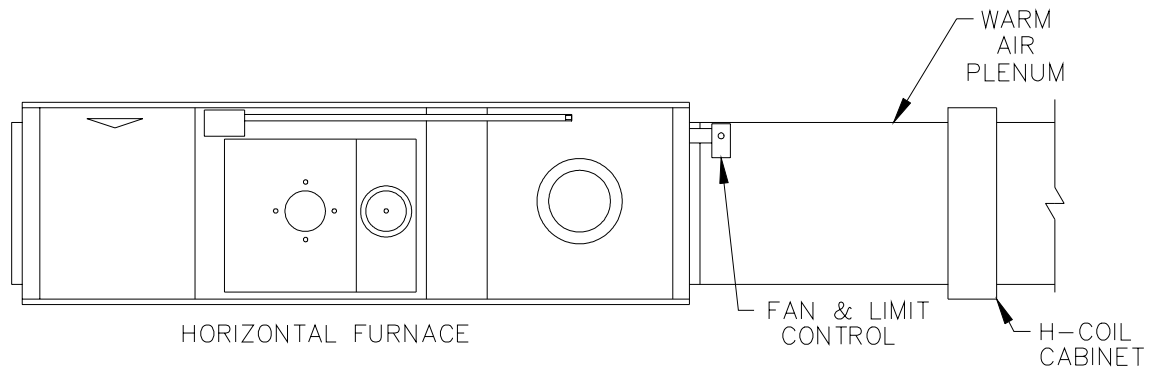
All installations and services must be performed by qualified service personnel.

DUCT WORK/AIR CONDITIONING:

If the furnace is used in connection with summer air conditioning (cooling), the furnace should be installed parallel with or on the upstream side of the evaporator coil to avoid condensation in the furnace heat exchanger. If the cooling unit is installed with a parallel flow arrangement, dampers or other means used to control flow of air should be provided to prevent chilled air from entering the furnace. If such a damper is manually operated, it must be equipped with a means to prevent operation of either unit, unless the damper is in the full heat or cool position.

The duct system should again follow the design standard of Air Conditioning Contractors of America (ACCA) or ASHRAE. (Latest Edition Fundamentals Volume).

A slab coil (HE style) is available for the horizontal air flow application on the PGT5-11-16 furnaces. (See Fig. below).



To obtain proper CFM with air conditioning installed on a belt drive unit, the motor and/or blower pulley may need to be changed. On a direct drive unit the blower motor speed may need to be changed depending upon the size of the air conditioning system installed and the static resistance of the duct system.

NOTE: The horizontal units have direct drive blowers and no pulley or motor change is required. See direct drive motor and blower specifications for air conditioning CFM's at .5 static.

SIZING THE DUCT WORK FOR A COMBINATION HEATING AND COOLING SYSTEM:

Two formulas must be used in determining the CFM requirements of a combustion heating and cooling system.

1. HEATING CFM:

BTU'S OUTPUT OF FURNACE

$$1.1 \times \text{TR (TEMPERATURE RISE)} = \text{HEATING CFM}$$

EXAMPLES:

A. 110,000 BTU OUTPUT

$$1.1 \times 85^{\circ}\text{F TR} = 1176 \text{ CFM FOR HEATING}$$

B. 110,000 BTU OUTPUT

$$1.1 \times 70^{\circ}\text{F TR} = 1429 \text{ CFM FOR HEATING}$$

2. COOLING CFM: 400 CFM X COOLING TONNAGE (12,000 BTU PER TON) = CFM FOR COOLING

EXAMPLES:

All installations and services must be performed by qualified service personnel.

A. 400 CFM X 3 TON (36,000 BTU'S) = 1,200 CFM FOR COOLING

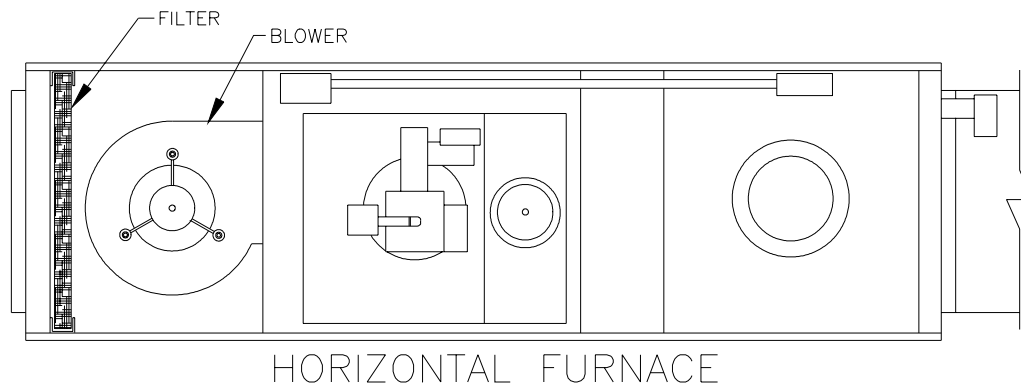
B. 400 CFM X 2.5 TON (30,000 BTU'S) = 1,000 CFM FOR COOLING

NOTE: To obtain the proper 50°F to 80°F temperature rise for heating an air conditioning coil is installed, the speed of the blower motor may have to be changed. This depends on the static resistance of an individual duct system and the size of the air conditioner.

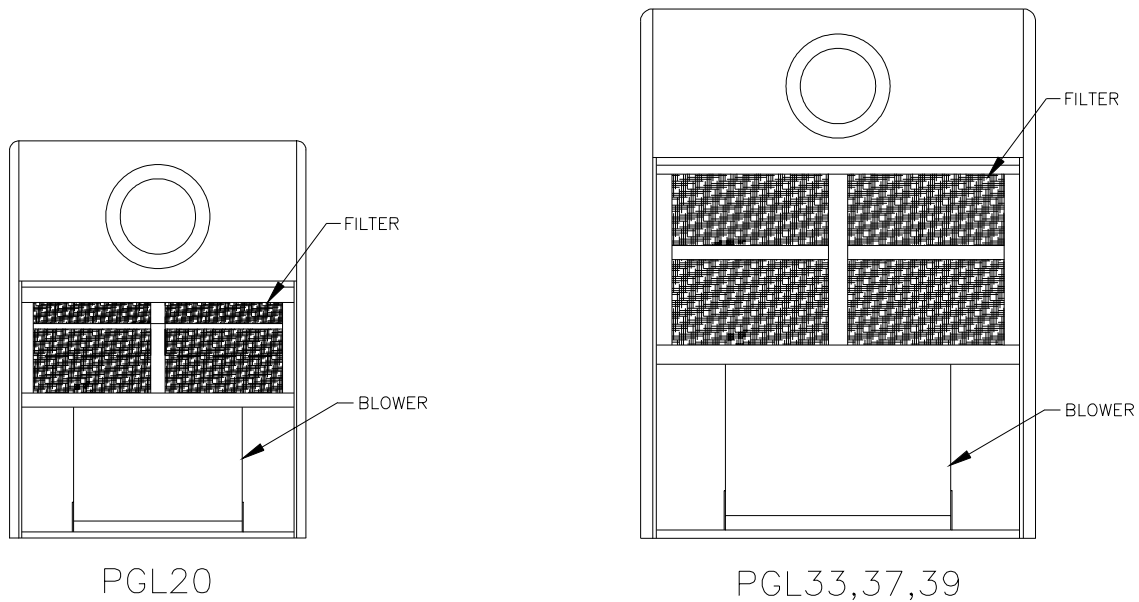
M. FILTERS

To clean a dirty filter, first remove the blower compartment door. Remove dirty filter from the filter rack and clean with a mild soap and water solution. Make sure filter is thoroughly dry before replacing. Put blower compartment door back into place.

A. PGT HORIZONTAL UNITS



B. PGL LOWBOY



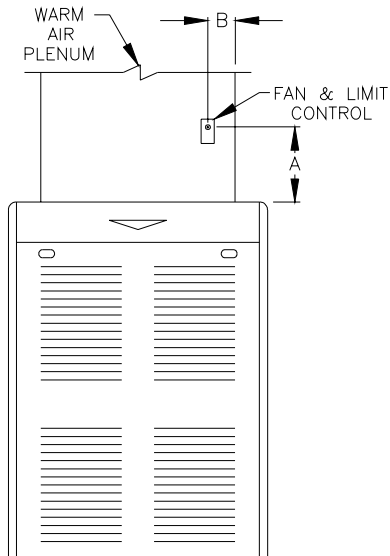
LOWBOY FURNACES

All installations and services must be performed by qualified service personnel.

N. FAN AND LIMIT POSITION AND LOCATION

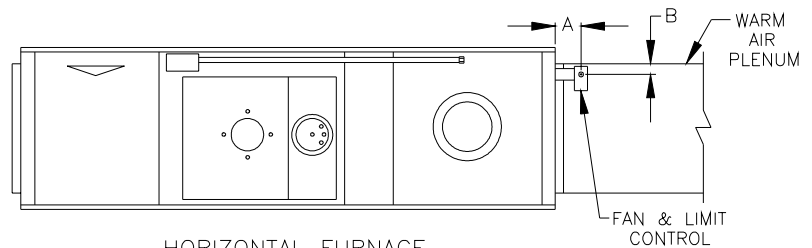
Power gas furnace models PGL5 through PGL20 are shipped with the fan and limit control pre-mounted in the vestibule. Should the installer prefer to mount the fan and limit control in the supply plenum, the installer must supply additional wire comparable to the original wire size and type which must be routed through either rigid, EMT or flexible metal conduit to the mounting location as described below.

LOCATION FOR LOWBOYS & HORIZONTALS WITHOUT AIR CONDITIONING:



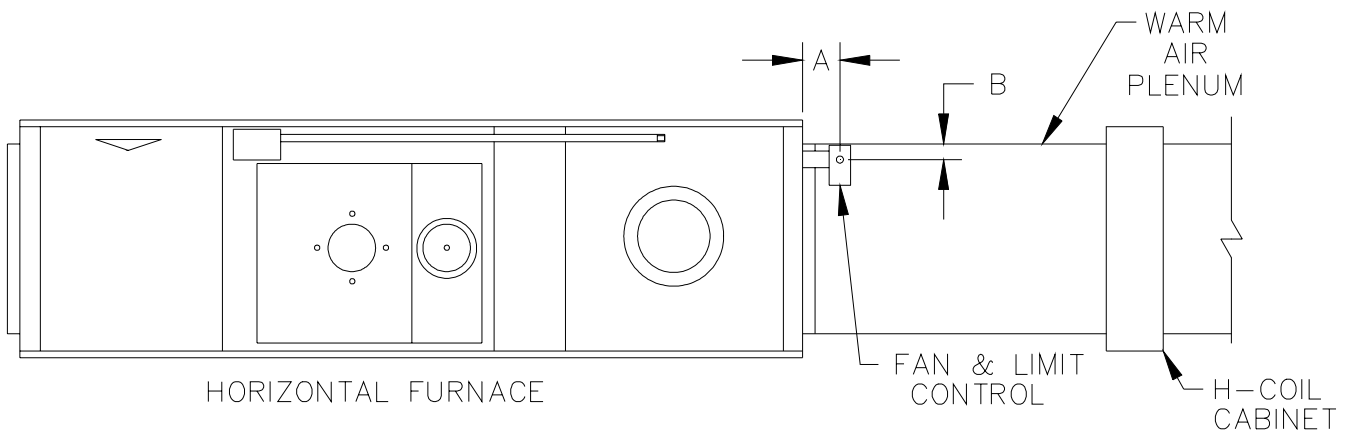
LOWBOY FURNACE

DIM. MODEL	A	B
T5	4-5/16"	4-3/16"
T11-T16	7"	2"
L33	7"	8"
L37	7"	6"
L39	7"	10-3/4"



HORIZONTAL FURNACE

FAN & LIMIT LOCATION FOR HORIZONTALS WITH AIR CONDITIONING:



HORIZONTAL FURNACE

All installations and services must be performed by qualified service personnel.

A. FAN & LIMIT LOCATION WITH H-COIL:

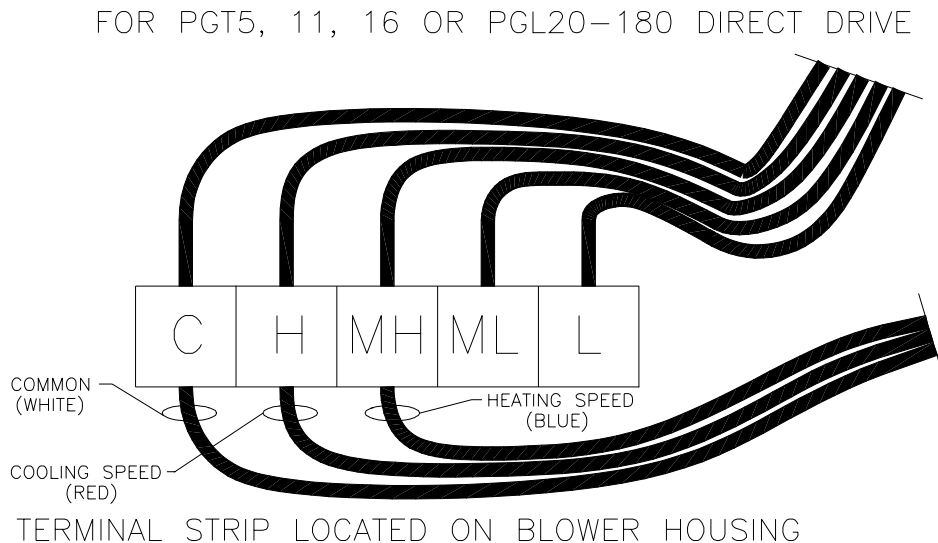
The fan & limit control should be mounted between the H-coil cabinet and furnace. For distances from top of plenum and furnace, see chart above. **IMPORTANT:** Do not mount fan/limit in H-coil cabinet.

O. WIRING

All wiring must conform to the provisions of local codes or in the absence of these codes with the provisions of the National Electrical Code, ANSI/NFPA70 (Latest Edition).

The following items are guidelines to complete the wiring portion of the installations.

1. Install the room thermostat according to instructions provided with thermostat. Set the anticipator to .8 amps.
2. The furnace must be grounded in accordance with local codes and with the National Electrical Code, ANSI/NFPA70 (Latest Edition).



WARNING: TURN OFF THE ELECTRICAL POWER to the furnace before attempting to change blower speed wiring.

WARNING: The power gas burner has its own transformer and no other electrical equipment should be operated from this transformer. If an electric vent damper is used, a separate transformer and relay must be installed. Thermally actuated vent dampers cannot be used with this power burner because the damper must be in the open position before the burner ignites.

For information on the electrical internal workings of the burners itself and the procedure for "initial start-up" and "adjustment" of the power burner, reference power burner manufacturer's instructions.

All wiring must perform to provisions of the National Electrical Code ANSI/NFPA70 (Latest Edition). Wiring between the furnace and devices that are field installed shall conform to temperature limitations for type T wire (35 C rise) and Local Ordinances. If any of the original wire supplied with the unit needs to be replaced, 105°C thermoplastic or its equivalent, must be used. The power supply to the furnace is to be on an individual electrical circuit with properly sized over-current protection.

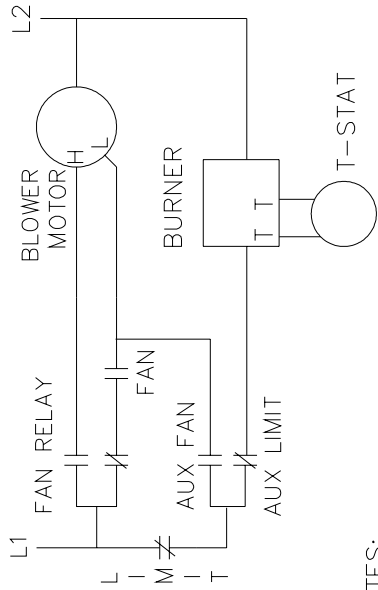
All installations and services must be performed by qualified service personnel.

All electrical wiring must be installed in strict accordance with local ordinances and codes. In the absence of local ordinances and codes, all electrical wiring must be in accordance with the National Electrical Code (ANSI/NFPA 70-LATEST EDITION).

On the following pages are the wiring diagrams for the various Thermo Pride gas furnace models.

P/N WD-231E
ECN 4276-MA

LADDER DIAGRAM



NOTES:

1. FLAME PROVING CONNECTION WIRE-REPLACE WITH 600 V TYPE SFF2 WIRE OR EQUIVALENT.
2. REPLACEMENT WIRE ON OR WITHIN POWER GAS BURNER MUST BE 300 V TYPE AWM OR EQUIVALENT.
3. REPLACEMENT WIRE ON OR WITHIN FURNACE; NOT ON OR WITHIN BURNER, MUST BE TYPE 105°C OR EQUIVALENT.
4. CONNECT HOT TO 1 AND COMMON TO 2.
5. SET HEAT ANTICIPATOR AT 0.8 MILLIAMPS

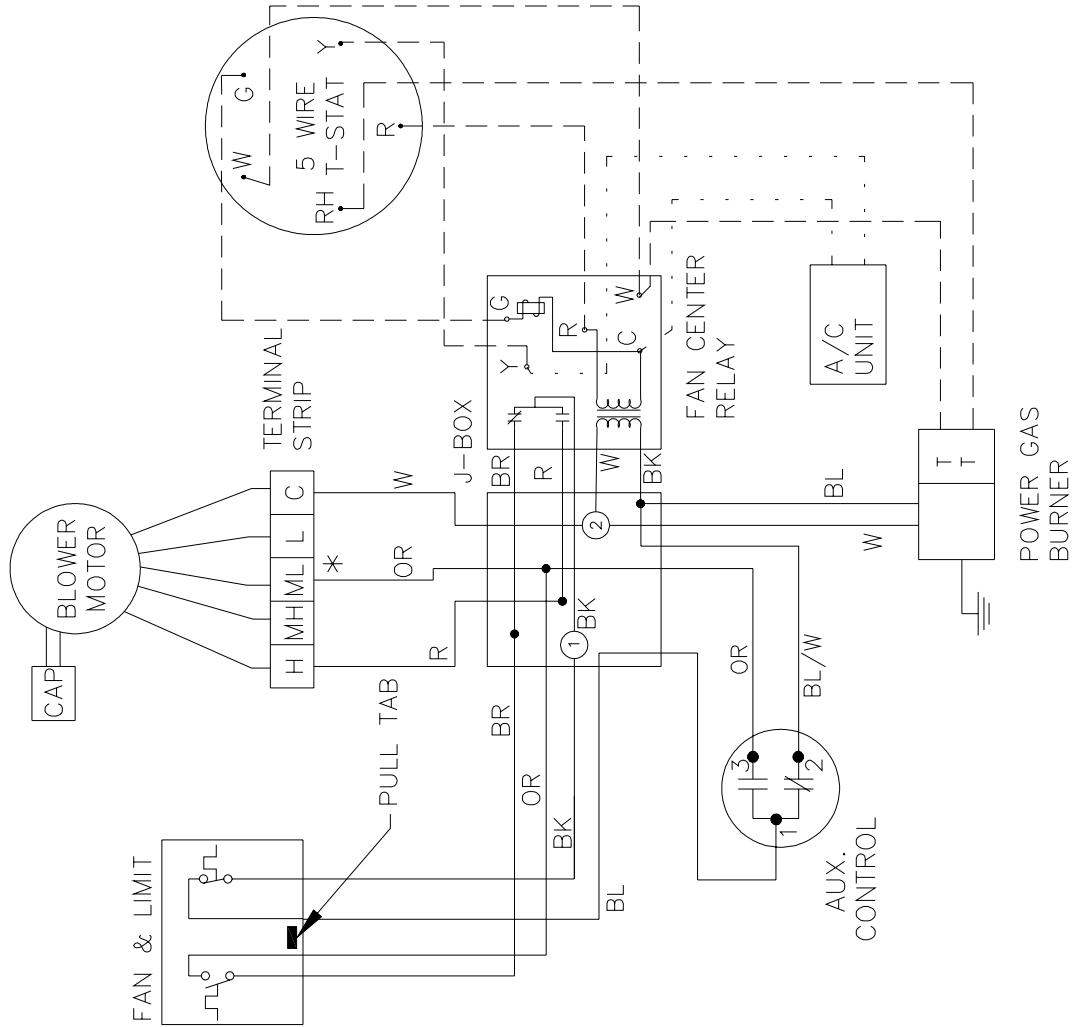
LEGEND

- - - - FIELD WIRING
- FACTORY WIRING
- AIR CONDITIONING WIRING

UNIT	MAX. FUSE	LIMIT SETTINGS	HTG. * SPEED	CLG. SPEED
PGT5	15A	180°F	ML	H
PGT11	15A	200°F	MH	H
PGT16	25A	190°F	ML	H

WIRING DIAGRAM
PGT5,11,16

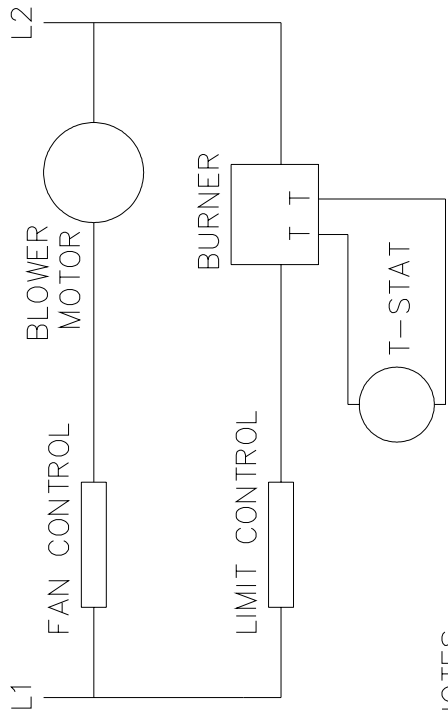
ELECTRICAL SCHEMATIC



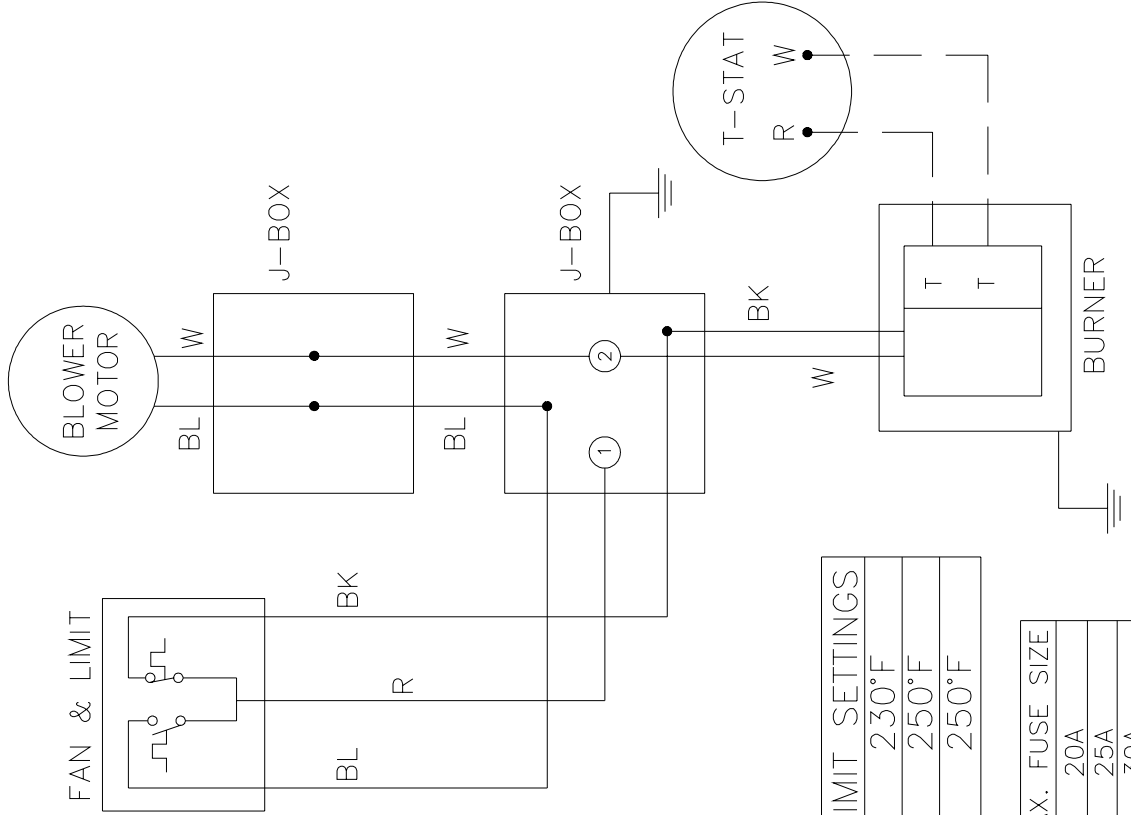
P/N WD-230
ECN 4276-MA

WIRING DIAGRAM PGL33,37,39 POWER GAS

LADDER DIAGRAM



ELECTRICAL SCHEMATIC



NOTES:

1. FLAME PROVING CONNECTION WIRE—REPLACE WITH 600 V TYPE SFF2 WIRE OR EQUIVALENT.
2. REPLACEMENT WIRE ON OR WITHIN POWER GAS BURNER MUST BE 300 V TYPE AWM OR EQUIVALENT.
3. REPLACEMENT WIRE ON OR WITHIN FURNACE NOT ON OR WITHIN BURNER, MUST BE TYPE 105°C OR EQUIVALENT.
4. CONNECT HOT TO 1 AND COMMON TO 2.
5. SET HEAT ANTICIPATOR AT .8 AMPS

UNIT	LIMIT SETTINGS
L33	230°F
L37	250°F
L39	250°F

UNIT	MAX. FUSE SIZE
PGL33	20A
PGL37	25A
PGL39	30A

LEGEND
 - - - - FIELD WIRING
 _____ FACTORY WIRING

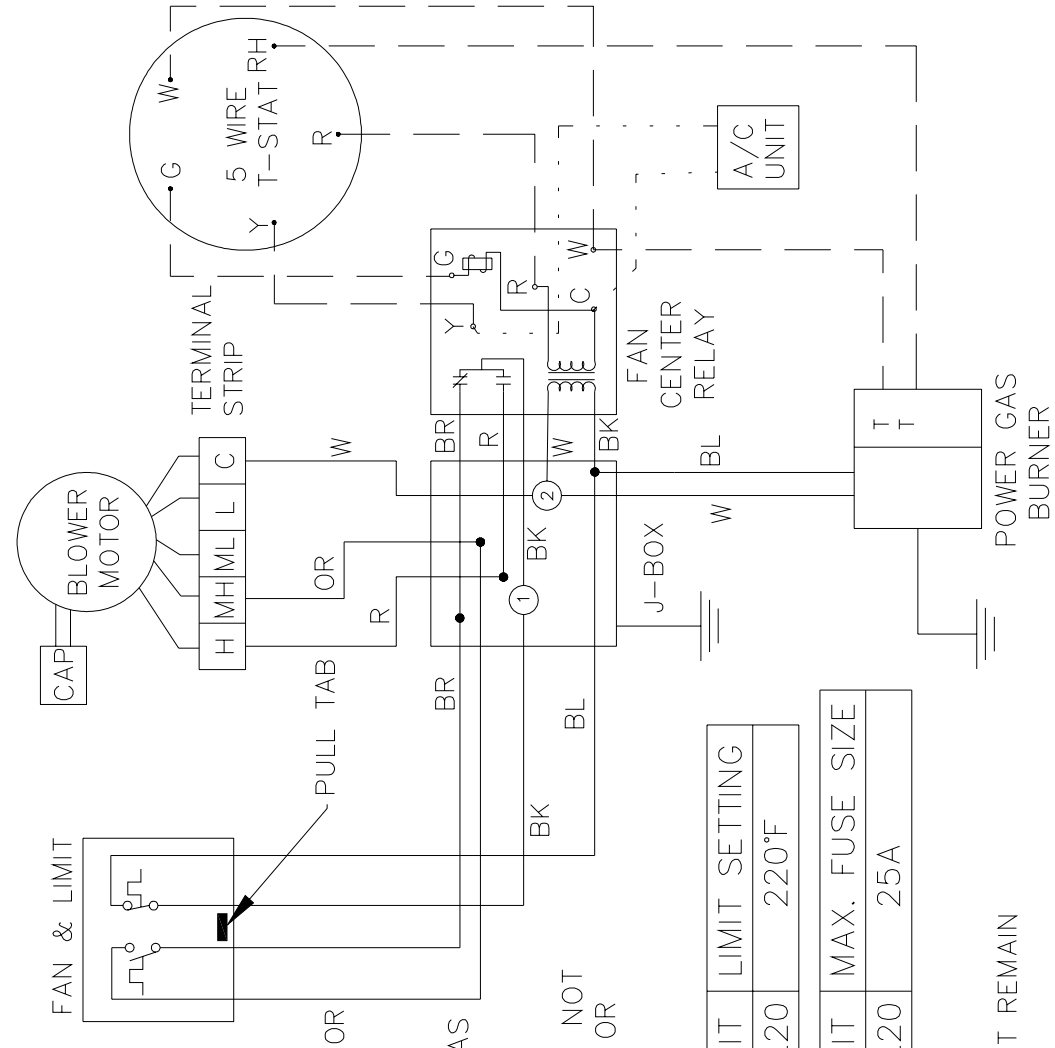
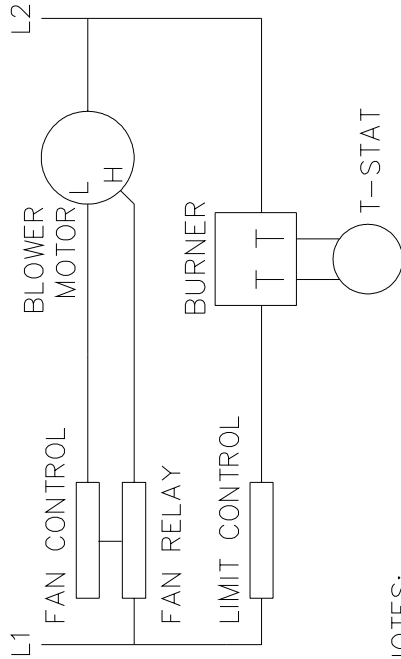
All installations and services must be performed by qualified service personnel.

P/N WD-234
ECN 4276-MA

WIRING DIAGRAM
PGL20
(DIRECT DRIVE)

LADDER DIAGRAM

ELECTRICAL SCHEMATIC



NOTES:

1. REPLACEMENT WIRE ON OR WITHIN POWER GAS BURNER MUST BE 300 V TYPE AWM OR EQUIVALENT.
2. REPLACEMENT WIRE ON OR WITHIN FURNACE: NOT ON OR WITHIN BURNER, MUST BE TYPE 105° OR EQUIVALENT.
3. CONNECT HOT TO 1 AND COMMON TO 2.
4. SET HEAT ANTICIPATOR AT .8 AMPS

UNIT	LIMIT SETTING
PGL20	220°F

UNIT	MAX. FUSE SIZE
PGL20	25A

LEGEND

- - - - FIELD WIRING
- _____ FACTORY WIRING
- AIR CONDITIONING WIRING

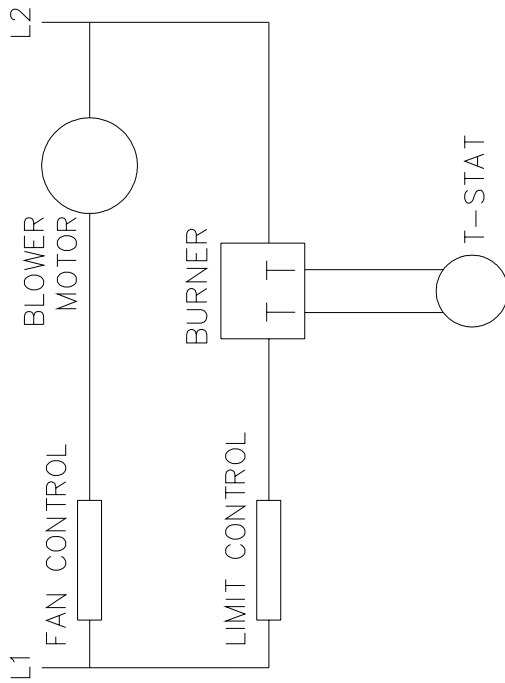
WARNING: DUE TO SHOCK AND FIRE HAZARD, CLASS 2 HEATING AND COOLING CIRCUITS MUST REMAIN SEPARATED.

All installations and services must be performed by qualified service personnel.

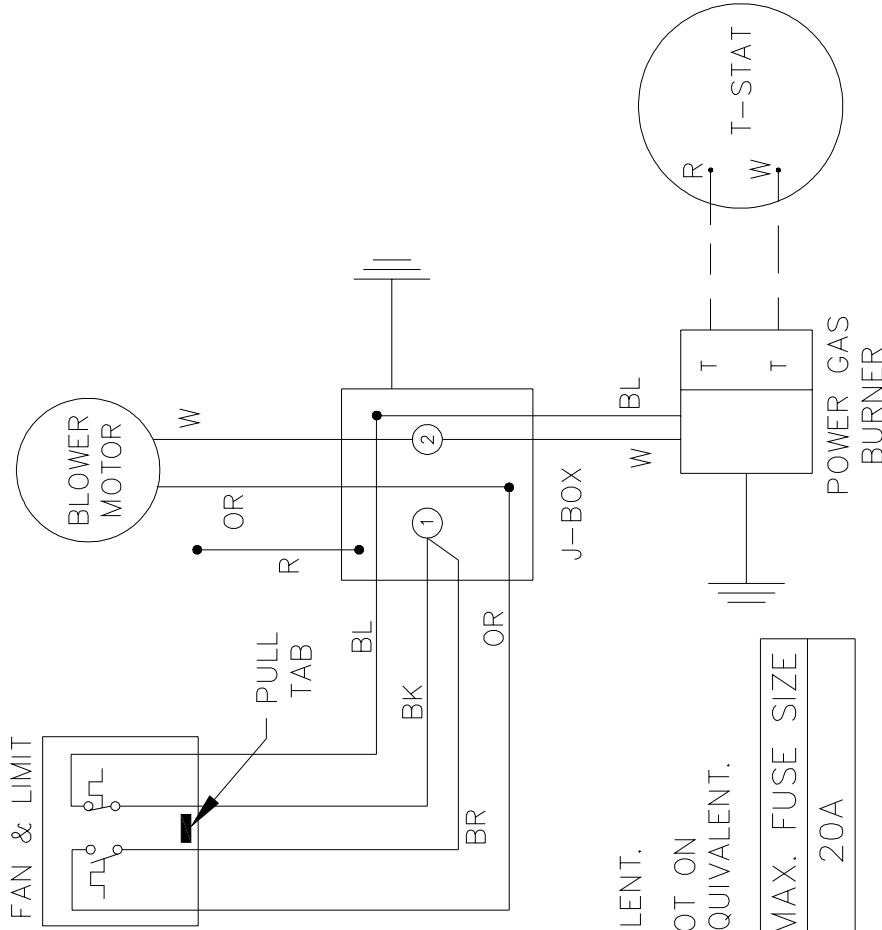
P/N WD-235
ECN 4276-MA

WIRING DIAGRAM
PGL20
(BELT DRIVE)

LADDER DIAGRAM



ELECTRICAL SCHEMATIC



NOTES:

1. REPLACEMENT WIRE ON OR WITHIN POWER GAS BURNER MUST BE 300 V TYPE AWM OR EQUIVALENT.
2. REPLACEMENT WIRE ON OR WITHIN FURNACE: NOT ON OR WITHIN BURNER, MUST BE TYPE 105°C OR EQUIVALENT.

3. CONNECT HOT TO 1 AND COMMON TO 2.
4. SET HEAT ANTICIPATOR AT .8 AMPS

UNIT	MAX. FUSE SIZE
PGL20	20A

UNIT	LIMIT SETTING
PGL20	220°F

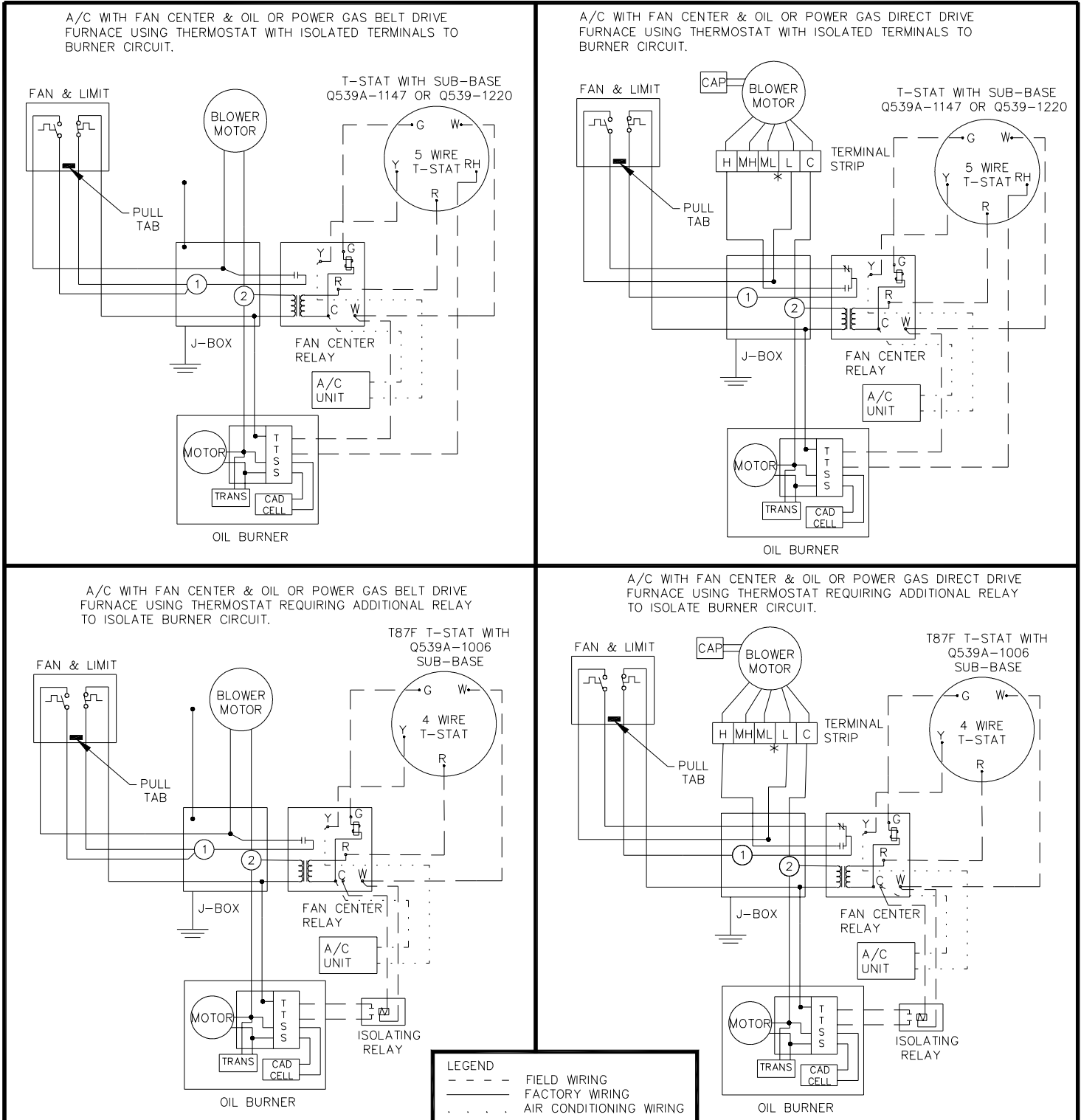
LEGEND
 - - - - - FIELD WIRING
 _____ FACTORY WIRING

All installations and services must be performed by qualified service personnel.

Wiring:

All electrical wiring must be installed in strict accordance with local ordinances and codes. In the absence of local ordinances and codes, all electrical wiring must be in accordance with the National Electrical Code (ANSI/NFPA 70-LATEST EDITION).

Below and on the following pages are the wiring diagrams for the various Thermo Pride gas furnace models.



All installations and services must be performed by qualified service personnel.

II. STARTING THE UNIT

A. INITIAL START UP:

1. Check all wiring for loose connections and proper hook up.
2. Leak test gas piping connections.
3. Check tubing to the pressure switch to make sure it is pushed firmly onto the pressure tap.
4. Check flue pipe, chimney, and all connections for tightness and to make sure there is no blockage.
5. Make sure air filters are in place.

OPERATING INSTRUCTIONS:

WARNING: For initial start-up of the furnace after installation, it may be necessary to purge the air out of the gas line. This should be done by qualified service personnel. If excessive gas escapes when purging the supply at the union, allow the area to ventilate for at least 15 minutes before starting the furnace. LP gas is especially hazardous because the specific gravity of LP gas allows it to accumulate at floor level at a hazardous concentration.

WARNING: Heat exchanger paint will burn off on initial firing creating an odor. To prevent this odor from occurring more than once, it is suggested that:

1. A window(s) be opened.
2. The thermostat set at highest setting.
3. The furnace remains running at conditions 1 & 2 for 30 minutes or until the odor has dissipated.

B. BURNER COMBUSTION:

Obtain the following recommended values when setting the burner combustion:

CO₂ NATURAL GAS - MIN. 8.5%, MAX. 10.5% WITH NO MORE THAN 50 *PPM OF CO.

CO₂ LPG - MIN. 10.5% MAX. 12.0% WITH NO MORE THAN 50 *PPM OF CO.

CO ALL GASES - ZERO TO A MAX. 50 *PPM.

After final adjustments are made, lock settings to prevent tampering.

*PPM = PARTS PER MILLION

50 PPM = .005% = 1/200 OF 1%

NOTICE: See burner manufacturer instructions for troubleshooting.

C. ADJUSTMENT OF BTU INPUT RATE:

The orifice for this furnace was sized: 1. For natural gas having a heating value of 1025 BTU per cubic foot and a specific gravity of .60 or 2. For liquified propane gas with a heating value of 2500 BTU per cubic foot and a specific gravity of 1.53. The information plate inside the furnace vestibule will specify which gas your furnace is orificed for. If the furnace is installed at an altitude that is more than 2,000 feet above sea level, it is mandatory that the input to the burner be reduced 4.0% for every 1,000 feet that it is above sea level. If the furnace is installed at an elevation of 5,000 feet, its input must be reduced 20.0%. Example: a furnace rated at 100,000 BTU at sea level must be reduced to a firing rate of 80,000 (100,000 x .80 = 80,000) at an elevation of 5,000 feet. If the furnace is installed at an

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elevation of 2,000 feet or less, no reduction in input is required. Your gas supplier will supply you with the correct BTU and orifice sizing information.

To check the input of your natural gas furnace, proceed as follows:

- a. Call your gas supplier and ask for the BTU content (heating value) of one cubic foot of the gas, supplied to the installation area. An alternate approach is to assume a value of 1025 BTU/Cu Ft that is the national average.
- b. With all other gas appliances turned off, allow the unit to operate for 10 to 15 minutes. Using a stopwatch, clock the time required for the (small) dial on the gas meter to make one full revolution. The meter will state how many cubic feet are flowing for each revolution usually one, two or five. The unit must have been in operation at least 10 minutes before clocking.

FORMULA:
$$\frac{\text{BTU/Cu Ft} \times \text{Number of Cu Ft} \times 3600 \text{ Seconds}}{\text{Seconds for one revolution}} = \text{Input BTU/hr}$$

EXAMPLE:
$$\frac{1025 \text{ BTU/Cu Ft} \times 2 \text{ Cu Ft} \times 3600}{74.8 \text{ Seconds}} = 98.663 \text{ BTU Input}$$

Check for the model number of this furnace, its input, the type of gas and the manifold pressure on the information plate located on the vestibule panel behind the upper front panel. If using the above example, the furnace was a PGT5-100 model the 98,663 BTU input would be acceptable because it was within 2% of the listed input of 100,000.

- c. Make sure that the gas supply pressure to the furnace falls within the maximum range of 5-1/2" to 14" WC pressure on natural gas and 11.0" to 14.0" WC on LP gases. The pressure to the furnace must be checked while the furnace burner and any other gas appliances on the same supply system are operating, using the test procedure outlined in Section H of this manual.

This gas furnace is equipped with a fixed orifice sized for the manifold pressure shown in the burner manual. The input can be increased or decreased by adjusting the manifold pressure. Remove the 1/8" threaded pipe plug located on the bottom right side of the gas valve. Use a U tube manometer or pressure gage to measure the pressure. To adjust the pressure, remove the cap from the regulator on the top of the gas valve and using the adjustment screw, decrease the pressure by turning the screw counterclockwise or increase it by turning the screw clockwise. **ADJUSTMENTS TO THE LISTED PRESSURE MUST NOT EXCEED** the recommended maximum manifold pressures in the burner manual.

If a gas meter is not available for natural gas, or the unit is installed on liquified petroleum gases which are not metered, the correct input can be assumed if the furnace manifold pressure is the same as that shown on the information label and the orifices are sized correctly.

Shut off the gas supply to the furnace. Remove the pressure gage and re-install the pipe plug using a thread compound resistant to the action of LP gases.

If the rated input cannot be obtained with the present orifice at the correct pressure, your local gas supplier will assist in sizing the proper orifice. Our Engineering Department will gladly assist in sizing the orifice if you provide them with the heating value in BTU per cubic foot and the specific gravity of the gas.

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ORIFICE CHART

FURNACE MODEL NO.	L.P.	NAT.
PGT5-100	.113 OR #33 DMS	.196 OR #9 DMS
PGT11-125	.1285 OR #30 DMS	.213 OR #3 DMS
PGT16-160	.144 OR #44 DMS	.238 OR B DMS
PGL20-180	.213 OR #3 DMS	.277 OR J DMS
PGL33-250	.265 OR 17/64 DMS	.332 OR Q DMS
PGL37-312	.297 OR 19/64 DMS	.390 OR 25/64 DMS
PGL39-400	.332 OR Q DMS	.468 OR 15/32 DMS

D. FURNACE CHECKOUT PROCEDURE

Before any system of gas piping is finally put into service, it shall be carefully tested to assure that it is gas tight as indicated in Gas Piping Section of Burner Manual.

NOTICE: All controls on the unit should be checked for proper functioning prior to the qualified service personnel leaving the job site. Specifically the following should be checked:

With furnace in normal heating operation, check to make certain blower will start and stop automatically under control of fan switch.

a. Check safety limit control as follows:

1. Shut off incoming power.
2. Block return air opening or remove blower belt on belt drive or unplug blower at terminal strip on direct drive.
3. Restore power to furnace.
4. Set thermostat above room temperature calling for heat.
5. When temperatures are reached in furnace at limit control setting with blower out of operation, burner should be shut off.
6. Shut off electrical power, remove blockage and restore power.

b. Make certain thermostat will automatically start and stop the burner and fan control operates blower properly.

IV. INSTALLER'S INSTRUCTIONS TO USER:

After completing the installation, the installer shall inform and demonstrate to the homeowner: 1. The Sequence of Operations. 2. Operating Instructions and Routine Maintenance. 3. Review label reproductions at beginning of this manual.

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V. DEALER MAINTENANCE

A. ELECTRICAL:

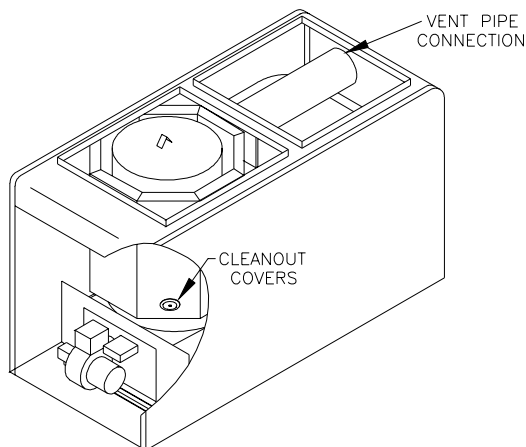
1. Check all wiring for loose connections.
2. Check for correct voltage at the furnace when operating.
3. Check amp-draw on blower motor and burner to assure they are not exceeding name plate amp rating.

B. CLEANING HEAT EXCHANGER:

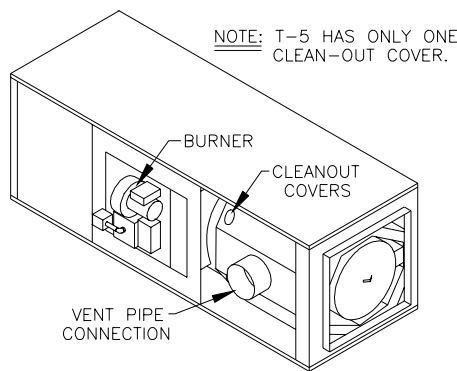
WARNING: THE HEAT EXCHANGER MUST BE CLEANED BY A QUALIFIED SERVICE TECHNICIAN.

It is important to inspect and clean the heat exchanger once a year or as necessary to remove any build-up of soot. A layer of soot on the inside of the heat exchanger will act as an insulator and reduce heat transfer, resulting in less efficiency. If heavy soot deposits were found in the heat exchanger, this indicates that the burner may be out of adjustment. Reset the burner as indicated under the "BURNER COMBUSTION" section.

To clean the heat exchanger, first turn off all power to the unit. Next, remove the access panel (see below and following page) immediately above the burner (on the horizontal furnace, it will be located to the side of the burner) to gain entry to the cleanout covers. **(Please notice: This panel is identified with a label.)** Remove cleanout covers, the vent connector pipe to the chimney, the burner, and the burner mounting plates. When removing the cleanout covers, special care must be taken not to damage the gaskets. Should the gaskets separate, crack, break, or otherwise not be able to provide the necessary seal, the gasket must be replaced before reattaching the cleanout covers.



LOWBOY FURNACE

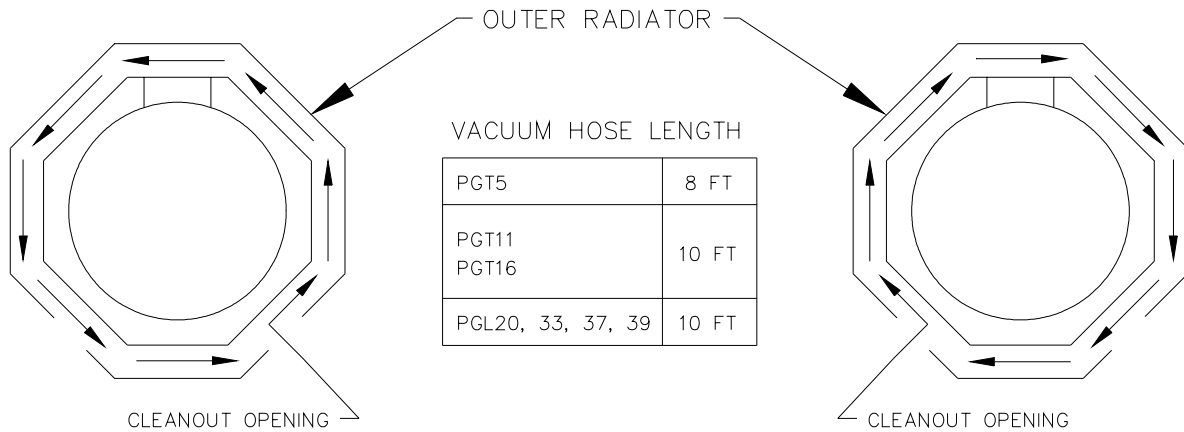


HORIZONTAL FURNACE

With access to the inside of the heat exchanger through the burner area, cleanout openings, and vent pipe connection, it is now possible to use a long, flexible wire brush and an industrial type vacuum cleaner to remove any soot build-up. **NOTE:** A one inch (outside diameter) vacuum cleaner hose will fit into the outer radiator.

To vacuum and brush the outer radiator of the heat exchanger, go through the cleanout openings in both directions, as shown below.

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Reassemble the furnace to its original construction. Remount the burner being certain that the air tube is properly inserted into the chamber opening (see Burner Installation section).

VI. TROUBLESHOOTING

For troubleshooting the power gas burner, reference the burner manufactures instructions.

If the burner is producing an excessive combustion sound level, perform the following procedures:

1. Re-check the position of the burner tube to assure that the end of the tube is 1/4 inch in from the inside surface of the combustion chamber. Also, make sure the burner is firing squarely into the center of the combustion chamber.
2. Verify the correct burner air setting using instrumentation (see initial start up section). If the air setting on the burner is excessive, this will cause the combustion sound level to be louder than normal.
3. Move the draft control as close to the chimney as possible. Also, face the draft control towards the open area of the room.
4. Alter manifold pressure of the burner, but stay within normal operating pressures as specified by burner manufactures instructions.
5. Derate the input of the burner 10% from normal furnace input rate.
6. If the combustion sound is resonating through a particular portion of the ductwork, insulating the ductwork or using flex duct should isolate that portion of the ductwork.

If the furnace air blower will not come on or cycles abnormally, check the following:

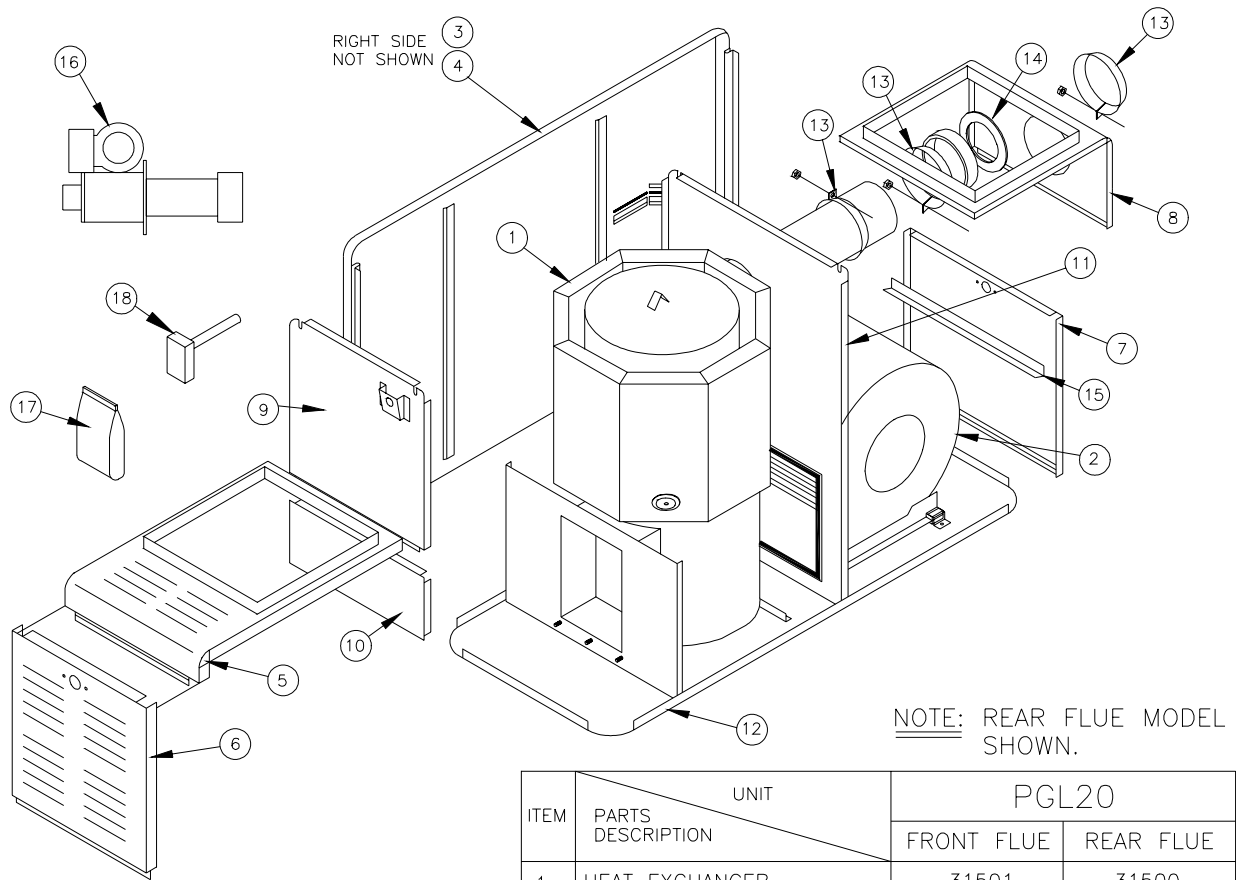
1. If the blower motor is receiving 115 V, it has cutout on thermal overload or is defective. A belt that is very tight may cause the blower motor to cut out on thermal overload on a belt drive blower. An incorrect or faulty capacitor may prevent a direct drive blower motor from operating.
2. If the blower motor is not receiving 115 V, check the power source to the furnace, as well as all wire connections in the vestibule junction box. Check wire connections at the fan and limit and the fan temperature settings. Also, check the fan and limit for response to temperature.

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ITEM #	UNIT PART DESCRIPTION		PGT5		PGT11		PGT16	
			FRONT FLUE	REAR FLUE	FRONT FLUE	REAR FLUE	FRONT FLUE	REAR FLUE
1	DRAW COLLAR		14131	14131	14131	14131	14132	14132
2	FRONT TOP PANEL		20495	20497	20504	20506	20513	20515
3	FRONT REMOVABLE PANEL		20493	20493	20502	20502	20511	20511
4	FRONT CENTER PANEL		10492	10492	10501	10501	10510	10510
5	BLOWER ACCESS DOOR		20491	20491	20500	20500	20509	20509
6	FLUE GASKET		330005	330005	330005	330005	330006	330006
7	FAN/LIMIT MTG. HINGE		24146	24146	24136	24136	24136	24136
8	END CAPS (INTAKE & EXHAUST)		20490	20490	20499	20499	20508	20508
9	SIDE CASINGS (RIGHT & LEFT)		20030	20030	20049	20049	20032	20032
10	HEAT EXCHANGER ASSEMBLY		31587	31588	31598	31599	31601	31602
11	BLOWER PAN		21082	21082	21083	21083	21084	21084
12	BLOWER ASSEMBLY		S00S4008	S00S4008	S00S4012A	S00S4012A	S00S4017	S00S4017
13	POWER GAS BURNER	L.P.	AOPS8367	AOPS8367	AOPS8369	AOPS8369	AOPS8371	AOPS8371
		NAT.	AOPS8366	AOPS8366	AOPS8368	AOPS8368	AOPS8370	AOPS8370
14	FILTER		370023	370023	370035	370035	370035	370035
15	REAR TOP PANEL		20496	20498	20505	20507	20514	20516
16	REAR BOTTOM PANEL		10494	10494	10503	10503	10512	10512
17	BOTTOM MTG. PLATE		25737	25737	25737	25737	25737	25737
18	BOTTOM MTG. PLATE GASKET		330056	330056	330056	330056	330056	330056
19	TOP MTG. PLATE GASKET		330055	330055	330055	330055	330055	330055
20	TOP MTG. PLATE		25716	25716	25716	25716	25716	25716
21	NOT SHOWN FILTER RACK (H16 ONLY)		*	*	*	*	*	*
22	NOT SHOWN BASE (H16 ONLY)		*	*	*	*	*	*
23	FAN & LIMIT CONTROL		350124	350124	350124	350124	350124	350124
24	AUX CONTROL		350163	350163	350163	350163	350163	350163

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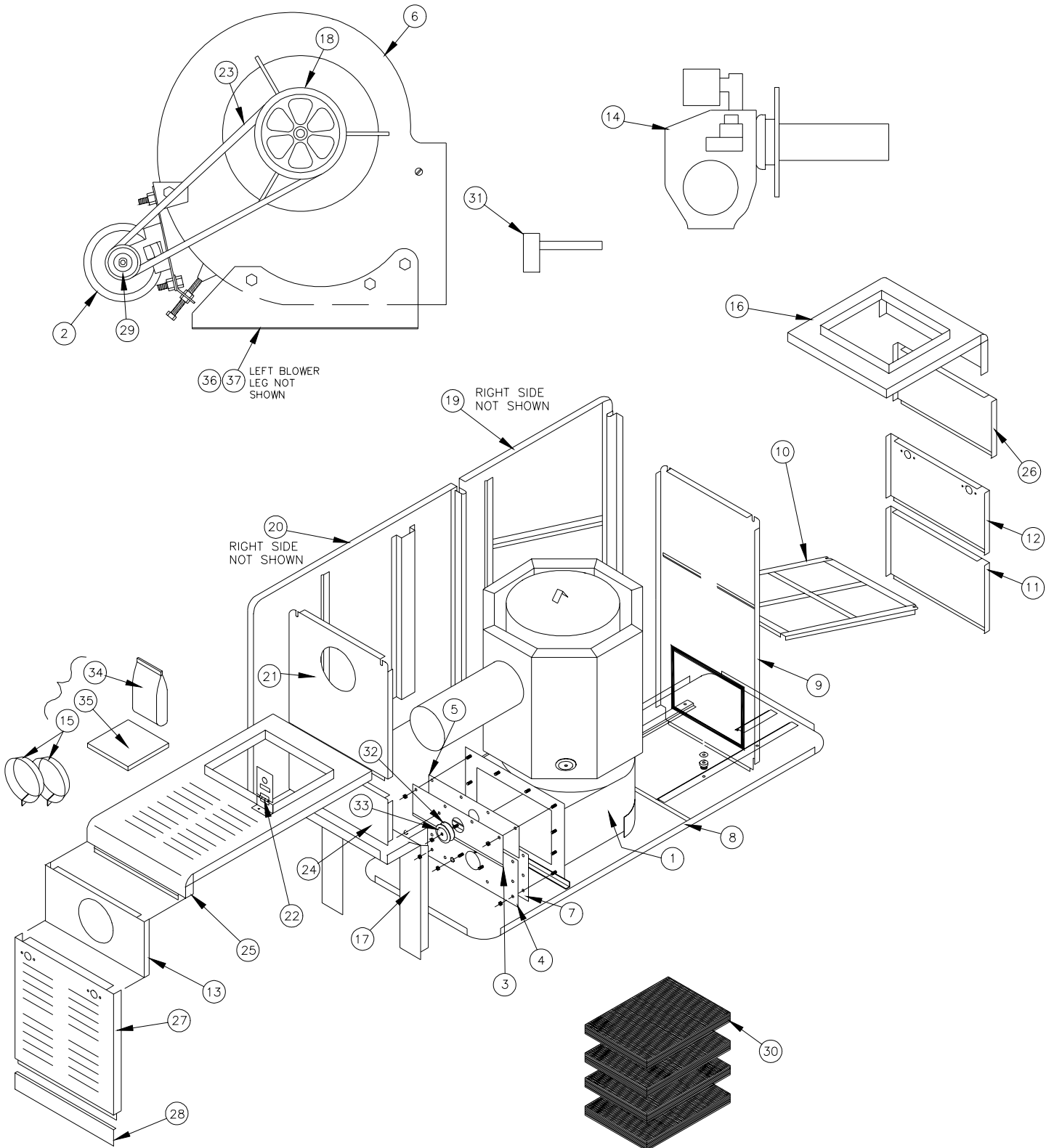
PGL20 REPLACEMENT PARTS LIST



ITEM	UNIT PARTS DESCRIPTION		PGL20	
			FRONT FLUE	REAR FLUE
1	HEAT EXCHANGER		31501	31500
2	BLOWER ASS'Y	BELT	S00S4019	S00S4019
		DIRECT	S00S4044	S00S4044
3	SIDE CASING (LEFT)		20010	20010
4	SIDE CASING (RIGHT)		20011	20011
5	TOP FRONT SECTION		20421	20423
6	FRONT DOOR		20425	20425
7	BLOWER ACCESS DOOR		20426	20426
8	TOP REAR SECTION		20422	20424
9	FRONT TOP SECTION		21041	21044
10	FRONT CENTER SEPARATOR		21054	21054
11	REAR SEPARATOR	BELT	21050	21051
		DIRECT	21049	21052
12	BASE	BELT	20465	20465
		DIRECT	20466	20466
13	DRAW COLLAR		—	14132
14	DRAW COLLAR GASKET		—	330006
15	REAR FILTER SUPPORT		14726	14726
16	MIDCO RE32 BURNER	NAT.	PG-180N	PG-180N
		L.P.	PG-180P	PG-180P
17	DOOR HANDLE PACKAGE		320152	320152
18	FAN & LIMIT CONTROL		350124	350124

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PGL33, 37, & 39 REPLACEMENT PARTS LIST
(FRONT FLUE SHOWN)



All installations and services must be performed by qualified service personnel.

ITEM #	PART DESCRIPTION	UNIT	PGL33		PGL37		PGL39	
			FRONT FLUE	REAR FLUE	FRONT FLUE	REAR FLUE	FRONT FLUE	REAR FLUE
1	HEAT EXCHANGER ASSEMBLY		31517	31516	31558	31560	31558	31560
2	BLOWER MOTOR		350302	350302	350305	350305	350306	350306
3	TOP BURNER MTG. PLATE		25726	25726	25732	25732	25732	25732
4	BOTTOM BURNER MTG. PLATE		25727	25727	25733	25733	25733	25733
5	TOP BURNER MTG. PLATE GASKET		330091	330091	330093	330093	330093	330093
6	BLOWER		340010	340010	340011	340011	340011	340011
7	BOTTOM BURNER MTG. PLATE GASKET		330092	330092	330094	330094	330094	330094
8	BASE		30457	30457	30458	30458	30458	30458
9	REAR SEPARATOR		21058	21061	21067	21070	21067	21070
10	FILTER RACK ASSEMBLY		24732	24732	24739	24739	24739	24739
11	REAR BOTTOM PANEL		20436	20436	20442	20442	20442	20442
12	BLOWER ACCESS DOOR		20432	20432	20444	20444	20444	20444
13	TOP FRONT PANEL		10437	10438	10445	10446	10445	10446
14	POWER GAS BURNER		380682	380682	380682	380682	380682	380682
15	DRAW COLLAR		24135	24135	24135	24135	24135	24135
16	TOP REAR SECTION		20433	20433	20440	20440	20440	20440
17	FRONT BOTTOM SEPARATOR		21055	21055	21064	21064	21064	21064
18	BLOWER PULLY		340209	340209	340209	340209	340208	340208
19	SIDE CASING REAR	LEFT	20014	20014	20053	20053	20053	20053
		RIGHT	20015	20015	20054	20054	20054	20054
20	SIDE CASING FRONT	LEFT	20012	20012	20051	20051	20051	20051
		RIGHT	20013	20013	20052	20052	20052	20052
21	FRONT TOP SEPARATOR		21056	21056	21065	21068	21065	21068
22	FAN & LIMIT BRACKET		24136	24136	24136	24136	24136	24136
23	BELT		340112	340112	340114	340114	340115	340115
24	FRONT CENTER SEPARATOR		21057	21057	21066	21066	21066	21066
25	TOP FRONT SECTION		20434	20434	20439	20439	20439	20439
26	TOP PANEL REAR		10438	10437	10446	10445	10446	10445
27	FRONT DOOR		20431	20431	20443	20443	20443	20443
28	FRONT BOTTOM PANEL		20435	20435	20441	20441	20441	20441
29	MOTOR PULLY		340201	340201	340202	340202	340202	340202
30	FILTER		370013	370013	370012	370012	370012	370012
31	FAN & LIMIT		350124	350124	350124	350124	350124	350124
32	CLEANOUT COVER GASKET		330009	330009	330009	330009	330009	330009
33	CLEANOUT COVER		15796	15796	15796	15796	15796	15796
34	PARTS PACKAGE		AOPS7567	AOPS7566	AOPS7567	AOPS7566	AOPS7567	AOPS7566
35	GASKET PACKAGE		AOPS7569	AOPS7568	AOPS7565	AOPS7564	AOPS7565	AOPS7564
36	LEFT BLOWER LEG		340022B	340022B	340022B	340022B	340022B	340022B
37	RIGHT BLOWER LEG		340022A	340022A	340022A	340022A	340022A	340022A

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